GPLUS EDUCATION

Date :
Time : **PHYSICS**
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UNITS AND MEASUREMENTS

Single Correct Answer Type

1. The velocity of water waves v may depend upon their wavelength λ, the density of water ρ and the acceleration due to gravity g. The method of dimensions gives the relation between these quantities as
   a) $v^2 \propto \lambda g^{-1}\rho^{-1}$ b) $v^2 \propto g\lambda\rho$ c) $v^2 \propto g\lambda$ d) $v^2 \propto g^{-1}\lambda^{-3}$
2. In a vernier callipers, one main scale division is $x\ cm$ and n division of the vernier scale coincide with $(n-1)$ divisions of the main scale. The least count (in cm) of the callipers is
   a) $\left(\frac{n-1}{n}\right)x$ b) $\frac{nx}{(n-1)}$ c) $\frac{x}{n}$ d) $\frac{x}{(n-1)}$
3. The work done by a battery is $W = \varepsilon\Delta q$, where Δq change transferred by battery, ε =emf of the battery. What are dimensions of emf of battery?
   a) $[M^0L^0T^{-2}A^{-2}]$ b) $[ML^2T^{-3}A^{-2}]$ c) $[M^2L^0T^{-3}A^0]$ d) $[ML^2T^{-3}A^{-1}]$
4. The dimensions of universal gravitational constant are
   a) $M^{-2}L^2T^{-2}$ b) $M^{-1}L^3T^{-2}$ c) $ML^{-1}T^{-2}$ d) ML^2T^{-2}
5. The dimension of $\frac{1}{\sqrt{\varepsilon_0\mu_0}}$ is that of
   a) Velocity b) Time c) Capacitance d) Distance
6. $[ML^2T^{-3}]$ is the dimension of
   a) Work b) Power c) Force d) Momentum
7. Crane is British unit of volume (one crane = 170.4742). convert crane into SI units.
   a) 0.170474 m^3 b) 17.0474m^3 c) 0.00170474m^3 d) 1704.74m^3
8. What are the units of $K = 1/4\pi\varepsilon_0$
   a) $C^2N^{-1}m^{-2}$ b) Nm^2C^{-2} c) Nm^2C^2 d) Unitless
9. If the speed of light (c), acceleration due to gravity (g) and pressure (p) are taken as the fundamental quantities, then the dimension of gravitational constant is
   a) $c^2g^0p^{-2}$ b) $c^0g^2p^{-1}$ c) cg^3p^{-2} d) $c^{-1}g^0p^{-1}$
10. The unit of reduction factor of tangent galvanometer is
    a) $Ampere$ b) $Gauss$ c) $Radian$ d) None of these
11. The constant of proportionality $\frac{1}{4\pi\varepsilon_0}$ in Coulomb's law has the following dimensions
    a) $C^{-2}Nm^2$ b) $C^2N^{-1}m^{-2}$ c) C^2Nm^2 d) $C^{-2}N^{-1}m^{-2}$
12. A resistor of 4 kΩ with tolerance 10% is connected in parallel with a resistor of 6 kW with tolerance 100%. The tolerance of the parallel combination is nearly
    a) 10% b) 20% c) 30% d) 40%
13. An object is moving through the liquid. The viscous damping force acting on it is proportional to the velocity. Then dimension of constant of proportionality is
    a) $ML^{-1}T^{-1}$ b) MLT^{-1} c) M^0LT^{-1} d) ML^0T^{-1}
14. If $v = \frac{A}{t} + Bt^2 + Ct^3$ where v is velocity, t is time and A, B and C are constants, then the dimensional formula of B is
    a) $[M^0LT^0]$ b) $[ML^0T^0]$ c) $[M^0L^0T\,]$ d) $[M^0LT^{-3}]$
15. The specific resistance ρ of a circular wire of radius r. Resistance R and and length l is given by $\rho = \frac{\pi r^2 R}{l}$. Given, $r = 0$: (24 ± 0.02)cm, $R = (30 \pm 1)\Omega$ and $l = (4.80 \pm 0.01)$cm. The percentage error in ρ is nearly
    a) 7% b) 9% c) 13% d) 20%

16. The fundamental physical quantities that have same dimensions in the dimensional formulae of torque and angular momentum are
    a) Mass, time b) Time, length c) Mass, length d) Time, mole
17. In an experiment, to measure the height of a bridge by dropping stone into water underneath, if the error in measurement of time is $0.1s$ at the end of $2s$, then the error in estimation of height of bridge will be
    a) 0.49 m b) 0.98 m c) 1.96 m d) 2.12 m
18. The radius of the proton is about 10^{-15}m. The radius of the observable universe is 10^{26}m. identify the distance which is half-way between these two extremes on a logarithmic scale.
    a) 10^{21}m b) 10^{6}m c) 10^{-6}m d) 10^{0}m
19. Which of the following pairs is wrong
    a) Pressure-Barometer b) Relative density-Pyrometer
    c) Temperature-Thermometer d) Earthquake-Seismograph
20. The temperature of a body on Kelvin scale is found to be X K. When it is measured by a Fahrenheit thermometer, it is found to be X^0F. Then X is
    a) 301.25 b) 574.25 c) 313 d) 40
21. A plate has a length (5 ± 0.1) cm and breadth (2 ± 0.01) cm. Then the area of the plate is
    a) (10 ± 0.2) cm^2 b) (10 ± 0.01) cm^2 c) (10 ± 0.001) cm^2 d) (10 ± 1) cm^2
22. One yard in SI units is equal
    a) 1.9144 *metre* b) 0.9144 *metre* c) 0.09144 *kilometre* d) 1.0936 *kilometre*
23. The dimensional formula for Boltzmann's constant is
    a) $[ML^2T^{-2}\theta^{-1}]$ b) $[ML^2T^{-2}]$ c) $[ML^0T^{-2}\theta^{-1}]$ d) $[ML^{-2}T^{-1}\theta^{-1}]$
24. $Erg - m^{-1}$ can be the unit of measure for
    a) Force b) Momentum c) Power d) Acceleration
25. Which physical quantities have the same dimension
    a) Couple of force and work b) Force and power
    c) Latent heat and specific heat d) Work and power
26. The frequency of vibration f of a mass m suspended from a spring of spring constant k is given by relation of the type $f = cm^xk^y$, where c is a dimensionless constant. The values of x and y are
    a) $1/2, 1/2$ b) $-1/2, -1/2$ c) $1/2, -1/2$ d) $-1/2, 1/2$
27. What is the unit of k in the relation $U = \frac{ky}{y^2+a^2}$ where U represents the potential energy, y represents the displacement and a represents the maximum displacement *ie*, amplitude?
    a) m s^{-1} b) m s c) J m d) J s^{-1}
28. The pair having the same dimensions is
    a) Angular momentum, work b) Work, torque
    c) Potential energy, linear momentum d) Kinetic energy, velocity
29. Which one has the dimensions different from the remaining three
    a) Power b) Work c) Torque d) Energy
30. Planck's constant has the dimensions (unit) of
    a) Energy b) Linear momentum c) Work d) Angular momentum
31. Dimension of R is
    a) ML^2T^{-1} b) $ML^2T^{-3}A^{-2}$ c) $ML^{-1}T^{-2}$ d) None of these
32. Which of the following sets have different dimensions?
    a) Pressure, Young's modulus, Stress b) Emf, Potential difference, Electric potential
    c) Heat, Work done, Energy d) Dipole moment, Electric flux, Electric field
33. Choose the incorrect statement out of the following
    a) Every measurement by any measuring instrument has some error
    b) Every calculated physical quantity that is based on measured values has some error
    c) A measurement can have more accuracy but less precision and vice versa

d) The percentage error is different from relative error

34. A public park, in the form of a square, has an area of $(100 \pm 0.2)\text{m}^2$. The side of park is
a) $(10 \pm 0.01)\text{m}$ b) $(10 \pm 0.1)\text{m}$ c) $(10.0 \pm 0.1)\text{m}$ d) $(10.0 \pm 0.2)\text{m}$

35. Which of the following is dimensionless?
a) $\frac{v^2}{rg}$ b) $\frac{v^2\text{g}}{r}$ c) $\frac{v\text{g}}{r}$ d) $v^2 r\text{g}$

36. If E =energy, G = gravitational constant, I = impulse and M = mass, the dimensions of $\frac{GIM^2}{E^2}$ are same as that of
a) Time b) Mass c) Length d) Force

37. The unit of percentage error is
a) Same as that of physical quantity
b) Different from that of physical quantity
c) Percentage error is unit less
d) Errors have got their own units which are different from that of physical quantity measured

38. The S.I. unit of gravitational potential is
a) J b) $J - kg^{-1}$ c) $J - kg$ d) $J - kg^{-2}$

39. Dimensions of charge are
a) $M^0L^0T^{-1}A^{-1}$ b) $MLTA^{-1}$ c) $T^{-1}A$ d) TA

40. $S = A(1 - e^{-Bxt})$, where S is speed and x is displacement. The unit of B is
a) $m^{-1}s^{-1}$ b) $m^{-2}s$ c) s^{-2} d) s^{-1}

41. A cube has numerically equal volume and surface area. The volume of such a cube is
a) 216 *units* b) 1000 *units* c) 2000 *units* d) 3000 *units*

42. The physical quantity having the dimensions $[M^{-1}L^{-3}T^3A^2]$ is
a) Resistance b) Resistivity
c) Electrical conductivity d) Electromotive force

43. If $x = at + bt^2$, where x is the distance travelled by the body in kilometre while t is the time in second, then the units of b are
a) km/s b) $km - s$ c) km/s^2 d) $km - s^2$

44. 'Torr' is the unit of
a) Pressure b) Volume c) Density d) Flux

45. A suitable unit for gravitational constant is
a) kg-m $\sec^{-1}$ b) $N\ m^{-1}\sec$ c) $N\ m^2\ kg^{-2}$ d) $kg\ m\ \sec^{-1}$

46. Dimensional formula for force is
a) $[\text{ML}^2\text{T}^{-2}]$ b) $[\text{MLT}^{-2}]$ c) $[\text{ML}^{-1}\text{T}^{-2}]$ d) $[\text{ML}^2\text{T}^{-2}]$

47. If L denotes the inductance of an inductor through which a current I is flowing, then the dimensional formula of LI^2 is
a) $[\text{MLT}^{-2}]$ b) $[\text{ML}^2\text{T}^{-2}]$
c) $[\text{M}^2\text{L}^2\text{T}^{-2}]$ d) Not expressible in terms of M, L, T

48. The dimensions of electric dipole moment are
a) $[\text{L}^2\text{I}]$ b) $[\text{LI}]$ c) $[\text{LTI}]$ d) $[\text{T}^{-2}]$

49. The velocity of a freely falling body changes as $g^p h^q$ where g is acceleration due to gravity and h is the height. The values of p and q are
a) $1, \frac{1}{2}$ b) $\frac{1}{2}, \frac{1}{2}$ c) $\frac{1}{2}, 1$ d) $1, 1$

50. $ML^{-1}T^{-2}$ represents
a) Stress b) Young's Modulus
c) Pressure d) All of the above three quantities

51. The unit of Wien's constant b is
a) $\text{Wm}^{-2}\text{K}^{-4}$ b) $\text{m}^{-1}\text{K}^{-1}$ c) Wm^2 d) MK

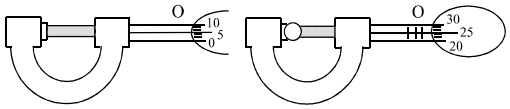
52. The SI unit of gravitational potential is
a) J b) Jkg^{-1} c) Jkg d) Jkg^2

53. A physical quantity is measured and its value is found to be nu where n = numerical value and u = unit. Then which of the following relations is true
a) $n \propto u^2$ b) $n \propto u$ c) $n \propto \sqrt{u}$ d) $n \propto \frac{1}{u}$

54. Frequency is the function of density (ρ) , length (a) and surface tension (T). Then its value is
a) $k\rho^{1/2}a^{3/2}/\sqrt{T}$ b) $k\rho^{3/2}a^{3/2}/\sqrt{T}$ c) $k\rho^{1/2}a^{3/2}/T^{3/4}$ d) None of these

55. The units of modulus rigidity are
a) $N-m$ b) N/m c) $N-m^2$ d) N/m^2

56. The circular divisions of shown screw gauge are 50. It moves 0.5 mm on main scale in one rotation. The diameter of the ball is



a) 2.25 mm b) 2.20 mm c) 1.20 mm d) 1.25 mm

57. Which of the following pairs has same dimensions?
a) Current density and charge density b) Angular momentum and momentum
c) Spring constant and surface energy d) Force and torque

58. The Vander Waal's equation of state for real gases is given as $\left(P+\frac{a}{V^2}\right)(V-b)=nRT$ which of the following terms has dimensions different from that of energy
a) PV b) $\frac{a}{V^2}$ c) $\frac{ab}{V^2}$ d) bP

59. In the relation $p=\frac{\alpha}{\beta}e^{-\frac{\alpha z}{k\theta}}$, p is the pressure, z the distance, k is Boltzmann constant and θ is the temperature, the dimensional formula of β will be
a) $[M^0L^2T^0]$ b) $[ML^2T]$ c) $[ML^0T^{-1}]$ d) $[ML^2T^{-1}]$

60. A dimensionally consistent relation for the volume V of a liquid of coefficient of viscosity η flowing per second through a tube of radius r and length l and having pressure p across its end, is
a) $V=\frac{\pi pr^4}{8\eta l}$ b) $V=\frac{\pi\eta l}{8pr^4}$ c) $V=\frac{8p\eta l}{\pi r^4}$ d) $V=\frac{\pi p\eta}{8lr^4}$

61. "Pascal-Second" has dimension of
a) Force b) Energy
c) Pressure d) Coefficient of viscosity

62. In the equation $X=3YZ^2$, X and Z have dimensions of capacitance and magnetic induction respectively. In MKSQ system, the dimensional formula of Y is
a) $[M^{-3}L^{-2}T^{-2}Q^{-4}]$ b) $[ML^{-2}]$ c) $[M^{-3}L^{-2}Q^4T^8]$ d) $[M^{-3}L^{-2}Q^4T^4]$

63. The dimensional formula for impulse is same as the dimensional formula for
a) Momentum b) Force
c) Rate of change of momentum d) Torque

64. If E, M, L and G denote energy, mass, angular momentum and gravitational constant respectively, then the quantity (EL^2/M^5G^2) has the dimensions of
a) Angle b) Length c) Mass d) Time

65. Unit of electric flux is
a) Vm b) Nm/C^{-1} c) Vm^{-1} d) CNm^{-1}

66. Dimensions of frequency are
a) $M^0L^{-1}T^0$ b) $M^0L^0T^{-1}$ c) M^0L^0T d) MT^{-2}

67. Students I, II and III perform an experiment for measuring the acceleration due to gravity (g) using a simple pendulum. They use different lengths of the pendulum and/or record time for different number of oscillations. The observations are shown in the table
Least count for length $= 0.1\ cm$
Least count for time $= 0.1\ s$

Student	Length of the pendulum (cm)	Number of oscillation (n)	Total time for (n) oscillations (s)	Time period (s)
I	64.0	8	128.0	16.0
I	64.0	4	64.0	16.0
III	20.0	4	36.0	9.0

If $E_{\mathrm{I}}, E_{\mathrm{II}}$ and E_{III} are the percentage errors in $g, i.e., \left(\frac{\Delta g}{g} \times 100\right)$ for students I, II and III, respectively

a) $E_{\mathrm{I}} = 0$ b) E_{I} is minimum c) $E_{\mathrm{I}} = E_{\mathrm{II}}$ d) E_{II} is maximum

68. The unit of the coefficient of viscosity in S.I. system is
a) $m/kg - s$ b) $m - s/kg^2$ c) $kg/m - s^2$ d) $kg/m - s$

69. The physical quantity angular momentum has the same dimensions as that of
a) Work b) Force c) Momentum d) Planck's constant

70. The physical quantity having the dimensions $[\mathrm{M^{-1}L^{-3}A^2}]$ is
a) Resistance b) Resistivity
c) Electrical conductivity d) Electromotive force

71. The dimensional formula of $\frac{1}{\varepsilon_0}\frac{e^2}{hc}$ is
a) $[\mathrm{M^0L^0T^0A^0}]$ b) $[\mathrm{M^{-1}L^3T^2A}]$ c) $[\mathrm{ML^3T^{-4}A^{-2}}]$ d) $[\mathrm{M^{-1}L^{-3}T^4}]$

72. In the formula, $a = 3bc^2$, a and c have dimensions of electric capacitance and magnetic induction respectively. What are dimensions of b in MKS system?
a) $[\mathrm{M^{-3}L^{-2}T^4Q^4}]$ b) $[\mathrm{M^{-3}T^4Q^4}]$ c) $[\mathrm{M^{-3}T^3Q}]$ d) $[\mathrm{M^{-3}L^2T^4Q^{-4}}]$

73. A unit of area, often used in measuring land areas, is the hectare defined as $10^4\ \mathrm{m^2}$. An open-pit coal mine consumes 75 hectares of land, down to a depth of 26m, each year. What volume of earth, in cubic kilometre, is removed in this time?
a) 0.01 b) 0.02 c) 0.03 d) 0.04

74. If 3.8×10^{-6} is added to 4.2×10^{-5} giving due regard to significant figures, then the result will be
a) 458×10^{-5} b) 4.6×10^{-5} c) 4.5×10^{-5} d) None of the above

75. Let us choose a new unit of length such that the velocity of light in vacuum is unity. If light takes 8 min and 20 sec to cover the distance between sun and earth, this distance in terms of the new unit is
a) 5 b) 50 c) 500 d) 3×10^8

76. If L, C and R denote inductance, capacitance and resistance respectively, then which of the following combination has the dimension of time?
a) $\frac{C}{L}$ b) $\frac{1}{RC}$ c) $\frac{L}{R}$ d) $\frac{RL}{C}$

77. In an experiment the angles are required to be measured using an instrument. 29 divisions of the main scale exactly coincide with the 30 divisions of the vernier scale. If the smallest division of the main scale is half-a-degree $(= 0.5°)$ then the least count of the instrument is
a) One minute b) Half minute c) One degree d) Half-degree

78. The position of a particle at time t is given by the relation $x(t) = \left(\frac{v_0}{\alpha}\right)(1 - e^{\alpha t})$, where v_0 is constant and $\alpha > 0$. The dimensions of v_0 and α are respectively

a) $M^0L^1T^{-1}$ and T^{-1} b) $M^0L^1T^0$ and T^{-1} c) $M^0L^1T^{-1}$ and LT^{-2} d) $M^0L^1T^{-1}$ and T

79. Out of the following which pair of quantities do not have same dimensions
a) Planck's constant and angular momentum b) Work and energy
c) Pressure and Young's modulus d) Torque and moment of inertia

80. The unit of physical quantity obtained by the line intergral of electric field is
a) NC^{-1} b) Vm^{-1} c) JC^{-1} d) $C^2N^{-1}m^{-2}$

81. Write dimensional formula for the intensity of radiation
a) $M^1L^0T^3$ b) $M^1L^0T^{-3}$ c) $M^1L^2T^{-2}$ d) $M^1L^2T^{-3}$

82. Two quantities A and B have different dimensions. Which mathematical operation given below is physically meaningful
a) A/B b) $A+B$ c) $A-B$ d) None

83. The percentage errors in the measurement of a mass and speed are 2% and 3% respectively. How much will be the maximum error in the estimate of kinetic energy obtained by measuring mass and speed?
a) 11% b) 8% c) 5% d) 1%

84. The concorde is the fastest airlines used for commercial service. It can cruise at 1450 mile per hour (about two times the speed of sound or in other words mach 2). What is it in m/s?
a) 644.4m/s b) 80 m/s c) 40 m/s d) None of these

85. The dimensions of electric potential are
a) $[ML^2T^{-2}Q^{-1}]$ b) $[MLT^{-2}Q^{-1}]$ c) $[ML^2T^{-1}Q]$ d) $[ML^2T^{-2}Q]$

86. The internal and external diameters of a hollow cylinder are measured with the help of a vernier calipers. Their values are 4.23 ± 0.01 cm and 3.87 ± 0.01 cm respectively. The thickness of the wall of the cylinder is
a) 0.36 ± 0.02 cm b) 0.18 ± 0.02 cm c) 0.36 ± 0.01 cm d) 0.18 ± 0.01 cm

87. The velocity v (in cm/sec) of a particle is given in terms of time t(in sec) by the relation $v = at + \frac{b}{t+c}$; the dimensions of a, b and c are
a) $a = L^2, b = T, c = LT^2$ b) $a = LT^2, b = LT, c = L$
c) $a = LT^2, b = L, c = T$ d) $a = L, b = LT, c = T^2$

88. The dimensions of kinetic energy are
a) $[M^2L^2T]$ b) $[ML^2T]$ c) $[ML^2T^{-2}]$ d) $[ML^2T^{-1}]$

89. What is the SI unit of permeability
a) *Henry* per *metre* b) Tesla *metre* per *ampere*
c) *Weber* per *ampere metre* d) All the above units are correct

90. A student measures the distance traversed in free fall of a body, initially at rest in a given time. He uses this data to estimate g, the acceleration due to gravity. If the maximum percentage errors in measurement of the distance and the time are e_1 and e_2 respectively, the percentage error in the estimation of g is
a) $e_2 - e_1$ b) $e_1 + 2e_2$ c) $e_1 + e_2$ d) $e_1 - 2e_2$

91. Which of the following is the smallest unit
a) *Millimetre* b) *Angstrom* c) *Fermi* d) *Metre*

92. The dimensions of a rectangular block measured with calipers having least count of 0.01 cm are 5 mm × 10 mm × 5 mm. The maximum percentage error in the measurement of the volume of the block is
a) 5% b) 10% c) 15% d) 20%

93. If E, m, J and G represent energy, mass, angular momentum and gravitational constant respectively, then the dimensional formula of EJ^2/m^5G^2 is
a) $[MLT^{-2}]$ b) $[M^0L^0T]$ c) $[M^0L^2T^0]$ d) Dimensionless

94. The dimensions of couple are
a) ML^2T^{-2} b) MLT^{-2} c) $ML^{-1}T^{-3}$ d) $ML^{-2}T^{-2}$

95. The dimension of quantity (L/RCV) is
a) $[A]$ b) $[A^2]$ c) $[A^{-1}]$ d) None of these

96. The dimensional formula of relative density is

a) ML^{-3} b) LT^{-1} c) MLT^{-2} d) Dimensionless

97. The dimensions of emf in MKS is
a) $ML^{-1}T^{-2}Q^{-2}$ b) $ML^{2}T^{-2}Q^{-2}$ c) $MLT^{-2}Q^{-1}$ d) $ML^{2}T^{-2}Q^{-1}$

98. If the length of rod A is (3.25 ± 0.01) cm and that of B is (4.19 ± 0.01) cm, then the rod B is longer than rod A by
a) (0.94 ± 0.00) cm b) (0.94 ± 0.01) cm c) (0.94 ± 0.02) cm d) (0.94 ± 0.005) cm

99. The length l, breadth b and thickness t of a block are measured with the help of a metre scale. Given $l = 15.12 \pm 0.01$cm, $b = 10.15 \pm 0.01$cm, $t = 5.28 \pm 0.01$cm.
The percentage error in volume is
a) 0.64% b) 0.28% c) 0.37% d) 0.48%

100. The mass and volume of a body are found to be $500 \pm 0.05\ kg$ and $1.00 \pm 0.05 m^3$ respectively. Then the maximum possible percentage error in its density is
a) 6% b) 3% c) 10% d) 5%

101. What is the dimensional formula of $\frac{\text{planck's constant}}{\text{linear momentum}}$?
a) $[M^0L^0T^0]$ b) $[M^0L^0T]$ c) $[M^0LT^0]$ d) $[MLT^{-1}]$

102. The dimensional formula of coefficient of permittivity for free space (ε_0) in the equation $F = \frac{1}{4\pi\varepsilon_0}\frac{q_1 q_2}{r^2}$, where symbols have their usual meanings, is
a) $[ML^3A^{-2}T^{-4}]$ b) $[M^{-1}L^{-3}T^4A^2]$ c) $[M^{-1}L^{-3}A^{-2}T^{-4}]$ d) $[ML^3A^2T^{-4}]$

103. The surface tension of a liquid is 70 $dyne/cm$, in MKS system value is
a) 70 N/m b) $7 \times 10^{-2}\ N/m$ c) $7 \times 10^{3}\ N/m$ d) $7 \times 10^{2}\ N/m$

104. If unit of length, mass and time each be doubled, the unit of work done is increased by
a) 4 times b) 6 times c) 8 times d) 2 times

105. Unit of impulse is
a) $Newton$ b) $kg - m$ c) $kg - m/s$ d) $Joule$

106. The constant of proportionality $\frac{1}{4\pi\varepsilon_0}$ in Coulomb's law has the following units
a) $C^{-2}Nm^2$ b) $C^2N^{-1}m^{-2}$ c) C^2Nm^2 d) $C^{-2}N^{-1}m^{-2}$

107. From the dimensional consideration, which of the following equation is correct
a) $T = 2\pi r\sqrt{\frac{R^3}{GM}}$ b) $T = 2\pi\sqrt{\frac{GM}{R^3}}$ c) $T = 2\pi\sqrt{\frac{GM}{GR^2}}$ d) $T = 2\pi\sqrt{\frac{R^2}{GM}}$

108. The length, breadth and thickness of a block are given by $l = 12cm, b = 6\ cm$ and $t = 2.45cm$
The volume of block according to the idea of significant figures should be
a) $1 \times 10^2\ cm^3$ b) $2 \times 10^2\ cm^3$ c) $1.763 \times 10^2\ cm^3$ d) None of tehse

109. A force F is given by $F = at + bt^2$, where t is time. What are the dimensions of a and b
a) MLT^{-3} and ML^2T^{-4} b) MLT^{-3} and MLT^{-4} c) MLT^{-1} and MLT^{0} d) MLT^{-4} and MLT^{1}

110. Which of the following is not a unit of energy
a) $W-$ s b) $kg-m/sec$ c) N-m d) $Joule$

111. In a new system of units, unit f mass is 10 kg, unit of length is 1 km and unit of time is 1 min. The value of 1 joule in this new hypothertical system is
a) 3.6×10^{-4} new units b) 6×10^{7} new units c) 10^{11} new units d) 1.67×10^{4} new units

112. In an experiment, the following observation's were recorded: $L = 2.820\ m$, $M = 3.00\ kg, l = 0.087\ cm$, diameter $D = 0.041\ cm$. Taking $g = 9.81\ m/s^2$ using the formula, $Y = \frac{4MgL}{\pi D^2 l}$, the maximum permissible error in Y is
a) 7.96% b) 4.56% c) 6.50% d) 8.42%

113. Which relation is wrong
a) $1\ calorie = 4.18\ joule$ b) $1\ \text{Å} = 10^{-10}m$
c) $1\ MeV = 1.6 \times 10^{-13} joule$ d) $1\ newton = 10^{-5} dyne$

114. The resistance $R = \frac{V}{i}$ where $V = 100 \pm 5\ volts$ and $i = 10 \pm 0.2\ amperes$. What is the total error in R

a) 5% b) 7% c) 5.2% d) $\frac{5}{2}$%

115. The quantity $X = \frac{\varepsilon_0 LV}{t}$: ε_0 is the permittivity of free space, L is length, V is potential difference and t is time. The dimensions of X are same as that of

a) Resistance b) Charge c) Voltage d) Current

116. $Ampere - hour$ is a unit of

a) Quantity of electricity b) Strength of electric current
c) Power d) Energy

117. 1 Wb/m^2 is equal to

a) 10^4 gauss b) $4\pi \times 10^{-3}$ gauss c) 10^2 gauss d) 10^{-4} gauss

118. Unit of magnetic moment is

a) $Ampere - metre^2$ b) $Ampere - metre$ c) $Weber - metre^2$ d) $Weber/metre$

119. Surface tension has the same dimensions as that of

a) Coefficient of viscosity b) Impulse
c) Momentum d) Spring constant

120. The dimensions of physical quantity X in the equation

Force $= \frac{X}{\text{Density}}$ is given by

a) $M^1L^4T^{-2}$ b) $M^2L^{-2}T^{-1}$ c) $M^2L^{-2}T^{-2}$ d) $M^1L^{-2}T^{-1}$

121. Given that $r = m^2 \sin pt$, where t represents time. If the unit of m is N, then the unit of r is

a) N b) N^2 c) N s d) N^{2}s

122. The dimensions of farad are

a) $M^{-1}L^{-2}T^2Q^2$ b) $M^{-1}L^{-2}TQ$ c) $M^{-1}L^{-2}T^{-2}Q$ d) $M^{-1}L^{-2}TQ^2$

123. One light year is defined as the distance travelled by light in one year. The speed of light is 3×10^8ms^{-1}. The same in metre is

a) 3×10^{12}m b) 9.461×10^{15}m c) 3×10^{15}m d) None of these

124. The mean time period of second's pendulum is 2.00s and mean absolute error in the time period is 0.05s. To express maximum estimate of error, the time period should be written as

a) $(2.00 \pm 0.01)\ s$ b) $(2.00 + 0.025)\ s$ c) $(2.00 \pm 0.05)\ s$ d) $(2.00 \pm 0.10)\ s$

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

a) 0.02 mm b) 0.05 mm c) 0.1 mm d) 0.2 mm

126. The relative density of material of a body is found by weighing it first in air and then in water. If the weight in air is $(5.00 \pm 0.05)\ newton$ and weight in water is $(4.00 \pm 0.05)\ newton$ .Then the relative density along with the maximum permissible percentage error is

a) $5.0 \pm 11\%$ b) $5.0 \pm 1\%$ c) $5.0 \pm 6\%$ d) $1.25 \pm 5\%$

127. The dimensions of coefficient of self inductance are

a) [ML^{2}T^{-2}A^{-2}] b) [ML^{2}T^{-2}A^{-1}] c) [MLT^{-2}A^{-2}] d) [MLT^{-2}A^{-1}]

128. If force (F), length (L) and time (T) are assumed to be the fundamental units, then the dimensional formula of the mass will be

a) [FL^{-1}T^2] b) [FL^{-1}T^{-2}] c) [FL^{-1}T^{-1}] d) [FL^{2}T^{-2}]

129. Inductance L can be dimensionally represented as

a) $ML^2T^{-2}A^{-2}$ b) $ML^2T^{-4}A^{-3}$ c) $ML^{-2}T^{-2}A^{-2}$ d) $ML^2T^4A^3$

130. Linear momentum and angular momentum have the same dimensions in

a) Mass and length b) Length and time
c) Mass and time d) Mass, length and time

131. Which unit is not for length

a) Parsec b) Light year c) Angstrom d) Nano

132. SI unit of electric intensity is
a) Coulomb b) Coulomb/m^2 c) Newton d) Newton/ coulomb

133. The thrust developed by a rocket-motor is given by $F = mv + A(p_1 - p_2)$, where m is the mass of the gas ejected per unit time, v is velocity of the gas, A is area of cross-section of the noszzle, $p_1 \cdot p_2$are the pressures of the exhaust gas and surrounding atmosphere. The formula is dimensionally
a) Correct b) Wrong
c) Sometimes wrong, sometimes correct d) Data is not adequate

134. The dimensional formula for impulse is
a) MLT^{-2} b) MLT^{-1} c) ML^2T^{-1} d) M^2LT^{-1}

135. If P represents radiations pressure, c represents speed of light and Q represents radiation energy striking a unit area per $second$, the non-zero integers x, y and z such that $P^xQ^yc^z$ is dimensionless, are
a) $x = 1, y = 1, z = -1$ b) $x = 1, y = -1, z = 1$ c) $x = -1, y = 1, z = 1$ d) $x = 1, y = 1, z = 1$

136. Which is not a unit of electric field
a) NC^{-1} b) Vm^{-1} c) JC^{-1} d) $JC^{-1}m^{-1}$

137. The dimensional formula of self-inductance is
a) $[MLT^{-2}]$ b) $[ML^2T^{-1}A^{-2}]$ c) $[ML^2T^{-2}A^{-2}]$ d) $[ML^2T^{-2}A^{-1}]$

138. The unit of self-inductance is
a) Weber ampere b) Weber^{-1} ampere c) Ohm second d) Farad

139. Consider a new system of units in which c(speed of light in vacuum), h(Planck's constant) and G(gravitational constant) are taken as fundamental units. Which of the following would correctly represent mass in this new system?
a) $\sqrt{\frac{hc}{G}}$ b) $\sqrt{\frac{Gc}{h}}$ c) $\sqrt{\frac{hG}{c}}$ d) $\sqrt{hGc}$

140. The dimensional formula for the modulus of rigidity is
a) ML^2T^{-2} b) $ML^{-1}T^{-3}$ c) $ML^{-2}T^{-2}$ d) $ML^{-1}T^{-2}$

141. Which of the following is not represented in correct unit
a) $\frac{\text{Stress}}{\text{Strain}} = N/m^2$ b) Surface tension $= N/m$
c) Energy $= kg - m/sec$ d) Pressure $= N/m^2$

142. If 1 g cm s^{-1}= x newton-second, then the number x is equal to
a) 1×10^{-3} b) 3.6×10^{-3} c) 1×10^{-5} d) 6×10^{-4}

143. The time taken by an electron to go from ground state to excited state is one shake (one shake = 10^{-8}s). this time in nanosecond will be
a) 10 ns b) 4 ns c) 2 ns d) 25 ns

144. The dimensional formula of angular velocity is
a) $M^0L^0T^{-1}$ b) MLT^{-1} c) $M^0L^0T^1$ d) ML^0T^{-2}

145. The physical quantity which has the dimensional formula M^1T^{-3} is
a) Surface tension b) Solar constant c) Density d) Compressibility

146. The dimensions of $e^2/4\pi\varepsilon_0 hc$, where e, ε_0, h and c are electronic charge, electric permittivity, Planck's constant and velocity of light in vacuum respectively
a) $[M^0L^0T^0]$ b) $[M^1L^0T^0]$ c) $[M^0L^1T^0]$ d) $[M^0L^0T^1]$

147. Farad is not equivalent to
a) $\frac{q}{V}$ b) qv^2 c) $\frac{q^2}{J}$ d) $\frac{J}{V^2}$

148. Given $X = (Gh/c^3)^{1/2}$, where G, h and c are gravitational constant, Planck's constant and the velocity of light respectively. Dimensions of X are the same as those of
a) Mass b) Time c) Length d) Acceleration

149. The velocity of a particle v at an instant t is given by $v = at + bt^2$ the dimension of b is

a) [L] b) $[LT^{-1}]$ c) $[LT^{-2}]$ d) $[LT^{-3}]$

150. Dimensions of luminous flux are
a) ML^2T^{-2} b) ML^2T^{-3} c) ML^2T^{-1} d) MLT^{-2}

151. The ratio of the dimension of Planck's constant and that of moment of inertia is the dimension of
a) Frequency b) Velocity c) Angular momentum d) Time

152. The equation of a wave is given by

$$Y = A\sin\omega\left(\frac{x}{v} - k\right)$$

where ω is the angular velocity and v is the linear velocity.
The dimension of k is
a) LT b) T c) T^{-1} d) T^2

153. The dimensional formula for impulse is
a) $[MLT^{-1}]$ b) $[ML^{-1}T]$ c) $[M^{-1}LT^{-1}]$ d) $[ML^{-1}T^{-1}]$

154. The radius of the sphere I (4.3 ± 0.1)cm. The percentage error in its volume is
a) $\frac{0.1}{4.3} \times 100$ b) $3 \times \frac{0.1 \times 100}{4.3}$ c) $\frac{1}{3} \times \frac{0.1 \times 100}{4.3}$ d) $3 + \frac{0.1 \times 100}{4.3}$

155. Size of universe is about
a) Ten million light years b) Million light years
c) Hundred million light years d) 10 million light years

156. A cube has a side of length 1.2×10^{-2} m. Calculate its volume.
a) 1.7×10^{-6} m^3 b) 1.73×10^{-6} m^3 c) 1.70×10^{-6} m^3 d) 1.732×10^{-6} m^3

157. The SI unit of momentum is
a) $\frac{kg}{m}$ b) $\frac{kg.m}{\text{sec}}$ c) $\frac{kg.m^2}{\text{sec}}$ d) $kg \times newton$

158. A calorie is a unit of heat and equal 4.2 J. Suppose we employ a system of units in which the unit of mass is αkg, the unit of length is β metre and the unit of time is γ sec. In this new system. 1 calorie =
a) $\alpha^{-1}\beta^{-2}\gamma^2$ b) $4.2\alpha\beta^2\gamma^2$ c) $\alpha\beta^2\gamma^2$ d) $4.2\alpha^{-1}\beta^{-2}\gamma^2$

159. Number of base SI unit is
a) 4 b) 7 c) 3 d) 5

160. Dimensions of bulk modulus are
a) $[M^{-1}LT^{-2}]$ b) $[ML^{-1}T^{-2}]$ c) $[ML^{-2}T^{-2}]$ d) $[M^2L^2T^{-1}]$

161. Position of body with acceleration 'a' is given by $x = Ka^m t^n$, here t is time. Find dimensions of m and n
a) $m = 1, n = 1$ b) $m = 1, n = 2$ c) $m = 2, n = 1$ d) $m = 2, n = 2$

162. A pressure of 10^6 dyne cm^{-2} is equivalent to
a) 10^5N m^{-2} b) 10^4 N m^{-2} c) 10^6N m^{-2} d) 10^7N m^{-2}

163. The unit of Planck's constant is
a) $Joule$ b) $Joule/s$ c) $Joule/m$ d) $Joule$-s

164. $Candela$ is the unit of
a) Electric intensity b) Luminous intensity c) Sound intensity d) None of these

165. The dimensions of gravitational constant G and the moment of inertia are respectively
a) $ML^3T^{-2}; ML^2T^0$ b) $M^{-1}L^3T^{-2}; ML^2T^0$ c) $M^{-1}L^3T^{-2}; M^{-1}L^2T$ d) $ML^3T^{-2}; M^{-1}L^2T$

166. What will be the unit of time in that system in which the unit of length is metre, unit of mass is kg and unit of force is kg wt?
a) $(9.8)^2$sec b) 9.8 sec c) $\sqrt{9.8}$ sec d) $\frac{1}{\sqrt{9.8}}$ sec

167. If pressure P, velocity V and time T are taken as fundamental physical quantities, the dimensional formula of force is
a) PV^2T^2 b) $P^{-1}V^2T^{-2}$ c) PVT^2 d) $P^{-1}VT^2$

168. If I is the moment of inertia and ω the angular velocity, what is the dimensional formula of rotational kinetic energy $\frac{1}{2}I\omega^2$?
a) $[ML^2T^{-1}]$ b) $[M^2L^{-1}T^{-2}]$ c) $[ML^2T^{-2}]$ d) $[M^2L^{-1}T^{-2}]$

169. The dimensional formula for Planck's constant (h) is
a) $ML^{-2}T^{-3}$ b) ML^2T^{-2} c) ML^2T^{-1} d) $ML^{-2}T^{-2}$

170. The physical quantities not having same dimensions are
a) Speed and $(\mu_0\varepsilon_0)^{-1/2}$ b) Torque and work
c) Momentum and Planck's constant d) Stress and Young's modulus

171. Pressure gradient has the same dimension as that of
a) Velocity gradient b) Potential gradient c) Energy gradient d) None of these

172. The damping force on an oscillator is directly proportional to the velocity. The units of the constant of proportionality are
a) $kgms^{-1}$ b) $kgms^{-2}$ c) kgs^{-1} d) kgs

173. Dimensional formula of capacitance (or farad) is
a) $M^{-1}L^{-2}T^4A^2$ b) $ML^2T^4A^{-2}$ c) $MLT^{-4}A^2$ d) $M^{-1}L^{-2}T^{-4}A^{-2}$

174. *Joule-second* is the unit of
a) Work b) Momentum c) Pressure d) Angular momentum

175. If $L = 2.331$ cm, $B = 2.1$ cm, then $L + B$ is equal to
a) 4.431 cm b) 4.43 cm c) 4.4 cm d) 4 cm

176. If the radius of the sphere is $(5.3 \pm 0.1)cm$. Then percentage error in its volume will be
a) $3 + 6.01 \times \frac{100}{5.3}$ b) $\frac{1}{3} \times 0.01 \times \frac{100}{5.3}$ c) $\left(\frac{3 \times 0.01}{5.3}\right) \times 100$ d) $\frac{0.1}{5.3} \times 100$

177. The dimension of magnetic field in M, L, T and C (coulomb) is given as
a) MT^2C^{-2} b) $MT^{-1}C^{-1}$ c) $MT^{-2}C^{-1}$ d) $MLT^{-1}C^{-1}$

178. In a system of units if force (F), acceleration (A), and time (T) are taken as fundamental units then the dimensional formula of energy is
a) FA^2T b) FAT^2 c) F^2AT d) FAT

179. In the equation S_{nth} the $= u + \frac{a}{2}(2n - 1)$, the letters have their usual meanings. The dimensional formula of S_{nth} is
a) $[ML^0T]$ b) $[ML^{-1}T^{-1}]$ c) $[M^0LT^{-1}]$ d) $[M^0LT^0]$

180. Which of the following system of units is not based on units of mass, length and time alone
a) SI b) MKS c) FPS d) CGS

181. The dimensions of permittivity ε_0 are
a) $A^2T^2M^{-1}L^{-3}$ b) $A^2T^4M^{-1}L^{-3}$ c) $A^{-2}T^{-4}ML^3$ d) $A^2T^{-4}M^{-1}L^{-3}$

182. Which one of the following is not a unit of Young's modulus?
a) Nm^{-1} b) Nm^{-2} c) Dyne cm^{-2} d) Mega pascal

183. The unit of surface tension in SI system is
a) $Dyne/cm^2$ b) $Newton/m$ c) $Dyne/cm$ d) $Newton/m^2$

184. The speed (v) of ripples on the surface of water depends on surface tension (σ), density (ρ) and wavelength (λ). The square of speed (v) is proportional to
a) $\frac{\sigma}{\rho\lambda}$ b) $\frac{\rho}{\sigma\lambda}$ c) $\frac{\lambda}{\sigma\rho}$ d) $P\lambda\sigma$

185. The dimension of $\frac{1}{2}\epsilon_0 E^2$, where ϵ_0 is permittivity of free space and E is electric field, is
a) MLT^1 b) ML^2T^{-2} c) $ML^{-1}T^{-2}$ d) ML^2T^{-1}

186. If the dimensions of a physical quantity are given by $M^aL^bT^c$, then the physical quantity will be
a) Pressure if $a = 1, b = -1, c = -2$ b) Velocity if $a = 1, b = 0, c = -1$
c) Acceleration if $a = 1, b = 1, c = -2$ d) Force if $a = 0, b = -1, c = -2$

187. The dimensional formula of modulus of rigidity is
a) $[ML^{-2}T^{-2}]$ b) $[ML^{-3}T_2]$ c) $[ML^2T^{-2}]$ d) $[ML^{-1}T^{-2}]$

188. SI unit of pressure is
a) $Pascal$ b) $dynes/cm^2$ c) cm of Hg d) $Atmosphere$

189. The dimensional formula of capacitance in terms of M, L, T and I is
a) $[ML^2T^2I^2]$ b) $[ML^{-2}T^4I^2]$ c) $[M^{-1}L^3T^3I]$ d) $[M^{-1}L^{-2}T^4I^2]$

190. Which of the following groups have different dimensions
a) Potential difference, EMF, voltage
b) Pressure, stress, young's modulus
c) Heat , energy, work-done
d) Dipole moment, electric flux, electric field

191. The fundamental unit, which has the same power in the dimensional formulae of surface tension and viscosity is
a) Mass b) Length c) Time d) None of these

192. Two full turns of the circular scale of a screw gauge cover a distance of 1 mm on its main scale. The total number of divisions on the circular scale is 50. Further, it is found that the screw gauge has a zero error of -0.03 mm. While measuring the diameter of a thin wire, a student notes the main scale reading of 3 mm and the number of circular scale divisions in line with the main scale as 35. The diameter of the wire is
a) 3.32 mm b) 3.73 mm c) 3.67 mm d) 3.38 mm

193. One million electron $volt$ $(1\ MeV)$ is equal to
a) $10^5\ eV$ b) $10^6\ eV$ c) $10^4\ eV$ d) $10^7\ eV$

194. Given, Force $= \frac{\alpha}{\text{density} + \beta^3}$
What are the dimensions of α, β?
a) $[ML^2T^{-2}], [ML^{-1/3}]$ b) $[M^2L^4T^{-2}], [M^{1/3}L^{-1}]$ c) $[M^2L^{-2}T^{-2}], [M^{1/3}L^{-1}]$ d) $[M^2L^{-2}T_2], [ML^{-3}]$

195. Hertz is the unit for
a) Frequency b) Force c) Electric charge d) Magnetic flux

196. If $S = \frac{1}{3}ft^3$, f has the dimensions of
a) $[M^0L^{-1}T^3]$ b) $[MLT^{-3}]$ c) $[M^0L^1T^{-3}]$ d) $[M^0L^{-1}T^{-3}]$

197. If $x = a - b$, then the maximum percentage error in the measurement of x will be
a) $\left(\frac{\Delta a + \Delta b}{a - b}\right) \times 100\%$ b) $\left(\frac{\Delta a}{a} - \frac{\Delta b}{b}\right) \times 100\%$
c) $\left(\frac{\Delta a}{a - a} + \frac{\Delta b}{a - b}\right) \times 100\%$ d) $\left(\frac{\Delta a}{a - a} - \frac{\Delta b}{a - b}\right) \times 100\%$

198. If the error in the measurement of radius of a sphere is 2%, then the error in the determination of volume of the sphere will be
a) 8% b) 2% c) 4% d) 6%

199. Which pair has the same dimensions
a) Work and power
b) Density and relative density
c) Momentum and impulse
d) Stress and strain

200. The value of Planck's constant is
a) $6.63 \times 10^{-34}\ J\text{-}sec$ b) $6.63 \times 10^{34}\ J\text{-}sec$ c) $6.63 \times 10^{-34}\ kg\text{-}m^2$ d) $6.63 \times 10^{34}\ kg\text{-}sec$

201. Which of the following is the unit of specific heat?
a) $Jkg\ °C^{-1}$ b) $Jkg^{-1}\ °C^{-1}$ c) $kg\ °CJ^{-1}$ d) $J/kg^{-1}\ °C^{-2}$

202. A body of mass $m = 3.513$ kg is moving along the x −axis with a speed of 5.00 ms^{-1}. The magnitude of its momentum is recorded as
a) 17.6 kg ms^{-1} b) 17.565 kg ms^{-1} c) 17.56 kg ms^{-1} d) 17.57 kg ms^{-1}

203. A sextant is used to measure
a) Area of hill
b) Height of an object
c) Breadth of a tower
d) Volume of the building

204. In the context of accuracy of measurement and significant figures in expressing results of experiment, which of the following is/are correct
(1) Out of the two measurements 50.14 cm and 0.00025 $ampere$, the first one has greater accuracy
(2) If one travels 478 km by rail and 397 m by road, the total distance travelled is 478 km
a) Only (1) is correct
b) Only (2) is correct
c) Both are correct
d) None of them is correct

205. Which one of the following pair of quantities has same dimension?
a) Force and work done
b) Momentum and impulse
c) Pressure and force
d) Surface tension and stress

206. If error in radius is 3%, what is error in volume of sphere?
a) 3%
b) 27%
c) 9%
d) 6%

207. Which of the following relation is wrong
a) 1 ampere × 1 ohm = 1 volt
b) 1 watt × 1 sec = 1 joule
c) 1 × newton per coulomb = 1 volt per meter
d) 1 coulomb × 1 volt = 1 watt

208. Let L denote the self-inductance of coil which is in series with a capacitor of capacitance C. Which of the following has the unit second?
a) $\sqrt{LC}$
b) C/L
c) CL
d) L^2/C^2

209. An important milestone in the evolution of the universe just after the Big Bang is the Planck time t_P, the value of which depends on three fundamental constants-speed c of light in vacuum, gravitational constant G and Planck's constant h. Then, $t_P \propto$
a) Ghc^5
b) $\frac{c^5}{Gh}$
c) $\frac{Gh}{c^5}$
d) $\left(\frac{Gh}{c^5}\right)^{1/2}$

210. One is equivalent to 931 MeV energy. The rest mass of electron is 9.1×10^{-31}kg. the Mass equivalent energy is
(1 amu = 1.67×10^{-17}kg)
a) 0.5073 MeV
b) 0.693 MeV
c) 4.0093 MeV
d) None of these

211. Out of the following four dimensional quantities, which one qualifies to be called a dimensional constant?
a) Acceleration due to gravity
b) Surface tension of water
c) Weight of a standard kilogram mass
d) The velocity of light in vacuum

212. The unit of Stefan's constant is
a) $\mathrm{Wm^{-2}\,K^{-1}}$
b) $\mathrm{Wm\,K^{-4}}$
c) $\mathrm{Wm^{-2}\,K^{-4}}$
d) $\mathrm{Nm^{-2}\,K^{-4}}$

213. The correct value of 0° C on the Kelvin scale is
a) 273.15 K
b) 272.85 K
c) 273 K
d) 273.2 K

214. The velocity v of water waves may depend on their wavelength (λ), the density of water (ρ) and the acceleration due to gravity (g). The method of dimensions gives the relation between these quantities as
a) $v^2 \propto \lambda^{-1}\rho^{-1}$
b) $v^2 \propto g\lambda$
c) $v^2 \propto g\lambda\rho$
d) $g^{-1} \propto \lambda^3$

215. Which of the following is not the unit of time
a) Micro $second$
b) Leap year
c) Lunar month
d) Parallactic $second$

216. The values of two resistors are $R_1 = (6 \pm 0.3)k\Omega$ and $R_2 = (10 \pm 0.2)k\Omega$. The percentage error in the equivalent resistance when they are connected in parallel is
a) 5.125%
b) 2%
c) 10.125%
d) 7%

217. SI unit of permittivity is
a) $\mathrm{C^2m^2N^2}$
b) $\mathrm{C^2m^{-2}N^{-1}}$
c) $\mathrm{C^2m^2N^{-1}}$
d) $\mathrm{C^{-1}m^2N^{-2}}$

218. The speed (v) of ripples on the surface of water depends on surface tension (σ), density (ρ) and wavelength (λ). The square of speed (v) is proportional to
a) $\frac{\sigma}{\rho\lambda}$
b) $\frac{\rho}{\sigma\lambda}$
c) $\frac{\lambda}{\sigma\rho}$
d) $\rho\lambda\sigma$

219. The dimensions of $1/2\ \varepsilon E^2$ are same as
a) Energy density (energy per unit volume)
b) Energy

c) Power d) None of the above

220. Which one of the following pairs of quantities and their unit is proper match?
a) Electric field-coulomb/m b) Magnetic flux-weber
c) Power-farad d) Capacitance-henry

221. The physical quantity which is not a unit of energy is
a) Volt-coulomb b) MeV-sec c) Henry $(\text{ampere})^2$ d) Farad-$(\text{volt})^2$

222. If the constant of gravitation (G), Plank's constant (h) and the velocity of light (c) be chosen as fundamental units. The dimension of the radius of gyration is
a) $h^{1/2}c^{-3/2}G^{1/2}$ b) $h^{1/2}c^{3/2}G^{1/2}$ c) $h^{1/2}c^{-3/2}G^{-1/2}$ d) $h^{-1/2}c^{-3/2}G^{1/2}$

223. Which of the following quantities is dimensionless
a) Gravitational constant b) Planck's constant
c) Power of a convex lens d) None

224. If the units of mass, length and time are doubled unit of angular momentum will be
a) Doubled b) Tripled
c) Quadrupled d) Eight times the original value

225. $\frac{h}{2\pi}$ is the dimension of
a) Velocity b) Momentum c) Energy d) Angular momentum

226. What is the dimensional formula of mc^2, where the letters have their usual meanings?
a) $[\text{MLT}^{-1}]$ b) $[\text{ML}^0\text{T}^0]$ c) $[\text{ML}^2\text{T}^{-2}]$ d) $[\text{M}^{-1}\text{L}^3\text{T}^6]$

227. Which is different from others by units
a) Phase difference b) Mechanical equivalent
c) Loudness of sound d) Poisson's ratio

228. Which of the following five physical parameters have the same dimensions
(A) Energy density (B) Refractive index (C) Dielectric constant (D) Young's modulus
(E) Magnetic field
a) (A) and (D) b) (A) and (E) c) (B) and (D) d) (C) and (E)

229. Which of the following is not equal to *watt*
a) $joule/second$ b) $ampere \times volt$ c) $(ampere)^2 \times ohm$ d) $ampere/volt$

230. The dimensions of $\frac{a}{b}$ in the equation $P = \frac{a-t^2}{bx}$, where P is pressure, x is distance and t is time, are
a) MT^{-2} b) M^2LT^{-3} c) ML^3T^{-1} d) LT^{-3}

231. Dimensions of impulse are same as that of
a) Force b) Momentum c) Energy d) Acceleration

232. $Dyne/cm^2$ is not a unit of
a) Pressure b) Stress c) Strain d) Young's modulus

233. Given $\pi = 3.14$. the value of π^2 with due regard for significant figures is
a) 9.86 b) 9.859 c) 9.8596 d) 9.85960

234. Which is the correct unit for measuring nuclear radii
a) *Micron* b) *Millimetre* c) *Angstrom* d) *Fermi*

235. The dimensional formula of electrical conductivity is
a) $[\text{M}^{-1}\text{L}^{-3}\text{T}^3\text{A}^2]$ b) $[\text{ML}^3\text{T}^3\text{A}^2]$ c) $[\text{M}^2\text{L}^3\text{T}^{-3}\text{A}^2]$ d) $[\text{ML}^3\text{T}^3\text{A}^{-2}]$

236. If the time period (T) of vibration of a liquid drop depends on surface tension (S), radius (r) of the drop and density (ρ) of the liquid, then the expression of T is
a) $T = k\sqrt{\rho r^3/S}$ b) $T = k\sqrt{\rho^{1/2}r^3/S}$ c) $T = k\sqrt{\rho r^3/S^{1/2}}$ d) None of these

237. The period of oscillation of a simple pendulum in the experiment is recorded as 2.63 s, 2.56 s, 2.42 s, 2.71 s and 2.80 s respectively. The average absolute error is
a) 0.1 s b) 0.11 s c) 0.01 s d) 1.0 s

238. Dimensional formula of Stefan's constant is

a) $MT^{-3}K^{-4}$ b) $ML^2T^{-2}K^{-4}$ c) ML^2T^{-2} d) $MT^{-2}L^0$

239. The dimensions of universal gas constant is
a) $[ML^2T^{-2}\theta^{-1}]$ b) $[M^2LT^{-2}\theta]$ c) $[ML^3T^{-1}\theta^{-1}]$ d) None of these

240. In the determination of Young's modulus $\left(Y = \frac{4\,MLg}{\pi\,\ell d^2}\right)$ by using Searle's method, a wire of length $L = 2m$ and diameter $d = 0.5mm$ is used. For a load $M = 2.5\ kg$, an extension $\ell = 0.25mm$ in the length of the wire is observed. Quantities d and ℓ are measured using a screw gauge and a micrometer, respectively. They have the same pitch of $0.5\ mm$. The number of divisions on their circular scale is 100. The contributions to the maximum probable scale is 100. The contributions to the maximum probable error of the Y measurement
a) Due to the errors in the measurements of d and ℓ are the same
b) Due to the error in the measurement of d is twice that due to the error in the measurement of ℓ
c) Due to the error in the measurement of ℓ is twice that due to the error in the measurement of d
d) Due to the error in the measurement of d is four time that due to the error in the measurement of ℓ

241. A screw gauge gives the following reading when used to measure the diameter of a wire.
Main scale reading : 0 mm
Circular scale reading : 52 divisions
Given that 1 mm on main scale corresponds to
100 divisions of the circular scale.
The diameter of wire from the above data is
a) 0.052 cm b) 0.026 cm c) 0.005 cm d) 0.52 cm

242. Out of the following pairs, which one does not have identical dimensions
a) Moment of inertia and moment of force b) Work and torque
c) Angular momentum and Planck's constant d) Impulse and momentum

243. Out of following four dimensional quantities , which one quantity is to be called a dimensional constant
a) Acceleration due to gravity b) Surface tension of water
c) Weight of a standard kilogram mass d) The velocity of light in vacuum

244. Given, potential difference V=(8 ± 0.5) volt and current $I = (2 \pm 0.2)$A. The value of resistance R is
a) $4 \pm 16.25\%$ b) $4 \pm 6.25\%$ c) $4 \pm 10\%$ d) $4 \pm 8\%$

245. The density of a material in CGS system of units is $4g/cm^3$, In a system of units which unit of length is $10\ cm$ and unit of mass is $100\ g$, the value of density of material will be
a) 400 b) 0.04 c) 0.4 d) 40

246. The density of the material of a cube is measured by measuring its mass and length of its side. If the maximum errors in the measurement of mass and the length are 3% and 2% respectively. The maximum error in the measurement of density is
a) 1% b) 5% c) 7% d) 9%

247. The equation of state of some gases can be expressed as $\left(P + \frac{a}{V^2}\right) = \frac{R\theta}{V}$. Where P is the pressure, V the volume, θ the absolute temperature and a and b are constants. The dimensional formula of a is
a) $[ML^5T^{-2}]$ b) $[M^{-1}L^5T^{-2}]$ c) $[ML^{-1}T^{-2}]$ d) $[ML^{-5}T^{-2}]$

248. The only mechanical quantity which has negative dimension of mass is
a) Angular momentum b) Torque
c) Coefficient of thermal conductivity d) Gravitational constant

249. The dimensions of shear modulus are
a) MLT^{-1} b) ML^2T^{-2} c) $ML^{-1}T^{-2}$ d) MLT^{-2}

250. The values of two resistors are $R_1 = (6 \pm 0.3)$ kΩ and $R_2 = (10 \pm 0.2)$kΩ. The percentage error in the equivalent resistance when they are connected in parallel is
a) 5.125% b) 2% c) 3.125% d) 10.125%

251. In which of the following system of units, *weber* is the unit of magnetic flux
a) CGS b) MKS c) SI d) None of these

252. A physical quantity is given by $X = [M^a L^b T^c]$. The percentage error in measurement of M, L and T are α, β and γ respectively. Then, the maximum % error in the quantity X is
a) $a\alpha + b\beta + c\gamma$ b) $a\alpha + b\beta - c\gamma$ c) $\frac{a}{\alpha} + \frac{b}{\beta} + \frac{c}{\gamma}$ d) None of these

253. If the velocity of light c, gravitational constant G and Planck's constant h are chosen as fundamental units, the dimensions of length L in the new system is
a) hcG^{-1} b) $[h^{1/2}c^{1/2}G^{-1/2}]$ c) $[hc^{-3}G^{1}]$ d) $[h^{1/2}c^{-3/2}G^{1/2}]$

254. Which of the following physical quantities has neither dimensions nor unit?
a) Angle b) Luminous intensity
c) Coefficient of friction d) Current

255. The modulus of elasticity is dimensionally equivalent to
a) Strain b) Force
c) Stress d) Coefficient of viscosity

256. What is the area of a disc of radius 1.1 cm?
a) 3.8028571 cm^2 b) 3.8029 cm^2 c) 3.803 cm^2 d) 3.8 cm^2

257. The length of a cylinder is measured with a meter rod having least count 0.1 cm.
Its diameter is measured with vernier callipers having least count 0.01 cm. Given that length is 5.0 cm. and radius is 2.0 cm. The percentage error in the calculated value of the volume will be
a) 1% b) 2% c) 3% d) 4%

258. If C and R represent capacitance and resistance respectively, then the dimensions of RC are
a) $M^0L^0T^2$ b) M^0L^0T c) ML^{-1} d) None of these above

259. In the following list, the only pair which have different dimensions, is
a) Linear momentum and moment of a force
b) Planck's constant and angular momentum
c) Pressure and modulus of electricity
d) Torque and potential energy

260. Dimensions of $\frac{1}{\mu_0\varepsilon_0}$, where symbols have their usual meaning, are
a) $[L^{-1}T]$ b) $[L^2T^2]$ c) $[L^2T^{-2}]$ d) $[LT^{-1}]$

261. In the relation $y = r\sin(\omega t - kx)$, the dimensions of ω/k are
a) $[M^0L^0T^0]$ b) $[M^0L^1T^{-1}]$ c) $[M^0L^0T^1]$ d) $[M^0L^1T^0]$

262. Electron – volt is the unit of energy ($1\ eV = 1.6 \times 10^{-19}J$). in H-atom, the binding energy of electron in first orbit is 13.6 eV. The same in joule (J) is
a) $10 \times 10^{-19}J$ b) $21.76 \times 10^{-19}J$ c) $13.6 \times 10^{-19}J$ d) None of these

263. The dimensions of pressure is equal to
a) Force per unit volume b) Energy per unit volume
c) Force d) energy

264. For the equation $F \propto A^a v^b d^c$, where F is the force, A is the area v is the velocity and d is the density, the value of a, b and c are respectively
a) 1,2,1 b) 2,1,1 c) 1,1,2 d) 0,1,1

265. The SI unit of universal gas constant (R) is
a) $Watt\ K^{-1}mol^{-1}$ b) $Newton\ K^{-1}mol^{-1}$ c) $Joule\ K^{-1}mol^{-1}$ d) $Erg\ K^{-1}mol^{-1}$

266. If E = energy, G = gravitational constant, I = impulse and M = mass, then dimensions of $\frac{GIM^2}{E^2}$ are same as that of
a) Time b) Mass c) Length d) Force

267. Dimensional formula for force is
a) $[M^1L^2T^{-2}]$ b) $[M^1L^1T^{-2}]$ c) $[M^1L^{-1}T^{-2}]$ d) $[M^1L^{-2}T^{-2}]$

268. Dimensions of the following three quantities are the same
a) Work, energy, force b) Velocity, momentum, impulse

c) Potential energy, kinetic energy, momentum d) Pressure, stress, coefficient of elasticity

269. A gas bubble from an explosion under water oscillates with a time period T, depends upon static pressure p, density of water ρ and the total energy of explosion E. Find the expression for the time period T.(where, k is a dimensionless constant)

a) $T = kp^{-5/6}\rho^{1/2}E^{1/3}$ b) $T = kp^{-4/7}\rho^{1/2}E^{1/3}$ c) $T = kp^{-5/6}\rho^{1/2}E^{1/2}$ d) $T = kp^{-4/7}\rho^{1/3}E^{1/2}$

270. The dimensional formula of magnetic flux is

a) $[MLT^{-2}A^{-1}]$ b) $[ML^2T^{-1}A^{-1}]$ c) $[ML^2T^{-1}A^{-2}]$ d) $[ML^2T^{-2}A^{-1}]$

271. The dimensions of K in the equation $W = \frac{1}{2}Kx^2$ is

a) $M^1L^0T^{-2}$ b) $M^0L^1T^{-1}$ c) $M^1L^1T^{-2}$ d) $M^1L^0T^{-1}$

272. $Kilowatt - hour$ is a unit of

a) Electrical charge b) Energy c) Power d) Force

273. If $L = 2.331\ cm, B = 2.1\ cm$, then $L + B =$

a) $4.431\ cm$ b) $4.43\ cm$ c) $4.4\ cm$ d) $4\ cm$

274. The dimensions of coefficient of thermal conductivity is

a) $ML^2T^{-2}K^{-1}$ b) $MLT^{-3}K^{-1}$ c) $MLT^{-2}K^{-1}$ d) $MLT^{-3}K$

275. Which of the following is a derived unit

a) Unit of mass b) Unit of length c) Unit of time d) Unit of volume

276. The density of a solid ball is to be determined in an experiment. The diameter of the ball is measured with a screw gauge, whose pitch is 0.5 mm and there are 50 divisions on the circular scale. The reading on the main scale is 2.5 mm and that on the circular scale is 20 divisions. If the measured mass of the ball has a relative error of 2%, the relative percentage error in the density is

a) 0.9% b) 2.4% c) 3.1% d) 4.2%

277. Density of a liquid in CGS system is $0.625\ g/cm^3$. What is its magnitude in SI system

a) 0.625 b) 0.0625 c) 0.00625 d) 625

278. The dimensions of magnetic field in M, L, T and C (coulomb) is given as

a) $[MLT^{-1}C^{-1}]$ b) $[MT^2C^{-2}]$ c) $[MT^{-1}C^{-1}]$ d) $[MT^{-2}C^{-1}]$

279. Which one of the following represents the correct dimensions of the coefficient of viscosity?

a) $[ML^{-1}T^{-2}]$ b) $[MLT^{-1}]$ c) $[ML^{-1}T^{-1}]$ d) $[ML^{-2}T^{-2}]$

280. When a wave traverses a medium, the displacement of a particle located at x at a time t is given by $y = a\sin(bt - cx)$, where a, b and c are constants of the wave. Which of the following is a quantity with dimensions

a) $\frac{y}{a}$ b) bt c) cx d) $\frac{b}{c}$

281. Energy per unit volume represents

a) Pressure b) Force c) Thrust d) Work

282. The unit of self inductance of a coil is

a) $Farad$ b) $Henry$ c) $Weber$ d) $Tesla$

283. The length, breadth and thickness of a metal block is given by $l = 90$ cm, $b = 8$ cm, $t = 2.45$ cm. The volume of the block is

a) $2 \times 10^2 cm^3$ b) $1.8 \times 10^2 cm^3$ c) $1.77 \times 10^2 cm^3$ d) $1.764 \times 10^2 cm^3$

284. One slug is equivalent to 14.6 kg. A force of 10 pound is applied on a body of 1 kg. The acceleration of the body is

a) $44.5\ ms^{-2}$ b) $4.448\ ms^{-2}$ c) $44.4\ ms^{-2}$ d) None of these

285. A physical quantity A is related to four observations a, b, c and d as follows, $A = \frac{a^2b^3}{c\sqrt{d}}$. The percentage error of measurement in a, b, c and d are 1%, 3%, 2% and 2% respectively. What is the percentage error in the quantity A

a) 12% b) 7% c) 5% d) 14%

286. The SI unit of electrochemical equivalent is

a) Kg C b) C kg^{-1} c) Kg C^{-1} d) kg^2C^{-1}

287. The position of a particle at time t is given by the equation $x(t) = \frac{v_0}{A}(1 - e^{At})$, v_0 = constant and $A > 0$. Dimensions of v_0 and A respectively are
a) $[M^0LT^0]$ and $[M^0L^0T^{-1}]$ b) $[M^0LT^{-1}]$ and $[M^0LT^{-2}]$
c) $[M^0LT^{-1}]$ and $[M^0L^0T]$ d) $[M^0LT^{-1}]$ and $[M^0L^0T^{-1}]$

288. Dimensions of magnetic field intensity is
a) $[M^0L^{-1}T^0A^1]$ b) $[MLT^{-1}A^{-1}]$ c) $[ML^0T^{-2}A^{-1}]$ d) $[MLT^{-2}A]$

289. If K denotes coefficient of thermal conductivity, d the density and c the specific heat, the unit of X, where $X = K/dc$ will be
a) cm sec^{-1} b) cm^2 sec^{-2} c) cm sec d) cm^2 sec^{-1}

290. The period of oscillation of a simple pendulum is given by $T = 2\pi\sqrt{\frac{l}{g}}$ where l is about 100 cm and is known to have $1mm$ accuracy. The period is about $2s$. The time of 100 oscillations is measured by a stop watch of least count 0.1 s . The percentage error in g is
a) 0.1% b) 1% c) 0.2% d) 0.8%

291. A weber is equivalent to
a) A m^{-2} b) A m^{-1} c) A m^2 d) T m^2

292. How many wavelengths of the Kr^{89} are there in one metre?
a) 658189.63 b) 2348123.73 c) 1650763.73 d) 1553164.12

293. If L and R are respectively the inductance and resistance, then the dimensions of $\frac{L}{R}$ will be
a) $M^0L^0T^{-1}$ b) M^0LT°
c) M^0L^0T d) Cannot be represented in terms of M, L and T

294. If energy (E), velocity (v) and force (F) be taken as fundamental quantity, then what are the dimensions of mass
a) Ev^2 b) Ev^{-2} c) Fv^{-1} d) Fv^{-2}

295. The physical quantities not having same dimensions are
a) Torque and work b) Momentum and Planck's constant
c) Stress and Young's modules d) Speed and $(\mu_0\varepsilon_0)^{-1/2}$

296. The Martians use force (F), acceleration (A) and time (T) as their fundamental physical quantities. The dimensions of length on Martians system are
a) FT^2 b) $F^{-1}T^2$ c) $F^{-1}A^2T^{-1}$ d) AT^2

297. In the gas equation $\left(p + \frac{a}{V^2}\right)(V - b) = RT$, the dimensions of a are
a) $[ML^3T^{-2}]$ b) $[M^{-1}L^3T^{-1}]$ c) $[ML^5T^{-2}]$ d) $[M^{-1}L^{-5}T^2]$

298. The dimension of the ratio of angular to linear momentum is
a) $M^0L^1T^0$ b) $M^1L^1T^{-1}$ c) $M^1L^2T^{-1}$ d) $M^{-1}L^{-1}T^{-1}$

299. If the acceleration due to gravity is 10 ms^{-2} and the units of length and time are changed in kilometer and hour respectively, the numerical value of the acceleration is
a) 360000 b) 72,000 c) 36,000 d) 129600

300. The dimensions of $\frac{R}{L}$ are
[here, R =electric resistance, L =self inductance]
a) $[T^{-2}]$ b) $[T^{-1}]$ c) $[ML^{-1}]$ d) [T]

301. The number of significant figures in all the given numbers 25.12, 2009, 4.156 and 1.217×10^{-4} is
a) 1 b) 2 c) 3 d) 4

302. The unit of momentum is
a) N s b) Ns^{-1} c) N m d) N m^{-1}

303. The maximum static friction on a body is $F = \mu N$. Here, N = normal reaction force on the body μ = coefficient of static friction. The dimensions of μ are
a) $[MLT^{-2}]$ b) $[M^0L^0T^0\theta^{-1}]$ c) Dimensionless d) None of these

304. The speed of light (c), gravitational constant (G) and Planck's constant (h) are taken as the fundamental units in a system. The dimension of time in this new system should be
a) $G^{1/2}h^{1/2}c^{-5/2}$ b) $G^{-1/2}h^{1/2}c^{1/2}$ c) $G^{1/2}h^{1/2}c^{-3/2}$ d) $G^{1/2}h^{1/2}c^{1/2}$

305. Dimensions of kinetic energy are
a) ML^2T^{-2} b) M^2LT^{-1} c) ML^2T^{-1} d) ML^3T^{-1}

306. The air bubble formed by explosion inside water performed oscillation with time period T that is directly proportional to $p^a\ d^b\ E^c$, where p is the pressure, d is the density and E is the energy due to explosion. The values of a, b and c will be
a) -5/6, 1/2, 1/3 b) 5/6, 1/3, 1/2 c) 5/6, 1/2, 1/3 d) None of these

307. Identify the pair whose dimensions are equal
a) Torque and work b) Stress and energy c) Force and stress d) Force and work

308. Which of the following cannot be regarded as an essential characteristic of a unit of measurement?
a) Inaccessibility b) Indenstructibility
c) Invariability d) Reproductibility

309. What is the power of a 100 W bulb in CGS units?
a) $10^6 ergs^{-1}$ b) $10^7 ergs^{-1}$ c) $10^9 ergs^{-1}$ d) $10^{11} ergs^{-1}$

310. The pressure on a square plate is measured by measuring the force on the plate and the length of the sides of the plate by using the formula $p = \frac{F}{l^2}$. If the maximum errors in the measurement of force and length are 4% and 2% respectively, then the maximum error in the measurement of pressure is
a) 1% b) 2% c) 8% d) 10%

311. How many wavelengths of Kr^{86} are there in one $metre$
a) 1553164.13 b) 1650763.73 c) 652189.63 d) 2348123.73

312. One femtometre is equivalent to
a) 10^{15} m b) 10^{-15} m c) 10^{-12} m d) 10^{12} m

313. A rectangular beam which is supported at its two ends and leaded in the middle with weight w sags by an amount δ such that $\delta = \frac{wl^3}{4Yd^3}$, where l, d and Y represent length, depth and elasticity respectively. Guess the unknown factor using dimensional considerations
a) Breadth b) (breadth)^2 c) (breadth)^3 d) Mass

314. The unit of L/R is (where L =inductance and R = Resistance)
a) Sec b) Sec^{-1} c) $Volt$ d) $Ampere$

315. The dimensions of $calorie$ are
a) ML^2T^{-2} b) MLT^{-2} c) ML^2T^{-1} d) ML^2T^{-3}

316. The dimensions of potential are the same as that of
a) Work b) Electric field per unit charge
c) Work per unit charge d) Force per unit charge

317. If the units of M and L are increased three times, then the unit of energy will be increased by
a) 3 times b) 6 times c) 27 times d) 81 times

318. Dimensions of resistance in an electrical circuit, in terms of dimension of mass M, of length L, of time T and current I, would be
a) $[ML^2T^{-3}I^{-1}]$ b) $[ML^2T^{-2}]$ c) $[ML^2T^{-1}I^{-1}]$ d) $[ML^2T^{-3}I^{-2}]$

319. An athletic coach told his team that muscle times speed equals power. What dimensions does he view for muscle
a) MLT^{-2} b) ML^2T^{-2} c) MLT^2 d) L

320. The following observations were take for determining surface tension of water by capillary tube method. Diameter of capillary, $D = 1.25 \times 10^{-2}$ m and rise of water in capillary. $h = 1.46 \times 10^{-2}$m

Taking g $= 9.80\text{ms}^{-2}$ and using the relation $T = (rgh/2) \times 103\text{Nm}^{-1}$, what is the possible error in surface tension$T$?

a) 2.4% b) 15% c) 1.6% d) 0.15%

321. $X = 3YZ^2$ find dimension of Y in (MKSA) system, If X and Z are the dimensions of capacity and magnetic field respectively

a) $M^{-3}L^{-2}T^{-4}A^{-1}$ b) ML^{-2} c) $M^{-3}L^{-2}T^{4}A^{4}$ d) $M^{-3}L^{-2}T^{8}A^{4}$

322. Student I, II and III perform an experiment for measuring the acceleration due to gravity (g) using a simple pendulum. They use different lengths of the pendulum and/or record time for different number of oscillations. The observations are shown in the table..

Least count for length = 0.1 cm.

Least count for time = 0.1 s.

Student	Length of the pendulum (cm)	Number of oscillations (n)	Total time for (n) oscillations (s)	Time period (s)
I	64.0	8	128.0	16.0
II	64.0	4	64.0	16.0
III	20.0	4	36.0	9.0

If E_1, E_{II} and E_{III} are the percentage errors in g, $ie, \left(\frac{\Delta g}{g} \times 100\right)$, for students I, II and III respectively.

a) $E_{\text{I}} = 0$

b) E_{I} is minimum

c) $E_{\text{I}} = E_{\text{II}}$

d) E_{II} is maximum

323. The physical quantity which has dimensional formula as that of $\frac{\text{Energy}}{\text{Mass} \times \text{Length}}$ is

a) Force b) Power c) Pressure d) Acceleration

324. Young's modulus of a material has the same units as

a) Pressure b) Strain c) Compressibility d) Force

325. The dimensional formula for $r.m.s.$ (root mean square) velocity is

a) M^0LT^{-1} b) $M^0L^0T^{-2}$ c) $M^0L^0T^{-1}$ d) MLT^{-3}

326. Dimensions of potential energy are

a) MLT^{-1} b) ML^2T^{-2} c) $ML^{-1}T^{-2}$ d) $ML^{-1}T^{-2}$

327. The unit of $e.m.f.$ is

a) $Joule$ b) $Joule - coulomb$ c) $Volt - coulomb$ d) $Joule/coulomb$

328. A student performs an experiment for determination of $g = \frac{4\pi^2 l}{T^2}$ and he commits an error of Δl. For that he takes the time of n oscillations with the stop watch of least count ΔT and he commits a human error of $0.1\ sec$. For which of the following data, the measurement of g will be most accurate

	Δl	ΔT	n	Ampli. of oscill.
a)	$5\ mm$	$0.2sec$	10	$5mm$
b)	$5\ mm$	$0.2sec$	20	$5mm$
c)	$5\ mm$	$0.1sec$	20	$1mm$
d)	$1\ mm$	$0.1sec$	50	$1mm$

329. If C is capacitance and q is charge, then the dimension of q^2/C is same as that of

a) Work b) Angular momentum c) Force d) Torque

330. Error in the measurement of radius of sphere is 2%. The error in the measurement of volume is

a) 1% b) 5% c) 3% d) 6%

331. Curie is a unit of

a) Energy of γ-rays b) Half life c) Radioactivity d) Intensity of γ-rays

332. Which has not the same unit as other?
a) Watt-sec b) Kilowatt-hour c) eV d) Js

333. The length of a cube is 2.1×10^{-2}m. the volume in significant figures will be
a) $9.2 \times 10^{-6}\text{m}^3$ b) $9.3 \times 10^{-6}\text{m}^3$ c) $9.26 \times 10^{-6}\text{m}^3$ d) $9.261 \times 10^{-6}\text{m}^3$

334. Position of a body with acceleration a is given by $x = ka^m\, t^n$. Here t is time. Find the dimensions of m and n.
a) $m = 1, n = 1$ b) $m = 1, n = 2$ c) $m = 2, n = 1$ d) $m = 2, n = 2$

335. Which one of the following units is not that of mutual inductance?
a) Henry b) $(\text{Weber})^{-1}$
c) Ohm second d) Volt second $(\text{ampere})^{-1}$

336. Two quantities A and B are related by the relation $\frac{A}{B}$=m, where m is linear mass den sity and A is force. The dimensions of B will be
a) Mass as that of latent heat b) Same a that of pressure
c) Same as that of work d) Same as that of momentum

337. The dimensions of electric potential are
a) $[\text{ML}^2\text{T}^{-2}\text{Q}^{-1}]$ b) $[\text{MLT}^{-2}\text{Q}^{-1}]$ c) $[\text{ML}^2\text{T}^{-1}\text{Q}]$ d) $[\text{ML}^2\text{T}^{-2}\text{Q}]$

338. The dimensions of gravitational constant G and the moment of inertia are respectively
a) $[\text{ML}^3\text{T}^{-2}]; [\text{ML}^2\text{T}^0]$ b) $[\text{M}^{-1}\text{L}^3\text{T}^{-2}]; [\text{ML}^2\text{T}^0]$ c) $[\text{M}^{-1}\text{L}^3\text{T}^{-2}]; [\text{M}^{-1}\text{L}^2\text{T}]$ d) $[\text{ML}^3\text{T}^{-2}]; [\text{M}^{-1}\text{L}^2\text{T}]$

339. The unit of absolute permittivity is
a) $Fm\ \ (farad - metre)$ b) $Fm^{-1}\ (farad/metre)$
c) $Fm^{-2}\ (farad/metre^2)$ d) F (farad)

340. $[\text{ML}^2\text{L}^{-2}]$ are dimensions of
a) Force b) Moment of force c) Momentum d) Power

341. the dimensional formula of latent heat is
a) $[\text{M}^0\text{L}^2\text{T}^{-2}]$ b) $[\text{MLT}^2]$ c) $[\text{ML}^2\text{T}^{-2}]$ d) $[\text{MLT}^{-1}]$

342. Which of the following is not the unit of energy
a) *Calorie* b) *Joule* c) *Electron volt* d) *Watt*

343. The unit of nuclear dose given to a patient is
a) *Fermi* b) Rutherford c) Curie d) Roentgen

344. The least count of a stop watch is 0.2 s. The time of 20 oscillations of a pendulum is measured to be 25 s. The percentage error in the measurement of time will be
a) 8% b) 1.8% c) 0.8% d) 0.1%

345. The dimensions of resistance are same as those of ……. Where h is the Planck's constant and e is the charge.
a) $\frac{h^2}{e^2}$ b) $\frac{h^2}{e}$ c) $\frac{h}{e^2}$ d) $\frac{h}{e}$

346. The dimensional formula of magnetic permeability is
a) $[\text{M}^0\text{L}^{-1}\text{T}]$ b) $[\text{M}^0\text{L}^2\text{T}^{-1}]$ c) $[\text{M}^0\text{L}^2\text{T}^{-1}\text{A}^2]$ d) $[\text{MLT}^{-2}\text{A}^{-2}]$

347. The dimensional formula for young's modulus is
a) $ML^{-1}T^{-2}$ b) M^0LT^{-2} c) MLT^{-2} d) ML^2T^{-2}

348. $ML^3T^{-1}Q^{-2}$ is dimensions of
a) Resistivity b) Conductivity c) Resistance d) None of these

349. The relative density of the material of a body I the ratio of its weight in air and the loss of its weight in water. By using a spring balance, the weight of the body in air in measured to be 5.00 ±0.05N. The weight of the body in water is measured to be 4.00 ± 0.05N. Then the maximum possible percentage error in relative density is
a) 11% b) 10% c) 9% d) 7%

350. If the unit of length and force be increased four times, then the unit of energy is

a) Increased 4 times b) Increased 8 times c) Increased 16 times d) Decreased 16 times

351. The physical quantity which has the dimensional formula $[M^1T^{-3}]$ is
a) Surface tension b) Density c) Solar constant d) Compressibility

352. Unit of surface tension is
a) Nm^{-1} b) Nm^{-2} c) N^2m^{-1} d) Nm^{-3}

353. The magnetic force on a point moving charge is $\vec{F} = q(\vec{V} \times \vec{B})$.
Here, q =electric charge
$\vec{V}$ = velocity of the point charge
$\vec{B}$ =magnetic field
The dimensions of $\vec{B}$
a) $[MLT^{-1}A]$ b) $[MLT^{-2}A^{-1}]$ c) $[MT^{-1}A^{-1}]$ d) None of these

354. IF L, C and R denote the inductance, capacitance and resistance respectively, the dimensional formula for C^2LR is
a) $[ML^{-2}T^{-1}I^0]$ b) $[M^0L^0T^3I^0]$ c) $[M^{-1}L^{-2}T^6\,I^2]$ d) $[M^0L^0T^2I^0]$

355. The dimensions of $e^2/4\pi\varepsilon_0 hc$, where e, ε_0, h and c are electronic charge, electric permittivity, Planck's constant and velocity of light in vacuum respectively, are
a) $[M^0L^0T^0]$ b) $[ML^0T^0]$ c) $[M^0LT^0]$ d) $[M^0L^0T^1]$

356. The period of a body under SHM is represented by $T = P^aD^bS^c$; where P is pressure, D is density and S is surface tension. The value of a, b and c are
a) $-\frac{3}{2}, \frac{1}{2}, 1$ b) $-1, -2, 3$ c) $\frac{1}{2}, -\frac{3}{2}, -\frac{1}{2}$ d) $1, 2, \frac{1}{3}$

357. $Faraday$ is the unit of
a) Charge b) Emf c) Mass d) Energy

358. If $X = A \times B$ and ΔX and ΔA and ΔB are maximum absolute errors in X, A and B respectively, then the maximum relative error in X is given by
a) $\Delta X = \Delta A + \Delta B$ b) $\Delta X = \Delta A - \Delta B$ c) $\frac{\Delta X}{X} = \frac{\Delta A}{A} - \frac{\Delta B}{B}$ d) $\frac{\Delta X}{X} = \frac{\Delta A}{A} + \frac{\Delta B}{B}$

359. The dimensions of Planck's constant are
a) $[M^2L^2T^{-2}]$ b) $[MLT^{-2}]$ c) $[ML^2T^{-2}]$ d) $[ML^2T^{-1}]$

360. A student performs an experiment to determine the Young's modulus of a wire, exactly 2 m long, by Searle's method. In a particular reading, the student measures the extension in the length of the wire to be 0.8 mm with an uncertainty of $\pm$ 0.05 mm at a load of exactly 1.0 kg. The student also measures the diameter of the wire to be 0.4mm with an uncertainty of $\pm$ 0.01 mm. Take g = 9.8 ms^{-2} (exact). The Young's modulus obtained from the reading is
a) $(2.0 \pm 0.3) \times 10^{11}Nm^{-2}$ b) $(2.0 \pm 0.2) \times 10^{11}Nm^{-2}$
c) $(2.0 \pm 0.1) \times 10^{11}Nm^{-2}$ d) $(2.0 \pm 0.05) \times 10^{11}Nm^{-2}$

361. Tesla is a unit for measuring
a) Magnetic moment b) Magnetic induction
c) Magnetic intensity d) Magnetic pole strength

362. The mass of a box is 2.3 g. Two gold pieces, each of mass 0.035 g, are placed in it. The total mass of the box and gold pieces is
a) 2.3 g b) 2.4 g c) 2.37 g d) 2.370 g

363. The dimensions of $\frac{a}{b}$ in the equation $p = \frac{a - t^2}{bx}$ where p is pressure, x is distance and t is time, are
a) $[M^2LT^{-3}]$ b) $[MT^{-2}]$ c) $[LT^{-3}]$ d) $[ML^3T^{-1}]$

364. If velocity v, acceleration A and force F are chosen a fundamental quantities, then the dimensional formula of angular momentum in terms of v, A and F would be
a) $FA^{-1}v$ b) Fv^3A^{-2} c) Fv^2A^{-1} d) $F^2v^2A^{-1}$

365. $[ML^2T^{-3}A^{-2}]$ is the dimensional formula of
a) Electric resistance b) Capacity c) Electric potential d) Specific resistance

366. The dimensions of CV^2 matches with the dimensions of
a) L^2I b) L^2I^2 c) LI^2 d) $\frac{1}{LI}$

367. To determine the Young's modulus of a wire, the formula is $Y = \frac{F}{A} \times \frac{L}{\Delta L}$; where L = length, A = area of cross-section of the wire, ΔL = change in length of the wire when stretched with a force F. The conversion factor to change it from CGS to MKS system is
a) 1 b) 10 c) 0.1 d) 0.01

368. If C and L denote capacitance and inductance respectively, then the dimensions of LC are
a) $M^0L^0T^0$ b) $M^0L^0\,T^2$ c) $M^2L^0T^2$ d) MLT^2

369. The potential energy of a particle varies with distance x from a fixed origin as $U = \left(\frac{A\sqrt{X}}{x+B}\right)$; where A and B are constants. The dimensions of AB are
a) $[ML^{5/2}T^{-2}]$ b) $[ML^2T^{-2}]$ c) $[M^{3/2}L^{3/2}T^{-2}]$ d) $[ML^{7/2}T^{-2}]$

370. Dimensional formula for torque is
a) L^2MT^{-2} b) $L^{-1}MT^{-2}$ c) L^2MT^{-3} d) LMT^{-2}

371. Dimensions of CR are those of
a) Frequency b) Energy c) Time period d) Current

372. The dimensions of inter atomic force constant are
a) MT^{-2} b) MLT^{-1} c) MLT^{-2} d) $ML^{-1}T^{-1}$

373. The ratio of 1 kWh to 1 MeV is
a) 2.25×10^{17} b) 2.25×10^{19} c) 2.25×10^{23} d) $2.25 \times 4.4 \times 10^9$

374. The physical quantity that has no dimensions is
a) Angular Velocity b) Linear momentum c) Angular momentum d) Strain

375. Out of the following pairs, which one does not have identical dimensions?
a) Angular momentum and Planck's constant b) Impulse and momentum
c) Moment of inertia and moment of a force d) Work and torque

376. A physical quantity is given by $X = M^aL^bT^c$. The percentage error in measurement of M, L and T are α, β and γ respectively. The maximum percentage error in the quantity X is
a) $a\alpha + b\beta + c\gamma$ b) $a\alpha + b\beta - c\gamma$ c) $\frac{a}{\alpha} + \frac{b}{\beta} + \frac{c}{\gamma}$ d) None of these

377. $[ML^{-2}T^{-2}]$ represents dimensional formula of which of the following physical quantities?
a) Energy b) pressure c) Torque d) Pressure gradient

378. Which of the following pairs does not have similar dimensions
a) Stress and pressure b) Angle and strain
c) Tension and surface tension d) Planck's constant and angular momentum

379. Density of liquid in CGS system is 0.625 g cm^{-3}. What is its magnitude in SI system?
a) 0.625 b) 0.0625 c) 0.00625 d) 625

380. Taking frequency f, velocity v and density ρ to be the fundamental quantities, then the dimensional formula for momentum will be
a) $[\rho v^4 f^{-3}]$ b) $[\rho v^3 f^{-1}]$ c) $[\rho v f^2]$ d) $[\rho^2 v^2 f^2]$

381. Oersted is a unit of
a) Dip b) Magnetic intensity c) Magnetic moment d) Pole strength

382. One nanometre is equal to
a) $10^9\ mm$ b) $10^{-6} cm$ c) $10^{-7} cm$ d) $10^{-9} cm$

383. If the length of rod A is $3.25 \pm 0.01\ cm$ and that of B is $4.19 \pm 0.01\ cm$ then the rod B is longer than rod A by
a) $0.94 \pm 0.00\ cm$ b) $0.94 \pm 0.01\ cm$ c) $0.94 \pm 0.02\ cm$ d) $0.94 \pm 0.005\ cm$

384. If force (F), length (L) and time (T) are assumed to be fundamental units, then the dimensional formula of the mass will be
a) $FL^{-1}T^{2}$ b) $FL^{-1}T^{-2}$ c) $FL^{-1}T^{-1}$ d) $FL^{2}T^{2}$

385. The dimensions of surface tension are
a) $ML^{-1}T^{-2}$ b) MLT^{-2} c) $ML^{-1}T^{-1}$ d) MT^{-2}

386. Unit of power is
a) $Kilowatt$ b) $Kilowatt\text{-}hour$ c) $Dyne$ d) $Joule$

387. Which of the following is dimensionally correct
a) Pressure = Energy per unit area
b) Pressure = Energy per unit volume
c) Pressure = Force per unit volume
d) Pressure = Momentum per unit volume per unit time

388. The sides of a rectangle are 6.01 m and 12m. taking the significant figures into account, the area of the rectangle is
a) 7.2 m^2 b) 72.1 m^2 c) 72.00 m^2 d) 72.12 m^2

389. The unit of angular acceleration in the SI system is
a) $N\ kg^{-1}$ b) ms^{-2} c) $rad\ s^{-2}$ d) $m\ kg^{-1}K$

390. If the unit of force is 1 kN, the length is 1 km and time is 100 s, what will be the unit of mass?
a) 1 kg b) 100 kg c) 1000 kg d) 10000 kg

391. Two full turns of the circular scale of a screw gauge cover a distance of $1\ mm$ on its main scale. The total number of divisions on the circular scale is 50. Further, it is found that the screw gauge has a zero error of -0.03 mm. While measuring the diameter of a thin wire, a student notes the main scale reading of 3 mm and the number of circular scale divisions in line with the main scale as 35. The diameter of the wire is
a) 3.73 mm b) 3.67 mm c) 3.38 mm d) 3.32 mm

392. $[ML^{3}T^{-1}Q^{-2}]$ is the dimensional formula of
a) Resistance b) Resistivity c) Conductance d) Conductivity

393. The damping force of an oscillating particle is observed to be proportional to velocity. The constant of proportionality can be measured in
a) Kg s^{-1} b) Kg s c) Kg ms^{-1} d) Kg $m^{-1}s^{-1}$

394. A physical quantity is represented by $X = M^{\alpha}L^{b}T^{-c}$. If percentage errors in the measurements of M, L and T are $\alpha\%, \beta\%$and $\gamma\%$ respectively, then total, percentage error is
a) $(\alpha a + \beta b - \gamma c)\%$ b) $(\alpha a + \beta b + \gamma c)\%$ c) $(\alpha a - \beta b - \gamma c)\%$ d) 0%

395. The value of $0.99-0.989$ is
a) 0.001 b) 0.010×10^{-1} c) 0.01×10^{-1} d) 0.1×10^{-3}

396. The dimensional formula for areal velocity is
a) $[M^{0}L^{-2}T]$ b) $[M^{0}L^{-2}T^{-1}]$ c) $[M^{0}L^{2}T^{-1}]$ d) $[M^{0}L^{2}T]$

397. Temperature can be expressed as a derived quantity in terms of any of the following
a) Length and mass b) Mass and time
c) Length, mass and time d) None of these

398. Unit of stress is
a) N/m b) $N - m$ c) N/m^2 d) $N - m^2$

399. If $f = x^2$, then the relative error in f is
a) $\frac{2\Delta x}{x}$ b) $\frac{(\Delta x)^2}{x}$ c) $\frac{\Delta x}{x}$ d) $(\Delta x)^2$

400. If the velocity of light (c), gravitational constant (G) and Planck's constant (h) are chosen as fundamental units, then the dimensions of mass in new system is
a) $c^{1/2}G^{1/2}h^{1/2}$ b) $c^{1/2}G^{1/2}h^{-1/2}$ c) $c^{1/2}G^{-1/2}h^{1/2}$ d) $c^{-1/2}G^{1/2}h^{1/2}$

401. The dimensions of resistivity in terms of M, L, T and Q where Q stands for the dimensions of charge, is
a) $ML^{3}T^{-1}Q^{-2}$ b) $ML^{3}T^{-2}Q^{-1}$ c) $ML^{2}T^{-1}Q^{-1}$ d) $MLT^{-1}Q^{-1}$

402. A spectrometer gives the following reading when used to measure the angle of a prism
Main scale reading : 58.5 degree
Vernier scale reading : 09 divisions
Given that 1 division on main scale corresponds to 0.5 degree. Total divisions on the vernier scale is 30 and match with 29 divisions of the main scale. The angle of the prism from the above data
a) 58.59 *Degree* b) 58.77 *Degree* c) 58.65 *Degree* d) 59 *Degree*

403. Ampere-hour is the unit of
a) Quantity of charge b) Potential c) Energy d) Current

404. A physical quantity u is given by the relation $u = \frac{B^2}{2\mu_0}$
here, B =magnetic field strength
μ_0 =magnetic permeability of vacuum.
a) Energy b) Energy density c) Pressure d) None of these

405. Which does not have the same unit as others
a) *Watt-sec* b) *Kilowatt-hour* c) *eV* d) *J-sec*

406. The radius of a wire is 0.24 mm. Then its area of cross section by taking significant figures into consideration is
a) 0.1 mm^2 b) 0.2 mm^2 c) 0.18 mm^2 d) 0.180 mm^2

407. The expression $[ML^{-1}T^{-1}]$ represents
a) Momentum b) Force
c) Pressure d) Coefficient of viscosity

408. In an experiment the angles are required to be measured using an instrument. 29 divisions of the main scale exactly coincide with the 30 divisions of the vernier scale. If the smallest division of the main scale is half-a-degree (= 0.5°), then the least count of the instrument is
a) One minute b) Half minute c) One degree d) Half degree

409. The length, breadth and thickness of a block is measured to be 50 cm, 2.0 cm and 1.00 cm. The percentage error in the measurement of volume is
a) 0.8 % b) 8% c) 10% d) 12.5%

410. Given that v is speed, r is the radius and g is the acceleration due to gravity. Which of the following is dimensionless
a) v^2/rg b) v^2r/g c) v^2g/r d) v^2rg

411. The focal length of a mirror is given by $\frac{1}{f} = \frac{1}{u} + \frac{1}{v}$ where u and v represent object and image distances respectively. The maximum relative error in f is
a) $\frac{\Delta f}{f} = \frac{\Delta u}{u} + \frac{\Delta v}{v}$ b) $\frac{\Delta f}{f} = \frac{1}{\Delta u/u} + \frac{1}{\Delta v/v}$
c) $\frac{\Delta f}{f} = \frac{\Delta u}{u} + \frac{\Delta v}{v} - \frac{\Delta(u+v)}{u+v}$ d) $\frac{\Delta f}{f} = \frac{\Delta u}{u} + \frac{\Delta v}{v} + \frac{\Delta u}{u+v} + \frac{\Delta v}{u+v}$

412. The equation of alternating current is $I = I_0 e^{-t/CR}$, where t is time, C is capacitance and R is resistance of coil, then the dimensions of $C\ R$ is
a) $[MLT^{-1}]$ b) $[M^0LT]$ c) $[M^0L^0T]$ d) None of these

413. The refractive index of a material is given by the equation $n = \frac{A+B}{\lambda^2}$, where A and B are constant. The dimensional formula for B is
a) $[M^0L^2T^{-1}]$ b) $[M^0L^{-2}T^0]$ c) $[M^0L^2T^{-2}]$ d) $[M^0L^2T^0]$

414. There are atomic clocks capable of measuring time with an accuracy of 1 part in 10^{11}. If two such clocks are operated with precision, then after running for 5000 years, these will record
a) A difference of nearly 1 s b) A difference of 1 day
c) A difference of 10^{11} s d) A difference of 1 year

415. R, L and C represent the physical quantities resistance, inductance and capacitance respectively. Which one of the following combination has dimension of frequency?

a) $\frac{1}{\sqrt{RC}}$ b) $\frac{R}{L}$ c) $\frac{1}{LC}$ d) $\frac{C}{L}$

416. Wavelength of ray of light is 0.00006 m. It is equal to
a) 6 $micron$ b) 60 $micron$ c) 600 $micron$ d) 0.6 $micron$

417. Dimensions of permeability are
a) $A^{-2}M^1L^1T^{-2}$ b) MLT^{-2} c) ML^0T^{-1} d) $A^{-1}MLT^2$

418. If L denotes the inductance of an inductor through which a current i is flowing, the dimensions of Li^2 are
a) ML^2T^{-2} b) Not expressible in MLT
c) MLT^{-2} d) $M^2L^2T^{-2}$

419. Ins is defined as
a) 10^{-9} s of Kr – clock of 1650763.73 oscillations
b) 10^{-9} s of Kr – clock of 6521389.63 oscillations
c) 10^{-9} s of Cs – clock of 1650763.73 oscillations
d) 10^{-9} s of Cs – clock of 9192631770 oscillations

420. Density of wood is 0.5 gm/cc in the CGS system of units. The corresponding value in MKS units is
a) 500 b) 5 c) 0.5 d) 5000

421. Unit of moment of inertia in MKS system
a) $kg \times cm^2$ b) kg/cm^2 c) $kg \times m^2$ d) $Joule \times m$

422. The percentage error in the above problem is
a) 7% b) 5.95% c) 8.95% d) 9.85%

423. Force constant has the same dimensions as
a) Coefficient of viscosity b) Surface tension
c) Frequency d) Impulse

424. A physical quantity P is given by $P = \frac{A^3B^{\frac{1}{2}}}{C^{-4}D^{\frac{3}{2}}}$. The quantity which brings in the maximum percentage error in P is
a) A b) B c) C d) D

425. The surface tension is $T = \frac{F}{l}$, then the dimensions of surface tension are
a) $[MLT^{-2}]$ b) $[MT^{-2}]$ c) $[M^0L^0T^0]$ d) None of these

426. What is dimensional formula of thermal conductivity?
a) $[MLT^{-1}\theta^{-1}]$ b) $[MLT^{-3}\theta^{-1}]$ c) $[M^2LT^{-3}\theta^{-2}]$ d) $[ML^2T^{-2}\theta]$

427. Universal time is based on
a) Rotation of the earth on its axis b) Earth's orbital motion around the Sun
c) Vibrations of cesium atom d) Oscillations of quartz crystal

428. If F denotes force and t time, then in equation $F = at^{-1} + bt^2$, the dimensions of a and b respectively are
a) $[LT^{-4}]$ and $[LT^{-1}]$ b) $[LT^{-1}]$ and $[LT^{-4}]$ c) $[MLT^{-4}]$ and $[MLT^{-1}]$ d) $[MLT^{-1}]$ and $[MLT^{-4}]$

429. Identify the pair which has different dimensions
a) Planck's constant and angular momentum b) Impulse and linear momentum
c) Angular momentum and frequency d) Pressure and Young's modulus

430. If voltage $V = (100 \pm 5)$ volt and current $I = (10 \pm 0.2)$ A, the percentage error in resistance R is
a) 5.2% b) 25% c) 7% d) 10%

431. Dimensions of ohm are same as (h –Planck's constant, e –charge)
a) h/e b) h^2/e c) h/e^2 d) h^2e^2

432. The respective number of significant figures for the numbers 23.023, 0.0003 and 2.1×10^{-3} are
a) 4, 4, 2 b) 5, 1, 2 c) 5, 1, 5 d) 5, 5, 2

433. The difference in the lengths of a mean solar day and a sidereal day is about
a) 1 min b) 4 min c) 15 min d) 56 min

434. Electron $volt$ is a unit of

a) Charge b) Potential difference c) Momentum d) Energy

435. The measured mass and volume of a body are 23.42 g and 4.9 cm^3 respectively with possible error 0.01 g and 0.1 cm^3. The maximum error in density is nearly
a) 0.2% b) 2% c) 5% d) 10%

436. In the relation $y = a\cos(\omega t - kx)$, the dimensional formula for k is
a) $[M^0L^{-1}T^{-1}]$ b) $[M^0LT^{-1}]$ c) $[M^0L^{-1}T^0]$ d) $[M^0LT]$

437. A quantity X is given by $\varepsilon_0 L\frac{\Delta V}{\Delta t}$, where ε_0 is the permittivity of free space, L is a length, ΔV is a potential difference and Δt is a time interval. The dimensional formula for X is the same as that of
a) Electrical resistance b) Electric charge c) Electric voltage d) Electric current

438. Dimension of electric current is
a) $[M^0L^0T^{-1}Q]$ b) $[ML^2T^{-1}Q]$ c) $[M^2LT^{-1}Q]$ d) $[M^2L^2T^{-1}Q]$

439. The velocity of a particle (v) at an instant t is given by $v = at + bt^2$ the dimension of b is
a) L b) LT^{-1} c) $LT^{-}2$ d) LT^{-3}

440. The dimensions of emf in MKS is
a) $[ML^{-1}T^{-2}Q^{-2}]$ b) $[ML^{-2}T^{-2}Q^{-2}]$ c) $[MLT^{-2}Q^{-1}]$ d) $[ML^2T^{-2}Q^{-1}]$

441. Number of particles is given by $n = -D\frac{n_2-n_1}{x_2-x_1}$ crossing a unit area perpendicular to X-axis in unit time, where n_1 and n_2 are number of particles per unit volume for the value of x meant to x_2 and x_1. Find dimensions of D called as diffusion constant
a) M^0LT^2 b) $M^0L^2T^{-4}$ c) M^0LT^{-3} d) $M^0L^2T^{-1}$

442. If the velocity v(is cms^{-1}) of a particle is given in terms of t (in second) by the relation $v = at + \frac{b}{t+c}$ then, the dimensions of a, b and c are
a b c
a) [L] [LT] $[T^2]$ b) $[L^2]$ [T] $[LT^{-2}]$ c) $[LT^2]$ [LT] [L] d) $[LT^{-2}]$ [L] [T]

443. A current of 2..34 A flows in a resistance of 11.111111Ω. The potential difference across the given resistance with due regard for significant figure is
a) 26.000 V b) 26.00 V c) 26.0 V d) 26 V

444. The dimensions of Planck's constant is same as that of
a) Angular momentum b) Linear momentum
c) Work d) Coefficient of viscosity

445. Solar constant is defined as energy received by earth per cm^2 per minute. The dimensions of solar constant are
a) $[ML^2T^{-3}]$ b) $[M^2L^0T^{-1}]$ c) $[ML^0T^{-3}]$ d) $[MLT^{-2}]$

446. Dimensional formula for volume elasticity is
a) $M^1L^{-2}T^{-2}$ b) $M^1L^{-3}T^{-2}$ c) $M^1L^2T^{-2}$ d) $M^1L^{-1}T^{-2}$

447. If p represents radiation pressure, C represents speed of light and q represents radiation energy striking a unit area per second, then non-zero integers a, b and c are such that $p^aq^bC^c$ is dimensionless, then
a) $a = 1, b = 1, c = -1$ b) $a = 1, b = -1, c = 1$
c) $a = -1, b = 1, c = 1$ d) $a = 1, b = 1, c = 1$

448. The unit of reactance is
a) Ohm b) $Volt$ c) Mho d) $Newton$

449. A wire has a mass 0.3 $\pm$ 0.003 g, radius 0.5 $\pm$ 0.005 mm and length 6 $\pm$ 0.06 cm. The maximum percentage error in the measurement of its density is
a) 1 b) 2 c) 3 d) 4

450. A highly rigid cubical block A of small mass M and side L is fixed rigidly on to another cubical block of same dimensions and of low modulus of rigidity η such that the lower face of A completely covers the upper face of B. The lower face of B is rigidly held on a horizontal surface. A small force F is applied perpendicular to one of the side faces of A. After the force is withdrawn, block A executes small oscillations, the time period o which is given by

a) $2\pi\sqrt{M\eta L}$ b) $2\pi\sqrt{\frac{M\eta}{L}}$ c) $2\pi\sqrt{\frac{ML}{\eta}}$ d) $2\pi\sqrt{\frac{M}{\eta L}}$

451. Dimensions of coefficient of viscosity are
a) ML^2T^{-2} b) ML^2T^{-1} c) $ML^{-1}T^{-1}$ d) MLT

452. Which physical quantities have same dimensions
a) Force and power b) Torque and energy c) Torque and power d) Force and torque

453. If L, C and R represent inductance, capacitance and resistance respectively, then which of the following does not represent dimensions of frequency
a) $\frac{1}{RC}$ b) $\frac{R}{L}$ c) $\frac{1}{\sqrt{LC}}$ d) $\frac{C}{L}$

454. Which of the following is/are the units of strength of magnetic field at a point?
a) NA m^{-1} b) NA m c) NA^{-1} m^{-1} d) NA^{-2} m^{-2}

455. A screw gauge gives the following reading when used to measure the diameter of a wire
Main scale reading : 0 mm
Circular scale reading : 52 divisions
Given that 1 mm on main scale corresponds to 100 divisions on the circular scale.
The diameter of wire from the above data is
a) 0.52 cm b) 0.052 cm c) 0.026 cm d) 0.005 cm

456. The energy (E), andgular momentum (L) and universal gravitational constant (G) are chosen as fundamental quantities. The dimensions of universal gravitational constant in the dimensional formula of Planck's constant (h) is
a) Zero b) -1 c) $\frac{5}{3}$ d) 1

457. A thin copper wire of length l $metre$ increases in length by 2% when heated through 10^oC. What is the percentage increase in area when a square copper sheet of length l $metre$ is heated through 10^oC
a) 4% b) 8% c) 16% d) None of the above

458. Which one of the following is not a fundamental SI unit?
a) Ampere b) Candela c) Newton d) Kelvin

459. Find the dimensions of electric permittivity
a) $[A^2M^{-1}L^{-3}T^4]$ b) $[A^2M^{-1}L^{-3}T^0]$ c) $[AM^{-1}L^{-3}T^4]$ d) $[A^2M^0L^{-3}T^4]$

460. The respective number of significant figures for the numbers 23.02310.0003 and 2.1×10^{-3} are
a) 5, 1, 2 b) 5, 1, 5 c) 5, 5, 2 d) 4, 4, 2

461. A body travels uniformly a distance of (13.8 ± 0.2) m in a time (4.0 ± 0.3) s. The velocity of the body within error limits is
a) (3.45 ± 0.2) ms^{-1} b) (3.45 ± 0.3) ms^{-1} c) (3.45 ± 0.4) ms^{-1} d) (3.45 ± 0.5) ms^{-1}

462. The force F on the sphere of radius 'a' moving in a medium with velocity 'v' is given by $F = 6\pi\eta av$. The dimensions of η are
a) $ML^{-1}T^{-1}$ b) MT^{-1} c) MLT^{-2} d) ML^{-3}

463. Given that $2l\sqrt{\frac{m}{T}}$, where l is the length of a string of linear density m, under tension T ha the same dimensional formula as that of
a) Mass b) Time c) Length d) Mole

464. In C.G.S. system the magnitude of the force is 100 $dyne$. In another system where fundamental physical quantities are kilogram, $metre$ and minute, the magnitude of the force is
a) 0.036 b) 0.36 c) 3.6 d) 36

465. The length of a simple pendulum is about 100 cm known to an accuracy of 1 mm. Its period of oscillation is 2s determined by measuring the time for 100 oscillations using a clock of 0.1 s resolution. What is the accuracy in the determined value of g?
a) 0.2% b) 0.5% c) 0.1% d) 2%

466. Which one of the following pairs of quantities and their units is a proper match
   a) Electric field-$coulomb/m$ b) Magnetic flux-$weber$
   c) Power-$farad$ d) Capacitance-$henry$
467. Which of the following units denotes the dimensions ML^2/Q^2, where Q denotes the electric charge
   a) Henry (H) b) H/m^2 c) Weber (Wb) d) Wb/m^2
468. The dimensional formula for the magnetic field is
   a) $[MT^{-2}A^{-1}]$ b) $[ML^2T^{-1}A^{-2}]$ c) $[MT^{-2}A^{-2}]$ d) $[MT^{-1}A^{-2}]$
469. The dimensions of stress are equal to
   a) Force b) Pressure c) Work d) $\frac{1}{\text{Pressure}}$
470. If C the restoring couple per unit radian twist and I is the moment of inertia, then the dimensional representation of $2\pi\sqrt{\frac{I}{C}}$ will be
   a) $[M^0L^0T^{-1}]$ b) $[M^0L^0T]$ c) $[M^0LT^{-1}]$ d) $[ML^2T^{-2}]$
471. The density of a solid ball is to be determined in an experiment. The diameter of the ball is measured with a screw gauge, whose pitch is 0.5 mm and there are 50 divisions on the circular scale. The reading on the main scale is 2.5 mm and that on the circular scale is 20 divisions. If the measured mass of the ball has a relative error of 2%, the relative percentage error in the density is
   a) 0.9% b) 2.4% c) 3.1% d) 4.2%
472. Which one of the following does not have the same dimensions
   a) Work and energy b) Angle and strain
   c) Relative density and refractive index d) Planck constant and energy
473. Dimensional formula of heat energy is
   a) ML^2T^{-2} b) MLT^{-1} c) $M^0L^0T^{-2}$ d) None of these
474. Given that : $y = A\sin\left[\left(\frac{2\pi}{\lambda}\right)(ct - x)\right]$ where, y and x are measured in metre. Which of the following statements is true?
   a) The unit of λ is same as that of x and A b) The unit of λ is same as that of x but not of A
   c) The unit of c is same as that of $\frac{2\pi}{\lambda}$ d) The unit of $(ct - x)$ is same as that of $\frac{2\pi}{\lambda}$
475. Length is measured in metre and time in second as usual. But a new unit of mass is so chosen that $G = 1$. This new unit of mass is equal to
   a) 1.5×10^7kg b) 1.5×10^{10}kg c) 6.67×10^{-11}kg d) 6.67×10^{-8}kg
476. The dimensional formula for entropy is
   a) $[MLT^{-2}K^{-1}]$ b) $[ML^2T^{-2}]$ c) $[ML^2T^{-2}K^{-1}]$ d) $[ML^{-2}T^{-2}K^{-1}]$
477. Which of the following represents a $volt$
   a) $Joule/second$ b) $Watt/ampere$ c) $Watt/coulomb$ d) $Coulomb/joule$
478. The equation $\left(P + \frac{a}{V^2}\right).(V - b) =$ constant. The unit of a is
   a) $Dyne \times cm^5$ b) $Dyne \times cm^4$ c) $Dyne \times cm^3$ d) $Dyne \times cm^2$
479. The unit of potential energy is
   a) $g(cm/\sec^2)$ b) $g(cm/\sec)^2$ c) $g(cm^2/\sec)$ d) $g(cm/\sec)$
480. If C be the capacitance and V be the electric potential, then the dimensional formula of CV^2 is
   a) $[ML^{-3}TA]$ b) $[K^0LT^{-2}A^0]$ c) $[ML^1T^{-2}A^{-1}]$ d) $[ML^2T^{-2}A^0]$
481. The mass and volume of a body are found to be 5.00 $\pm$ 0.05 kg and 1.00 $\pm$ 0.05 m^3 respectively. Then the maximum possible percentage error in its density is
   a) 6% b) 3% c) 10% d) 5%
482. The number of significant figures in all the given numbers 25.12, 2009, 4.156 and 1.217×10^{-4} is
   a) 1 b) 2 c) 3 d) 4
483. The unit of permittivity of free space ε_0 is
   a) $Coulomb/newton - metre$ b) $Newton - metre^2/coulomb^2$

c) $Coulomb^2/(newton-metre)^2$ d) $Coulomb^2/newton-metre^2$

484. If the units of mass, length and time are doubled, unit of angular momentum will be
a) Doubled b) Tripled
c) Quadrupled d) 8 times the original value

485. $1kWh$ =
a) $1000\ W$ b) $36\times10^5\ J$ c) $1000\ J$ d) $3600\ J$

486. A wire has a mass $0.3\pm0.003g$, radius $0.5\pm0.005\ mm$ and length $6\pm0.06\ cm$. The maximum percentage error in the measurement of its density is
a) 1 b) 2 c) 3 d) 4

487. Coefficient of thermal conductivity has the dimensions
a) $[MLT^{-3}K^{-1}]$ b) $[ML^3T^3K^2]$ c) $[ML^3T^{-3}K^{-2}]$ d) $[M^2L^3T^{-3}K^2]$

488. If C, R, L and I denote capacity, resistance, inductance and electric current respectively, the quantities having the same dimensions of time are
(1) CR
(2) $\frac{L}{R}$
(3) $\sqrt{LC}$
(4) LI^2
a) (1) and (2) only
b) (1) and (3) only
c) (1) and (4) only
d) (1), (2) and (3) only

489. In the relation $P=\frac{\alpha}{\beta}e^{\frac{\alpha Z}{k\theta}}$ P is pressure, Z is the distance, k is Boltzmann's constant and θ is the temperature. The dimensional formula of β will be
a) $[M^0L^2T^0]$ b) $[M^1L^2T^1]$ c) $[M^1L^0T^{-1}]$ d) $[M^0L^2T^{-1}]$

490. Which physical quantities have same dimensions?
a) Force and power b) Torque and energy c) Torque and power d) Force and torque

491. In the equation $y=a\sin(\omega t+kx,)$ the dimensional formula of ω is
a) $[M^0L^0T^{-1}]$ b) $[M^0LT^{-1}]$ c) $[ML^0T^0]$ d) $[M^0L^{-1}T^0]$

492. Resistance of a given wire is obtained by measuring the current flowing in it and the voltage difference applied across it. If the percentage errors in the measurement of the current and the voltage difference are 3% each, then error in the value of resistance of the wire is
a) 6% b) Zero c) 1% d) 3%

493. Electric displacement is given by $D=\varepsilon E$,
Here, ε =electric permittivity
E =electric field strength
The dimensions of electric displacement are
a) $[ML^{-2}TA]$ b) $[L^{-2}T^{-1}A]$ c) $[L^{-2}TA]$ d) None of these

494. The dimension of k in the equation $W=\frac{1}{2}kx^2$ is
a) $[ML^0T^{-2}]$ b) $[M^0LT^{-1}]$ c) $[MLT^{-2}]$ d) $[ML^0T^{-1}]$

495. In $S=a+bt+ct^2$. S is measured in metre and t in $second$. The unit of c is
a) None b) m c) ms^{-1} d) ms^{-2}

496. Dimensional formula for the universal gravitational constant G is
a) $[M^{-1}L^2T^{-2}]$ b) $[M^0L^0T^0]$ c) $[M^{-1}L^3T^{-2}]$ d) $[M^{-1}L^3T^{-1}]$

497. Select the pair whose dimensions are same
a) Pressure and stress b) Stress and strain c) Pressure and force d) Power and force

498. A resistor of 10 kΩ having tolerance 10% is connected in series with another resistor of 20kΩ having tolerance 20%. The tolerance of the combination will be approximately

a) 10% b) 13% c) 17% d) 20%

499. R and L represent respectively resistance and self inductance, which of the following combinations has the dimensions of frequency

a) $\frac{R}{L}$ b) $\frac{L}{R}$ c) $\sqrt{\frac{R}{L}}$ d) $\sqrt{\frac{L}{R}}$

500. The unit of specific resistance is

a) Ohm/cm^2 b) Ohm/cm c) $Ohm - cm$ d) $(Ohm - cm)^{-1}$

501. If C is the capacitance and V is the potential, the dimensional formula for CV^2 is

a) $[ML^2T^{-1}]$ b) $[ML^{-2}T^{-3}]$ c) $[ML^2\ T^{-2}]$ d) $[ML^{-2}T^{-2}]$

502. The equation of state of some gases can be expressed as $\left(P + \frac{a}{V^2}\right)(V - b) = RT$. Here P is the pressure, V is the volume, T is the absolute temperature and a, b, R are constants. The dimensions of 'a' are

a) ML^5T^{-2} b) $ML^{-1}\ T^{-2}$ c) $M^0L^3T^0$ d) $M^0L^6T^0$

503. With the usual notations, the following equation $S_t = u + \frac{1}{2}a(2t - 1)$ is

a) Only numerically correct b) Only dimensionally correct

c) Both numerically and dimensionally correct d) Neither numerically nor dimensionally correct

504. $Volt/metre$ is the unit of

a) Potential b) Work c) Force d) Electric intensity

505. Length cannot be measured by

a) $Fermi$ b) $Debye$ c) $Micron$ d) $Light\ year$

506. $Henry/ohm$ can be expressed in

a) $Second$ b) $Coulomb$ c) Mho d) $Metre$

507. 1 $a.m.u.$ is equivalent to

a) $1.6 \times 10^{-27} kg$ b) 934 MeV c) $1.6 \times 10^{-24}\ gm$ d) All above

508. The unit of Stefan's constant σ is

a) $W\ m^{-2}\ K^{-1}$ b) $W\ m^2\ K^{-4}$ c) $W\ m^{-2}\ K^{-4}$ d) $W\ m^{-2}\ K^4$

509. The dimensions of time constant are

a) $[M^0L^0T^0]$ b) $[M^0L^0T]$ c) [MLT] d) None of these

510. The wavelength associated with a moving particle depends upon power p of its mass m, qth power of its velocity v and rth power of planck's constant h. Then the correct set of values of p, q and r is

a) $p = 1, q = -1, r = 1$ b) $p = 1, q = 1, r = 1$

c) $p = -1, q = -1, r = -1$ d) $p = -1, q = -1, r = 1$

511. Parsec is a unit of

a) Distance b) Velocity c) Time d) Angle

512. A student performs an experiment for determination of g $\left(= \frac{4\pi^2 l}{T^2}\right)$, $l \approx 1$m, and he commits an error of Δl. For T he takes the time of n oscillations with the stop watch of least count ΔT and he commits a human error of 0.1 s. For which of the following data, the measurement of g will be most accurate?

a) $\Delta L = 0.5, \Delta T = 0.1, n = 20$ b) $\Delta L = 0.5, \Delta T = 0.1, n = 50$

c) $\Delta L = 0.5, \Delta T = 0.01, n = 20$ d) $\Delta L = 0.5, \Delta T = 0.05, n = 50$

513. Dimensional formula of magnetic flux is

a) $ML^2T^{-2}A^{-1}$ b) $ML^0T^{-2}A^{-2}$ c) $M^0L^{-2}T^{-2}A^{-3}$ d) $ML^2T^{-2}A^3$

514. The SI unit of length is the metre. Suppose we adopt a new unit of length which equal x metre. The area of 1 m^2 expressed in terms of the new unit has a magnitude

a) x b) x^2 c) x^{-1} d) x^{-2}

515. A physical quantity A is related to four observables a, b, c and d as follows

$$A = \frac{a^2b^3}{c\sqrt{d}}$$

The percentage errors of measurement in a, b, c and d are 1%, 3%, 2% and 2% respectively. What is the percentage error in the quantity A?

a) 12% b) 7% c) 5% d) 14%

516. The percentage errors in the measurement of length and time period of a simple pendulum are 1% and 2% respectively. Then the maximum error in the measurement of acceleration due to gravity is

a) 8% b) 3% c) 4% d) 5%

517. If the acceleration due to gravity is 10 ms^{-2} and the units of length and time are changed in kilometer and hour respectively, the numerical value ofacceleration is

a) 360000 b) 72000 c) 36000 d) 129600

518. The square root of the product of inductance and capacitance has the dimension of

a) Length b) Mass c) Time d) No dimension

519. The number of particles given by $n = -D\frac{n_2-n_1}{x_2-x_1}$ are crossing a unit area perpendicular to x-axis in unit time, where n_1 and n_2 are the number of particles per unit volume for the values x_1 and x_2 of x respectively. Then the dimensional formula of diffusion constant D is

a) $[M^0LT^0]$ b) $[M^0L^2T^{-4}]$ c) $[M^0LT^{-3}]$ d) $[M^0L^2T^{-1}]$

520. The expression for centripetal force depends upon mass of body, speed of the body and the radius of circular path. Find the expression for centripetal force

a) $F = \frac{mv^2}{2r^3}$ b) $F = \frac{mv^2}{r}$ c) $F = \frac{mv^2}{r^2}$ d) $F = \frac{m^2v^2}{2r}$

521. A small steel ball of radius r is allowed to fall under gravity through a column of a viscous liquid of coefficient of viscosity η. After some time the velocity of the ball attains a constant value known as terminal velocity v_T. The terminal velocity depends on (i) the mass of the ball m, (ii) η , (iii) r and (iv) acceleration due to gravity g. Which of the following relations is dimensionally correct

a) $v_T \propto \frac{mg}{\eta r}$ b) $v_T \propto \frac{\eta r}{mg}$ c) $v_T \propto \eta rmg$ d) $v_T \propto \frac{mgr}{\eta}$

522. If $F = 6\pi\eta^a r^b v^c$,

Where F =viscous force

η = coefficient of viscosity

r = radius of spherical body

v = terminal velocity of the body.

Find the values of a, b and c.

a) $a = 1, b = 2, c = 1$ b) $a = 1, b = 1, c = 1$

c) $a = 2, b = 1, c = 1$ d) $a = 2, b = 1, c = 2$

523. A physical parameter a can be determined by measuring the parameters b, c, d and e using the relation $a = b^\alpha c^\beta / d^\gamma e^\delta$. If the maximum errors in the measurement of b, c, d and e are $b_1\%, c_1\%, d_1\%$ and $e_1\%$, then the maximum error in the value of a determined by the experiment is

a) $(b_1 + c_1 + d_1 + e_1)\%$ b) $(b_1 + c_1 - d_1 - e_1)\%$

c) $(\alpha b_1 + \beta c_1 - \gamma d_1 - \delta e_1)\%$ d) $(\alpha b_1 + \beta c_1 + \gamma d_1 + \delta e_1)\%$

524. The frequency f of vibration of mass m suspended from a spring of spring constant k is given by

$$f = cm^x k^y$$

Where c is dimensionless constant. The values of x and y are respectively

a) 1/2, 1/2 b) -1/2, 1/2 c) 1/2, -1/2 d) -1/2, -1/2

525. The dimensional formula of universal gas constant is

a) $[ML^2T^{-2}\theta^{-1}]$ b) $[M^2LT^{-2}\theta]$ c) $[ML^3T^{-1}\theta^{-1}]$ d) None of these

526. Dimensions of $\frac{1}{\mu_0\epsilon_0}$, where symbols have their usual meaning, are

a) $[lT^{-1}]$ b) $[L^{-1}T]$ c) $[L^{-2}T^2]$ d) $[L^2T^{-2}]$

527. In an experiment, we measure quantities a, b and c. Then x is calculated from the formula $x = \frac{ab^2}{c^3}$. The percentage errors in a, b, c are $\pm 1\%, \pm 3\%$, and $\pm 2\%$ respectively. The percentage error in x can be

a) $\pm 1\%$ b) $\pm 4\%$ c) 7% d) $\pm 13\%$

528. The dimensions of potential are the same as that of
a) Work b) Electric field per unit charge
c) Work per unit charge d) Force per unit charge

529. Which of the following units denotes the dimensions $[ML^2/Q^2]$, where Q denotes the electric charge?
a) Wbm^{-2} b) Henry (H) c) Hm^{-2} d) Weber (Wb)

530. The dimensional formula of the ratio of angular to linear momentum is
a) $[M^0LT^0]$ b) $[MLT]$ c) $[ML^2T^{-1}]$ d) $[M^{-1}L^{-1}T^{-1}]$

531. If force is proportional to square of velocity, then the dimensions of proportionality constant are
a) $[ML^{-1}T]$ b) $[ML^{-1}T^0]$ c) $[MLT^0]$ d) $[M^0LT^{-1}]$

532. The number of significant figures in the numbers 4.8000×10^4 and 48000.50 are respectively
a) 5 and 6 b) 5 and 7 c) 2 and 7 d) 2 and 6

533. The pressure on a square plate is measured by measuring the force on the plate and the length of the sides of the plate. If the maximum error in the measurement of force and length are respectively 4% and 2%, the maximum error in the measurement of pressure is
a) 1% b) 2% c) 6% d) 8%

534. The frequency of vibration of string is given by $v = \frac{P}{2l}\left[\frac{F}{m}\right]^{1/2}$. Here p is number of segments in the string and l is the length. The dimensional formula for m will be
a) $[M^0LT^{-1}]$ b) $[ML^0T^{-1}]$ c) $[ML^{-1}T^0]$ d) $[M^0L^0T^0]$

535. The time dependence of a physical quantity P is given by $P = P_0e^{\alpha t^2} - \alpha t^2$ where α is a constant and t is time. Then constant α is
a) Dimensionless b) Dimensionless of T^{-2}
c) Dimensionless of P d) Dimensionless of T^2

536. The percentage errors in the measurement of length and time period of a simple pendulum are 1% and 2% respectively. Then the maximum error in the measurement of acceleration due to gravity is
a) 8% b) 3% c) 4% d) 5%

537. According to $Joule's$ law of heating, heat produced $H = I^2Rt$, where I is current, R is resistance and t is time. If the errors in the measurement of I, R and t are 3%, 4% and 6% respectively then error in the measurement of H is
a) $\pm 17\%$ b) $\pm 16\%$ c) $\pm 19\%$ d) $\pm 25\%$

538. From the equation $\tan\theta = \frac{rg}{v^2}$, one can obtain the angle of banking θ for a cyclist taking a curve (the symbols have their usual meanings). Then say it is,
a) Both dimensionally and numerically correct b) Neither numerically nor dimensionally correct
c) Dimensionally correct only d) Numerically correct only

539. If the length of a rectangle $l = 10.5$ cm, breadth $b = 2.1$ cm and minimum possible measurement by scale $= 0.1$ cm, then the area is
a) $22.0\ cm^2$ b) $22.1\ cm^2$ c) $22.05\ cm^2$ d) $22\ cm^2$

540. According to Newton, the viscous force acting between liquid layers of area A and velocity gradient $\Delta v/\Delta z$ is given by $F = -\eta A\frac{\Delta v}{\Delta x}$ where η is constant called coefficient of viscosity. The dimensions of η are
a) $[ML^2T^{-2}]$ b) $[ML^{-1}T^{-1}]$ c) $[ML^{-2}T^{-2}]$ d) $[M^0L^0T^0]$

541. SI unit of intensity of wave is
a) $Jm^{-2}s^{-1}$ b) $Jm^{-1}s^{-2}$ c) $W\ m^{-2}$ d) $J\ m^{-2}$

542. The value of universal gas constant is $R = 8.3$ J/K-mol. The value of R in atmosphere litre per Kelvin mol
a) 8.12 b) 0.00812 c) 81.2 d) 0.0812

543. E, m, I and G denote energy, mass, angular momentum and gravitational constant respectively, then the dimensions of $\frac{EI^2}{m^5G^2}$ are

a) Angle b) Length c) Mass d) Time

544. The velocity of a body is given by the equation $v = \frac{b}{t} + ct^2 + dt^2$
The dimensional formula of b is
a) $[M^0LT^0]$ b) $[ML^0T^0]$ c) $[M^0L^0T]$ d) $[MLT^{-1}]$

545. If V denotes the potential difference across the plates of a capacitor of capacitance C, the dimensions of CV^2 are
a) Not expressible in MLT b) MLT^{-2}
c) M^2LT^{-1} d) ML^2T^{-2}

546. The dimensions of power are
a) $M^1L^2T^{-3}$ b) $M^2L^1T^{-2}$ c) $M^1L^2\,T^{-1}$ d) $M^1L^1T^{-2}$

547. Light year is a unit of
a) Time b) Mass c) Distance d) Energy

548. The surface tension of mercury is 32 dyne cm^{-1}. Its value in SI units is
a) 0.032 b) 0.32 c) 3200 d) 32000

549. Which of the following quantities has not been expressed in proper unit
a) Torque : Newton metre b) Stress : Newton $metre^{-2}$
c) Modulus of elasticity : Newton $metre^{-2}$ d) Surface tension : Newton $metre^{-2}$

550. One femtometer is equivalent to
a) $10^{15}\ m$ b) $10^{-15}\ m$ c) $10^{-12}\ m$ d) $10^{12}\ m$

551. One side of a cubical block is measured with the help of a vernier callipers of vernier constant 0.01 cm. This side comes out to be 1.23 cm. What is the percentage error in the measurement of area?
a) $\frac{1.23}{0.01} \times 100$ b) $\frac{0.01}{1.23} \times 100$ c) $2 \times \frac{0.01}{1.23} \times 100$ d) $3 \times \frac{0.01}{1.23} \times 100$

552. Assuming the mass of Earth as $6.64 \times 10^{24} kg$ and the average mass of the atoms that make up earth as $40u$ (atomic mass unit), the number of atoms in the Earth are approximately
a) 10^{30} b) 10^{40} c) 10^{50} d) 10^{60}

553. The velocity of transverse wave in a string is $v = \sqrt{\frac{T}{m}}$, where T is the tension in the string and m is mass per unit length. If $T = 3.0$ kgf, mass of string is 2.5 g and length of string is 1.00m, then the percentage error in the measurement of velocity is
a) 0.5 b) 0.7 c) 2.3 d) 3.6

554. $Newton/metre^2$ is the unit of
a) Energy b) Momentum c) Force d) Pressure

555. The unit of magnetic moment is
a) TJ^{-1} b) JT^{-1} c) Am^{-2} d) Am^{-1}

556. Dimensional formula of Stefan's constant is
a) $[MT^{-3}K^{-4}]$ b) $[ML^2T^{-2}K^{-4}]$ c) $[ML^2T^{-2}]$ d) $[MT^{-2}L^0]$

557. In the relation $x = \cos(\omega t + kx)$, the dimensions of ω are
a) $[M^0LT]$ b) $[M^0L^{-1}T^0]$ c) $[M^0L^0T^{-1}]$ d) $[M^0LT^{-1}]$

558. $newton - second$ is the unit of
a) Velocity b) Angular momentum c) Momentum d) Energy

559. Which of the two have same dimensions
a) Force and strain b) Force and stress
c) Angular velocity and frequency d) Energy and strain

560. The initial temperature of a liquid is $(80.0 \pm 0.1)^0$C. After it has been cooled, its temperature is $(10.0 \pm 0.1)^0$C. The fall in temperature in degree centigrade is
a) 70.0 b) 70.0 ± 0.3 c) 70.0 ± 0.2 d) 70.0 ± 0.1

561. The dimensional formula of magnetic induction B is
a) $[M^0ALT^0]$ b) $[M^0AL^{-1}T^0]$ c) $[M^0AL^2T^0]$ d) $[ML^2T^{-2}A^{-1}]$

562. Which one of the following is not a unit of young's modulus
a) Nm^{-1} b) Nm^{-2} c) $Dyne\ cm^{-2}$ d) Mega Pascal

563. A student has measured the length of a wire equal to 0.04580 m. This value of length has the number of significant figures equal to
a) Five b) Four c) Six d) None of these

564. If u_1 and u_2 are the units selected in two systems of measurement and n_1 and n_2 their numerical values, then
a) $n_1u_1 = n_2u_2$ b) $n_1u_1 + n_2u_2 = 0$
c) $n_1n_2 = u_1u_2$ d) $(n_1 + u_1) = (n_2 + u_2)$

565. Universal time is based on
a) Rotation of earth on its axis
b) Oscillations of quartz crystal
c) Vibrations of cesium atom
d) Earth's orbital motion around the sun

566. The power of lens is $P = \frac{1}{f}$, where f is focal length of the lens . The dimensions of power of lens are
a) $[LT^{-2}]$ b) $[M^0L^{-1}T^0]$ c) $[M^0L^0T^0]$ d) None of these

567. If there is a positive error of 50% in the measurement of speed of a body, then the error in the measurement of kinetic energy is
a) 25% b) 50% c) 100% d) 125%

568. Dimensional formula for angular momentum is
a) ML^2T^{-2} b) $ML^2\ T^{-1}$ c) MLT^{-1} d) $M^0L^2T^{-2}$

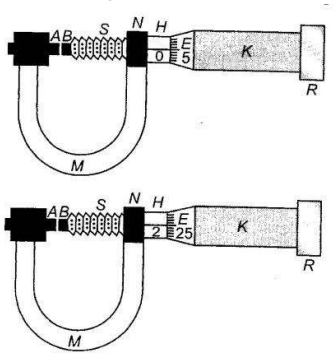
569. If the value of the resistance is 10.845Ω and the value of the current is 3.23 A, then the potential difference is 35.02935 V. its value in correct significant figures would be
a) 35 V b) 35.0 V c) 35.03 V d) 35.029 V

570. Which of the following quantities has the same dimensions as that of energy
a) Power b) Force c) Momentum d) Work

571. Which of the following sets of quantities have same dimensional formula?
a) Frequency, angular frequency and angular momentum
b) Surface tension, stress and spring constant
c) Acceleration, momentum and retardation
d) Work, energy and torque

572. Dimensions of strain are
a) MLT^{-1} b) ML^2T^{-1} c) MLT^{-2} d) $M^0L^0T^0$

573. The circular scale of a screw gauge has 50 divisions and pitch of 0.5 mm. Find the diameter of sphere. Main scale reading is 2.



a) 1.2 b) 1.25 c) 2.20 d) 2.25

574. The random error in the arithmetic mean of 100 observations is x; then random error in the arithmetic mean of 4000 observations would be

a) $4x$ b) $\frac{1}{4}x$ c) $2x$ d) $\frac{1}{2}x$

575. Which of the following quantity is expressed as force per unit area

a) Work b) Pressure c) Volume d) Area