PHYSICS
—----------

1- SI unit of force
A newton

2-The pair of quantities having same dimensions is
A - Work and Torque

3 - The damping force on an oscillator is directly proportional to the velocity. The units of the constant of proportionality are
A- kg s^{-1}

4- The dimensions of $(\mu_0 \varepsilon_0)^{-1/2}$ are
A- $[LT^{-1}]$

5 - A stone falls freely under gravity. It covers distances h1, h2and h3in the first 5 seconds, the next 5 seconds and the next 5 seconds respectively. The relation between h1, h2 and h3 is
A- h1=h2 /3= h3 /5

6- The displacement 'x' (in meter) of a particle of mass 'm' (in kg) moving in one dimension under the action of a force, is related to time 't' (in sec) by $t = \sqrt{x} + 3$. The displacement of the particle when its velocity is zero, will be
A - 0 m (zero meter)

7 - The motion of a particle along a straight line is described by equation $x = 8 + 12t - t^3$ where x is in metre and t in second. The retardation of the particle when its velocity becomes zero is
A- 12 ms^{-2}

8 -What is the SI unit of electric current?
A- Ampere

9- If the magnitude of sum of two vectors is equal to the magnitude of difference of the two vectors, the angle between these vectors is
A- 90°

10- A particle moves so that its position vector is given by $\vec{r}$ =cos ωt $\hat{x}$+sin ωt $\hat{y}$, where ω is a constant.
Which of the following is true?
A- Velocity is perpendicular to $\vec{r}$ and acceleration is directed towards the origin.

11- A balloon with mass m is descending down with an acceleration a (where a < g). How much mass should be removed from it so that it starts moving up with an acceleration a?

A- 2ma/ (g+a)

12 - An explosion breaks a rock into three parts in a horizontal plane. Two of them go off at right angles to each other. The first part of mass 1 kg moves with a speed of 12 m s–1 and the second
part of mass 2 kg moves with 8 m s–1 speed. If the third part flies off with 4 m s–1 speed, then its mass is
A- 5 Kg

13 - A moving block having mass m, collides with another stationary block having mass 4m. The lighter block comes to rest after collision. When the initial velocity of the lighter block is v, then the value of coefficient of restitution (e) will be
A- 0.25

14 -Consider a drop of rain water having mass 1 g falling from a height of 1 km. It hits the ground with a speed of 50 m s^{-1}.Take 'g' constant with a value 10 ms^{-2} The work done
by the (i) gravitational force and the (ii) resistive force of air is
A- ¡ - 10 J, ¡¡ –8.75 J

15 - The ratio of radii of gyration of a circular ring and a circular disc, of the same mass and radius, about an axis passing through their centers and perpendicular to their planes are
A-√2 : 1

16 - Two discs are rotating about their axes, normal to the discs and passing through the centeres
of the discs. Disc D1 has 2 kg mass and 0.2 m radius and initial angular velocity of 50 rad s–1. Disc D2 has 4 kg mass, 0.1 m radius and initial angular velocity of 200 rad s–1. The two discs are brought in contact face to face, with their axes of rotation coincident. The final angular velocity (in rad s–1) of the system is
A- 100

17 - When a mass is rotating in a plane about a fixed point, its angular momentum is directed along
A-a line perpendicular to the plane of rotation

18 - A spherical planet has a mass Mp
and diameter D□ .A particle of mass m falling freely near the surface of this planet will experience an acceleration due to gravity, equal to
A- 4GM□/ D□²

19 - A geostationary satellite is orbiting the earth at a height of 5R above the surface of the earth,
R being the radius of the earth. The time period of another satellite in hours at a height of 2R from the surface of the earth is

A-6√2

20 - If v_e is escape velocity and v_o is orbital velocity of a satellite for orbit close to the earth's surface, then these are related by
A- $v_e = \sqrt{2}\, v_o$

21 - A certain number of spherical drops of a liquid of radius r coalesce to form a single drop of radius R and volume V. If T is the surface tension of the liquid, then
A- energy =3VT(1/r - 1/R) is released

22 - Steam at 100°C is passed into 20 g of water at 10°C. When water acquires a temperature of
80°C, the mass of water present will be
[Take specific heat of water = 1 cal g–1 °C–1 and latent heat of steam = 540 cal g–1]
A - 22.5 g

23 - Certain quantity of water cools from 70°C to
60°C in the first 5 minutes and to 54°C in the
next 5 minutes. The temperature of the
surroundings is
A- 45°C

24 - A Carnot engine having an efficiency of 1/10 as heat engine, is used as a refrigerator. If the
work done on the system is 10 J, the amount of energy absorbed from the reservoir at lower temperature is
A - 90 J

25 - A gas mixture consists of 2 moles of O2 and 4 moles of Ar at temperature T. Neglecting all vibrational modes, the total internal energy of the system is
A - 11 RT

26 - A particle of mass m oscillates along x-axis according to equation x = a sinωt.The nature of the graph between momentum and displacement of the particle is
A - Ellipse

27 - Two astronauts are floating in gravitational free space after having lost contact with their spaceship. The two will
A - move towards each other.

28 - The power radiated by a black body is P and it radiates maximum energy at wavelength,λ_0 . If the temperature of the black body is now changed so that it radiates maximum energy at wavelength
3/4 λ_0, the power radiated by it becomes nP. The value of n is

A - 256/810

29 - The bulk modulus of a spherical object is ‘B’. If it is subjected to uniform pressure ‘p’, the fractional decrease in radius is
A - p /3B

30 - An ideal gas is compressed to half its initial volume by means of several processes. Which of the process results in the maximum work done on the gas?
A -adiabatic

31 - The period of oscillation of a mass M suspended from a spring of negligible mass is T. If along with it another mass M is also suspended, the period of oscillation will now be
A - $\sqrt{2}$ T

32 - A simple pendulum performs simple harmonic motion about x = 0 with an amplitude a and time period T. The speed of the pendulum at x = a / 2 will be
A - $\pi a\sqrt{3}$ / T

33 - . In a simple harmonic motion, when the displacement is one-half the amplitude, what fraction of the total energy is kinetic?
A- ¾

34 -A tuning fork is used to produce resonance in a glass tube. The length of the air column in this tube can be adjusted by a variable piston. At room temperature of 27°C two successive resonances are produced at 20 cm and 73 cm of column length. If the frequency of the tuning fork is 320 Hz, the velocity of sound in air at 27°C is
A- 339 m s^{-1}

35 - The fundamental frequency in an open organ pipe is equal to the third harmonic of a closed organ pipe. If the length of the closed organ pipe is 20 cm, the length of the open organ pipe is
A - 13.2cm

36 - The two nearest harmonics of a tube closed at one end and open at other end are 220 Hz and 260 Hz. What is the fundamental frequency of the system?
A - 20 Hz

37 - Two cars moving in opposite directions approach each other with speed of 22 m s–1 and 16.5 m s–1 respectively. The driver of the first car blows a horn having a frequency 400 Hz. The frequency heard by the driver of the second car is (velocity of sound is 340 m s–1)
A - 448 Hz

38 - An electron falls from rest through a vertical distance h in a uniform and vertically upward directed electric field E. The direction of electric field is now reversed, keeping its magnitude the

same. A proton is allowed to fall from rest in it through the same vertical distance h. The time of fall of the electron, in comparison to the time of fall of the proton is
A - smaller

39 - . The electrostatic force between the metal plates of an isolated parallel plate capacitor C having a charge Q and area A, is
A - Independent of the distance between the plates

40 - A toy car with charge q moves on a frictionless horizontal plane surface under the influence of a uniform electric field $\mathbf{E}$. Due to the force q $\mathbf{E}$, its velocity increases from 0 to 6 m s–1 in one second duration. At that instant the direction of the field is reversed. The car continues to move for two more seconds under the influence of this field. The average velocity and the average speed
of the toy car between 0 to 3 seconds are respectively
A - 1 m s^{-1}, 3 m s^{-1}

41 - A capacitor is charged by a battery. The battery is removed and another identical uncharged
capacitor is connected in parallel. The total electrostatic energy of resulting system
A - decreases by a factor of 2

42 - A set of n equal resistors, of value R each, are connected in series to a battery of emf E and
internal resistance R. The current drawn is I. Now, the n resistors are connected in parallel to the
same battery. Then the current drawn from battery becomes 10I. The value of n is
A - 10

43 - A carbon resistor of (47 ± 4.7) kΩ is to be marked with rings of different colors for its identification.
The color code sequence will be
A-Yellow – Violet – Orange – Silver

44 - The resistance of a wire is ‘R’ ohm. If it is melted and stretched to ‘n’ times its original length, its new resistance will be
A - n^2R

45 - An electron is moving in a circular path under the influence of a transverse magnetic field of 3.57 $\times 10^{-2}$ T. If the value of e/m is 1.76 $\times$ 10^{11} C kg–1,the frequency of revolution of the electron is
A- 1GHz

46 - A long straight wire of radius a carries a steady current I. The current is uniformly distributed

over its cross-section. The ratio of the magnetic fields B and B′, at radial distances a/2 and 2a respectively, from the axis of the wire is
A - 1

47 - A square loop ABCD carrying a current i, is placed near and co planar with a long straight conductor XY carrying a current I, the net force on the loop will be
A-$2\mu_0 IiL/ 3\pi$

48 - A proton and an alpha particle both enter a region of uniform magnetic field B, moving at right angles to the field B. If the radius of circular orbits for both the particles is equal and the kinetic energy acquired by proton is 1 MeV, the energy acquired by the alpha particle will be
A-1 MeV

49 - A short bar magnet of magnetic moment 0.4 J T–1 is placed in a uniform magnetic field of 0.16 T.
The magnet is in stable equilibrium when the potential energy is
A- -0.064 J

50 - Electromagnets are made of soft iron because soft iron has
A- low retentivity and low coercive force

51 - A vibration magnetometer placed in magnetic meridian has a small bar magnet. The magnet
executes oscillations with a time period of 2 sec in earth's horizontal magnetic field of 24 micro tesla.
When a horizontal field of 18 micro tesla is produced opposite to the earth's field by placing a current carrying wire, the new time period of magnet will be
A - 4 s

52 - The magnetic moment of a diamagnetic atom is
A - equal to zero

53 - A transformer having efficiency of 90% is working on 200 V and 3 kW power supply.
If the current in the secondary coil is 6 A, the voltage across the secondary coil and the current in the primary coil respectively are
A -450 V, 15 A

54 - A wire loop is rotated in a magnetic field. The frequency of change of direction of the induced e.m.f. is
A - twice per revolution

55 - A coil of self-inductance L is connected in series with a bulb B and an AC source.
Brightness of the bulb decreases when
A - an iron rod is inserted in the coil.

56 - Light with an energy flux of 25 $\times 10^4$ W m–2 falls on a perfectly reflecting surface at normal incidence. If the surface area is 15 cm^2, the average force exerted on the surface is
A - 2.50 × 10^{-6} N

57 - The condition under which a microwave oven heats up a food item containing water molecules most efficiently is
A - The frequency of the microwaves must match the resonant frequency of the water molecules.

58 - An electromagnetic wave of frequency = 3.0 MHz passes from vacuum into a dielectric medium with relative permittivity = 4.0. Then
A - Wavelength is halved and frequency remains unchanged.

59 - The electric field associated with an em wave in vacuum is given by E = 40 îcos (kz – 6 × 10^8t)
where E, z and t are in volt/m, meter and seconds respectively. The value of wave vector k is
A - 2 m^{-1}

60 - An astronomical refracting telescope will have large angular magnification and high angular resolution, when it has an objective lens of
A - large focal length and large diameter

61 - The ratio of resolving powers of an optical microscope for two wavelengths 1 = 4000 Å and wave length 2 = 6000 Å is
A - 3:2

62 - Young's double slit experiment is first performed in air and then in a medium other than air. It is found that 8th bright fringe in the medium lies where 5th dark fringe lies in air. The refractive index of the medium is nearly
A - 1.78

63 - A beam of light from a source L is incident normally on a plane mirror fixed at a certain distance x from the source. The beam is reflected back as a spot on a scale placed just above the source L. When the mirror is rotated through a small angle θ the spot of the light is found to move through a distance y on the scale. The angle θ is given by
A - y /2x

64 - Monochromatic radiation emitted when electron on hydrogen atom jumps from first excited to the ground state irradiates a photosensitive material. The stopping potential is measured to be 3.57 V. The threshold frequency of the material is
A - 1.6 × 10^{15} Hz

65 - An alpha particle moves in a circular path of radius 0.83 cm in the presence of a magnetic field of
0.25 Wb/m2. The de Broglie wavelength associated with the p will be
A -0.01 Å

66 - if the momentum of an electron is changed by P, then the de Broglie wavelength associated with it changes by 0.5%. The initial momentum of electron will be
A - 200P

67 - Two radiations of photons energies 1 eV and 2.5 eV, successively illuminate a photosensitive
metallic surface of work function 0.5 eV. The ratio of the maximum speeds of the emitted electrons is
A - 1:2

68 - For a radioactive material, half-life is 10 minutes. If initially there are 600 number of nuclei, the time taken (in minutes) for the disintegration of 450 nuclei is
A - 20

69 - The ratio of kinetic energy to the total energy of an electron in a Bohr orbit of the hydrogen atom, is
A - 1 :-1

70 - The ratio of wavelengths of the last line of Balmer series and the last line of Lyman series is
A - 4

71 - Pure Si at 500 K has equal number of electron (ne) and hole (nh) concentrations of 1.5 * 10^16 m–3.
Doping by indium increases nh to 4.5*10^22 m–3.The doped semiconductor is of
A- p-type having electron concentration ne = 5*10^9 m-3

72 - Which one of the following statement is false?
A - Majority carriers in a n-type semiconductor are holes.

73 - Which one of the following bonds produces a solid that reflects light in the visible region and whose electrical conductivity decreases with temperature and has high melting point?
A - metallic bonding

74 - The device that can act as a complete electronic
circuit is
A- integrated circuit

75 - Dimensional formula of force is:

A-MLT^{-2}

76 - A body moving with constant speed may have:
A-Variable acceleration

77 - A lift moving upward with acceleration ‘a’. Apparent weight is:
A - m(g+a)

78 - Work done by a force perpendicular to displacement is:
A - zero

79 - Centripetal force acts:
A - Towards center

80 - Orbital velocity depends on:
A- Both A & B

81 - Time period of SHM is independent of:
A - amplitude

82 - Phase difference between two points λ/2 apart:
A -π

83 - First law of thermodynamics is based on:
A - Energy conservation

84 -Electric field inside conductor is:
A - zero

85 - Drift velocity depends on:
A - Electric field

86 - Force on moving charge in magnetic field is:
A- qvB sinθ

87 - Induced EMF depends on:
A - All

88 - Power of lens =
A - 1/f

89 - Assertion: Work done by centripetal force is zero
Reason: Force is perpendicular to displacement
A - Both true, R correct explanation

90 - Assertion: In SHM, velocity is maximum at mean position
Reason: Acceleration is zero at mean position
A -Both true, R correct explanation

91 - Assertion: Electric field inside conductor is zero
Reason: Charges move until equilibrium
A- Both true, R correct explanation

92 - Assertion: Total mechanical energy conserved in SHM
Reason: Only conservative forces act
A - Both true, R correct explanation

93 - Which of the following is a vector quantity?
A - velocity

94 -Assertion: EM waves can travel in vacuum
Reason: They don’t require medium
A - Both true, R correct explanation

95 - Critical angle occurs when:
A- r=90°

96 - Refractive index =
A - sin i / sin r

97 -Transformer works on:
A - AC

98 -Magnetic field lines are:
A- closed loope

99 - Resistance increases with:
A - Both B & C

100 - Potential difference unit:
A - Volt