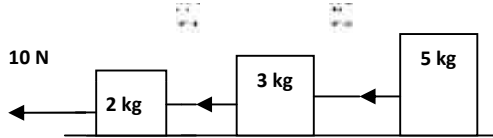
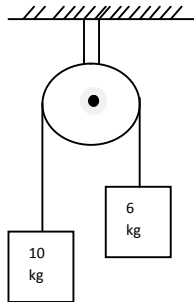


GGSIPIU Physics 2004

1. Three blocks of masses 2 kg, 3 kg and 5 kg are connected to each other with light string and are then placed on a frictionless surface as shown in the figure. The system is pulled by a force $F=10\text{ N}$, then tension T_1 is :



- a) 1 N b) 5 N
c) 8 N d) 10 N
2. Two masses m_1 and m_2 are attached to a string which passes over a frictionless smooth pulley. When $m_1 = 10\text{ kg}$, $m_2 = 6\text{ kg}$, the acceleration of masses is :



- a) 20 m/s^2 b) 5 m/s^2
c) 2.5 m/s^2 d) 10 m/s^2
3. An object is moving through the liquid. The viscous damping force acting on it is proportional to the velocity. Then dimension of proportionality is :
- a) $[ML^{-1}T^{-1}]$ b) $[MLT^{-1}]$
c) $[M^0LT^{-1}]$ d) $[ML^0T^{-1}]$

4. Magnetic meridian is a :
- a) Point b) horizontal plane
c) Vertical plane d) Line along N -S
5. The unit of L/R is where L = inductance and R = resistance :
- a) Sec b) sec^{-1}
c) volt d) ampere
6. If the current is doubled ,the deflection is also doubled in :
- a) a tangent galvanometer b) a moving coil galvanometer
c) both a) and b d) none of the above
7. The permeability of a paramagnetic substance is :
- a) Slightly more than vacuum b) slightly less than vacuum
c) much more than vacuum d) none of the above
8. When particles will have minimum frequency of revolution when projected with the same velocity perpendicular to magnetic field?
- a) Li^+ b) Electron
c) Proton d) He^+
9. A body of mass M_1 collides elastically with another mass M_2 at rest. There is maximum transfer of energy when :
- a) $M_2 > M_1$ b) $M_1 < M_2$
c) $M_1 = M_2$ d) same of all values of M_1 and M_2
10. Minimum energy required to take out the only one electron from ground state of He^+ is :
- a) 13.6 eV b) 54.4 eV
c) 27.2 eV d) 6.8 eV

11. Photons of 5.5 eV energy fall on the surface of the metal emitting photoelectrons of maximum kinetic energy 4.0 eV .The stopping voltage required for these electrons is :

a) 5.5 V b) 1.5 V

c) 9.5 V d) 4.0 V

12. Which is different from others by units?

a) Phase different b) Mechanical equivalent

c) Loudness of sound d) poisson's ratio

13. The velocity of a body of rest mass m_0 is $\frac{\sqrt{3}}{2}c$ where c is the velocity of light in vacuum. Then mass of this body is :

a) $\frac{\sqrt{3}}{2}m_0$ b) $\frac{1}{2}m_0$

c) $2m_0$ d) $2\sqrt{3}m_0$

14. A ball is dropped from top of a tower of 100m height. Simultaneously another ball was thrown upward from bottom of the tower with a speed of 50 m/s. They will cross each other after : $g = 10 \text{ m/s}^2$

a) 1 sec b) 2 sec

c) 3 sec d) 4 sec

15. The driver of a car moving towards a rocket launching pad with a speed of 6 m/s observes that the rocket is moving with speed of 10 m/s .The upward speed of the rocket as seen by the stationary observer is :

a) 4 m/s b) 6 m/s

c) 8 m/s d) 11 m/s

16. A satellite revolves very near to the earth surface. Its speed should be around :

a) 5 km/s b) 8 km/s

c) 2 km/s d) 11 km/s

17. If the density of the earth is doubled keeping its radius constant, then acceleration due to gravity g is :

a) 20 m/s^2 b) 10 m/s^2

- c) 5 m/s^2 d) 2.5 m/s^2

18. A simple pendulum oscillates in a vertical plane. When it passes through the mean position, the tension in the string is 3 times the weight of the pendulum bob. What is the maximum displacement of the pendulum of the string with respect to the vertical ?

- a) 30° b) 45°
 c) 60° d) 90°

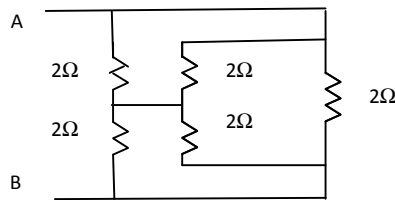
19. A body of mass 8 kg is moved by a force $F = 3x \text{ N}$, where x is the distance covered. Initial position is $x = 2 \text{ m}$ and the final position is $x = 10 \text{ m}$. The initial speed is zero. The final speed is :

- a) 6 m/s b) 12 m/s
 c) 18 m/s d) 14 m/s

20. Which of the following statement is true ?

- a) velocity of light is constant in all media. b) Velocity of light in vacuum is maximum
 c) Velocity of light is same in all reference frame d) laws of nature have identical form in all reference frames.

21. Find the equivalent resistance across AB:



- a) 1Ω b) 2Ω
 c) 3Ω d) 4Ω

22. The nuclear reaction $1\text{H}^1 + 1\text{H}^1 \longrightarrow 2\text{He}^4$ mass of deuteron = 2.0141 amu and of $\text{He} = 4.0024 \text{ amu}$ is :

- a) fusion reaction releasing 24 MeV energy
 b) fusion reaction absorbing 24 MeV energy
 c) fission reaction releasing 0.0258 MeV energy
 d) fission reaction absorbing 0.0258 MeV energy

23. In Thomson experiment of finding e/m for electrons, beam of electron is replaced by that of muons particle with same charge as of electrons but mass 208 times that of electrons. No deflection condition in this case satisfy if :

- a) B is increased to 208 times b) E is increased to 208 times
 c) B is increased to 14.4 times d) none of the above

24. A thin metal plate P is inserted half way between the plates of a parallel plate capacitor of capacitance C in such a way that it is parallel of the two plates. The capacitance now becomes :

- a) C b) $\frac{C}{2}$
 c) 4C d) none of these

25. An inclined plane makes an angle 30° with horizontal. A solid sphere rolling down this inclined plane has a linear acceleration of :

- a) $\frac{5g}{11}$ b) $\frac{2g}{3}$
 c) $\frac{g}{3}$ d) $\frac{5g}{7}$

26. A bullet of mass 10 g is fired from a gun of mass 1 kg. If the recoil velocity is 5 m/s, the velocity of the muzzle is :

- a) 0.05 m/s b) 5 m/s
 c) 50 m/s d) 500 m/s

27. A particle moves with constant speed v along circular path of radius r and completes the circle in time T . The acceleration of the particle is :

- a) $\frac{2\pi v}{T}$ b) $\frac{2\pi r}{T}$
 c) $\frac{2\pi v^2}{T}$ d) $\frac{2\pi r^2}{T}$

28. The separation between C and O atoms in CO is 1.2 \AA . The distance of carbon atom from the centre of mass is :

- a) 0.3 \AA b) 0.7 \AA
 c) 0.5 \AA d) 0.9 \AA

29. A body moves a distance of 10 m under the action of force $F = 10 \text{ N}$. If the work is done by 25 J, the angle which the force makes with the direction of motion is :

- a) 0° b) 30°
 c) 60° d) none of these

30. When a spring is stretched by 2 cm, it stores 100 J of energy. If it is stretched further by 2 cm, the stored energy will be increased by :

- a) 100 J b) 200 J
- c) 300 J d) 400 J

31. Two wires A and B are of same materials. Their lengths are in the ratio 1:2 and diameters are in the ratio 2:1. When stretched by force F_A and F_B respectively they get equal increase in their lengths.

Then the ratio $\frac{F_A}{F_B}$ should be :

- a) 1:2 b) 1:1
- c) 2:1 d) 8:1

32. Mixed He^+ and O^{2+} ions mass of $\text{He}^+ = 4$ amu and that of $\text{O}^{2+} = 16$ amu beam passes a region of constant perpendicular magnetic field. If kinetic energy of all the ions is same then :

- a) He^+ ions will be deflected more than those of O^{2+}
- b) He^+ ions will be deflected less than those of O^{2+}
- c) all the ions will be deflected equally
- d) no ions will be deflected

33. In young double slit experiment the wavelength of light was changed from 7000 \AA to 3500 \AA . While doubling the separation between the slits which of the following is not true for the experiment ?

- a) The width of the fringes changes
- b) The colour of bright fringes changes
- c) The separation between successive bright fringes changes
- d) The separation between successive dark fringes remains unchanged

34. The coherence of two light sources means that the light waves emitted have :

- a) same frequency b) same intensity
- c) constant phase difference d) same velocity

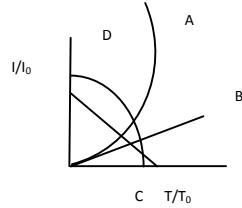
35. The valence band and conduction band of a solid overlap at low temperature, the solid may be :

- a) a metal b) a semiconductor
- c) an insulator d) none of these

36. The dominant contribution to current comes from holes in case of :

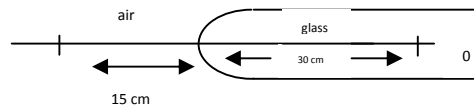
- a) metals
- b) intrinsic semiconductor
- c) p-type extrinsic semiconductors
- d) n-type extrinsic semiconductors

37. The ratio of thermionic currents I/I_0 for a metal when the temperature is slowly increased T_0 to T as shown in figure. I and I_0 are currents at T and T_0 respectively. Then which one is correct?



- a) A
- b) B
- c) C
- d) D

38. A point object O is placed in front of a glass rod having spherical end of radius of curvature 30 cm . The image would be formed at :



- a) 30 cm left
- b) infinity
- c) 1 cm to the right
- d) 18 cm to the left

39. In the information of a rainbow light from the sun on water droplets undergoes :

- a) dispersion only
- b) only total internal reflection
- c) dispersion and total internal reflection
- d) none of the above

40. The angular magnification of a simple microscope can be increased by increasing :

- a) focal length of lens
- b) size of object
- c) aperture of lens
- d) power of lens

41. If no external voltage is applied across p-n junction, there would be :

- a) no electric field across the junction
- b) an electric field pointing from n -type to p-type side across the junction
- c) an electric field pointing from p -type to n-type side across the junction
- d) a temporary electric field during formation of p -n junction that would subsequently disappear

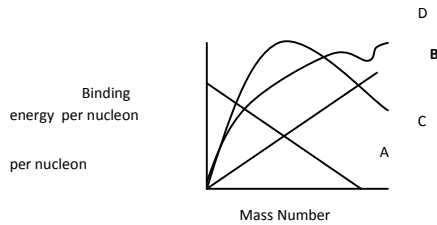
42. Light travelling from a transparent medium to air undergoes total internal reflection at an angle of incidence of 45° . Then refractive index of the medium may be :

- a) 1.5 b) 1.3
- c) 1.1 d) $\sqrt{2}$

43. Plate voltage of a triode is increased from 200 V to 225 V. To maintain the plate current, change in grid voltage from 5 V to 5.75 V is needed. the amplification factor is :

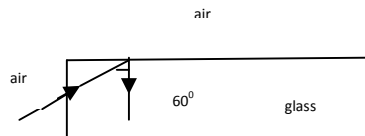
- a) 40 b) 45
- c) 33.3 d) 25

44. Binding energy per nucleon plot against the mass number for stable nuclei is shown in the figure. Which curve is correct ?



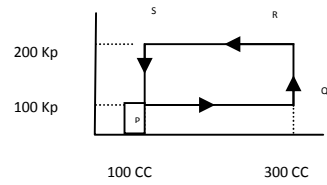
- a) A b) B
- c) C d) D

45. A light ray from air is incident as shown in figure at one end of a glass fiber refractive index, $\mu = 1.5$ making an incidence angle of 60° on the lateral surface, so that it undergoes a total internal reflection. How much time would it take to traverse the straight fiber of length 1 km?



- a) $3.33 \mu s$ b) $6.67 \mu s$
- c) $5.77 \mu s$ d) $3.85 \mu s$

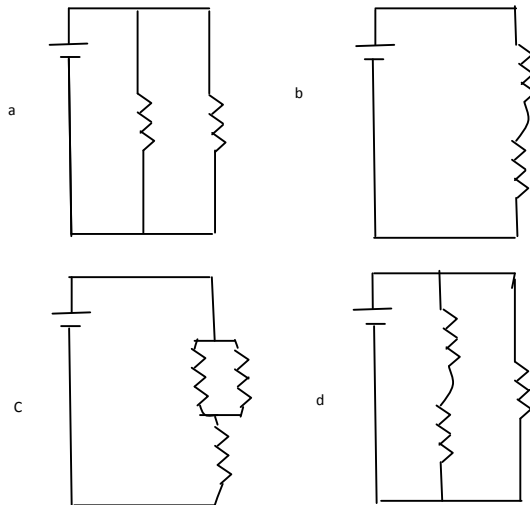
46. A thermodynamic system is taken through the cycle PQRSP process. The network done by the system is :



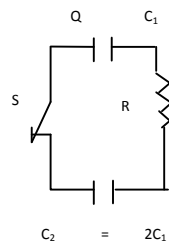
- a) 20 J b) -20 J
 c) 400 J d) -374 J

47. Consider four circuits shown in the figure below. In which circuit dissipated is greatest ?

Neglect the internal resistance of the power supply



48. Two capacitors C_1 and $C_2 = 2C_1$ are connected in a circuit with a switch between them as shown in the figure. Initially the switch is open and C_1 holds charge Q . The switch is closed. At steady state, the charge on each capacitor will be :



49. A particle is moving in a vertical circle. The tensions in the string when passing through two positions at angles 30° and 60° from vertical lowest positions are T_1 and T_2 respectively then :

- a) $T_1 = T_2$ b) $T_2 > T_1$

c) $T_1 > T_2$ d) tension in the string always remains the same

50. A coil of 100 turns carries a current of 5 mA and creates a magnetic flux of 10^{-5} weber. The inductance is :

- a) 0.2 mH b) 2.0 mH
c) 0.02 mH d) none of these

51. The starter motor of a car draws a current $I = 300$ A from the battery of voltage 12 V. If the car starts only after 2 minutes, what is the energy drawn from the battery ?

- a) 3 kJ b) 30 kJ
c) 7.2 kJ d) 432 kJ

52. Surface of the lake is at 2°C and depth of the lake is 20 m. Find the temperature of the bottom of the lake :

- a) 2°C b) 3°C
c) 4°C d) none of these

53. $y_1 = 4 \sin(\omega t + kx)$, $y_2 = -4 \cos(\omega t + kx)$, the phase difference is :

- a) $\pi/2$ b) $3\pi/2$
c) π d) zero

54. Gauss's law should be invalid if :

- a) there were magnetic monopoles
b) the inverse square law were not exactly true
c) the velocity of light were not a universal constant
d) none of the above

55. A charged particle of mass 0.003g is held stationary in space by placing it in a downward direction of electric field of 6×10^4 N/C. Then the magnitude of the charge is :

- a) 5×10^{-4} C b) 5×10^{-10} C
c) -18×10^{-6} C d) -5×10^{-9} C

56. A parallel plate capacitor has an electric field of 10^5 V/m between the plates. If the charge on the capacitor plate is $1 \mu\text{C}$, the force on each capacitor plate is :

- a) 0.5 N b) 0.05 N
c) 0.005 N d) none of these

57. An elementary particle of mass m and charge $+e$ is projected with velocity v at a much more massive particle of charge Ze , where $Z > 0$. What is the closest possible approach of the incident particle?

- a) $\frac{Ze^2}{4\pi\epsilon_0 m v^2}$ b) $\frac{Ze^2}{4\pi\epsilon_0 r_n}$
c) $\frac{Ze^2}{8\pi\epsilon_0 r_n}$ d) $-\frac{Ze^2}{8\pi\epsilon_0 r_n}$

58. 1 g of water at atmospheric pressure has a volume of 1 cc and when boiled it becomes 1681 cc of steam. The heat of vaporization of water is 540 cal/g. Then the change in its internal energy in this process is:

- a) 540 cal b) 500 cal
c) 1681 cal d) none of these

59. A physicist works in a laboratory where the magnetic field is 2 T. She wears a necklace enclosing an area of 0.01 m^2 in such a way that the plane of the necklace is normal to the field and is having a resistance $R = 0.01 \Omega$. Because of a power failure, the field decays to 1 T in 10^{-3} sec. Then what is the total heat produced in her necklace?

- a) 10 J b) 20 J
c) 20 J d) 40 J

60. The temperature coefficient of resistance of a wire is $0.00125^\circ \text{C}^{-1}$. At 300 K, the resistance is 1Ω . At what temperature will the resistance of the wire be 2Ω ?

- a) 800 K b) 1100 K
c) 600 K d) none of these