Fluid Mechanics

1. 1) Oil is transported through a pipeline by a series of pumps that can produce a pressure of in the oil leaving each pump. The losses in the pipeline cause a pressure drop of each kilometer. What is the maximum possible spacing of the pumps?. [Sahil]

-

---

2. The pressure at the bottom of a tank containing a liquid does not depend on . [Kerala (Engg.)]

- Acceleration due to gravity
- Area of the bottom surface
- Height of the liquid column
- Nature of the liquid

-

---

3. A body is just floating on the surface of a liquid. The density of the body is same as that of the liquid. The body is slightly pushed down. What will happen to the body . [AIIMS 1980]

- It will slowly come back to its earlier position
- It will sink
- It will remain submerged, where it is left
- It will come out violently

-

---

4. When a large bubble rises from the bottom of a lake to the surface. Its radius doubles. If atmospheric pressure is equal to that of column of water height H, then the depth of lake is . [AIIMS 1995; AFM]

- H
- 7H
- 2H
- 8H

-

---

5. A cylindrical tank has a hole of 1 cm2 in its bottom. If the water is allowed to flow into the tank from a tube above it at the rate of 70 cm^3/sec. then the maximum height up to which water can rise in the tank is

- 2.5 cm
- 10 cm
- 5 cm
- 0.25 cm

-

6. A small sphere of mass m is dropped from a great height. After it has fallen 100 m, it has attained its terminal velocity and continues to fall at that speed. The work done by air friction against the sphere during the first 100 m of fall is . [MP PMT 1990]

- Greater than the work done by air friction in the second 100 m
- Equal to 100 mg
- Less than the work done by air friction in the second 100 m
- Greater than 100 mg

---

7. Why the dam of water reservoir is thick at the bottom . [AFMC 2005]

- Quantity of water increases with depth
- Pressure of water increases with depth
- Density of water increases with depth
- Temperature of water increases with depth

---

8. The height of a mercury barometer is 75 cm at sea level and 50 cm at the top of a hill. Ratio of density of mercury to that of air is 10^4. The height of the hill is

- 250 m
- 1.25 km
- 2.5 km
- 750 m

---

9. A hollow sphere of volume V is floating on water surface with half immersed in it. What should be the minimum volume of water poured inside the sphere so that the sphere now sinks into the water

- V / 2
- V / 4
- V / 3
- V

---

10. A beaker containing a liquid is kept inside a big closed jar. If the air inside the jar is continuously pumped out, the pressure in the liquid near the bottom of the liquid will

- Increases
- Remain constant
- Decreases
- First decrease and then increase

11. A wooden cylinder floats vertically in water with half of its length immersed. The density of wood is

- Equal of that of water
- Double the density of water
- Half the density of water
- The question is incomplete

---

12. There is a hole of area A at the bottom of cylindrical vessel. Water is filled up to a height h and water flows out in t second. If water is filled to a height 4h, it will flow out in time equal to. [MP PMT 1997]

- t
- 2 t
- 4t
- t/4

---

13. An ice berg of density 900 Kg/m^3 is floating in water of density 1000 Kg/m^3. The percentage of volume of ice-cube outside the water is. [CPMT 2004]

- 20%
- 10%
- 35%
- 25%

---

14. The value of g at a place decreases by 2%. The barometric height of mercury

- Increases by 2%
- Remains unchanged
- Decreases by 2%
- Sometimes increases and sometimes decreases

---

15. Water is moving with a speed of 5.18 ms-1 through a pipe with a cross-sectional area of 4.20 cm2. The water gradually descends 9.66 m as the pipe increase in area to 7.60 cm2. The speed of flow at the lower level is

- 3.0 ms^{-1}
- 3.82 ms^{-1}
- 5.7 ms^{-1}
- 2.86 ms^{-1}

16. A large ship can float but a steel needle sinks because of . [AFMC 2005]

- Viscosity
- Density
- Surface tension
- None of these

---

17. A uniformly tapering vessel is filled with a liquid of density 900 kg/m3. The force that acts on the base of the vessel due to the liquid is ($g = 10\ m/s^2$)

- 3.6 N
- 9.0 N
- 7.2 N
- 14.4 N

---

18. A rectangular block is 5 cm × 5 cm × 10cm in size. The block is floating in water with 5 cm side vertical. If it floats with 10 cm side vertical, what change will occur in the level of water?

- No change
- It will fall
- It will rise
- It may rise or fall depending on the density of block

---

19. A cylinder of height 20 m is completely filled with water. The velocity of efflux of water (in m/s) through a small hole on the side wall of the cylinder near its bottom is . [AIEEE 2002]

- 10
- 25.5
- 20
- 5

---

20. A siphon in use is demonstrated in the following figure. The density of the liquid flowing in siphon is 1.5 gm/cc. The pressure difference between the point P and S will be

- 10^5 N/m
- Zero
- 2×10^5 N/m
- Infinity

21. A cork is submerged in water by a spring attached to the bottom of a bowl. When the bowl is kept in an elevator moving with acceleration downwards, the length of spring

- Increases
- Remains unchanged
- Decreases
- None of these

---

22. Spherical balls of radius r are falling in a viscous fluid of viscosity η with a velocity v. The retarding viscous force acting on the spherical ball is. [AIEEE 2004]

- Inversely proportional to r but directly proportional to velocity v
- Inversely proportional to both radius r and velocity v
- Directly proportional to both radius r and velocity v
- Directly proportional to r but inversely proportional to v

---

23. Construction of submarines is based on. [Kerala PMT 2005]

- Archimedes' principle
- Pascal's law
- Bernoulli's theorem
- Newton's laws

---

24. Air is blown through a hole on a closed pipe containing liquid. Then the pressure will . [AFMC 2005]

- Increase on sides
- Increase in all directions
- Increase downwards
- Never increases

---

25. Radius of an air bubble at the bottom of the lake is r and it becomes 2r when the air bubbles rises to the top surface of the lake. If P cm of water be the atmospheric pressure, then the depth of the lake is. [Kerla PET 2005]

- 2p
- 4p
- 8p
- 7p

26. A boat carrying steel balls is floating on the surface of water in a tank. If the balls are thrown into the tank one by one, how will it affect the level of water. [J&K CET 2005]

- It will remain unchanged
- It will fall
- It will rise
- First it will first rise and then fall

-

---

27. An ice block contains a glass ball when the ice melts within the water containing vessel, the level of water. [AFMC 2005]

- Rises
- Unchanged
- Falls
- First rises and then falls

-

---

28. The velocity of kerosene oil in a horizontal pipe is 5 m/s. If g =10 then the velocity head of oil will be

- 1.25 m
- 0.125 m
- 12.5 m
- 125 m

-

---

29. Equal masses of water and a liquid of density 2 are mixed together, then the mixture has a density of

- 2/3
- 3/2
- 4/3
- 3

-

---

30. In which one of the following cases will the liquid flow in a pipe be most streamlined. [Pb. CET 2005]

- Liquid of high viscosity and high density flowing through a pipe of small radius
- Liquid of low viscosity and low density flowing through a pipe of large radius
- Liquid of high viscosity and low density flowing through a pipe of small radius
- Liquid of low viscosity and high density flowing through a pipe of large radius

-

31. Two pieces of metal when immersed in a liquid have equal upthrust on them; then

- Both pieces must have equal weights
- Both pieces must have equal volumes
- Both pieces must have equal densities
- Both are floating to the same depth

-

---

32. A concrete sphere of radius R has a cavity of radius r which is packed with sawdust. The specific gravities of concrete and sawdust are respectively 2.4 and 0.3 for this sphere to float with its entire volume submerged under water. Ratio of mass of concrete to mass of sawdust will be . [AIIMS 1995]

- 8
- 3
- 4
- Zero

-

---

33. A solid sphere of density η (> 1) times lighter than water is suspended in a water tank by a string tied to its base as shown in fig. If the mass of the sphere is m then the tension in the string is given by

- $((\eta-1)/\eta)mg$
- $mg/(\eta-1)$
- ηmg
- $(\eta-1)mg$

-

---

34. If pressure at half the depth of a lake is equal to 2/3 pressure at the bottom of the lake then what is the depth of the lake . [RPET 2000]

- 10 m
- 60 m
- 20 m
- 30 m

-

---

35. A metallic block of density 5 gm cm-3 and having dimensions 5 cm × 5 cm × 5 cm is weighed in water. Its apparent weight will be

- 5 × 5 × 5 × 5 gf
- 5 × 4 × 4 × 4 gf
- 4 × 4 × 4 × 4 gf
- 4 × 5 × 5 × 5 gf

-

36. Water enters through end A with speed v_1 and leaves through end B with speed v_2 of a cylindrical tube AB. The tube is always completely filled with water. In case I tube is horizontal and in case II it is vertical with end A upwards and in case III it is vertical with end B upwards. We have $v_1 = v_2$ for

- Case I
- Case II
- Case III
- Each case

FRICTION

1. The limiting friction is

- Always greater than the dynamic friction
- Equal to the dynamic friction
- Always less than the dynamic friction
- Sometimes greater and sometimes less than the dynamic friction

---

2. A block of 1 kg is stopped against a wall by applying a force F perpendicular to the wall. If μ=0.2 then minimum value of F will be . [MP PMT 2003]

- 980 N
- 98 N
- 49 N
- 490 N

---

3. To avoid slipping while walking on ice, one should take smaller steps because of the. [BHU 1999; BCECE]

- Friction of ice is large
- Friction of ice is small
- Larger normal reaction
- Smaller normal reaction

---

4. Which of the following statements is not true . [CMC Vellore 198]

- The coefficient of friction between two surfaces increases as the surface in contact are made rough
- Rolling friction is greater than sliding friction
- The force of friction acts in a direction opposite to the applied force
- The coefficient of friction between wood and wood is less than 1

---

5. Consider a car moving on a straight road with a speed of 100 m/s. The distance at which car can be stopped is $\mu_k = 0.5$. [AIEEE 2005]

- 100 m
- 800 m
- 400 m
- 1000 m

6. When a body is moving on a surface, the force of friction is called. [MP PET 2002]

- Static friction
- Limiting friction
- Dynamic friction
- Rolling friction

-

---

7. The coefficient of friction μ and the angle of friction λ are related as

- $\sin\lambda = \mu$
- $\tan\lambda = \mu$
- $\cos\lambda = \mu$
- $\tan\mu = \lambda$

-

---

8. If a ladder weighing 250 N is placed against a smooth vertical wall having coefficient of friction between it and floor is 0.3, then what is the maximum force of friction available at the point of contact between the ladder and the floor. [BHU 2004]

- 75 N
- 35 N
- 50 N
- 25 N

-

---

9. A body of mass 2 kg is being dragged with uniform velocity of 2 m/s on a rough horizontal plane. The coefficient of friction between the body and the surface is 0.20. The amount of heat generated in 5 sec is (J=4.2 joule/cal) and g=9.8 . [MH CET (Med.) 2]

- 9.33 cal
- 12.67 cal
- 10.21 cal
- 13.34 cal

-

---

10. Maximum value of static friction is called . [BHU 1995; RPET]

- Limiting friction
- Normal reaction
- Rolling friction
- Coefficient of friction

-

---

11. A force of 98 N is required to just start moving a body of mass 100 kg over ice. The coefficient of static friction is

- 0.6
- 0.2
- 0.4
- 0.1

---

12. Assuming the coefficient of friction between the road and tyres of a car to be 0.5, the maximum speed with which the car can move round a curve of 40.0 m radius without slipping, if the road is unbanked, should be. [AMU 1995]

- 25 m/s
- 14 m/s
- 19 m/s
- 11 m/s

---

13. A heavy uniform chain lies on a horizontal table-top. If the coefficient of friction between the chain and table surface is 0.25, then the maximum fraction of length of the chain, that can hang over one edge of the table is. [CBSE PMT 1990]

- 20%
- 35%
- 25%
- 15%

---

14. When two surfaces are coated with a lubricant, then they . [AFMC 1998, 99;]

- Stick to each other
- Roll upon each other
- Slide upon each other
- None of these

---

15. The coefficient of friction and the angle of friction λ are related as

- $\sin\lambda = \mu$
- $\tan\lambda = \mu$
- $\cos\lambda = \mu$
- $\tan\mu = \lambda$

16. Work done by a frictional force is

- Negative
- Zero
- Positive
- All of the above

-

---

17. Which is a suitable method to decrease friction

- Ball and bearings
- Polishing
- Lubrication
- All the above

-

---

18. The maximum static frictional force is

- Equal to twice the area of surface in contact
- Equal to the area of surface in contact
- Independent of the area of surface in contact
- None of the above

-

---

19. A motorcycle is travelling on a curved track of radius 500m. If the coefficient of friction between road and tyres is 0.5, the speed avoiding skidding will be. [MH CET (Med.) 2]

- 50 m/s
- 25 m/s
- 75 m/s
- 35 m/s

-

---

20. When a body is lying on a rough inclined plane and does not move, the force of friction

- is equal to μR
- is greater than μR
- is less than μR
- is equal to R

-

---

21. Which one of the following is not used to reduce friction . [Kerala (Engg.)]

- Oil
- Sand
- Ball bearings
- Graphite

-

---

22. A horizontal force of 10 N is necessary to just hold a block stationary against a wall. The coefficient of friction between the block and the wall is 0.2. the weight of the block is . [AIEEE 2003]

- 2 N
- 50 N
- 20 N
- 100 N

-

---

23. A car turns a corner on a slippery road at a constant speed of 10m/s . If the coefficient of friction is 0.5, the minimum radius of the arc in meter in which the car turns is

- 20
- 5
- 10
- 4

-

---

24. A body B lies on a smooth horizontal table and another body A is placed on B. The coefficient of friction between A and B is μ. What acceleration given to B will cause slipping to occur between A and B

- μg
- μ/g
- g/μ
- $\sqrt{\mu g}$

-

---

25. A block weighs W is held against a vertical wall by applying a horizontal force F. The minimum value of F needed to hold the block is. [MP PMT 1993]

- Less than W
- Greater than W
- Equal to W
- Data is insufficient

-

26. A 20 kg block is initially at rest on a rough horizontal surface. A horizontal force of 75 N is required to set the block in motion. After it is in motion, a horizontal force of 60 N is required to keep the block moving with constant speed. The coefficient of static friction is . [AMU 1999]

- 0.38
- 0.52
- 0.44
- 0.60

-

---

27. A box is lying on an inclined plane what is the coefficient of static friction if the box starts sliding when an angle of inclination is 60^o. [KCET 2000]

- 1.173
- 2.732
- 1.732
- 1.677

-

---

28. Two carts of masses 200 kg and 300 kg on horizontal rails are pushed apart. Suppose the coefficient of friction between the carts and the rails are same. If the 200 kg cart travels a distance of 36 m and stops, then the distance travelled by the cart weighing 300 kg is . [CPMT 1989; DPMT]

- 32 m
- 16 m
- 24 m
- 12 m

-

---

29. If a ladder weighing 250N is placed against a smooth vertical wall having coefficient of friction between it and floor is 0.3, then what is the maximum force of friction available at the point of contact between the ladder and the floor . [AIIMS 2002]

- 75 N
- 35 N
- 50 N
- 25 N

-

GRAVITATION

1. The gravitational force between two point masses m_1 and m_2 at separation r is given by $F = km_1m_2/r^2$ The constant k. [CPMT 1993]

- Depends on system of units only
- Depends on both (a) and (b)
- Depends on medium between masses only
- Is independent of both (a) and (b)

---

2. The tidal waves in the sea are primarily due to

- The gravitational effect of the moon on the earth
- The gravitational effect of venus on the earth
- The gravitational effect of the sun on the earth
- The atmospheric effect of the earth itself

---

3. Gravitational mass is proportional to gravitational . [AIIMS 1998]

- Field
- Intensity
- Force
- All of these

---

4. If density of earth increased 4 times and its radius become half of what it is, our weight will . [AMU (Engg.) 200]

- Be four times its present value
- Remain same
- Be doubled
- Be halved

---

5. If the distance between two masses is doubled, the gravitational attraction between them . [AMU (Med.) 2000]

- Is doubled
- Is reduced to half
- Becomes four times
- Is reduced to a quarter

6. Which of the following is the evidence to show that there must be a force acting on earth and directed towards the sun . [AIIMS 1980]

- Deviation of the falling bodies towards east
- Phenomenon of day and night
- Revolution of the earth round the sun
- Apparent motion of sun round the earth

-

---

7. Reason of weightlessness in a satellite is . [RPMT 2000]

- Zero gravity
- Zero reaction force by satellite surface
- Centre of mass
- None

-

---

8. The diameters of two planets are in the ratio 4 : 1 and their mean densities in the ratio 1 : 2. The acceleration due to gravity on the planets will be in ratio. [ISM Dhanbad 199]

- 1 : 2
- 2 : 1
- 2 : 3
- 4 : 1

-

---

9. Two identical solid copper spheres of radius R placed in contact with each other. The gravitational attracton between them is proportional to . [Kerala PET 2005]

- R^2
- R^4
- R^{-2}
- R^{-4}

-

---

10. The centripetal force acting on a satellite orbiting round the earth and the gravitational force of earth acting on the satellite both equal F. The net force on the satellite is. [AMU 1999]

- Zero
- $F\sqrt{2}$
- F
- 2 F

-

11. If radius of the earth contracts 2% and its mass remains the same, then weight of the body at the earth surface . [CPMT 1997; KCET]

- Will decrease
- Will remain the same
- Will increase
- None of these

-

---

12. At what distance from the centre of the earth, the value of acceleration due to gravity g will be half that on the surface (R = radius of earth). [MP PMT 2001]

- 2 R
- 1.414 R
- R
- 0.414 R

-

---

13. Choose the correct statement from the following : Weightlessness of an astronaut moving in a satellite is a situation of. [MP PMT 1995]

- Zero g
- Zero mass
- No gravity
- Free fall

-

---

14. The mass of the earth is 81 times that of the moon and the radius of the earth is 3.5 times that of the moon. The ratio of the acceleration due to gravity at the surface of the moon to that at the surface of the earth is. [MP PMT 1994]

- 0.15
- 1
- 0.04
- 6

-

---

15. Weightlessness experienced while orbiting the earth in space-ship, is the result of. [NCERT 1978; DPM]

- Inertia
- Zero gravity
- Acceleration
- Free fall towards earth

-

16. The atmosphere is held to the earth by . [IIT 1986]

- Winds
- Clouds
- Gravity
- None of the above

-

---

17. The time period of a simple pendulum on a freely moving artificial satellite is . [CPMT 1984; AFMC]

- Zero
- 3 sec
- 2 sec
- Infinite

-

---

18. Two sphere of mass m and M are situated in air and the gravitational force between them is F. The space around the masses is now filled with a liquid of specific gravity 3. The gravitational force will now be . [CBSE PMT 2003]

- F
- F/9
- F/3
- 3 F

-

---

19. If radius of earth is R then the height ‘h’ at which value of ‘g’ becomes one-fourth is . [BHU 2000]

- R/4
- R
- 3R/4
- R/8

-

---

20. The weight of a body at the centre of the earth is . [AFMC 1988]

- Zero
- Same as on the surface of earth
- Infinite
- None of the above

-

---

21. Force of gravity is least at. [CPMT 1992]

- The equator
- A point in between equator and any pole
- The poles
- None of these

-

---

22. If mass of a body is M on the earth surface, then the mass of the same body on the moon surface is . [AIIMS 1997; RPM]

- M/6
- M
- Zero
- None of these

-

---

23. The value of 'g' at a particular point is 9.8 m/s^2 . Suppose the earth suddenly shrinks uniformly to half its present size without losing any mass. The value of 'g' at the same point (assuming that the distance of the point from the centre of earth does not shrink) will now be . [NCERT 1984; DPM]

- 4.9 m/s^2
- 9.8 m/s^2
- 3.1 m/s^2
- 19.6 m/s^2

-

---

24. If the angular speed of the earth is doubled, the value of acceleration due to gravity (g) at the north pole . [EAMCET (Med.) 1]

- Doubles
- Remains same
- Becomes half
- Becomes zero

25. A satellite of the earth is revolving in a circular orbit with a uniform speed v. If the gravitational force suddenly disappears, the satellite will . [AIIMS 1982; AIE]

- Continue to move with velocity v along the original orbit
- Fall down with increasing velocity
- Move with a velocity v, tangentially to the original orbit
- Ultimately come to rest somewhere on the original orbit

-

26. If the change in the value of ‘g’ at a height h above the surface of the earth is the same as at a depth x below it, then (both x and h being much smaller than the radius of the earth) . [NCERT 1983; BHU]

- x = h
- x = h/2
- x = 2h
- $x = h^2$

---

27. At what height over the earth's pole, the free fall acceleration decreases by one percent (assume the radius of earth to be 6400 km) . [KCET 1994]

- 32 km
- 1.253 km
- 80 km
- 64 km

---

28. The radius of the earth is 6400 km and g= 10 In order that a body of 5 kg weighs zero at the equator, the angular speed of the earth is. [MP PMT 1985]

- 1/80 radian/sec
- 1/800 radian/sec
- 1/400 radian/sec
- 1/1600 radian/sec

---

29. Assuming earth to be a sphere of a uniform density, what is the value of gravitational acceleration in a mine 100 km below the earth’s surface (Given R = 6400 km) . [AFMC 2000; Pb.]

- $9.66\ m/s^2$
- $5.06\ m/s^2$
- $7.64\ m/s^2$
- $3.10\ m/s^2$

---

30. At what height from the ground will the value of ‘g’ be the same as that in 10 km deep mine below the surface of earth . [RPET 1999]

- 20 km
- 15 km
- 10 km
- 5 km

Heating and chemical effect of current

1. On an electric heater 220 volt and 1100 watt are marked. On using it for 4 hours, the energy consumed in kWh will be

- 2
- 6
- 4.4
- 8

---

2. Thermopile is used for

- Collecting the heat energy
- The measurement of current
- The measurement of radiant heat energy
- The change of atomic energy into heat energy

---

3. The amount of charge required to liberate 9 gm of aluminium (atomic weight = 27 and valency = 3) in the process of electrolysis is (Faraday's number = 96500 coulombs/gm equivalent)

- 321660 coulombs
- 289500 coulombs
- 69500 coulombs
- 96500 coulombs

---

4. Two electric bulbs, one of 200 volt 40 watt and the other 200 volt 100 watt are connected in a house wiring circuit . [NCERT 1971; CBS]

- They have equal currents through them
- The resistance of the filament in 40 watt bulb is more than the resistance in 100 watt bulb
- The resistance of the filaments in both the bulbs is same
- The resistance of the filament in 100 watt bulb is more than the resistance in 40 watt bulb

---

5. Two electric lamps of 40 watt each are connected in parallel. The power consumed by the combination will be . [CPMT 1984]

- 20 watt
- 80 watt
- 60 watt
- 100 watt

6. How much energy in kilowatt hour is consumed in operating ten 50 watt bulbs for 10 hours per day in a month (30 days).. [NCERT 1978, 80;]

- 1500
- 15
- 5,000
- 150

-

---

7. In electrolysis, if the duration of the passage of current is doubled, the mass liberated is . [EAMCET 1979]

- Doubled
- Increased four times
- Halved
- Remains the same

-

---

8. An electric heater kept in vacuum is heated continuously by passing electric current. Its temperature . [MP PET 1993]

- Will go on rising with time
- Will rise for sometime and there after will start falling
- Will stop after sometime as it will loose heat to the surroundings by conduction
- Will become constant after sometime because of loss of heat due to radiation

-

---

9. The value of internal resistance of an ideal cell is . [EAMCET 1989]

- Zero
- 1 Ω
- 0.5 Ω
- Infinity

-

---

10. For electroplating a spoon, it is placed in the voltameter at . [MP PMT/PET 1998]

- The position of anode
- Exactly in the middle of anode and the cathode
- The position of cathode
- Anywhere in the electrolyte

-

11. The true statement for thermo e.m.f. of a thermocouple

- Depends on the nature of metals
- Depends only on temperature of hot junction
- Depends only on temperature of cold junction
- Depends on the length of the wires used for thermocouple

---

12. The electrochemical equivalent of a material in an electrolyte depends on. [MP PET 2001]

- The nature of the material
- The amount of charge passed through electrolyte
- The current through the electrolyte
- The amount of material present in electrolyte

---

13. The brightness of a bulb will be reduced, if a resistance is connected in

- Series with it
- Series or parallel with it
- Parallel with it
- Brightness of the bulb cannot be reduced

---

14. The production of e.m.f. by maintaining a difference of temperature between the two junctions of two different metals is known as

- Joule effect
- Peltier effect
- Seebeck effect
- Thomson effect

---

15. A 25 watt, 220 volt bulb and a 100 watt, 220 volt bulb are connected in parallel across a 220 volt line. Which bulb will glow more brightly

-)25 watt bulb
- Both will have same brightness
- 100 watt bulb
- First 25 watt then 100 watt

16. A heating coil is labelled 100 W, 220 V. The coil is cut in half and the two pieces are joined in parallel to the same source. The energy now liberated per second is . [CBSE PMT 1995]

- 200 J
- 25 J
- 400 J
- 50 J

---

17. Two identical heaters rated 220 volt, 1000 watt are placed in series with each other across 220 volt lines. If resistance do not change with temperature, then the combined power is

- 1000 watt
- 500 watt
- 2000 watt
- 4000 watt

---

18. Resistance of one carbon filament and one tungsten lamp are measured individually when the lamp are lit and compared with their respective resistances when cold. Which one of the following statements will be true . [NCERT 972]

- Resistance of the carbon filament lamp will increase but that of the tungsten will diminish when hot
- Resistances of both the lamps will increase when hot
- Resistance of the tungsten filament lamp will increase but that of carbon will diminish when hot
- Resistances of both the lamps will decrease when hot

---

19. What is immaterial for an electric fuse wire . [CPMT 1996, 2003]

- Its specific resistance
- Its length
- Its radius
- Current flowing through it

---

20. A 25 watt, 220 volt bulb and a 100 watt, 220 volt bulb are connected in series across a 220 volt lines. Which electric bulb will glow more brightly. [MP PET 1999; MP]

- 25 watt bulb
- First 25 watt and then 100 watt
- 100 watt bulb
- Both with same brightness

21. A heater coil is cut into two parts of equal length and one of them is used in the heater. The ratio of the heat produced by this half coil to that by the original coil is . [AIEEE 2005; CBS]

- 2 : 1
- 1 : 4
- 1 : 2
- 4 : 1

---

22. One kilowatt hour is equal to . [NCERT 1974; MP]

- $36 * 10^5$ joules
- 10^3 joules
- $36 * 10^3$ joules
- 10^5 joules

---

23. Two bulbs of equal wattage, one having carbon filament and the other having a tungsten filament are connected in series to the mains, then

- Both bulbs glow equally
- Tungsten filament bulbs glows more
- Carbon filament bulb glows more
- Carbon filament bulb glows less

---

24. The current inside a copper voltameter. [Roorkee 1992]

- Is half the outside value
- Is twice the outside value
- Is the same as the outside value
- Depends on the concentration of $CuSO_4$

---

25. Two bulbs, one of 50 watt and another of 25 watt are connected in series to the mains. The ratio of the currents through them is. [JIPMER 1997]

- 2 : 1
- 1 : 1
- 1 : 2
- Without voltage, cannot be calculated

26. If and are respectively the filament resistances of a 200 watt bulb and 100 watt bulb designed to operate on the same voltage, then. [NCERT 1980; CPM]

- R_1 is two times R_2
- R_2 is four times R_1
- R_2 is two times R_1
- R_1 is four times R_2

---

27. (1) The product of a volt and a coulomb is a joule.
(2) The product of a volt and an ampere is a joule/second.
(3) The product of volt and watt is horse power.
(4) Watt-hour can be measured in terms of electron volt.
State if . [NCERT 1978; MP]

- All four are correct
- (1) and (3) are correct
- (1), (2) and (4) are correct
- (3) and (4) are correct

---

28. The amount of substance liberated on electrodes during electrolysis when 1 coulomb of electricity is passed, is

- Chemical equivalent
- Equivalent weight
- Electrochemical equivalent
- One mol

---

29. In water voltameter, the electrolysis of ..... takes place . [DPMT 1999]

- H_2O
- H_2O and H_2SO_4 both
- H_2SO_4
- H_2 and O_2

---

30. To deposit one gm equivalent of an element at an electrode, the quantity of electricity needed is . [IIT 1984; DPMT]

- One ampere
- 96500 farads
- 96000 amperes
- 96500 coulombs

---

31. A thermocouple is made of Cu and Fe. If a battery is connected in it, then

- Both junctions will be at the same temperature
- One junction will be hotter than the other
- Both junctions will become hot
- None of these

---

32. Which of the following is not a correct statement . [MP PET 1995]

- Resistivity of electrolytes decreases on increasing temperature
- When joined in series a 40 W bulb glows more than a 60 W bulb
- Resistance of mercury falls on decreasing its temperature
- Resistance of 40 W bulb is less than the resistance of 60 W bulb

---

33. In the above question, the power lost in the cable during transmission is

- 12.5 kW
- 25 kW
- 6.25 kW
- 3.15 kW

---

34. The heating coils rating at 220 volt and producing 50 cal/sec heat are available with the resistances 55Ω,110,Ω220Ω,440Ω and . The heater of maximum power will be of . [MP PMT 1985]

- 440 Ω
- 110 Ω
- 220 Ω
- 55 Ω

---

35. A 220 volt and 800 watt electric kettle and three 220 volt and 100 watt bulbs are connected in parallel. On connecting this combination with 220 volt electric supply, the total current will be. [MP PMT 1975]

- 0.15 ampere
- 5.5 ampere
- 5.0 ampere
- 6.9 ampere

36. Forty electric bulbs are connected in series across a 220 V supply. After one bulb is fused, the remaining 39 are connected again in series across the same supply. The illumination will be . [DPMT 2001]

- More with 40 bulbs than with 39
- Equal in both the cases
- More with 39 bulbs than with 40
- In the ratio of $49^2 : 39^2$

-

---

37. On passing the current in water voltameter, the hydrogen

- Liberated at anode
- Does not liberate
- Liberated at cathode
- Remains in the solution

-

---

38. A 25 W, 220 V bulb and a 100 W, 220 V bulb are connected in parallel across a 440 V line. [CBSE PMT 2001]

- Only 100 watt bulb will fuse
- Both bulbs will fuse
- Only 25 watt bulb will fuse
- None of the bulbs will fuse

-

---

39. Water can not be made conducting by adding small amount of any of the following except

- Sodium chloride
- Ammonium chloride
- Copper sulphate
- Sugar

-

---

40. For a thermocouple, the neutral temperature is 270 ^{0}C and the temperature of its cold junction is 20 ^{0}C If there is no deflection in the galvanometer, the temperature of the hot junction should be . [AMU Engg. 2000]

- 210 ^{0}C
- 520 ^{0}C
- 540 ^{0}C
- 209 ^{0}C

-

---

41. Three equal resistors connected in series across a source of e.m.f. together dissipate 10 watt. If the same resistors are connected in parallel across the same e.m.f., then the power dissipated will be . [CBSE PMT 1998;]

- 10 watt
- 10/3 watt
- 30 watt
- 90 watt

---

42. When current is passed in antimony-bismuth couple, then

- The junction becomes hot when the current is from bismuth to antimony
- Both junctions become hot
- The junction becomes hot when current flows from antimony to bismuth
- Both junctions become cold

---

43. You are given three bulbs of 25, 40 and 60 watt. Which of them has lowest resistance . [NCERT 1982]

- 25 watt bulb
- 60 watt bulb
- 40 watt bulb
- Information is insufficient

---

44. The two bulbs as in the above question are connected in series to a 200 volt line. Then . [NCERT 1971, 78]

- The potential drop across the two bulbs is the same
- The potential drop across the 100 W bulb is greater than the potential drop across the 40 W bulb
- The potential drop across the 40 watt bulb is greater than the potential drop across the 100 watt bulb
- The potential drop across both the bulb is 200 volt

---

45. The power rating of an electric motor which draws a current of 3.75 amperes when operated at 200 V is about

- 1 H.P.
- 54 W
- 500 W
- 750 H.P.

46. A battery of e.m.f. 3 volt and internal resistance 1.0 ohm is connected in series with copper voltameter. The current flowing in the circuit is 1.5 amperes. The resistance of voltameter will be

- Zero
- 1.5 ohm
- 1.0 ohm
- 2.0 ohm

---

47. A 100 watt bulb working on 200 volt and a 200 watt bulb working on 100 volt have

- Resistances in the ratio of 4 : 1
- Resistances in the ratio of 2 : 1
- Maximum current ratings in the ratio of 1 : 4
- Maximum current ratings in the ratio of 1 : 2

---

48. Electroplating does not help in. [AIIMS 1998]

- Fine finish to the surface
- Metals to become hard
- Shining appearance
- Protect metal against corrosion

---

49. When a current passes through the junction of two different metals, evolution or absorption of heat at the junction is known as. [MP PMT/PET 1998]

- Joule effect
- Peltier effect
- Seebeck effect
- Thomson effect

---

50. An electric bulb of 100 watt is connected to a supply of electricity of 220 V. Resistance of the filament is . [MP PMT 1993, 97]

- 484 Ω
- 22000 Ω
- 100 Ω
- 242 Ω

Ray optics

1. A diver in a swimming pool wants to signal his distress to a person lying on the edge of the pool by flashing his water proof flash light. [NCERT 1972]

- He must direct the beam vertically upwards
- He has to direct the beam at an angle to the vertical which is slightly less than the critical angle of incidence for total internal reflection
- He has to direct the beam horizontally
- He has to direct the beam at an angle to the vertical which is slightly more than the critical angle of incidence for the total internal reflection

---

2. A virtual image larger than the object can be obtained by. [MP PMT 1986]

- Concave mirror
- Plane mirror
- Convex mirror
- Concave lens

---

3. A ray of light incidents on a plane mirror at an angle of 30^0 The deviation produced in the ray is

- 30^0
- 90^0
- 60^0
- 120^0

---

4. A light bulb is placed between two plane mirrors inclined at an angle of The number of images formed are. [CPMT 1996, 97;]

- 6
- 5
- 2
- 4

---

5. If an observer is walking away from the plane mirror with 6 m / sec Then the velocity of the image with respect to observer will be. [RPMT 1999]

- 6 m / sec
- 12 m / sec
- - 6 m / sec
- 3 m / sec

-

6. A man having height 6 m. He observes image of 2 m height erect, then mirror used is. [BCECE 2004]

- Concave
- Plane
- Convex
- None of these

---

7. A plane mirror produces a magnification of. [MP PET/PMT 1997]

- -1
- Zero
- +1
- Between 0 and + ∞

---

8. A ray of light is incidenting normally on a plane mirror. The angle of reflection will be. [MP PET 2000]

- 0^0
- Will not be reflected
- 90^0
- None of the above

---

9. A man runs towards a mirror at a speed 15 m/s The speed of the image relative to the man is. [Kerala PET 2002]

- 15 m / s
- 35 m / s
- 30 m / s
- 20 m / s

---

10. A concave mirror is used to focus the image of a flower on a nearby well 120 cm from the flower. If a lateral magnification of 16 is desired, the distance of the flower from the mirror should be. [MP PET 1986]

- 8 cm
- 80 cm
- 12 cm
- 120 cm

11. The focal length of a convex mirror is 20 cm its radius of curvature will be. [MP PMT 2001]

- 10 cm
- 30 cm
- 20 cm
- 40 cm

---

12. To an observer on the earth the stars appear to twinkle. This can be ascribed to. [CPMT 1972, 74;]

- The fact that stars do not emit light continuously
- Frequent absorption of star light by the earth's atmosphere
- Frequent absorption of star light by their own atmosphere
- The refractive index fluctuations in the earth's atmosphere

---

13. Image formed by a convex mirror is. [MP PET 1993]

- Virtual
- Enlarged
- Real
- Inverted

---

14. The ratio of the refractive index of red light to blue light in air is. [CPMT 1978]

- Less than unity
- Greater than unity
- Equal to unity
- Less as well as greater than unity depending upon the experimental arrangement

---

15. A rectangular tank of depth 8 meter is full of water ($\mu = 4 / 3$), the bottom is seen at the depth. [MP PMT 1987]

- 6 m
- 8 cm
- 8/3 m
- 10 cm

16. The focal length of a concave mirror is 50 cm. Where an object be placed so that its image is two times and inverted

- 75 cm
- 63 cm
- 72 cm
- 50 cm

---

17. It is desired to photograph the image of an object placed at a distance of from the plane mirror. The camera which is at a distance of 3 m from the mirror should be focussed for a distance of 4.5 m. [NCERT 1971]

- 3 m
- 6 m
- 4.5 m
- 7.5 m

---

18. A convex mirror is used to form the image of an object. Then which of the following statements is wrong. [CPMT 1973]

- The image lies between the pole and the focus
- The image is erect
- The image is diminished in size
- The image is real

---

19. Refractive index for a material for infrared light is. [CPMT 1984]

- Equal to that of ultraviolet light
- Equal to that for red colour of light
- Less than for ultraviolet light
- Greater than that for ultraviolet light

---

20. A ray is reflected in turn by three plain mirrors mutually at right angles to each other. The angle between the incident and the reflected rays is. [Roorkee 1995]

- 90^0
- 180^0
- 60^0
- None of these

21. Two vertical plane mirrors are inclined at an angle of 60^0 with each other. A ray of light travelling horizontally is reflected first from one mirror and then from the other. The resultant deviation is

- 60^0
- 180^0
- 120^0
- 240^0

---

22. All of the following statements are correct except. [Manipal MEE 199]

- The magnification produced by a convex mirror is always less than one
- A virtual, erect, magnified image can be formed using a concave mirror
- A virtual, erect, same-sized image can be obtained using a plane mirror
- A real, inverted, same-sized image can be formed using a convex mirror

---

23. What should be the angle between two plane mirrors so that whatever be the angle of incidence, the incident ray and the reflected ray from the two mirrors be parallel to each other. [KCET 1994; SCRA]

- 60^0
- 120^0
- 90^0
- 175^0

---

24. An object is at a distance of 0.5 m in front of a plane mirror. Distance between the object and image is. [CPMT 2002]

- 0.5 m
- 0.25 m
- 1 m
- 1.5 m

---

25. A person sees his virtual image by holding a mirror very close to the face. When he moves the mirror away from his face, the image becomes inverted. What type of mirror he is using

- Plane mirror
- Concave mirror
- Convex mirror
- None of these

26. When light wave suffers reflection at the interface from air to glass, the change in phase of the reflected wave is equal to. [CPMT 1991; J &]

- 0
- π
- $\pi/2$
- 2π

---

27. A plane mirror reflecting a ray of incident light is rotated through an angle θ about an axis through the point of incidence in the plane of the mirror perpendicular to the plane of incidence, then. [NCERT 1978; CPM]

- The reflected ray does not rotate
- The reflected ray rotates through an angle 2θ
- The reflected ray rotates through an angle θ
- The incident ray is fixed

---

28. Two plane mirrors are at 45^0 to each other. If an object is placed between them, then the number of images will be. [MP PMT 2003]

- 5
- 7
- 9
- 8

---

29. The wavelength of light diminishes μ times ($\mu = 1.33$ for water) in a medium. A diver from inside water looks at an object whose natural colour is green. He sees the object as. [CPMT 1990; MNR]

- Green
- Yellow
- Blue
- Red

---

30. A diminished virtual image can be formed only in. [MP PMT 2002]

- Plane mirror
- A convex mirror
- A concave mirror
- Concave-parabolic mirror

31. Ray optics fails when

- The size of the obstacle is 5 cm
- The size of the obstacle is less than the wavelength of light
- The size of the obstacle is 3 cm
- (a) and (b) both

---

32. A boy stands straight in front of a mirror at a distance of away from it. He sees his erect image whose height is 1/5 th of his real height. The mirror he is using is. [MP PMT 1993]

- Plane mirror
- Concave mirror
- Convex mirror
- Plano-convex mirror

---

33. Light of different colours propagates through air

- With the velocity of air
- With the velocity of sound
- With different velocities
- Having the equal velocities

---

34. A virtual image larger than the object can be obtained by. [MP PMT 1986]

- Concave mirror
- Plane mirror
- Convex mirror
- Concave lens

---

35. When a plane mirror is rotated through an angle θ then the reflected ray turns through the angle 2θ then the size of the image

- Is doubled
- Remains the same
- Is halved
- Becomes infinite

36. A light beam is being reflected by using two mirrors, as in a periscope used in submarines. If one of the mirrors rotates by an angle θ, the reflected light will deviate from its original path by the angle. [UPSEAT 2004]

- 2θ
- θ
- 0^0
- 4θ

---

37. An object 5 cm tall is placed 1m from a concave spherical mirror which has a radius of curvature of 2cm The size of the image is. [MP PET 1993]

- 0.11 cm
- 0.55 cm
- 0.50 cm
- 0.60 cm

---

38. A concave mirror of focal length f (in air) is immersed in water ($\mu = 4/3$). The focal length of the mirror in water will be. [MNR 1998]

- f
- 3 / 4 f
- 4/3 f
- 7 / 3 f

---

39. Convergence of concave mirror can be decreased by dipping in. [AFMC 2003]

- Water
- Both
- Oil
- None of these

---

40. To get three images of a single object, one should have two plane mirrors at an angle of. [AIEEE 2003]

- 30°
- 90°
- 60°
- 150°

---

41. A cut diamond sparkles because of its. [NCERT 1974; RPE]

- Hardness
- Emission of light by the diamond
- High refractive index
- Absorption of light by the diamond

---

42. A watch shows time as 3 : 25 when seen through a mirror, time appeared will be. [RPMT 1997; JIPM]

- 8 : 35
- 7 : 35
- 9 : 35
- 8 : 25

---

43. If the angle of refraction is twice the angle of incidence, find the angle of incidence.(refractive index of medium is μ). [Aniruddha]

- $\theta=\cos-1(\mu/2)$
- $\theta=\sin-1(\mu/2)$
- $\theta=\cos-1(\mu)$
- Cant Be Predicted

---

44. Two plane mirrors are at right angles to each other. A man stands between them and combs his hair with his right hand. In how many of the images will he be seen using his right hand. [MP PMT 1995; UP]

- None
- 2
- 1
- 3

---

45. When light travels from one medium to the other of which the refractive index is different, then which of the following will change. [MP PMT 1986; AM]

- Frequency, wavelength and velocity
- Frequency and velocity
- Frequency and wavelength
- Wavelength and velocity

Simple harmonic motion

1. The displacement of a particle moving in S.H.M. at any instant is given by y= a sin ωt. The acceleration after time t = T/4 is (where T is the time period) . [MP PET 1984]

- aω
- $a\omega^2$
- - aω
- $-a\omega^2$

---

2. A particle moving along the x-axis executes simple harmonic motion, then the force acting on it is given by . [CBSE PMT 1994]

- - A Kx
- A exp (- Kx)
- A cos (Kx)
- A Kx

---

3. A vertical mass-spring system executes simple harmonic oscillations with a period of 2 s. A quantity of this system which exhibits simple harmonic variation with a period of 1 s is. [SCRA 1998]

- Velocity
- Phase difference between acceleration and displacement
- Potential energy
- Difference between kinetic energy and potential energy

---

4. There is a body having mass m and performing S.H.M. with amplitude a. There is a restoring force , where x is the displacement. The total energy of body depends upon . [CBSE PMT 2001]

- K, x
- K, a, x
- K, a
- K, a, v

---

5. The total energy of a particle executing S.H.M. is proportional to . [MP PMT 2001; Pb]

- Displacement from equilibrium position
- Velocity in equilibrium position
- Frequency of oscillation
- Square of amplitude of motion

6. The amplitude and the time period in a S.H.M. is 0.5 cm and 0.4 sec respectively. If the initial phase is $\pi/2$ radian, then the equation of S.H.M. will be

- $y = 0.5 \sin 5\pi t$
- $y = 0.5 \sin 2.5\pi t$
- $y = 0.5 \sin 4\pi t$
- $y = 0.5 \cos 5\pi t$

---

7. The maximum velocity of a simple harmonic motion represented by $y = 3 \sin (100t + \pi/6)$ is given by . [BCECE 2005]

- 300
- 100
- $3\pi/6$
- $\pi/6$

---

8. The equation of S.H.M. is $y = a \sin(2\pi nt + \alpha)$, then its phase at time t is. [DPMT 2001]

- $2\pi nt$
- $2\pi nt + \alpha$
- α
- $2\pi t$

---

9. A particle executing simple harmonic motion along y-axis has its motion described by the equation $y = A \sin(\omega t) + B$. The amplitude of the simple harmonic motion is . [Orissa JEE 2003]

- A
- A + B
- B
- $\sqrt{(A + B)}$

---

10. If a hole is bored along the diameter of the earth and a stone is dropped into hole. [CPMT 1984]

- The stone reaches the centre of the earth and stops there
- The stone executes simple harmonic motion about the centre of the earth
- The stone reaches the other side of the earth and stops there
- The stone reaches the other side of the earth and escapes into space

11. The amplitude of a particle executing S.H.M. with frequency of 60 Hz is 0.01 m. The maximum value of the acceleration of the particle is . [CPMT 1993, 95,]

- $144\ \pi^2 m/sec^2$
- $144/\pi^2\ m/sec^2$
- $144\ m/sec^2$
- $288\ \pi^2\ m/sec^2$

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---

12. A body of mass 5 gm is executing S.H.M. about a point with amplitude 10 cm. Its maximum velocity is 100 cm/sec. Its velocity will be 50 cm/sec at a distance. [CPMT 1976]

- 5
- $5\sqrt{3}$
- $5\sqrt{2}$
- $10\sqrt{2}$

---

13. A body executing simple harmonic motion has a maximum acceleration equal to and maximum velocity equal to . The amplitude of the simple harmonic motion is . [RPET 2003; Pb.]

- 32/3 meters
- 1024/9 meters
- 3/32 meters
- 64/9 meters

---

14. A particle is executing simple harmonic motion with frequency f. The frequency at which its kinetic energy change into potential energy is . [MP PET 2000]

- f/2
- 2 f
- f
- 4 f

---

15. A simple harmonic oscillator has a period of 0.01 sec and an amplitude of 0.2 m. The magnitude of the velocity in m/sec at the centre of oscillation is. [JIPMER 1997]

- 20π
- 40π
- 100
- 100π

16. A body is executing S.H.M. When its displacement from the mean position is 4 cm and 5 cm, the corresponding velocity of the body is 10 cm/sec and 8 cm/sec. Then the time period of the body is . [CPMT 1991; MP P]

- 2π sec
- π sec
- $\pi/2$ sec
- $3\pi/2$ sec

---

17. A particle executes a simple harmonic motion of time period T. Find the time taken by the particle to go directly from its mean position to half the amplitude. [UPSEAT 2002]

- T / 2
- T / 8
- T / 4
- T / 12

---

18. A body is moving in a room with a velocity of 20 m / s perpendicular to the two walls separated by 5 meters. There is no friction and the collisions with the walls are elastic. The motion of the body is. [MP PMT 1999]

- Not periodic
- Periodic and simple harmonic
- Periodic but not simple harmonic
- Periodic with variable time period

---

19. Which of the following is a necessary and sufficient condition for S.H.M. . [NCERT 1974]

- Constant period
- Proportionality between acceleration and displacement from equilibrium position
- Constant acceleration
- Proportionality between restoring force and displacement from equilibrium position

---

20. In S.H.M. maximum acceleration is at . [RPET 2001; BVP]

- Amplitude
- Acceleration is constant
- Equilibrium
- None of these

---

21. A body is executing simple harmonic motion with an angular frequency 2rad/s . The velocity of the body at 20 mm displacement, when the amplitude of motion is 60 mm, is. [Pb. CET 1996; P]

- 40 mm /s
- 113 mm /s
- 60 mm /s
- 120 mm /s

---

22. A particle of mass m is hanging vertically by an ideal spring of force constant K. If the mass is made to oscillate vertically, its total energy is. [CPMT 1978; RPET]

- Maximum at extreme position
- Minimum at mean position
- Maximum at mean position
- Same at all position

---

23. The velocity of a particle performing simple harmonic motion, when it passes through its mean position is . [MH CET (Med.) 2]

- Infinity
- Minimum
- Zero
- Maximum

---

24. A system exhibiting S.H.M. must possess. [KCET 1994]

- Inertia only
- Elasticity, inertia and an external force
- Elasticity as well as inertia
- Elasticity only

---

25. Acceleration of a particle, executing SHM, at it’s mean position is. [MH CET (Med.) 2]

- Infinity
- Maximum
- Varies
- Zero

26. The angular velocities of three bodies in simple harmonic motion are $\omega_1,\omega_2,\omega_3$ with their respective amplitudes as A_1,A_2,A_3 . If all the three bodies have same mass and velocity, then . [BHU 2002]

- $A_1\omega_1 = A_2\omega_2 = A_3\omega_3$
- $A_1^2\omega_1 = A_2^2\omega_2 = A_3^2\omega_3$
- $A_1\omega_1^2 = A_2\omega_2^2 = A_3\omega_3^2$
- $A_1^2\omega_1^2 = A_2^2\omega_2^2 = A^2$

---

27. Which one of the following is a simple harmonic motion . [CBSE PMT 1994]

- Wave moving through a string fixed at both ends
- Ball bouncing between two rigid vertical walls
- Earth spinning about its own axis
- Particle moving in a circle with uniform speed

---

28. A particle is performing simple harmonic motion with amplitude A and angular velocity w. The ratio of maximum velocity to maximum acceleration is . [Kerala (Med.) 2]

- ω
- ω^2
- $1/\omega$
- $A\omega$

---

29. A body executes simple harmonic motion. The potential energy (P.E.), the kinetic energy (K.E.) and total energy (T.E.) are measured as a function of displacement x. Which of the following statements is true . [AIEEE 2003]

- P.E. is maximum when x = 0
- T.E. is zero when x = 0
- K.E. is maximum when x = 0
- K.E. is maximum when x is maximum

---

30. A particle is oscillating according to the equation $X = 7 \cos 0.5\pi t$, where t is in second. The point moves from the position of equilibrium to maximum displacement in time. [CPMT 1989]

- 4.0 sec
- 1.0 sec
- 2.0 sec
- 0.5 sec

---

31. Which of the following equation does not represent a simple harmonic motion . [Kerala (Med.) 2]

- $y = a \sin \omega t$
- $y = a \sin \omega t + b \cos \omega t$
- $y = a \cos \omega t$
- $y = a \tan \omega t$

---

32. Which of the following expressions represent simple harmonic motion. [Roorkee 1999]

- $X = A \sin(\omega t + \delta)$
- $X = A \tan(\omega t + ø)$
- $X = B \cos(\omega t + ø)$
- $X = A \sin\omega t \cos\omega t$

---

33. If a simple pendulum oscillates with an amplitude of 50 mm and time period of 2 sec, then its maximum velocity is . [AIIMS 1998; MH]

- 0.10 m / s
- 0.8 m / s
- 0.15 m / s
- 0.26 m / s

---

34. A particle executes simple harmonic motion along a straight line with an amplitude A. The potential energy is maximum when the displacement is . [CPMT 1982]

- +(-A)
- +(-A/2)
- Zero
- $+(-A/\sqrt{2})$

---

35. For a particle executing simple harmonic motion, which of the following statements is not correct . [PMT 1997; AIIMS]

- The total energy of the particle always remains the same
- The restoring force is maximum at the extreme positions
- The restoring force of always directed towards a fixed point
- The acceleration of the particle is maximum at the equilibrium position

36. The acceleration of a particle in S.H.M. is. [MP PMT 1993]

- Always zero
- Maximum at the extreme position
- Always constant
- Maximum at the equilibrium position

Surface Tension

1. The maximum force, in addition to the weight required to pull a wire of 5.0 cm long from the surface of water at temperature 20oC, is 728 dynes. The surface tension of water is

- 7.28 N/cm
- 72.8 dyne/cm
- 7.28 dyne/cm
- 7.28×10^2 dyne/cm

---

2. The value of surface tension of a liquid at critical temperature is . [AIIMS 1980]

- Zero
- Between 0 and ∞
- Infinite
- Can not be determined

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3. The liquid meniscus in capillary tube will be convex, if the angle of contact is . [EAMCET (Med.) 1]

- Greater than
- Equal to 90°
- Less than 90°
- Equal to 0°

---

4. A square frame of side L is dipped in a liquid. On taking out, a membrane is formed. If the surface tension of the liquid is T, the force acting on the frame will be . [MP PMT 1990; DP]

- 2 TL
- 8 TL
- 4 TL
- 10 TL

---

5. A spherical drop of oil of radius 1 cm is broken into 1000 droplets of equal radii. If the surface tension of oil is 50 dynes/cm, the work done is . [MP PET 1990]

- 18π ergs
- 1800π ergs
- 180π ergs
- 8000π ergs

6. When a drop of water is dropped on oil surface, then . [RPMT 1997]

- It will mix up with oil
- It will deform
- It spreads in the form of a film
- It remains spherical

---

7. The force required to take away a flat circular plate of radius 2 cm from the surface of water, will be (the surface tension of water is 70 dyne/cm) . [Pb. PET 2001]

- 280π dyne
- 140π dyne
- 250π dyne
- 210π dyne

---

8. Small liquid drops assume spherical shape because . [JIPMER 1997]

- Atmospheric pressure exerts a force on a liquid drop
- Gravitational force acts upon the drop
- Volume of a spherical drop is minimum
- Liquid tends to have the minimum surface area due to surface tension

---

9. It is easy to wash clothes in hot water because its . [RPMT 2000]

- Surface tension is more
- Consumes less soap
- Surface tension is less
- None of these

---

10. The surface tension of a liquid . [MNR 1990]

- Increases with area
- Increase with temperature
- Decreases with area
- Decrease with temperature

11. What is ratio of surface energy of 1 small drop and 1 large drop, if 1000 small drops combined to form 1 large drop . [CPMT 1990]

- 100 : 1
- 10 : 1
- 1000 : 1
- 1 : 100

---

12. When 10^6 small drops coalesce to make a new larger drop then the drop . [RPMT 1999]

- Density increases
- Temperature increases
- Density decreases
- Temperature decreases

---

13. The value of contact angle for kerosene with solid surface. . [RPMT 2000]

- 0°
- 45°
- 90°
- 33°

---

14. On mixing the salt in water, the surface tension of water will

- Increase
- Remain unchanged
- Decrease
- None of the above

---

15. Two droplets merge with each other and forms a large droplet. In this process . [RPMT 1997, 2000]

- Energy is liberated
- Neither liberated nor absorbed
- Energy is absorbed
- Some mass is converted into energy

---

16. If the surface tension of a liquid is T, the gain in surface energy for an increase in liquid surface by A is . [MP PET 1991; RP]

- AT^{-1}
- A^2T
- AT
- A^2T^2

---

17. Which of the following statements are true in case when two water drops coalesce and make a bigger drop . [Roorkee 1999]

- Energy is released
- The surface area of the bigger drop is greater than the sum of the surface areas of both the drops
- Energy is absorbed
- The surface area of the bigger drop is smaller than the sum of the surface areas of both the drops

---

18. Which of the fact is not due to surface tension

- Dancing of a camphor piece over the surface of water
- A liquid surface comes at rest after stirring
- Small mercury drop itself becomes spherical
- Mercury does not wet the glass vessel

---

19. Force necessary to pull a circular plate of 5 cm radius from water surface for which surface tension is 75 dynes/cm, is . [MP PMT 1991]

- 30 dyne
- 750 dynes
- 60 dynes
- 750 dynes

---

20. The surface tension of liquid is 0.5 N/m. If a film is held on a ring of area 0.02 m2, its surface energy is . [CPMT 1977]

- 5×10^{-2} joule
- 4×10^{-4} joule
- 2.0×10^{-2} joule
- 0.8×10^{-1} joule

---

21. Soap helps in cleaning clothes, because . [DPMT 1983, 2001]

- Chemicals of soap change
- It absorbs the dirt
- It increases the surface tension of the solution
- It lowers the surface tension of the solution

---

22. When the temperature is increased the angle of contact of a liquid . [AIIMS 1980]

- Increases
- Remains the same
- Decreases
- First increases and then decreases

---

23. One thousand small water drops of equal radii combine to form a big drop. The ratio of final surface energy to the total initial surface energy is . [MP PET 1997; KC]

- 1000 : 1
- 10 : 1
- 1 : 1000
- 1 : 10

---

24. Small droplets of a liquid are usually more spherical in shape than larger drops of the same liquid because . [EAMCET 1988]

- Force of surface tension is equal and opposite to the force of gravity
- Force of gravity predominates the force of surface tension
- Force of surface tension predominates the force of gravity
- Force of gravity and force of surface tension act in the same direction and are equal

---

25. If a glass rod is dipped in mercury and withdrawn out, the mercury does not wet the rod because . [MP PET 1995]

-)Angle of contact is acute
-)Adhesion force is more
- Cohesion force is more
- Density of mercury is more

26. If two glass plates are quite nearer to each other in water, then there will be force of

- Attraction
- Attraction or repulsion
- Repulsion
- None of the above

---

27. The meniscus of mercury in the capillary tube is . [MP PET/PMT 1988]

- Convex
- Plane
- Concave
- Uncertain

---

28. Surface tension is due to

- Frictional forces between molecules
- Adhesive forces between molecules
- Cohesive forces between molecules
- Gravitational forces

---

29. A big drop of radius R is formed by 1000 small droplets of water, then the radius of small drop is . [AFMC 1998; Pb.]

- R/2
- R/6
- R/5
- R/10

---

30. Two pieces of glass plate one upon the other with a little water in between them cannot be separated easily because of . [JIPMER 1997]

- Inertia
- Surface tension
- Pressure
- Viscosity

31. The temperature at which the surface tension of water is zero

- 0°C
- 370°C
- 277 K
- Slightly Greatere than 647 K

---

32. A wooden stick 2m long is floating on the surface of water. The surface tension of water 0.07 N/m. By putting soap solution on one side of the sticks the surface tension is reduced to 0.06 N/m. The net force on the stick will be . [Pb. PMT 2002]

- 0.07 N
- 0.01 N
- 0.06 N
- 0.02 N

---

33. Cohesive force is experienced between . [MH CET 2001]

- Magnetic substances
- Molecules of same substances
- Molecules of different substances
- None of these

---

34. Energy needed in breaking a drop of radius R into n drops of radii r is given by . [CPMT 1982, 97]

- $4\pi T(nr^2 - R^2)$
- $4\pi T(R^2 - nr^2)$
- $4\pi(nr^3 - R^2)$
- $4\pi T(nr^2 + R^2)$

---

35. The work done in increasing the size of a soap film from 10 cm× 6 cm to 10 cm × 11 cm is 3×10^{-4} joule. The surface tension of the film is . [JIPMER 2001, 02]

- $1.5 * 10^{-2}$ N/m
- $6.0 * 10^{-2}$ N/m
- $3.0 * 10^{-2}$ N/m
- $11.0 * 10^{-2}$ N/m