PHYSICS

BOOKS - MHTCET PREVIOUS YEAR PAPERS AND PRACTICE PAPERS

PRACTICE SET 01

Paper 1 Physics Chemistry

1. The physical quantity for which magnitude and direction remains constant in unifrom

circlar motion is

A. tangential velcoity

B. angular momentum

C. liner momentum

D. centrifugal force

Answer: B

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2. The tension in the string revolving in a vertical circle with a mass m at the end which is at the lowest position

A. $\dfrac{mv^2}{r}$

B. $\dfrac{mv^2}{r} - mg$

C. $\dfrac{mv^2}{r} + mg$

D. mg

Answer: C

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3. Scaler quantities have

A. only magnitude

B. only direction

C. Both magnitude and direction

D. none of these

Answer: A

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4. A satellite moves around the earth in a circular orbit with speed v. If m is the mass of the satellite, its total energy is

A. $\dfrac{1}{2}mv^2$

B. $-\dfrac{1}{2}mv^2$

C. $\dfrac{3}{2}mv^2$

D. $\dfrac{1}{2}(PE)$

Answer: D

5. Elastic limit of a particular steel wire is $2.5 \times 10^{10} N/m^2$ maximum strain to which the wire be subjected without losing elasticity is $\left(Y_{\text{steel}} = 2 \times 10^{11} N/m^2 \right)$

A. 0.5

B. 0.25

C. 0.125

D. 1.25

Answer: C

6. Vector quantities have

     A. only magnitude

     B. only direction

     C. Both magnitude and direction

     D. none of these

Answer: C

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7. Consider a vector $\overrightarrow{F} = 4\hat{i} - 3\hat{j}$. Another vector that is perpendicular to $\overrightarrow{F}$ is

A. $4\hat{i} + 3\hat{j}$

B. $6\hat{i}$

C. $7\hat{k}$

D. $3\hat{i} - 4\hat{j}$

Answer: C

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8. Equation of displacement of a harmonic oscillator is $x = 15 \sin 20\pi t$, amplitude and angular velocity are respectively

    A. 15 m and 20π rad/s

    B. 20π rad/s and 15 m

    C. 15 m and 10π rad/s

    D. 15 m and 20 rad /s

Answer: A

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9. The radius of gyration of a body depends upon

A. mass of the body

B. nature of distribution of mass

C. axis of rotation

D. none of the above

Answer: A

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10. The length of a simple pendulum is increased by 1%. Its time period will

    A. increased by 1%

    B. decreased by 1%

    C. increased by 0.5%

    D. decreased by 0.5%

Answer: C

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11. The formula for height of a liquid column (h) in a capillary tube is

A. $h = \dfrac{2T}{rpg}$

B. $h = \dfrac{2T\cos\theta}{rpg}$

C. $h = \dfrac{2T\sin\theta}{rpg}$

D. $h = \dfrac{T^2\cos\theta}{rpg}$

Answer: B

12. The period of oscillation of a simple pendulum in the experiment is recorded as $2.63s$, $2.56s$, $2.42s$, $2.71s$, and $2.80s$. Find the average absolute error.

A. 0.1 s

B. 0.11 s

C. 0.01 s

D. 1.0 s

Answer: B

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13. What will be the speed of sound in a perfectly rigid rod?

A. zero

B. infinite

C. 332 m/s

D. 664 m/s

Answer: B

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14. In stationary waves, antinodes are the points where there is

    A. zero displacement and maximum change in pressure

    B. maximum displacement and minimum change in pressure

    C. maximum displacement and maximum change in pressue

    D. none of the above

Answer: A

15. A uniform wire of linear density 0.004 per kg-m, when stretched between two rigid supports, with a tension 3.6×10^2 N, resonates with a frequency of 420 hz. The next harmonic frequency with which the wire resonates is 490 Hz. The length of the wire in metre is

A. 1.41

B. 2.41

C. 2.14

D. 3.14

Answer: C

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16. The temperature at which the average speed of the gas molecules is double to that at a temperature of $27°C$ is

A. $54°C$

B. $108°C$

C. $300°C$

D. $327°C$

Answer: D

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17. A rope of length 5 m is kept on frictionless

surface and a force of 5 N is applied to one of

its end. Find the tension in the rope at 1 m from this end

A. 1N

B. 3N

C. 4N

D. 5N

Answer: C

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18. If distance between the two bodies is doubled.then the gravitational force between them will become

    A. one-fourth

    B. half

    C. remains the same

    D. double

Answer: A

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19. The simple harmonic vibrations of two particles are $y_1 = 5\sin(100t)$ and $y_2 = 4\cos\left(100t + \dfrac{\pi}{4}\right)$. The phase difference between both particles is

A. $\dfrac{\pi}{4}$

B. $\dfrac{\pi}{2}$

C. π

D. $\dfrac{3\pi}{4}$

Answer: D

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20. A body initially at $80°C$ cools to $64°C$ in 5 minutes and to $52°C$ in 10 minutes. What is the temperature of the surroundings?

A. $24°$

B. $28°$

C. $22°$

D. $25°$

Answer: A

21. Two spherical bodies A (radius 6cm) and B (radius 18cm) are at temperature T_1 and T_2 respectively The maximum intensity in the emission spectrum of A is at $500nm$ and in that of B is at $1500nm$ considering them to be black bodies, what will be the ratio of the rate of total energy radiated by A to that of B . ?

A. 9

B. 9.5

C. 8

D. 8.5

Answer: A

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22. A pulley 1 metre in diameter rotating at 600 rpm is brought to rest in 80s by a constant force of frication on its shaft. How

many revolutions does it make before coming

to rest ?

A. 200

B. 400

C. 300

D. 500

Answer: B

23. At 20. C, to attain the terminal velocity how fast willan aluminium sphre of radii 1 mm fall though water. Assume flow to be laminar flow and specific gravity (Al)

$$= 2.7\eta_{water} = 8 \times 10^{-4} Pa$$

A. 9.2 m/s

B. 6.1 m/s

C. 4.6 m/s

D. 2.3 m/s \

Answer: C

24. An organ pipe closed at one end restonates with a tuning fork of frequencies 180 Hz and 300 Hz it will also resonate with tuning fork of frequencies

A. 360 Hz

B. 420 Hz

C. 480 Hz

D. 600 Hz

Answer: B

25. In a single slit diffraction patternm, the distance between the first minimum on the left and the first minimum on the right is 5 mm. The screen on which the diffraction pattern is displayed is at a distance of 8 cm friom the silt. The wavelength is 6000 Å. The slit width (in mm) is about .

A. 0.576

B. 0.348

C. 0.192

D. 0.096

Answer: C

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26. If T is the surface tension of a liquid, the energy needed to break a liquid drop of radius R into 64 drops is :-

A. $6\pi R^2 T$

B. $\pi R^2 T$

C. $12\pi R^2 T$

D. $8\pi R^2 T$

Answer: C

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27. A force of 20N is applied on a body of mass

5 kg resting on a horizontal plane. The body

gains a kinetic energy of 10 after is moves a distance 2m. The fricitional force is

A. 10N

B. 15N

C. 20N

D. 30N

Answer: B

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28. The distance travelled by light in glass (refractive index =1 .5) in a nanosecond will be

A. 45 cm

B. 40 cm

C. 30 cm

D. 20 cm

Answer: D

29. The sources of monochromatic and choherent light beam should be narrow to produce stable interference, because narrow sources can have

A. approximately equal intesities

B. approximately equal and small intensities

C. approximately equal and long intensities

D. small number of point sources to maintain coherency

Answer: D

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30. The wavelength of sodium light in air is 5890 Å . The velocity of light in air is $3 \times 10^8 ms^{-1}$. The wavelength of light in a glass of refractive index 1.6 would be close to

A. 5890 Å

B. 3681 Å

C. 9424 Å

D. 15078 Å

Answer: B

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31. The number of electric lines of force passing normally through unit area is called

    A. electric intensity

    B. flux density

    C. surface charge density

D. None of these

Answer: B

32. Three capacitors C_1, C_2 and C_3 are connected as show in the figure to a battery of V volt. If the capacitor C_3 breaks down electrically, the change in total charge on the

combination of capacitors is
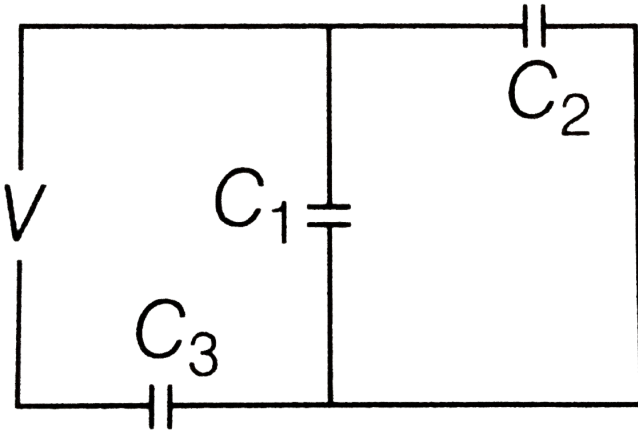
A. $(C_1 + C_2)V\left[1 - \left(\dfrac{C_3}{C_1 + C_2 + C_3}\right)\right]$

B. $(C_1 + C_2)V\left[1 - \left(\dfrac{C_1 + C_2}{C_1 + C_2 + C_3}\right)\right]$

C. $(C_1 + C_2)V\left[1 + \left(\dfrac{C_3}{C_1 + C_2 + C_3}\right)\right]$

D. $(C_1 + C_2)V\left[1 + \left(\dfrac{C_2}{C_1 + C_2 + C_3}\right)\right]$

Answer: A

33. An electron eneters the space between the plates of charged capacitor as shown. The carge density on the plate is σ, electric intensity in the space between the plates is E, A unifrom magnetic field B aslo exists B also exists in the spae perpendicular to the direction of E.

The electron moves perpendicular to both E and B without any change in direction. The time taken by the electron to travel a distance

I in the space is
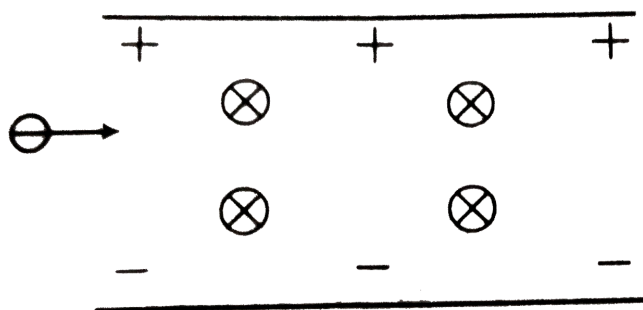
A. $\dfrac{\sigma l}{e_0 B}$

B. $\dfrac{\sigma B}{e_0 l}$

C. $\dfrac{e_0 l B}{\sigma}$

D. $\dfrac{e_0 l}{\sigma B}$

Answer: C

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34. The turn ratio of a transformers is given as

$2:3$. If the current through the primary coil is

$3A$, thus calculate the current through load

resistance

A. 1A

B. 4.5 A

C. $2A$

D. 1.5 A

Answer: C

35. Wheaststone bridge is most sensitive when

the resistance of all four arms are

    A. greater than 10Ω

    B. less than 10Ω
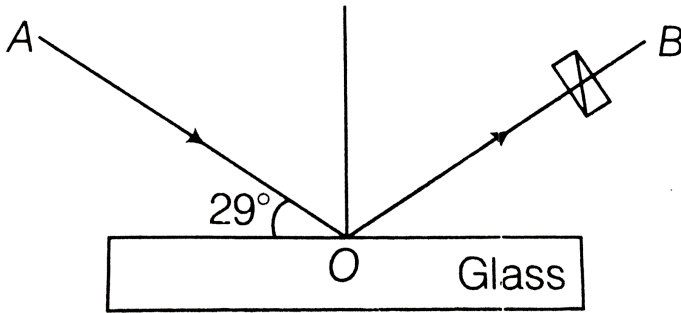
    C. same

    D. none of the above

Answer: C

36. A light beam is incident on a rectangular glass plate $(\mu = 1.54)$ The reflected light OB passes through a nicol prism.

On observing the transmitted light while

rotating the prism, it is seen that

A B
29° O Glass

A. intensity of light reduces to zero

B. intensity of light decreases and then

increases

C. there is no change of intensity of light

D. intensity of light reduces to zero slowly

and then starts to increase

Answer: B

37. Two unknown resistance X and Y are connected to left and right gaps of a meter bridge and the balancing point is obtained at 80 cm from left. When a 10Ω resisance is connected in parallel to x, balance point is 50 cm from left. The values of X and Y respectively are

A. 4Ω, 9Ω

B. 30Ω, 7.5Ω

C. 20Ω, 6Ω

D. 10Ω, 3Ω

Answer: B

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38. The scale of a galvanometer of resistance

$100 ohms$ contains 25 divisions. It gives a

defelction of one division on passing a current

of 4×10^{-4} amperes. The resistance in ohms to be added to it, so that it may become a voltmeter of range 2.5 volts is

A. 150

B. 170

C. 110

D. 220

Answer: A

39. A hydrogen atom emits a photon corresponding to an electron transition from $n = 5$ to $n = 1$. The recoil speed of hydrogen atom is almost (mass of proton $\approx 1.6 \times 10^{-27} kg$).

   A. 10 m/s

   B. 2×10^{-2} m/s

   C. 4 m/s

   D. $8 \times 10^{2} m/s$

Answer: C

40. Which one is ferromagnetic substance ?

A. Cu

B. Na

C. Ni

D. H_2O

Answer: C

41. Resonant frequency is given by (for a series L-C-R circuit)

A. $2\pi\sqrt{\dfrac{L}{C}}$

B. $\dfrac{1}{2\pi}\sqrt{\dfrac{L}{C}}$

C. $\dfrac{2\pi}{\sqrt{LC}}$

D. $\dfrac{1}{2\pi\sqrt{LC}}$

Answer: D

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42. What will be the height of image when an object of 2 mm is placed on the axis of a convex mirror at a distance 20 cm of radius of curvature 40 cm

A. 20 mm

B. 10 mm

C. 6 mm

D. 1 mm

Answer: D

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43. A beam of ions with velocity 2×10^5 m/s enters normally into a uniform magnetic field of 4×10^{-2} T. if the specific charge to the ions is 5×10^7 C/kg, the radius of the circular path described will be

   A. 0.10 m

   B. 0.16 m

   C. 0.20 m

   D. 0.25 m

Answer: A

44. An object moving at a speed of 5m/s towards a concave mirror of focal length f=1 m is at a distance of 9m. The average speed of the image is

A. 1/5 m/s
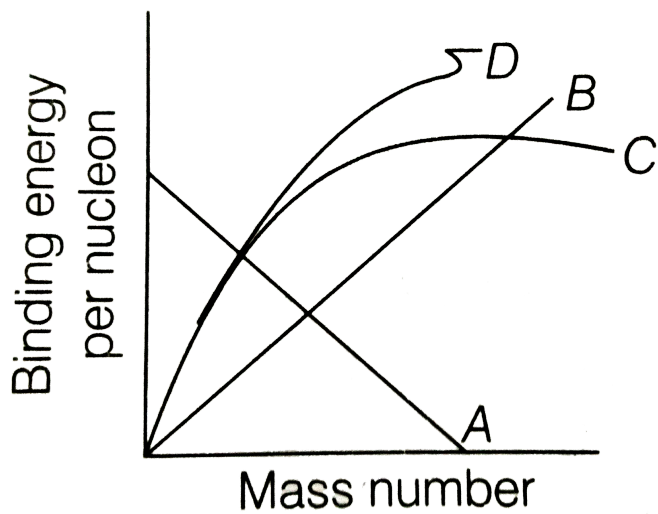
B. 1/10 m/s

C. 5/9 m/s

D. 2/8 m/s

Answer: A

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45. Binding energy per nucleon plot against

the mass number for stable nuclei is show in

the figure. Which curve is correct ?

A. A

B. B

C. C

D. D

Answer: C

46. de-Broglie wavelength λ is

    A. proportional to mass

    B. proportional to impulse

    C. inversely proportional to impulse

    D. independent to impulse

Answer: C

47. For a transistor is common base configuration if β is 100 , the value of current gain is is

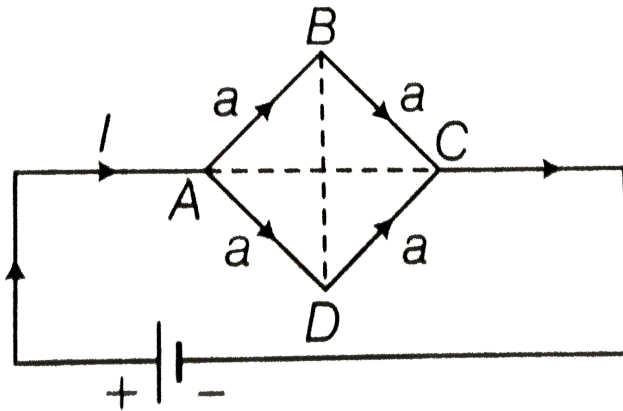A. 1

B. 0.99

C. 0.1

D. 0.01

Answer: B

48. The depletion layer in $P - N$ junction region is caused by

    A. difit of electrons

    B. migration of impurity ions

    C. drift of holes

    D. diffusion of charge carriers

Answer: D

49. Magnetic field induction at the centre O of a square loop of side a carrying current I as shown in figure.

A. $\dfrac{\mu_0 l}{\sqrt{2}\pi a}$

B. $2\sqrt{2}\dfrac{\mu_0 l}{\pi a}$

C. zero

D. $\dfrac{\mu_0 l}{2\pi a}$

Answer: C

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50. If the maximum amplitude of an amoplitude modulated wave is 25 V and the minimum amplitude is 5V, the modulation index is

A. $\dfrac{1}{5}$

B. $\dfrac{1}{3}$

C. $\dfrac{3}{2}$

D. $\dfrac{2}{3}$

Answer: D

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