NEET

Q1. A microscope has an objective of focal length 2 cm, eyepiece of focal length 4 cm and the tube length of 40 cm. If the distance of distinct vision of eye is 25 cm, the magnification in the microscope is

(1) 100 (2) 125

(3) 150 (4) 25

Ans: 125

Solution : $m = \frac{L}{f_o} \cdot \frac{D}{f_e} = \frac{40}{2} \cdot \frac{25}{4} = 20 \times 6.25 = 125$

Q2. There are two inclined surfaces of equal length (L) and same angle of inclination 45º with the horizontal. One of them is rough and the other is perfectly smooth A given body takes 2 times as much time to slide down on rough surface than on the smooth surface. The coefficient of kinetic friction (μk) between the object and the rough surface is close to.
(1) 0.25 (2) 0.40
(3) 0.5 (4) 0.75

Ans: 0.75

Solution :

Thought for 8 seconds

$a_s = g\sin 45^\circ$ (smooth)

$a_r = g\sin 45^\circ - \mu_k g\cos 45^\circ$ (rough)

$$\frac{t_r}{t_s} = \sqrt{\frac{a_s}{a_r}} = 2 \implies a_r = \frac{a_s}{4}$$

$$g\sin 45^\circ - \mu_k g\cos 45^\circ = \frac{g\sin 45^\circ}{4}$$

$$\implies \mu_k = \frac{3\sin 45^\circ}{4\cos 45^\circ} = \frac{3}{4}\tan 45^\circ = 0.75$$

Q3. A 2 amp current is flowing through two different small circular copper coils having radii ratio 1:2. The ratio of their respective magnetic moments will be
(1) 1:4
(2) 1:2

(3) 2:1
(4) 4:1

Ans: 1:4

Solution :

$m = NIA$ for a circular coil.
With the same current (2 A) and equal single turns,

$$\frac{m_1}{m_2} = \frac{A_1}{A_2} = \frac{\pi r_1^2}{\pi r_2^2} = \left(\frac{1}{2}\right)^2 = \frac{1}{4}.$$

magnetic moment is proportional to the square of the coil's radius, so doubling the radius quadruples the moment.

Q4. The electric field in a plane electromagnetic wave is given by Ez = 60 cos (5x + 1.5 ×10^9 t)V/m. Then expression for the corresponding magnetic field is (here subscripts denote the direction of the field):
(1) By = 2 × 10^–7 cos (5x + 1.5 × 10^9t)T
(2) Bx = 2 × 10^–7 cos (5x + 1.5 × 10^9t)T
(3) Bz = 60cos (5x + 1.5 × 10^9t)T
(4) By = 60sin (5x + 1.5 × 10^9t)T

Ans: By = 2×10^-7 cos(5x + 1.5 ×10^9t)T

Solution :

$E_z = 60\cos\left(5x + 1.5 \times 10^9 t\right)\ \mathrm{V\,m^{-1}}$.
$B_0 = E_0/c = 60/(3 \times 10^8) = 2 \times 10^{-7}\ \mathrm{T}$
Phase is $kx + \omega t \Rightarrow$ propagation along $-\hat{x}$.
So B is along Y–axis

Q5. A ball of mass 0.5 kg is dropped from a height of 40 m. The ball hits the ground and rises to a height of 10 m. The impulse imparted to the ball during its collision with the ground is

(Take g = 9.8 m/s2)
(1) 21 Ns
(2) 7 Ns
(3) 0
(4) 84 Ns

Ans: 21 Ns

Solution :

Initial speed just before impact
$v_i = \sqrt{2gh} = \sqrt{2(9.8)(40)} = 28\ \text{m s}^{-1}$
(downward).
Rebound speed (to reach 10 m)
$v_f = \sqrt{2gh'} = \sqrt{2(9.8)(10)} = 14\ \text{m s}^{-1}$
(upward).
Impulse $J = m\,(v_f - (-v_i)) = m\,(v_f + v_i)$
$= 0.5\,(14 + 28) = 21\ \text{N s}$ (units: kg m s^{-1} = N s).

Q6. The ratio of the wavelengths of the light absorbed by a Hydrogen atom when it undergoes
n = 2 → n = 3 and n = 4 → n = 6 transitions, respectively, is
(1) 1/36
(2) 1/16
(3) 1/9
(4) 1/4

Ans: 1/4

Solution :

For hydrogen,
$E_n = -R_H/n^2$. Absorbed photon energy is
$\Delta E = R_H(1/n_1^2 - 1/n_2^2)$. Thus
$2 \to 3$: $\Delta E_1 = R_H \cdot 5/36$; $4 \to 6$:
$\Delta E_2 = R_H \cdot 5/144$.
Since $\lambda \propto 1/\Delta E$,
$\lambda_1/\lambda_2 = \Delta E_2/\Delta E_1 = 1/4$. Hence option 4 is the correct answer.

Q7. Which among the following electronic configurations belong to main group elements?
A. [Ne]3s1 B. [Ar]3d3 4s2 C. [Kr]4d105s25p5 D. [Ar]3d104s1 E. [Rn]5f06d27s2
Choose the correct answer from the options given below:
(1) B and E only
(2) A and C only
(3) D and E only
(4) A, C and D only

Ans: A nd C only

Solution :

Main group = elements whose valence shell involves only s or p subshells (Groups 1 – 2, 13 – 18). Configuration A ([Ne] $3s^1$) corresponds to Na, an s-block metal; configuration C ([Kr] $4d^{10}5s^25p^5$) is I, a p-block halogen. Configurations B and D possess 3d electrons, and E (Th) has 6d/5f involvement, so none are main-group. Therefore the only main-group configurations listed are A and C, making Option 2 the correct choice.

Q8. Which one of the following compounds can exist as cis-trans isomers?
(1) Pent-1-ene
(2) 2-Methylhex-2-ene
(3) 1,1-Dimethylcyclopropane
(4) 1,2-Dimethylcyclohexane

Ans: 1,2-Dimethylcyclohexane

Solution :

Geometric (cis-trans) isomerism requires restricted rotation and two different substituents on each stereogenic centre. Pent-1-ene and 2-methylhex-2-ene possess identical groups on one carbon. 1,1-Dimethylcyclopropane holds both methyls on the same carbon. In 1,2-Dimethylcyclohexane C-1 and C-2 can occupy the same or opposite faces, producing distinct cis- and trans-isomers.

Q9. Dalton's Atomic theory could not explain which of the following?
(1) Law of conservation of mass
(2) Law of constant proportion
(3) Law of multiple proportion
(4) Law of gaseous volume

Ans: Law of gaseous volume

Solution : Dalton's theory could explain the laws of chemical combinations. However, it could not
explain the laws of gaseous volumes.

Q10. If the half-life (t1/2) for a first order reaction is 1 minute, then the time required for 99.9%
completion of the reaction is closet to:
(1) 2 minutes (2) 4 minutes
(3) 5 minutes (4) 10 minutes

Ans: 10 minutes

Solution :

$$Kt = 2.303 \log \frac{a}{a-x}$$
$$\frac{0.693}{t_{1/2}} \times t = 2.303 \log \frac{100}{100-99.9}$$
$$\frac{0.693}{1} \times t = 2.303 \log \frac{100}{0.1}$$
$$t = \frac{2.303}{0.693} \log 10^3$$
$$t = \frac{2.303}{0.693} \times 3 \log 10$$
$$t = 10 \text{ min}$$

Q11. The complex II of mitochondrial electron transport chain is also known as :
(1) Cytochrome bc1
(2) Succinate dehydrogenase
(3) Cytochrome c oxidase
(4) NADH dehydrogenase

Ans: Succinate dehydrogenase

Solution : Complex II of the mitochondrial electron transport chain is known as Succinate
dehydrogenase. It catalyzes the oxidation of succinate to fumarate in the Krebs cycle and
transfers electrons to ubiquinone (coenzyme Q).

Q12. Polymerase chain reaction (PCR) amplifies DNA
following the equation.
(1) N2 (2) 2n
(3) 2n + 1 (4) 2N2

Ans: 2n

Solution : In Polymerase chain reaction, each cycle of amplification doubles the amount of DNA. So, if we start with one molecule of DNA, after:
1 cycle → 2 molecules
2 cycles → 4 molecules

- 3 cycles → 8 molecules
- ...and so on.
  This pattern is **exponential** and follows the formula:

Therefore, amount of DNA after n cycles=2^n
Where n = number of cycles
And 2^n = fold increase in DNA quantity

Q13. What are the potential drawbacks in adoption of the IVF method?
A. High fatality risk to mother
B. Expensive instruments and reagents
C. Husband/wife necessary for being donors
D. Less adoption of orphans
E. Not available in India
F. Possibility that the early embryo does not survive

Choose the correct answer from the options given below:
(1) B, D, F only.
(2) A, C, D, F only
(3) A, B, C, D only
(4) A, B, C, E, F only

Ans: B, D, F only.

Solution : The potential drawbacks in adoption of the invitro fertilisation methods are;

1. Expensive instruments and reagents as the assisted reproductive techniques require extremely high precision handling by specialised professionals and expensive instrumentation.
2. Less adoption of orphans as in India we have so many orphaned and destitute children, who would probably not survive till maturity, unless taken care of. The in-vitro fertilisation methods reduce the chances of legal adoption of orphan children. There is always a possibility that early embryos formed by in-vitro fertilisation methods do not survive.

Q14. What is the name of the blood vessel that carries deoxygenated blood from the body to the heart in a frog?
(1) Aorta
(2) Pulmonary artery
(3) Pulmonary vein
(4) Vena cava

Ans: Vena cava

Solution： The blood from the heart of frog is carried to all the parts of the body through the arteries and the veins collect deoxygenated blood from the different parts of the body to the heart of frog. Therefore the correct answer is venacava.

Q15. Epiphytes that are growing on a mango branch is an example of which of the following?
(1) Commensalism (2) Mutualism
(3) Predation (4) Amensalism

Ans: Commensalism

Solution： In commensalism, one species benefits while the other is neither harmed nor benefited. Epiphytes growing on mango branches gain physical support and access to sunlight, while the mango tree is unaffected. This is a classic example of commensalism.