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NATIONAL LEVEL SCIENCE TALENT SEARCH EXAMINATION

Solutions for sample questions

Class: 11 (PCB)

Biology

1. (D) Mucor is not a biofertilizer.
2. (A) Mature sporogonium of Riccia is having only outer layer of calyptra as wall layer and spores (both haploid) Jacket layer disintegrate soon when sporogonium attains maturity.
3. (D) Ascaris monogenetic; its infection is through contaminated food and water.
4. (C) Owing to the presence of fat globule, the cytoplasm is pushed to periphery in adipocytes, giving the shape of a signet ring.
5. (A) A muscular, dome-shaped diaphragm is found in mammals which aids in breathing.

Physics

6. (D) $\alpha = \frac{\omega_1 - \omega_2}{t}$
 $= \left[\frac{1200 \times 2\pi}{60} - \frac{600 \times 2\pi}{60} \right] \text{rad s}^{-1}/10 \text{ s}$
 $= 2\pi \text{ rad s}^{-2}$
7. (B) Below the sea level the pressure is increasing with depth in mine due to presence of atmosphere air there. The acceleration due to gravity below the surface of the earth decreases with the distance from the surface of the earth, as
 $g' = g \left(1 - \frac{d}{R} \right)$
8. (C) Applying work-energy theorem,
work done by all the forces = change in kinetic energy.

$$W_{\text{mg}} + W_{\text{air}} = \frac{1}{2} mv^2$$

$$W_{\text{air}} = \frac{1}{2} mv^2 - W_{\text{mg}}$$

$$= \frac{1}{2} mv^2 - mgh$$

$$= \frac{1}{2} \times 5 \times (10)^2 - (5) \times (10) \times (20)$$

$$= -750 \text{ J}$$

9. (D) Dipole moment = (charge) × (distance)
Electric flux = (electric field) × (area)

$$10. (A) Y = \frac{FL}{\pi r^2 \Delta L} \text{ or } \Delta L = \frac{L}{r^2}$$

Here L/r^2 is maximum when $L = 40 \text{ cm}$ and $r = 0.20 \text{ mm}$ as compared to other cases.

Chemistry

11. (C) Magnalium contains Al = 95% and Mg = 5%.
12. (A) O.N. of Cr in $K_2Cr_2O_7$ is
 $2 \times (+1) + 2x - (2 \times 7) = 0$ or $x = + 6$
Similarly, O.N. of Cr in $K_2Cr_2O_4$ is
 $2 \times (+1) + 2x - (2 \times 4) = 0$ or $x = + 6$.
13. (D) Both hydrogen and alkali metals are liberated at the cathode when their halides are electrolysed. Thus hydrogen resembles alkali metals.
14. (B) Benzene-1, 2, 3, 4, 5, 6-hexol
15. (C) A liquid which is immiscible to water and has a vapour pressure of 10 – 15 mm of Hg at 373 K can be conveniently purified by steam distillation.