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## NATIONAL LEVEL SCIENCE TALENT SEARCH EXAMINATION

### Solutions for Class : 11 PCB

#### BIOLOGY

1. (B) Lepidoptera (scale wings) is an insect order comprising butterflies and moths.
2. (B) Only the eusporangiate sporangia develop multicellular jacket whose inner most layer develops into tapetum. Tapetum provides nutrition to developing spore mother cells and spores (nutritive in function) and finally abort.
3. (D) Phagocytosis is triggered by the presence of certain particles on the cell surface.
4. (C) The biomacromolecules are formed from smaller molecules by a dehydration synthesis reaction.
5. (D) Brown fat has a multilocular appearance. It is brown due to many mitochondria present. Brown fat is specially involved in heat production. The electron transport system is uncoupled from oxidative phosphorylation, which results in the production of heat instead of ATP.

#### PHYSICS

6. (C) It falls with terminal velocity. (i.e., acquires a constant velocity)
7. (C) The pressure inside the soap bubble is more than that outside it.
8. (C) The total momentum of the ball and the earth is conserved.
9. (B) The inclination of the string is  $\tan^{-1}(a/g)$  opposite to the direction of motion.
10. (A) Viscous force is temperature dependent and velocity dependent.

#### CHEMISTRY

11. (D) The favourable conditions are :  
(i) Low temperature, (ii) Catalyst  
(iii) High pressure
12. (D) All the given mixtures form buffer solutions. In case of (II) sodium acetate reacts with HCl to form  $\text{CH}_3\text{COOH}$  and NaCl.
13. (A) Exhaust system in limekilns drive away  $\text{CO}_2$  formed so that the equilibrium shifts towards forward reaction.
14. (B) HCl, a strong acid, decreases the sulphide ion concentration by common ion effect. Secondly, dil. HCl is used to keep the sulphide ion concentration at a minimum level. Thus, products of their respective sulphides precipitate out.
15. (C) In option (A) No violation of any rule  
In option (B) Violation of Aufbau principle  
In option (C) Violation of both Aufbau principle & Hund's rule.  
In option (D) Violation of Aufbau principle.

#### CRITICAL THINKING

16. (B)
17. (A)
18. (D)
19. (A)
20. (D)