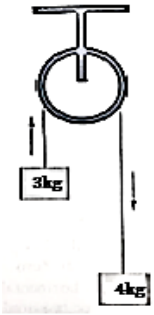
SECTION – 1 (PHYSICS)

1. A body mass 2 kg collides with a wall with a speed of 100 ms^{-1} and rebounds with the same speed. If time of contact was $\frac{1}{50}$ second then the force exerted on the wall is

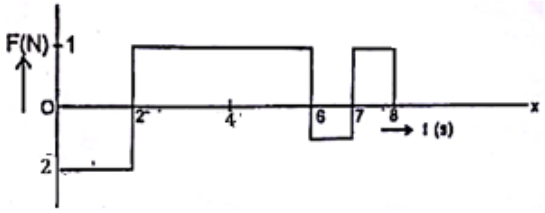
(1) 4 N (2) 8 N (3) 2×10^4 N (4) zero

2. Two bodies of masses 3 kg and 4 kg are tied to the end of massless string. The string passes over a frictionless pulley. If g = 10 ms^{-2}, the tension in the string is



(1) $\frac{120}{7}$ N (2) $\frac{240}{7}$ N (3) $\frac{280}{7}$ N (4) $\frac{320}{7}$ N

3. Force versus time graph for the motion of a body is shown in figure. Then the change in linear momentum between t = 0 and t = 8s is



(1) 4 Ns (2) 8 Ns (3) 12 Ns (4) Zero

4. A constant force acts on a body of mass m at rest. The velocity ν acquired in transversing a specific distance depends on m as

(1) $\nu \propto \frac{1}{m}$ (2) $\nu \propto \frac{1}{\sqrt{m}}$ (3) $\nu \propto \sqrt{m}$ (4) $\nu \propto m^0$

5. What force will change the velocity of a body of mass 2kg from 20 ms^{-1} to 30 ms^{-1} in two seconds?

(1) 5 N (2) 10 N (3) 20 N (4) None of these

6. Two bullets P and Q masses 10g and 20g are moving in the same direction towards a target with velocities of 20m/s and 10 m/s respectively. Which one of the bullets will pierce a greater distance through the target? (assume average resistive force is constant)

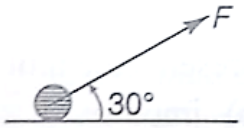
(1) P (2) Q
(3) both will cover the same distance (4) nothing can be decided

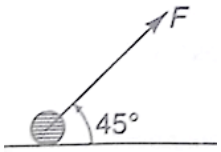
7. The number of joules contained in 1 kWh is

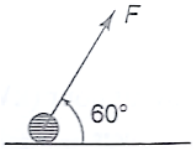
(1) 36×10^2 (2) 36×10^3 (3) 36×10^4 (4) 3.6×10^6

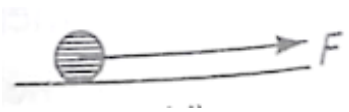
8. When the momentum of body increases by 10%, its K.E. increases by (assume mass remain constant)
(1) 20% (2) 40% (3) 44% (4) none of these

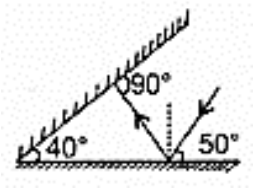
9. When the momentum of a body decreases by 10%, its K.E. decreases by (assume mass remain constant)
(1) 20% (2) 40% (3) 36% (4) none of these

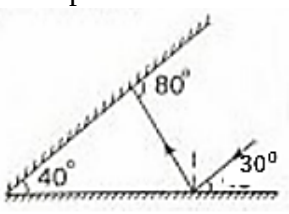
10. In which of the following cases will the work done be maximum? The body is moved through a distance S on the ground
(1) 

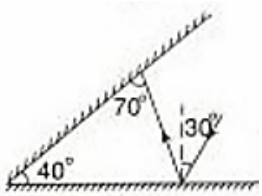
(2) 

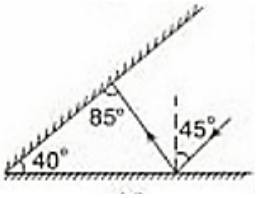
(3) 

(4) 

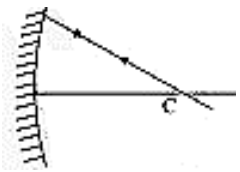
11. Which of the following correctly depicts reflections in case of plane mirrors inclined at 40^o ?
(1) 

(2) 

(3) 

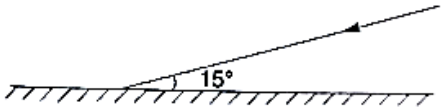
(4) 

12. A ray, emerging from a point on the object, passing through the centre of curvature C strikes the mirror normally i.e. at 90^o. Then the angle of incidence is equal to



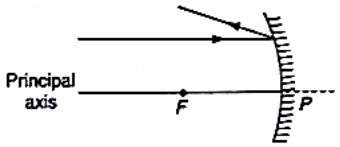
(1) 0^o (2) 45^o (3) 90^o (4) 180^o

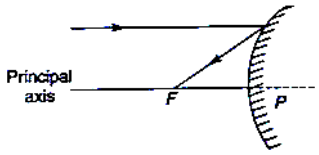
13. When a ray of light strikes a plane mirror at an angle of 15^o with the mirror, what will be the angle through which the ray gets deviated?

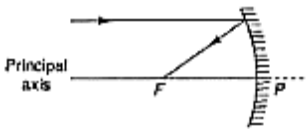


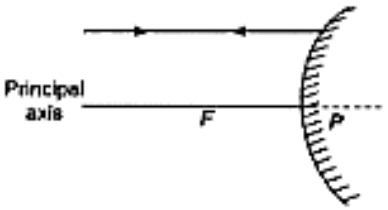
(1) 15^o (2) 30^o (3) 75^o (4) None of these

14. Which of the following correctly depicts the reflection of a ray of light on a spherical mirror?

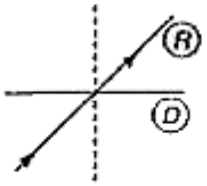
(1) 

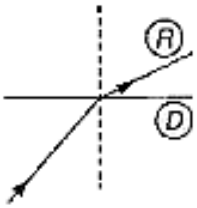
(2) 

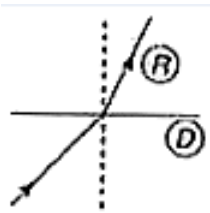
(3) 

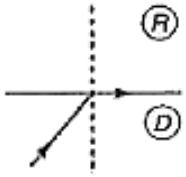
(4) 

15. Which of the following shows the bending of light from denser (D) medium into a rarer (R) medium?

(1) 

(2) 

(3) 

(4) 

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SECTION – 2 (CHEMISTRY)

16. The atomic number of element X is 19. Which statement is correct about X?
(1) Period 3, Group 1, valency 1 (2) Period 4, Group 1, valency 1
(3) Period 4, Group 2, valency 2 (4) Period 3, Group 2, valency 2

17. Which pair of elements is most likely to form an ionic compound of type MCl_2?
(1) Na and Cl (2) Mg and Cl (3) Al and Cl (4) S and Cl

18. Elements P (2,8,6) and Q (2,8,2) react to form a compound. What is the simplest formula?
(1) PQ (2) P_2Q_2 (3) P_2Q (4) PQ_2

19. Which set correctly shows decreasing atomic radius within a period?
(1) Na > Mg > Al > Si (2) Si > Al > Mg > Na (3) Na < Mg < Al < Si (4) Si < Al < Mg < Na

20. Which element will have maximum metallic character in the third period?
(1) Na (2) Mg (3) Al (4) Si

21. The atomic numbers of four elements are: 8, 10, 16, 18. Which pair are noble gases and hence chemically least reactive?
(1) 8 and 16 (2) 8 and 18 (3) 10 and 18 (4) 10 and 16

22. Which statement about variation of valency across a period is correct?
(1) Valency remains constant
(2) Valency increases from 1 to 8
(3) Valency first increases from 1 to 4, then decreases to 0.
(4) Valency randomly changes without pattern

23. Which correctly represents a balanced combination reaction?
(1) $2KClO_3 \rightarrow 2KCl + 3O_2$ (2) $CaO + CO_2 \rightarrow CaCO_3$
(3) $2H_2O \rightarrow 2H_2 + O_2$ (4) $Zn + CuSO_4 \rightarrow ZnSO_4 + Cu$

24. In the reaction: $Fe + CuSO_4 \rightarrow FeSO_4 + Cu$, which species acts as the reducing agent?
(1) Fe (2) $CuSO_4$ (3) $FeSO_4$ (4) Cu

25. A white solid "A" on heating strongly gives a white solid "B" and a colourless gas "C" that turns limewater milky. Which compound is "A"?
(1) $ZnCO_3$ (2) $Pb(NO_3)_2$ (3) $CaCO_3$ (4) $NaHCO_3$

26. Which change definitely indicates a chemical reaction?
(1) Evaporation of alcohol
(2) Sublimation of iodine
(3) Formation of brown gas when heating lead nitrate
(4) Melting of naphthalene

27. Identify the correct pair of oxidised and reduced species in the reaction: $2Mg + O_2 \rightarrow 2MgO$
(1) Mg oxidised, O_2 reduced (2) Mg reduced, O_2 oxidised
(3) Mg and O_2 both oxidised (4) Mg and O_2 both reduced

28. On passing electricity through molten lead (II) bromide, grey metal forms at one electrode and reddish-brown vapours at the other. This reaction is best classified as:
(1) Combination (2) Decomposition (electrolytic)
(3) Displacement (4) Double displacement

29. A metal X forms a green basic carbonate layer on long exposure to moist air. Which metal is X, and what type of reaction has occurred?
(1) Iron; redox and corrosion (2) Copper; redox and corrosion
(3) Aluminium; displacement (4) Zinc; neutralisation

30. Consider the skeletal equation: $Al + Fe_2O_3 \rightarrow Al_2O_3 + Fe$. What are the correct coefficients to balance the equation?
(1) 1,1,1,1 (2) 2,1,1,2 (3) 2,1,2,1 (4) 2,3,1,3

SECTION – 3 (BIOLOGY)

31. The process of digestion is completed by:
(1) Intestinal juice (2) trypsin (3) bile juice (4) pepsin

32. Lipase acts on
(1) Amino acids (2) Fats (3) Carbohydrates (4) All of these

33. In human males, the testes lie in the scrotum, because it helps in the
(1) process of mating (2) formation of sperms
(3) easy transfer of gametes (4) secretion of estrogen

34. Assertion (A): The main pulmonary artery pumps oxygenated blood from the right ventricle into the lungs.
Reason (R): Inside the lungs, the artery divides and divides several times to form capillaries around the air sacs.
(1) A is True, and R is false. (2) A is False, and R is true.
(3) Both A and R are true. (4) Both A and R are false.

35. Assertion: If both kidneys fail, urea from the blood is removed by dialysis.
Reason: Accumulation of urea in the human body is toxic.
(1) A is True, and R is false. (2) A is False, and R is true.
(3) Both A and R are true. (4) Both A and R are false.

36. An exo-endocrine gland in the human body is
(1) Pituitary gland (2) Pancreas (3) Salivary gland (4) Adrenal gland

37. Which of the following is the correct pathway of urine in the excretory system?
(1) Kidney → ureter → bladder → urethra → outside the body
(2) Bladder → urethra → kidney → ureter → outside the body
(3) Kidney → bladder → urethra → ureter → outside the body
(4) Urethra → bladder → kidney → ureter → outside the body

38. Which of the following is NOT a function of the nervous system?
(1) Controlling movement (2) Sensing and responding to the environment
(3) Regulating body temperature (4) Controlling thoughts and emotions

39. Which of the following diseases is transmitted sexually?
(1) Kala Azar (2) Jaundice (3) Cholera (4) Syphilis

40. Which of the following does Darwin's theory not include?
(1) Natural selection (2) Survival of the fittest .
(3) Evolution Through inheritance (4) Struggle for the existence of life

41. In aerobic respiration, the steps are: breakdown of glucose to pyruvate and its further conversion to carbon dioxide. Both processes respectively occur in:
(1) Vacuole and Cytoplasm (2) Chloroplast and Mitochondria
(3) Mitochondria and Cytoplasm (4) Cytoplasm and Mitochondria

42. In human alimentary canal, the digestive juice secreted by the gastric glands are:
(1) Bile, Trypsin, Pepsin (2) Hydrochloric acid, Pepsin, Mucus
(3) Lipase, Bile, Mucus (4) Salivary amylase, Pepsin, Bile

43. The basic filtration unit of the excretory system in human beings is:
(1) Nephron (2) Urethra (3) Neuron (4) Urinary bladder

44. Which one of the following is not an excretory product in plants?
(1) CO_2 (2) Starch (3) Resins and gums (4) Dead cells

45. Question consist of two statements -
Assertion (A) and Reason (R). Answer these questions selecting the appropriate option (a), (b), (c) and (d) as given below:
Assertion (a): Xylem tissue moves water and minerals obtained from the soil by the roots.
Reason (R): Xylem tissue is found only in the roots of a plant.
(1) Both A and R are true, and R is the correct explanation of A.
(2) Both A and R are true, but R is not the correct explanation of A.
(3) A is true, but R is false.
(4) A is false, but R is true.

46. Parasitic mode of nutrition is observed in
(1) Bryophyllum (2) Hibiscus (3) Cuscuta (4) Helianthus

47. The essential element used in the synthesis of proteins is:
(1) Nitrogen (2) Phosphorus (3) Iron (4) Magnesium

48. The opening and closing of stomata is regulated by:
(1) CO_2 concentration in stomata (2) Temperature in guard cells
(3) O_2 concentration in stomata (4) Amount of water in guard cells

49. Secretion of less saliva in mouth will affect the conversion of
(1) Proteins into amino acids (2) Fats into fatty acids and glycerol
(3) Starch into simple sugars (4) Sugars into alcohol

50. The breakdown of glucose has taken the following pathway:

$$\text{Glucose} \xrightarrow{(a)} \text{Pyruvate} + \text{Energy} \xrightarrow{(b)} \text{Lactic acid} + \text{Energy}$$

The sites 'a' and 'b' respectively are:
(1) Mitochondria and Oxygen deficient muscle cells
(2) Cytoplasm and Oxygen rich muscle cells
(3) Cytoplasm and Yeast cells
(4) Cytoplasm and Oxygen deficient muscle cells