

PART A : PHYSICS

MULTIPLE CHOICE QUESTIONS

1. If a wire of resistance R is melted and recasted to half of its length, then the new resistance is

(A) $\frac{R}{4}$ (B) $\frac{R}{2}$ (C) R (D) $2R$

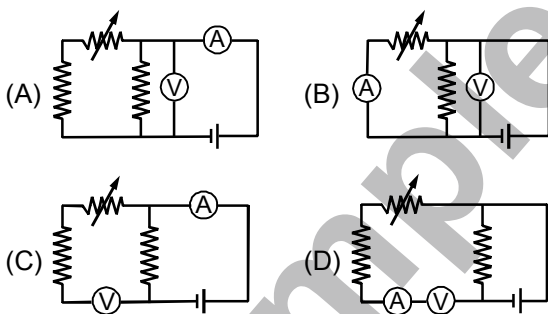
2. The focal length of a plano-convex lens is equal to its radius of curvature. The value of the R.I. of its material is

(A) 1.33 (B) 1.6
(C) 1.5 (D) 2

3. A movable pulley is used as –

(A) force multiplier
(B) speed multiplier
(C) device to change the direction of effect
(D) all the above

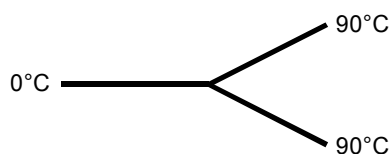
4. Express which of the following set ups can be used to verify ohm's law?



5. Hypermetropia is caused by –

(A) low converging power of eye lens
(B) low diverging power of eye lens
(C) high converging power of eye lens
(D) retinal displacement

6. Three rods made of the same material and having the same cross-section have been joined as shown in the figure. Each rod is of the same length. The left and right ends are kept at 0°C and 90°C respectively. The temperature of the junction of the three rods will be –



(A) 45°C (B) 60°C
(C) 30°C (D) 20°C

7. A child is sitting on a swing. Its minimum and maximum heights from the ground are 0.75 m and 2 m respectively. Its maximum speed will be –

(A) 15 m/s (B) 10 m/s (C) 5 m/s (D) 8 m/s

8. A faulty common balance has two pans of equal masses but the length of its two arms are not equal. When a body is placed in one pan it reads m_1 . When the same body is placed in the other pan, it reads m_2 . Then the true mass of the body is

(A) $m = \frac{\sqrt{m_1}}{\sqrt{m_2}}$ (B) $m = \sqrt{m_1 m_2}$
(C) $m = \frac{\sqrt{m_2}}{\sqrt{m_1}}$ (D) $m = m_1 m_2$

9. A spaceship moving at 1000 m/s fires a missile of mass 1000 kg at a speed of 10000 m/s. What is the mass of the spaceship if it slows down to a velocity of 910 m/s?

(A) 1×10^6 kg (B) 1×10^5 kg
(C) 1×10^4 kg (D) 1×10^3 kg

10. The resistance of the series combination of two equal resistors is S . When they are joined in parallel, the total resistance is P . If $S = nP$, then the minimum possible value of n is _____.

(A) 4 (B) 3 (C) 2 (D) 1

11. The magnification 'm' of an image formed by a concave mirror is positive. It means, the image is –

(A) smaller than the object
(B) larger than the object
(C) erect and virtual
(D) inverted and virtual

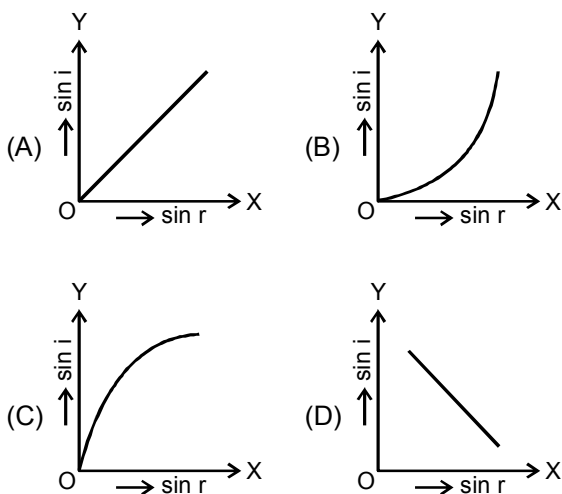
12. A circuit has a fuse of 5A. What is the maximum number of 100W (220 V) bulbs that can be safely used in the circuit in parallel combination?

(A) 7 (B) 9 (C) 11 (D) 20

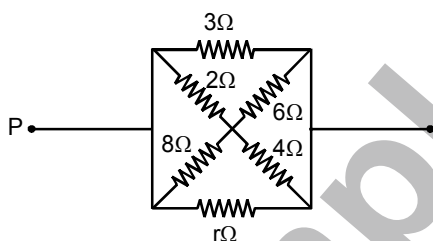
13. A negative charge released from a point A moves along the line AB. The potential at A is 20 volt, and it varies uniformly along AB. The potential at B –

(A) 20 V (B) 25 V (C) 15 V (D) 10 V

14. Which of the following correctly represents graphical relation between sine of angle of incidence (i) and sine of angle of refraction (r)?



15. In the network shown below, the equivalent resistance between P & Q is $\frac{4}{3}\Omega$. Hence the value of 'r' is –



- (A) 3Ω (B) 4Ω (C) 5Ω (D) 6Ω

PART B : CHEMISTRY

16. Number of hydrogen and oxygen atom present in 0.09 g of water is respectively –
- (A) 3.011×10^{21} and 6.022×10^{21}
 (B) 3.011×10^{21} and 1.506×10^{21}
 (C) 1.506×10^{21} and 3.011×10^{21}
 (D) 6.022×10^{21} and 3.011×10^{21}
17. Number of electrons in 1.7 g NH_3 is –
- (A) 12.044×10^{23} (B) 1.204×10^{22}
 (C) 6.022×10^{22} (D) 6.022×10^{23}

18. Atomic mass of an element is 31. It has 5 electrons in its third shell. The number of neutrons in its nucleus is –

- (A) 15 (B) 5
 (C) 16 (D) can not be predicted

19. Among the following which one is amphoteric in nature?

- (A) SiO_2 (B) ZnO (C) CO_2 (D) CaO

20. An atom having atomic number 33 is placed in _____ group in the long form of periodic table.

- (A) 2nd (B) 13th (C) 15th (D) 18th

21. On reaction with which of the elements given below hydrogen acts as an oxidizing agent?

- (A) Bromine (B) Nitrogen
 (C) Calcium (D) Sulphur

22. Chemical name of phosgene is –

- (A) Phosphine
 (B) Carbonyl chloride
 (C) Phosphorus oxychloride
 (D) Phosphorus trichloride

23. The loss in weight when 75 g of calcium carbonate is subjected to decomposition completely –

- (A) 66 g (B) 22 g
 (C) 44 g (D) 33 g

24. MgCl_2 compound contains

- (A) MgCl_2 molecules
 (B) Mg atoms and Cl atoms
 (C) Mg^{2+} ions and Cl^- ions
 (D) Mg^+ ions and Cl^- ions

25. Which one settles as dirty green precipitate?

- (A) $\text{Pb}(\text{OH})_2$ (B) $\text{Mg}(\text{OH})_2$
 (C) $\text{Fe}(\text{OH})_2$ (D) $\text{Zn}(\text{OH})_2$

26. The molecular formula of an organic compound is C_5H_{12} . The possible number of structural isomers of the compound is –

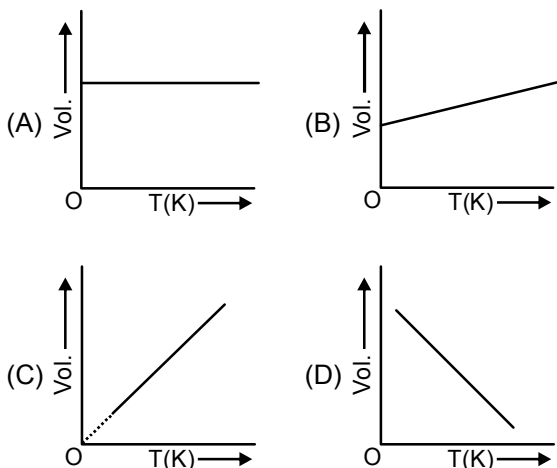
- (A) 2 (B) 3
 (C) 4 (D) 7

27. What mass of calcium chloride in grams would be enough to produce 14.35 g of AgCl ?

- (At. mass : Ca = 40; Ag = 108)
 (A) 5.55 g (B) 8.295 g (C) 16.59 g (D) 11.19 g

28. The electron in an atom
 (A) moves randomly around the nucleus
 (B) has fixed space around the nucleus
 (C) is stationary in various energy levels
 (D) moves around its nucleus in definite energy levels

29. The correct representation of Charle's law is given in



30. HNO_3 acts as
 (A) acid (B) oxidising agent
 (C) reducing agent (D) Both (A) and (B)

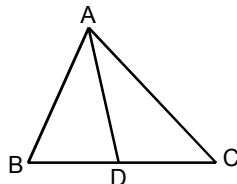
PART C : MATHEMATICS

31. If the points $(a, 0)$, $(0, b)$ and $(1, 1)$ are collinear, then which of the following is true?

- (A) $\frac{1}{a} + \frac{1}{b} = 2$ (B) $\frac{1}{a} - \frac{1}{b} = 1$
 (C) $\frac{1}{a} - \frac{1}{b} = 2$ (D) $\frac{1}{a} + \frac{1}{b} = 1$

32. In $\triangle ABC$, AD is the median, then $AB^2 + AC^2$ is

- (A) $AD^2 + BD^2$
 (B) $2(AD^2 + BD^2)$
 (C) $\frac{1}{2}(AD^2 + BD^2)$
 (D) $AD^2 + 2BD^2$



33. $\frac{\tan \theta + \sec \theta - 1}{\tan \theta - \sec \theta + 1} = \text{_____}$.

- (A) $\frac{\cos \theta}{1 + \sin \theta}$ (B) $\frac{1 + \cos \theta}{\sin \theta}$
 (C) $\frac{1 + \sin \theta}{\cos \theta}$ (D) $\frac{1 - \sin \theta}{\cos \theta}$

34. A shopkeeper purchases 11 pens for ₹10 and sells them at the rate of 10 for ₹11, then the profit is

- (A) 18% (B) 19%
 (C) 20% (D) 21%

35. Solution set of $|x - 3| + 1 < 3$ equals to

- (A) $[2, 6]$ (B) $(1, 5)$
 (C) $[2, 6]$ (D) $(2, 6]$

36. If an ordered pair satisfying the equation $2x - 3y = 18$ and $4x - y = 16$ also satisfies the equation $5x - py - 23 = 0$, then the value of p is

- (A) 1 (B) 2 (C) -1 (D) -2

37. If α and β are the roots of the equation $x^2 + px + q = 0$ then $(\alpha - \beta)^2$ equals to

- (A) $q^2 - 4p$ (B) $4q^2 - p$
 (C) $p^2 - 4q$ (D) $p^2 + 4q$

38. In $\triangle ABC$, $\angle B = 90^\circ$, $BC = 5\text{cm}$ and $AC - AB = 1\text{cm}$,

then $\frac{1 + \sin C}{\cos C}$ is equal to

- (A) 2 (B) 3 (C) 4 (D) 5

39. A roller rolled an area of 1650sq.m. in 125 revolutions, whose length is 2.8m. The radius of the roller is

- (A) 0.75m (B) 0.85m
 (C) 0.65m (D) 0.7m

40. The solution of the inequation, $15x^2 - 31x + 14 < 0$ is given by

- (A) $x \in \left(-\infty, \frac{2}{3}\right)$ (B) $\frac{2}{3} < x < \frac{7}{5}$
 (C) $x \in \left(\frac{7}{5}, \infty\right)$ (D) $x \in \mathbb{R}$

41. $\frac{\sin \theta + \cos \theta}{\sin \theta - \cos \theta} + \frac{\sin \theta - \cos \theta}{\sin \theta + \cos \theta}$ equals to
- (A) $\frac{2}{1-2\cos^2 \theta}$ (B) $\frac{2}{2\sin^2 \theta - 1}$
 (C) $\frac{2}{2\cos^2 \theta - 1}$ (D) $\frac{2}{1-2\sin^2 \theta}$
42. A balloon tied with 12m long rope makes 45° angle with the ground. The height of the balloon is
- (A) 6m (B) $6\sqrt{2}$ m
 (C) $6\sqrt{3}$ m (D) 18m
43. If the area of the three adjacent faces of a cuboid are x, y and z then volume of the cuboid is
- (A) xyz (B) 2xyz (C) \sqrt{xyz} (D) $\sqrt[3]{xyz}$
44. The number of integral solution of $\frac{x+2}{x^2+1} > \frac{1}{2}$ is
- (A) 0 (B) 2 (C) 3 (D) Infinite
45. If the sun ray's inclination increases from 45° to 60° , the length of shadow of a tower decreases by 50m. The length of the tower (in m) is
- (A) $50(\sqrt{3}-1)$ (B) $75(3-\sqrt{3})$
 (C) $100(\sqrt{3}+1)$ (D) $25(3+\sqrt{3})$

PART D : BIOLOGY

46. Which of the following hormone synthesized from hypothalamus?
- (A) Prolactin (B) Oxytocin
 (C) STH (D) None of these
47. 'Heredity' means to discuss about
- (A) Gene (B) Only Genetics
 (C) Recombination & variation
 (D) Genetics & variation
48. Example of retrovirus
- (A) HIV only
 (B) HIV and Rous sarcoma
 (C) HIV and adenovirus
 (D) HIV and Rhinovirus
49. Budding takes place in
- (A) Hydra only (B) Yeast only
 (C) Hydra and Yeast
 (D) Hydra, Yeast and Planaria
50. Reflex action is
- (A) Voluntary action (B) Involuntary action
 (C) A & B both (D) Active action
51. Which of the following hormone helps in synthesis of chlorophyll?
- (A) Auxin (B) Gibberellin
 (C) Kinin (D) ABA
52. Feeding centre present in
- (A) Cerebrum (B) Cerebellum
 (C) Hypothalamus (D) Thalamus
53. Which of the following is genetic system of prokaryotic cell?
- (A) DNA and RNA (B) Single ds RNA
 (C) Single ds DNA (D) many ds DNA
54. Which of the following hormone has no specific target organ?
- (A) STH (B) TSH (C) ACTH (D) GTH
55. Gemmule found in
- (A) Tapeworm (B) Sponges
 (C) Hydra (D) Yeast
56. Which hormone controls tropic movement of plants?
- (A) Auxin (B) Gibberellin
 (C) Kinin (D) ABA
57. Which coenzyme is essential for glycolysis?
- (A) NAD only (B) FAD only
 (C) TPP (D) NAD & FAD both
58. Meninges is the covering of
- (A) Hypothalamus (B) Cerebrum
 (C) Brain only (D) Brain and spinal cord
59. Number of neuron present in bysynaptic reflex is/are
- (A) 1 (B) 2 (C) 3 (D) 4
60. Growth of bones takes place in presence of
- (A) STH only (B) STH and Thyroxin
 (C) only STH and oestrogen
 (D) STH, oestrogen and thyroxine