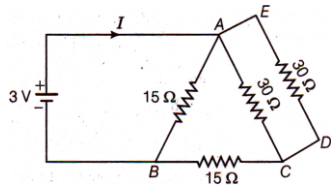
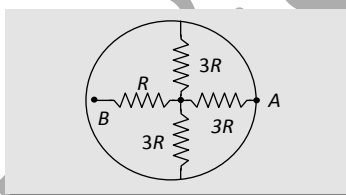


PHYSICS

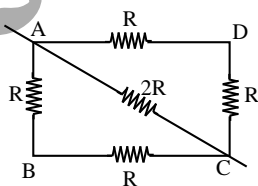
- The image formed by a concave mirror is real, inverted and of the same size as that of the object. The position of the object should be -
 (a) Beyond C (b) Between C and F
 (c) At C (d) At F
- A wire of length ℓ is placed in a magnetic field B, If the current in the wire is I, then maximum magnetic force on the wire is -
 (a) $BI\ell$ (b) $\frac{B}{I\ell}$
 (c) $\frac{I\ell}{B}$ (d) $\frac{I}{B\ell}$
- Two heater wires of equal length are first connected in series and then in parallel with a battery. The ratio of heat produced in the two cases is -
 (a) 2 : 1 (b) 1 : 2
 (c) 4 : 1 (d) 1 : 4
- Find the value of current I in the circuit given as below:



- In the given circuit, the effective resistance between points A and B will be -
 (a) 0.3 A (b) 0.6 A
 (c) 0.8 A (d) 0.5 A



- In the given circuit, the effective resistance between points A and C will be -



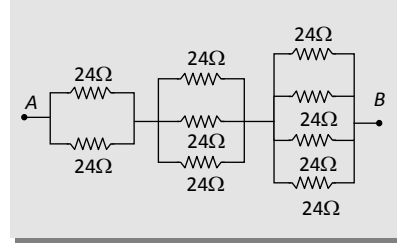
- Match the column

Column I (Common name)	Column II (Chemical formula)
(a) Baking Soda	(1) $\text{Na}_2\text{CO}_3 \cdot 10\text{H}_2\text{O}$
(b) Washing Soda	(2) $\text{CaSO}_4 \cdot \frac{1}{2} \text{H}_2\text{O}$
(c) Plaster of Paris	(3) NaHCO_3
(d) Gypsum	(4) $\text{CaSO}_4 \cdot 2\text{H}_2\text{O}$

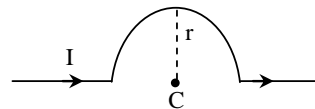
- Match the column

- A - 3, B - 1, C - 2, D - 4
- A - 1, B - 2, C - 3, D - 4
- A - 3, B - 1, C - 4, D - 2
- A - 4, B - 3, C - 2, D - 1

- In the given circuit, the effective resistance between points A and B will be -







- Figure shows, current in a part of electrical circuit, then the value of current is -
 (a) 1.7 A (b) 3.7
 (c) 13 A (d) 1.0 A
- A plane mirror is approaching you at 10 cm s^{-1} . Your image shall approach you with a speed of -
 (a) $+ 10 \text{ cm s}^{-1}$ (b) $- 10 \text{ cm s}^{-1}$
 (c) $+ 20 \text{ cm s}^{-1}$ (d) $- 20 \text{ cm s}^{-1}$
- A wire as shown in figure carries a current I ampere. The semicircle has a radius r. The magnetic field at the centre C will be -



- zero
- $\frac{\pi I}{r} \times 10^{-7}$ Newton/ampere-meter
- $\frac{\pi I}{r}$ Newton/ampere-meter
- $\frac{\pi I}{r}$ gauss

CHEMISTRY

BIOLOGY

2. Which of the following compound gives effervescence of CO_2 with NaHCO_3 ?
- (a) $\text{C}_2\text{H}_5\text{OH}$ (b) CH_3COOH
(c) CH_4 (d) $\text{CH}_2 = \text{CH}_2$
3. The maximum number of electrons that can be accommodated in shell depends on which formula. (Where 'n' is the number of the given shell from the nucleus)
- (a) n^2 (b) n^3
(c) $2n^2$ (d) $3n^2$
4. The total no. of neutrons present in 54 ml H_2O (l) are
- (a) $3N_A$ (b) $30N_A$
(c) $24N_A$ (d) None of these
5. False about aqua – regia
- (a) Freshly prepared mixture of concentrated HCl & Conc. HNO_3 in ratio of 3 : 1.
(b) Latin meaning of aqua – regia is Royal-water.
(c) Highly non – corrosive, fuming liquid.
(d) Able to dissolve gold & platinum.
6. Calcium starts floating when put in water because
- (a) It react violently with water
(b) It doesn't react with water
(c) The bubble of hydrogen gas formed during reaction stick to the surface of calcium
(d) It is non-metal
7. How many structural isomers are possible for compound having molecular formula C_5H_{12} .
- (a) 1 (b) 2
(c) 3 (d) 4
8. Find out the product (a) of reaction.
- $$\text{C}_6\text{H}_6 + \text{H}_2 \xrightarrow[\text{Catalyst}]{\text{Ni}} (\text{A})$$
- (a)  (b) 
(c)  (d) 
9. Which of the following solutions has the highest pH?
- (a) 0.2 M HClO_4
(b) 0.20 M CH_3COOH
(c) 0.2 M HCl
(d) 0.2 M NaCl
10. How many gases are produced by heating ferrous sulphate
- (a) One (b) Two
(c) Three (d) Four

1. If salivary amylase is lacking in the saliva, which of the following event in the mouth cavity will be affected?
- (a) Proteins breaking down into amino acids
(b) Starch breaking down into sugars
(c) Fats breaking down into fatty acids and glycerol
(d) Absorption of vitamins
2. Identify relationship:
The difference between xylem and phloem is
- (a) Xylem transports the food prepared by leaves whereas phloem transports water and minerals absorbed by roots.
(b) Xylem transports water and minerals absorbed by roots whereas phloem transports food prepared by leaves.
(c) Xylem transports food, water and minerals whereas phloem stores food
(d) Xylem stores food whereas phloem transports food, water and minerals.
3. Urea is formed in
- (a) Liver (b) Spleen
(c) Kidney (d) Lungs
4. Who out of the following had the strongest opinion that acquired characteristics are inherited?
- (a) Lamarck (b) Lysenko
(c) Mendel (d) Hyxley
5. Which of the following acts both as Endocrine (ductless) and Exocrine (with duct) gland.
- (a) Pancreas (b) Liver
(c) Adrenal (d) Kidney
6. Growth of pollen tube towards ovule is called
- (a) Phototropism (b) Geotropism
(c) Hydrotropism (d) Chemotropism
7. Gemmule formation in sponges is helpful in
- (a) Parthenogenesis (b) Sexual reproduction
(c) Only dissemination (d) Asexual reproduction
8. Site of fertilization in mammals is
- (a) Ovary (b) Uterus
(c) Vagina (d) Fallopian tube
9. From heredity point of view which marriage is not suitable?
- (a) Man Rh (–) and woman Rh (+)
(b) Both Rh (+)
(c) Both Rh (–)
(d) Man Rh (+) and Woman Rh (–)

10. Match the following columns:

Column I	Column II
A. Parthenocarpary	(p) Photoperiodism
B. Apical dominance	(q) Development of seedless fruit
C. Extreme cold treatment	(r) Vernalization
D. Response to length of the day	(s) Auxin

- (a) A – q, B – s, C – r, D – p
 (b) A – s, B – p, C – q, D – r
 (c) A – p, B – s, C – r, D – q
 (d) A – p, B – r, C – s, D – q

MATHEMATICS

1. If x_1, x_2, \dots, x_n are n values of a variable X such that

$$\sum_{i=1}^n (x_i - 2) = 110 \text{ and } \sum_{i=1}^n (x_i - 5) = 20.$$

Find the value of n .

- (a) 17/3 (b) 30
 (c) 10 (d) 20

2. Solution of the equation

Column 1	Column 2
(i) $\frac{2y-3}{5} + \frac{y-3}{4} = \frac{4y+1}{7}$	(p) $\frac{8}{5}$
(ii) $\frac{3}{x-1} + \frac{4}{x-2} = \frac{7}{x-3}$, $x \neq 1, 2, 3$ is	(q) $\frac{209}{11}$
(iii) $(x+1)(2x+1) = (x+3)(2x+3) - 14$,	(r) 1

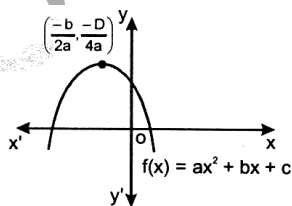
is

- (a) (i) – (q), (ii) – (p), (iii) – (r)
 (b) (i) – (p), (ii) – (p), (iii) – (r)
 (c) (i) – (r), (ii) – (p), (iii) – (q)
 (d) (i) – (r), (ii) – (q), (iii) – (p)

3. Which of the following curve touches X-axis –

- (a) $x^2 - 2x + 4$ (b) $3x^2 - 6x + 1$
 (c) $4x^2 - 16x + 9$ (d) $25x^2 - 20x + 4$

4. In the diagram given below shows the graphs of the polynomial $f(x) = ax^2 + bx + c$, then



- (a) $a < 0, b < 0$ and $c > 0$
 (b) $a < 0, b < 0$ and $c < 0$
 (c) $a < 0, b > 0$ and $c > 0$
 (d) $a < 0, b > 0$ and $c < 0$

5. A quadratic polynomial is exactly divisible by $(x + 1)$ & $(x + 2)$ and leaves the remainder 4 after division by $(x + 3)$ then that polynomial is

- (a) $x^2 + 6x + 4$ (b) $2x^2 + 6x + 4$
 (c) $2x^2 + 6x - 4$ (d) $x^2 + 6x - 4$

6. If the first five elements of the set x_1, x_2, \dots, x_{10} are replaced by $x_i + 5, i = 1, 2, 3, 4, 5$ and next five elements are replaced by $x_j - 5, j = 6, 7, \dots, 10$ then the mean will change by

- (a) 0 (b) $\frac{n+1}{2}$
 (c) 10 (d) 25

7. If $\cos \theta + \sin \theta = \sqrt{2} \cos \theta$, then find the value of $\cos \theta - \sin \theta$.

- (a) 0 (b) 1
 (c) $\sqrt{2} \sin \theta$ (d) $2 \sin \theta$

8. Two triangles ABC and PQR are similar, if

$BC : CA : AB = 1 : 2 : 3$, then $\frac{QR}{PR}$ is

- (a) $\frac{2}{3}$ (b) $\frac{1}{2}$
 (c) $\frac{1}{\sqrt{2}}$ (d) $\frac{2}{3}$

9. In a triangle ABC, if angle $B = 90^\circ$ and D is the point in BC such that $BD = 2 DC$, then

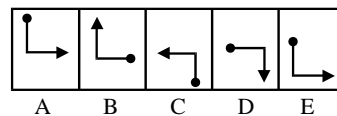
- (a) $AC^2 = AD^2 + 3 CD^2$ (b) $AC^2 = AD^2 + 5 CD^2$
 (c) $AC^2 = AD^2 + 7 CD^2$ (d) $AC^2 = AB^2 + 5 BD^2$

10. If $7 \sin \alpha = 24 \cos \alpha; 0 < \alpha < \frac{\pi}{2}$, then value of $14 \tan \alpha - 75 \cos \alpha - 7 \sec \alpha$ is equal to

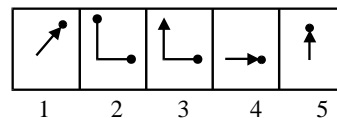
- (a) 1 (b) 2
 (c) 3 (d) 4

MENTAL ABILITY

1. Problem Figures



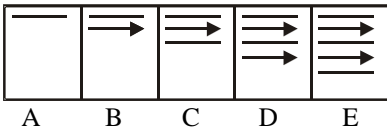
Answer figures



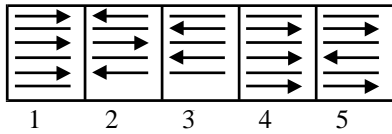
2. If '+' means 'divided by', '-' means 'multiplied by', 'x' means 'minus' and '÷' means 'plus', which of the following will be the value of the expression $16 \div 8 - 4 + 2 \times 4$?

- (a) 16 (b) 28
 (c) 32 (d) 44

3. Problem Figures



Answer figures



4. If + means \div , - means \times , \div means + and \times means -, then $36 \times 12 + 4 \div 6 + 2 - 3 = ?$

- (a) 2
- (b) 18
- (c) 42
- (d) $6\frac{1}{2}$

5. Which of the following two signs need to be interchanged to make the given equation correct?

$$10 + 10 \div 10 - 10 \times 10 = 10$$

- (a) + and -
- (b) + and \div
- (c) + and \times
- (d) \div and +

6. A man is facing North-West. He turns 90° in the clockwise direction, then 180° in the anticlockwise direction and then another 90° in the same direction. Which direction is he facing now?

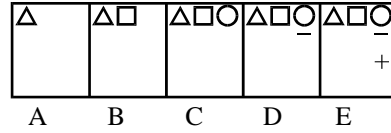
- (a) South
- (b) South-West
- (c) West
- (d) South-East

7. Which of the following two signs need to be interchanged to make the given equation correct?

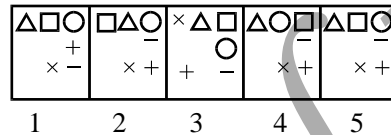
$$2 \times 3 + 6 - 12 \div 4 = 17$$

- (a) \times and +
- (b) + and -
- (c) + and \div
- (d) - and \div

8. Problem Figures



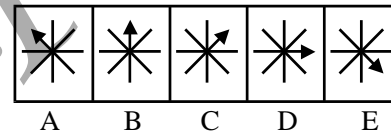
Answer figures



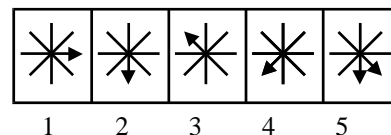
9. Kishen walks 10 km towards North. From there, he walks 6 km towards South. Then, he walks 3 km towards East. How far and in which direction is he with reference to his starting point?

- (a) 5 km, North
- (b) 5 km, North-East
- (c) 7 km, East
- (d) 7 km, West

10. Problem Figures



Answer figures



SPACE FOR ROUGH WORK