

Section – I

Physics (1 – 13)

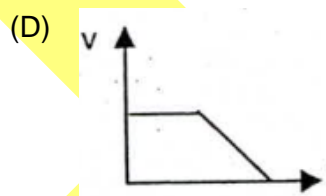
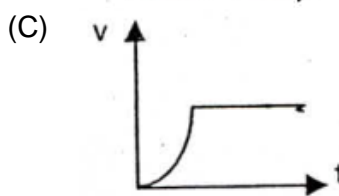
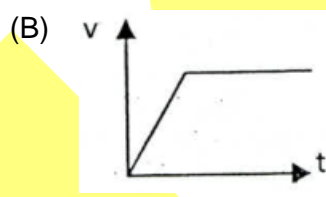
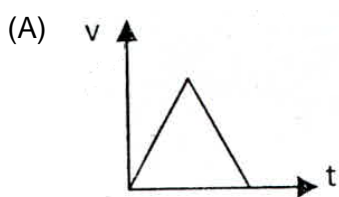
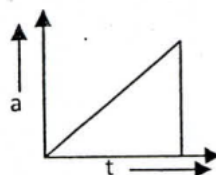
1. The numerical ratio of displacement to distance is
 (A) always less than one (B) always more than one
 (C) always equal to one (D) equal to or less than one

1. **D**

Sol. Displacement \leq distance

$$\therefore \frac{\text{Displacement}}{\text{Distance}} \leq 1$$

2. For given acceleration – time graph the most suitable velocity time graph will be:



2. **C**

Sol. The graph (C) is most suitable for the given a–t graph the parabolic shape of v–t graph represents positive slope in a–t graph.

3. The unit of coefficient of friction is :
 (A) Newton (B) Kg. wt.
 (C) Pascal (D) No unit

3. **D**

Sol. Coefficient of friction is unitless.

4. Rocket propulsion is based on the principle of :
 (A) Conservation of linear momentum
 (B) Conservation of force
 (C) Conservation of angular momentum
 (D) None of the above

4. **A**

Sol. Rocket propulsion is based on the principle of conservation of linear momentum.

5. A nucleus at rest splits into two nuclear parts having radii in the ratio 1 : 2. Their velocities are in the ratio:
 (A) 8 : 1 (B) 6 : 1
 (C) 4 : 2 (D) 2 : 1

5. **A**

Sol. By conservation of momentum

$$m_1 v_1 = m_2 v_2$$

$$\frac{v_1}{v_2} = \frac{m_2}{m_1}$$

MVPP-Part Test-2-SAT

$$\therefore m = \frac{4}{3} \pi r^3 \rho$$

$$\text{Or } m \propto r^3$$

$$\frac{m_2}{m_1} = \frac{r_2^3}{r_1^3} ; \quad \frac{v_1}{v_2} = \frac{r_2^3}{r_1^3}$$

$$\frac{r_1}{r_2} = \frac{1}{2}$$

$$\frac{v_1}{v_2} = \frac{2^3}{1^3} = \frac{8}{1} = 8 : 1.$$

6. Which of the following is self adjusting force?
 (A) Static Friction (B) Sliding Friction
 (C) Dynamic Friction (D) None of these

6. **A**
 Sol. Static friction is a self-adjusting force.

7. If the distance between Sun and Earth is doubled then the duration of year will be
 (A) two times (B) $\frac{1}{4}$ times
 (C) $2\sqrt{2}$ times (D) remain same

7. **C**
 Sol. As, $T^2 \propto r^3$
 So, $T^2 / T_1^2 = r^3 / 8r^3$
 Thus $T_1^2 = 8 T^2$

8. Two particles of masses m_1 and m_2 are moving with equal linear momenta. Compare their kinetic energies E_1 and E_2 if $m_1 > m_2$.
 (A) $E_1 > E_2$ (B) $E_1 = E_2$
 (C) $E_1 < E_2$ (D) $\frac{E_1}{E_2} = \frac{m_1}{m_2}$

8. **C**
 Sol. If momentum is same greater mass will have lesser kinetic energy.

9. A motor boat is moving with a constant velocity of 10 m/s encounters water resistance of 1000 N. The power of the motor boat will be
 (A) 10 kW (B) 110 kW
 (C) 1000 kW (D) 10^6 kW

9. **A**
 Sol. Power = $F \times v$
 $= 1000 \times 10 = 10000 \text{ W}$
 $= 10 \text{ kW}$

10. When the momentum of body increases by 10%, its K.E. increase by
 (A) 21% (B) 40%
 (C) 44% (D) None

10. **A**
 Sol. $\frac{k_1}{k_2} = \frac{\frac{p^2}{2m}}{\left(\frac{p + \frac{10p}{100}}{2m}\right)^2} = \frac{p^2 \times 100}{121p^2} = \frac{100}{121}$
 $\therefore k_2 = \frac{121k_1}{100} = k_1 + \frac{21k_1}{100}$

11. The volume of 50 g of a solid substance X is 20 cm³ and that of 25 g of another solid substance Y is 25 cm³. If these two solids are immersed in a liquid of density 0.875 g/cm³ (both X and Y are insoluble in given liquid). Then
 (A) X will sink, Y will float
 (B) X will float, Y will sink
 (C) Both X and Y will sink
 (D) Both X and Y will float

11. **C**

Sol. $\text{Density} = \frac{\text{Mass}}{\text{Volume}}$.

If density of solid is more than liquid, then it sinks.

12. A silver ornament is suspected to be hollow. Its weight is 250 g and it displaces 50 cc of water. If the specific gravity of silver be 10. Find the volume of cavity.
 (A) 50 cc (B) 25 cc
 (C) 10 cc (D) 250 cc

12. **B**

Sol. Volume of silver = $\frac{250}{10} = 25 \text{ cc}$

Volume of cavity = 50 – 25 = 25 cc.

13. If mass of a planet is 25 times mass of earth and radius of the planet is 125 times radius of earth then escape velocity of an object from the planet (V_P) is _____ times the escape velocity from earth (V_E).

- (A) $\frac{1}{\sqrt{5}}$ (B) $\sqrt{5}$
 (C) $\frac{1}{5}$ (D) 5

13. **A**

Sol. $M_P = 25 M_E, R_P = 125 R_E, \frac{V_P}{V_E} = ?$

$V_E = \sqrt{2g_E R_E}, V_P = \sqrt{2g_P R_P}$

$\frac{V_P}{V_E} = \sqrt{\frac{2g_P R_P}{2g_E R_E}} = \sqrt{\frac{\frac{GM_P}{R_P^2} \times R_P}{\frac{GM_E}{R_E^2} \times R_E}}$

$= \sqrt{\frac{M_P}{R_P} \times \frac{R_E}{M_E}} = \sqrt{\frac{25M_E \times R_E}{M_E \times 125R_E}}$

$= \frac{1}{\sqrt{5}}$

Section – II

Chemistry (14 – 26)

1. Calculate the number of molecules present in 88 gram of CO₂. N_A is Avogadro's number.
 (A) 2 N_A (B) 4 N_A
 (C) 6 N_A (D) 8 N_A

1. A

Sol. $88 \text{ gram CO}_2 = \frac{88}{44} \times N_A \text{ molecules}$
 $= 2 N_A \text{ molecules}$

2. How many grams of SO₂ contains the same molecules as that present in 0.5 mole of NH₃.
 (A) 64 gram (B) 32 gram
 (C) 0.32 gram (D) 6.4 gram

2. B

Sol. Moles of SO₂ = moles of NH₃ = 0.5
 $\Rightarrow 0.5 \text{ mole} = 0.5 \times 64 \text{ gram} = 32 \text{ gram}$

3. Which of the following has more heat content?
 (A) 10 g ice at 0°C (B) 10 g water at 0°C
 (C) Both have same heat content (D) their heat content can not be compared

3. B

Sol. Water contains latent heat of fusion.

4. The density of water is maximum at:
 (A) 0°C (B) 277 K
 (C) 100°C (D) 283 K

4. B

Sol. Density is maximum at 4°C = 277 K

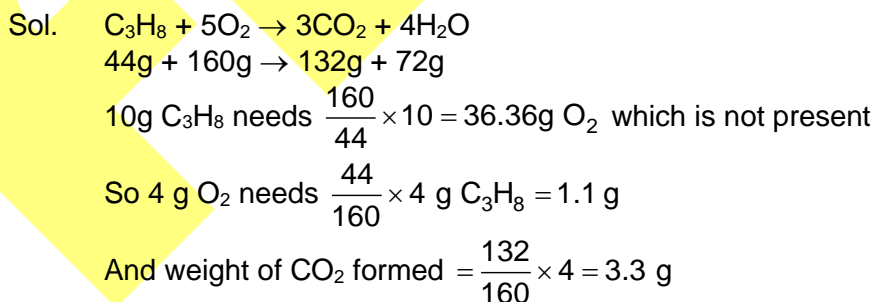
5. How many grams of KCl would have to be dissolved in 60 gram H₂O to give 25% by wt of solution?
 (A) 20 g (B) 1.5 g
 (C) 11.5 g (D) 31.5 g

5. A

Sol. $25\% = \frac{x}{x+60} \times 100$
 $\Rightarrow x = 20 \text{ gram}$

6. When 10 g of propane is made to react with 4g of O₂ then weight of CO₂ produced will be:
 (A) 9.98 g (B) 3.3 g
 (C) 4.4 g (D) 5.5 g

6. B



7. Water is boiling in an open fry pan represent which type of change?
 (A) physical and irreversible (B) chemical and irreversible
 (C) physical and reversible (D) chemical and reversible

MVPP-Part Test-2-SAT

7. A
Sol. It's physical change and since water is boiling so it will not change into liquid simultaneously.
8. The process by which a mixture of sodium chloride and ammonium chloride can be separated, is called:
(A) evaporation (B) distillation
(C) sublimation (D) chromatography
8. C
Sol. NH_4Cl is a sublimable salt.
9. The solubility of a substance 'A' in water is 28.6% (mass by volume) at 50°C . It is cooled to 40°C and 2.4 g of solid A separates out. The solubility of A (mass by volume) in water at 40°C is:
(A) 2.4% (B) 11.9%
(C) 26.2% (D) 28.6%
9. C
Sol. 100 ml has 28.6 gram 'A' at 50°C .
At 40°C A = $28.6 - 2.4 = 26.2$ g in same volume of 100 ml
10. Which of the following pairs does not contain with elements?
(A) Carbon, Silicon (B) Helium, Nitrogen
(C) Copper, Silver (D) Bronze, Zinc
10. D
Sol. Bronze is a mixture of metals.
11. Which of the following is a compound?
(A) Steel (B) Water
(C) Brass (D) Iodine
11. B
Sol. Water is a compound of hydrogen and oxygen.
12. 52 U of He contains:
(A) $4 \times 6.022 \times 10^{25}$ atoms (B) 13 atoms
(C) $13 \times 6.022 \times 10^{23}$ atoms (D) 4 atoms
12. B
Sol. $52 \text{ U} = \frac{52}{4} \text{ atoms} = 13 \text{ atoms}$
13. Mass of 3 moles of NaOH in gram is:
(A) 240 g (B) 120 g
(C) 100 g (D) 69 g
13. B
Sol. 3 mole NaOH = $3 \times 40 \text{ g} = 120 \text{ g}$

Section – III

Biology (27 – 40)

1. DPT vaccine is given to develop immunity against _____ disease.
(A) Tetanus (B) Diphtheria
(C) Pertussis (D) All of these
1. D
- Sol. DPT vaccine is given to develop immunity against tetanus, diphtheria and pertussis disease.
2. The organelle found between cell wall of two cells is called:
(A) Golgi apparatus (B) Lysosome
(C) Mitochondria (D) Middle lamella
2. D
- Sol. The organelle found between cell wall of two cells is called middle lamella.
3. Which one of the following disease an infected mother can transmit through breast feeding to her baby?
(A) Malaria (B) Kalaazar
(C) AIDS (D) Elephantiasis
3. C
- Sol. AIDS can transmit by a mother through breast feeding to her baby.
4. Name the process in which the passage of water goes from a region of higher concentration to a region of lower concentration through a semi permeable membrane?
(A) Diffusion (B) Osmosis
(C) Both (A) and (B) (D) None of these
4. B
- Sol. Osmosis is the process in which the passage of water goes from a region of higher concentration to a region of lower concentration through a semi permeable membrane.
5. Pseudostratified epithelium is found in:
(A) Seminiferous tubule (B) Fallopian tube
(C) Trachea (D) Kidney tubules
5. C
- Sol. Pseudostratified epithelium is found in trachea.
6. Minamata disease was caused due to the consumption of:
(A) sea food containing lot of cadmium (B) fish contaminated with mercury
(C) oysters with lot of pesticide (D) sea food contaminated with selenium
6. B
- Sol. Minamata disease was caused due to the consumption of fish contaminated with mercury.
7. Protozoan microbes cause:
(A) Anthrax (B) Cholera
(C) Kalaazar (D) Elephantiasis
7. C
- Sol. Protozoan microbes cause kalaazar.
8. Congenital disease is:
(A) Deficiency disease (B) Present from the time of birth
(C) Spread from man to man (D) That occurs during lifetime
8. B
- Sol. Congenital disease is present from the time of birth.
9. Which of the following organelles contain DNA?
(i) Mitochondria, (ii) Chloroplasts, (iii) Golgi bodies, (iv) Ribosomes

MVPP-Part Test-2-SAT

- (A) (i) and (ii) (B) (ii) and (iii)
(C) (i) only (D) (iv) only
9. A
Sol. Mitochondria and chloroplasts contain DNA.
10. Golgi apparatus is absent in:
(A) Liver cell (B) Blue green algae
(C) Lower plants (D) Higher plants
10. B
Sol. Golgi apparatus is absent in blue green algae.
11. Penicillin kills bacteria but not our cells because:
(A) our cell are immune to penicillin (B) Penicillin blocks formation of cell wall
(C) Our cell do not form cell wall (D) None of the above
11. C
Sol. Penicillin kills bacteria but not our cells because our cell do not form cell wall.
12. The vacuoles are surrounded by a thin membrane called:
(A) Plasmodesmata (B) Hydathodes
(C) Tonoplast (D) Both (B) and (C)
12. C
Sol. The vacuoles are surrounded by a thin membrane called tonoplast.
13. Intensive fish farming can be done in _____ culture system.
(A) Composite fish (B) Rohu fish
(C) Prawns (D) Mackerel fish
13. A
Sol. Intensive fish farming can be done in composite fish culture system.
14. Manure is rich in _____ and _____ hence it improves fertility of soil.
(A) Nutrients, vitamins (B) Nutrients, inorganic matter
(C) Nutrients, organic matter (D) Both (A) and (B)
14. C
Sol. Manure is rich in nutrients and organic matter hence it improves fertility of soil.

MVPP-Part Test-2-SAT

3. Fractorise : $p^3(q-r)^3 + q^3(r-p)^3 + r^3(p-q)^3$
 (A) $2pq(p+q)(q+r)(r-p)$ (B) $3pqr(p-q)(r-q)(r-p)$
 (C) $2pqr(p-q)(q-r)(p-r)$ (D) $3pqr(p-q)(q-r)(r-p)$

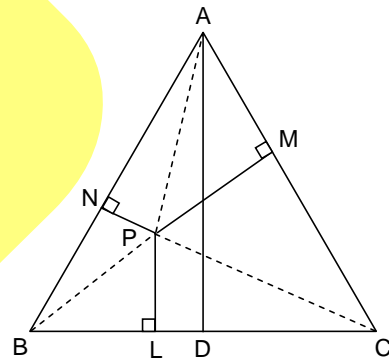
3. D

Sol. We have, $p^3(q-r)^3 + q^3(r-p)^3 + r^3(p-q)^3$
 $= \{p(q-r)\}^3 + \{q(r-p)\}^3 + \{r(p-q)\}^3$
 Let $p(q-r) = a, q(r-p) = b$ and $r(p-q) = c$
 Then, $a+b+c = p(q-r) + q(r-p) + r(p-q)$
 $\Rightarrow a+b+c = pq - pr + qr - qp + rp - rq = 0$
 $\therefore a^3 + b^3 + c^3 = 3abc$
 $\Rightarrow \{p(q-r)\}^3 + \{q(r-p)\}^3 + \{r(p-q)\}^3 = 3p(q-r) \times q(r-p) \times r(p-q)$
 $\Rightarrow p^3(q-r)^3 + q^3(r-p)^3 + r^3(p-q)^3 = 3pqr(p-q)(q-r)(r-p)$

4. A point P is selected inside an equilateral triangle. If sum of lengths of perpendicular dropped on to sides from P is 2019, then $\left(\frac{\text{length of altitude of triangle}}{2019}\right)$, is equal to
 (A) 1 (B) 2
 (C) 3 (D) None of these

4. A

Sol. let ABC be an equilateral triangle with side a, i.e. $AB = BC = AC = a$
 Given, $PL + PM + PN = 2019$
 Now, area of $\triangle ABC = \text{ar}(\triangle PBC) + \text{ar}(\triangle CPA) + \text{ar}(\triangle APB)$
 $= \frac{1}{2} \times a \times AD = \frac{1}{2} \times BC \times PL + \frac{1}{2} \times PM \times AC + \frac{1}{2} \times AB \times PN$
 $\Rightarrow \frac{1}{2} \times a \times AD = \frac{1}{2} a \cdot PL + \frac{1}{2} a \cdot PM + \frac{1}{2} a \cdot PN$
 $\Rightarrow \frac{1}{2} \times a \times AD = \frac{1}{2} a (PL + PM + PN)$
 $\Rightarrow AD = PL + PM + PN$
 $\Rightarrow AD = 2019$
 $\therefore \frac{\text{Length of altitude}}{2019} = \frac{AD}{2019} = \frac{2019}{2019} = 1$



5. A man can row 40 km upstream and 55 km downstream in 13 hours. Also, he can row 30 km upstream and 44 km downstream in 10 hours. Find the speed of the man in still water and speed of the current.
 (A) 8 km/hr, 5 km/hr (B) 8 km/hr, 3 km/hr
 (C) 5 km/hr, 3 km/hr (D) 9 km/hr, 6 km/hr

5. B

Sol. Let rate of man in still water = x km/hr and rate of current = y km/hr. Speed in upstream = $(x - y)$ km/hr and speed in downstream = $(x + y)$ km/hr.
 $\frac{40}{x-y} + \frac{55}{x+y} = 13$ and $\frac{30}{x-y} + \frac{44}{x+y} = 10$
 Let $\frac{1}{x-y} = u$ and $\frac{1}{x+y} = v$
 So equations becomes

MVPP-Part Test-2-SAT

$$40u + 55v = 13 \text{ and } 30u + 44v = 10$$

$$\Rightarrow 40u + 55v - 13 = 0 \text{ and } 30u + 44v - 10 = 0$$

By cross multiplication, we get

$$\frac{u}{55 \times (-10) - 44 \times (-13)} = \frac{-v}{40 \times (-10) - 30 \times (-13)} = \frac{1}{44 \times 40 - 55 \times 30}$$

$$\Rightarrow \frac{u}{22} = \frac{v}{10} = \frac{1}{110}$$

$$\Rightarrow u = \frac{22}{110} = \frac{1}{5} \text{ and } v = \frac{10}{110} = \frac{1}{11}$$

$$\text{So, } u = \frac{1}{5} = \frac{1}{x-y} \Rightarrow x-y=5 \quad \dots(i)$$

$$\text{and } v = \frac{1}{10} = \frac{1}{x+y} \Rightarrow x+y=11 \quad \dots(ii)$$

Adding (1) & (2), we get $2x = 16 \Rightarrow x = 8$ and putting $x = 8$ in (1), we get $x = 3$.

\therefore Speed of man in still water = 8 km/hr and speed of current = 3 km/hr

6. If $\frac{4+3\sqrt{3}}{\sqrt{7+4\sqrt{3}}} = A + \sqrt{B}$, then $B - A$ is :

(A) -13

(B) $2\sqrt{13}$

(C) 13

(D) $3\sqrt{3} - \sqrt{7}$

6. C

Sol. $\sqrt{7+4\sqrt{3}} = \sqrt{7+2 \times 2 \times \sqrt{3}}$

$$= \sqrt{4+3+2 \times 2 \times \sqrt{3}}$$

$$= \sqrt{(2+\sqrt{3})^2} = 2+\sqrt{3}$$

$$\therefore \frac{4+3\sqrt{3}}{2+\sqrt{3}} = A + \sqrt{B}$$

$$\Rightarrow \frac{(4+3\sqrt{3})(2-\sqrt{3})}{(2+\sqrt{3})(2-\sqrt{3})} = A + \sqrt{B}$$

$$\Rightarrow \frac{8-4\sqrt{3}+6\sqrt{3}-9}{4-3} = A + \sqrt{B}$$

$$\Rightarrow 2\sqrt{3}-1 = A + \sqrt{B}$$

$$\Rightarrow A = -1 \text{ and } \sqrt{B} = 2\sqrt{3}$$

$$\Rightarrow B = 2\sqrt{3} \times 2\sqrt{3} = 12$$

7. Find the approximate area of quadrilateral ABCD if $AB = 3$ cm, $BC = 4$ cm, $CD = 4$ cm, $DA = 5$ cm and $AC = 5$ cm

(A) 24 cm^2

(B) 9.16 cm^2

(C) 18.6 cm^2

(D) 15.2 cm^2

7. D

Sol. Area of

$$\Delta ADC = \sqrt{s(s-a)(s-b)(s-c)}$$

$$\text{where } s = \frac{4+5+5}{2} = 7$$

$$= \sqrt{7 \times 2 \times 2 \times 3}$$

MVPP-Part Test-2-SAT

Sol. $x + \frac{1}{x} = 5$

$$x^5 + \frac{1}{x^5} = \left(x^4 + \frac{1}{x^4}\right)\left(x + \frac{1}{x}\right) - \left(x^3 + \frac{1}{x^3}\right) \quad (1)$$

$$\Rightarrow x^4 + \frac{1}{x^4} = \left(x^2 + \frac{1}{x^2}\right)^2 - 2 = \left(\left(x + \frac{1}{x}\right)^2 - 2\right)^2 \quad (2)$$

$$= (5^2 - 2)^2 - 2 = 23^2 - 2 = 527$$

$$\Rightarrow x^3 + \frac{1}{x^3} = \left(x + \frac{1}{x}\right)\left(x^2 + \frac{1}{x^2} - 1\right) \Rightarrow 5x\left(\left(x + \frac{1}{x}\right)^2 - 2 - 1\right)$$

$$\Rightarrow 5 \times (5^2 - 3) = 110.$$

Putting in (i)

$$x^5 + \frac{1}{x^5} = 527 \times 5 - 110$$

$$= 2635 - 110$$

$$= 2525$$

11. In a parallelogram ABCD, AB = 6 cm, BC = 5 cm and AC = 7 cm. Find the perpendicular distance between AB and CD.

(A) $6\sqrt{6}$ cm

(B) $12\sqrt{6}$ cm

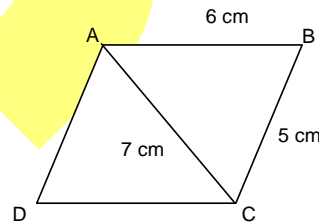
(C) 5 cm

(D) $2\sqrt{6}$ cm

11. D

Sol. Area of $\triangle ABC = \sqrt{9 \times 3 \times 4 \times 2}$
 $= 6\sqrt{6}$ cm²

Area of parallelogram = $2 \times 6\sqrt{6} = 6 \times h$
 $\Rightarrow h = 2\sqrt{6}$ cm



12. If $(11)^a = (19)^b = (209)^c$ then the correct relation is

(A) $ab = (c)^{ab}$

(B) $a^b = c$

(C) $ab = c(a+b)$

(D) none of these

12. C

Sol. let $(11)^a = (19)^b = (209)^c = k \Rightarrow 11 = (k)^{1/a}$, $19 = (k)^{1/b}$ and $11 \times 19 = (k)^{1/c} \Rightarrow ab = c(a+b)$

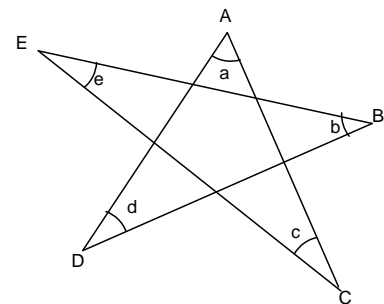
13. In the given figure $\angle a + \angle b + \angle c + \angle d + \angle e = ?$

(A) 180°

(B) 360°

(C) 450°

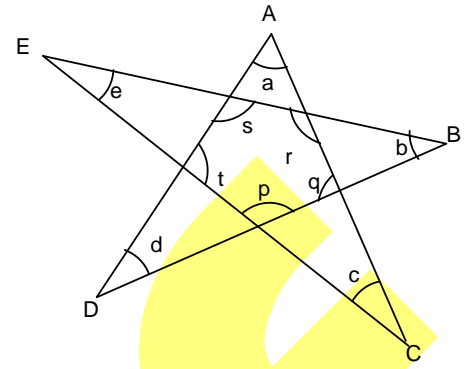
(D) 90°



13. A

MVPP-Part Test-2-SAT

Sol. $\angle a + \angle d + \angle q = 180^\circ$
 $\angle a + \angle c + \angle t = 180^\circ$
 $\angle b + \angle e + \angle p = 180^\circ$
 $\angle b + \angle d + \angle s = 180^\circ$
 $\angle c + \angle e + \angle r = 180^\circ$ (adding all)



$$2(\angle a + \angle b + \angle c + \angle d + \angle e) + \angle p + \angle q + \angle r + \angle s + \angle t = 900^\circ$$

$$\Rightarrow 2(\angle a + \angle b + \angle c + \angle d + \angle e)$$

$$= 900 - (\angle p + \angle q + \angle r + \angle s + \angle t)$$

$$= 900 - 540 \quad (\because \text{sum of all the is of pentagon is } 540^\circ)$$

$$= 360^\circ$$

$$\therefore \angle a + \angle b + \angle c + \angle d + \angle e = 180^\circ$$

14. In an isosceles triangle ABC with AB = AC, if BD and CE are its altitudes, then
 (A) BD = CD (B) BD > CE
 (C) BD < CE (D) none of these

14. D

15. If $x = \frac{\sqrt{5} + \sqrt{3}}{\sqrt{80} + \sqrt{48} - \sqrt{45} - \sqrt{27}}$, then value of $4x^2 + 3x + 5$ is
 (A) 15 (B) 2
 (C) 12 (D) 8

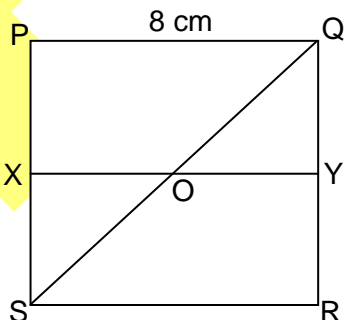
15. C

Sol. $x = \frac{\sqrt{5} + \sqrt{3}}{\sqrt{80} + \sqrt{48} - \sqrt{45} - \sqrt{27}}$
 After simplification, the value of x can be written as
 $x = \frac{\sqrt{5} + \sqrt{3}}{4\sqrt{5} + 4\sqrt{3} - 3\sqrt{5} - 3\sqrt{3}} = \frac{\sqrt{5} + \sqrt{3}}{\sqrt{5} + \sqrt{3}} = 1$
 So, $4x^2 + 3x + 5 = 4(1)^2 + 3(1) + 5 = 12$

16. In a square PQRS, X and Y are mid points of sides PS and QR respectively. XY and QS intersect at O. Find the area of ΔXOS , if PQ = 8 cm.
 (A) 6 cm^2 (B) 12 cm^2
 (C) 4 cm^2 (D) 8 cm^2

16. D

Sol. Since, PQRS is a square
 $\therefore PQ = QR = RS = SP = 8 \text{ cm}$
 X and Y are the mid-points of PS and QR
 $\therefore PX = XS = QY = YR = 4 \text{ cm}$



MVPP-Part Test-2-SAT

In $\triangle QOY$ and $\triangle SOX$

$$\angle YOQ = \angle XOS$$

(Vertically opposite angles)

$$\angle OQY = \angle OSX$$

(Alternate angles)

$$QY = SX$$

$$\Rightarrow \triangle QOY \cong \triangle SOX$$

(AAS congruency)

$$\Rightarrow OX = OY$$

(C.P.C.T.)

$$\therefore OX = OY = \frac{1}{2} \times XY = \frac{1}{2} \times 8 = 4 \text{ cm}$$

$$\therefore \text{Area of } \triangle XOS = \frac{1}{2} \times OX \times XS = \frac{1}{2} \times 4 \times 4 = 8 \text{ cm}^2$$

17. If $a^2 + b^2 + c^2 + 3 = 2(a - b - c)$, then the value of $2a - b + c$ is:

(A) 2

(B) 3

(C) 4

(D) 0

17. A

Sol. $a^2 + b^2 + c^2 + 3 = 2(a - b - c)$

$$\Rightarrow a^2 - 2a + 1 + b^2 + 2b + 1 + c^2 + 2c + 1 = 0$$

$$\Rightarrow (a - 1)^2 + (b + 1)^2 + (c + 1)^2 = 0$$

It is possible only when $a = 1, b = -1, c = -1$

$$\therefore 2a - b + c = 2 \times 1 - (-1) + (-1) = 2 + 1 - 1 = 2$$

18. Which of the following will completely divide $4^{61} + 4^{62} + 4^{63} + 4^{64}$?

(A) 3

(B) 10

(C) 11

(D) 15

18. B

Sol. $4^{61} + 4^{62} + 4^{63} + 4^{64}$

$$= 4^{61}(1 + 4 + 4^2 + 4^3)$$

$$= 4^{61} \times 85$$

which is divisible by 10.

19. The $K(-2, -1), L(p, 0), M(4, q), N(1, 2)$ are the vertices of a parallelogram KLMN then sum of the values of $p + q = ?$

(A) 2

(B) 3

(C) 4

(D) 5

19. C

Sol. Since the diagonals of a parallelogram bisect each other, the mid-point of KM should be the same as the mid-point of LN. Thus:

$$\left(\frac{-2+4}{2}, \frac{-1+q}{2} \right) = \left(\frac{p+1}{2}, \frac{0+2}{2} \right)$$

$$\Rightarrow \left(1, \frac{q-1}{2} \right) = \left(\frac{p+1}{2}, 1 \right)$$

$$\Rightarrow 1 = \frac{p+1}{2}, \frac{q-1}{2} = 1$$

$$\Rightarrow p = 1, q = 3$$

$$\Rightarrow p + q = 4$$

20. HCF of $18(x^4 - y^4)$ and $12(x^3 + 2x^2y - xy^2 - 2y^3)$ is

(A) $6(x^2 - y^2)$

(B) $6(x^2 + y^2)$

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(C) $6(x+2y)$

(D) $6(x+2y)(x-y)(x+y)$

20. A

Sol. $18(x^4 - y^4) = 18(x^2 + y^2)(x + y)(x - y)$

$$12(x^3 + 2x^2y - xy^2 - 2y^3) = 12(x + 2y)(x + y)(x - y)$$

$$\text{HCF} = 6(x + y)(x - y)$$

Section – V

Social Science (61 – 100)

1. The southern – most latitude of mainland India is ____
 (A) 4° 8' N (B) 8° 4' N
 (C) 8° 7' N (D) 8° 4' N
1. B
2. The Tropic of Cancer passes through ____
 (A) 22° 45' N (B) 23° 30' E
 (C) 23° 30' N (D) None of these
2. C
3. The landmass of India has an area of ____
 (A) 3.28 m sq. km (B) 4.78 m. sq km
 (C) 2.38 m sq. km (D) None of these
3. A
4. How much land does India accounts of the total geographical area of the world?
 (A) 2.7% (B) 2.4%
 (C) 3.2% (D) 4.2%
4. B
5. In how many groups Indian river are grouped?
 (A) 3 (B) 4
 (C) 2 (D) 7
5. C
6. Which is the longest river of India?
 (A) Godavari (B) Yamuna
 (C) Ganga (D) Sindhu
6. C
7. Which is the oldest Indian River?
 (A) Krishna (B) Ganga
 (C) Yamuna (D) Narmada
7. D
8. The upper part of the Earth is known as ____
 (A) Silt (B) Magma
 (C) Crust (D) Soil
8. C
9. The highest peak in the Eastern ghats is
 (A) Anaimudi (B) Kanchenjunga
 (C) Mahendragiri (D) Khasi
9. C
10. Lesser Himalayas are also called
 (A) Himadari (B) Himachal
 (C) Shivaliks (D) Purvanchal
10. A
11. Which part of India has highest temperature during the month of March?
 (A) Deccan plateau (B) Northern plains
 (C) Central highland (D) Rajasthan
11. A

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12. The word monsoon is derived from which word?
(A) Greek (B) Latin
(C) Arabic (D) German
12. **C**
13. Which Indian state face the most annual precipitation?
(A) Sikkim (B) Arunachal Pradesh
(C) UP (D) Meghalaya
13. **D**
14. Which Indian state get a large portion of its rainfall during October and November?
(A) Himachal Pradesh (B) Meghalaya
(C) Tamil Nadu (D) Asom
14. **C**
15. How does leeward side of the mountain remains?
(A) Wet (B) Dry
(C) Moderate (D) None of these
15. **B**
16. When did the French Revolution take place/start?
(A) 14 July, 1786 (B) 14 July, 1785
(C) 14 July, 1791 (D) 14 July, 1789
16. **D**
17. Who was the king of France during the French revolution?
(A) Louis XII (B) Louis XVII
(C) Louis XVI (D) Louis I
17. **C**
18. What is the percentage sharing of peasants in France during 1790?
(A) Approx 80% (B) Approx 90%
(C) Approx 72% (D) None of these
18. **B**
19. Who charged tithes in France?
(A) King (B) Nobility
(C) Church (D) None of them
19. **C**
20. What was taille?
(A) An army of the king (B) A type of tax
(C) A group of farmers (D) None of these
20. **B**
21. Who believed in Universal Adult Franchise?
(A) Liberals (B) Radicals
(C) Conservatives (D) A and B both
21. **B**
22. Who among the following wanted the government to encourage cooperatives?
(A) Louis Blank (B) Karl Marx
(C) Robert Owen (D) None of them
22. **A**

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23. Who believed that A communist Society; was the natural society?
(A) Robert Owen (B) Louis Blank
(C) Karl Marx (D) None of them
23. **C**
24. When was the Hitler born?
(A) March 5, 1889 (B) April 20, 1889
(C) May 17, 1889 (D) None of the above
24. **B**
25. By whom the Allied powers were initially led in World War II?
(A) USA and UK (B) France and USA
(C) UK and France (D) USSR and USA
25. **C**
26. Who was the emperor of Germany during World War I?
(A) Wilhelm I (B) William Kaiser II
(C) Wilhelm III (D) Wilhelm IV
26. **B**
27. When was Treaty of Versailles signed?
(A) May 28, 1919 (B) June 28, 1919
(C) August 28, 1919 (D) June 12, 1919
27. **B**
28. When did Russia withdraw from the World War I?
(A) 1916 (B) 1918
(C) 1915 (D) 1917
28. **D**
29. The word 'Democracy' is derived from which of the following language?
(A) Latin (B) Arabic
(C) Greek (D) Farsi
29. **C**
30. Which among the following is not a required basis for Democracy?
(A) Equality (B) Liberty
(C) Secularism (D) Freedom of speech
30. **C**
31. Which among the following is considered as Supreme law of any democratic country?
(A) The Supreme Court (B) The Parliament
(C) The Constitution (D) The President
31. **C**
32. Who were in majority in South Africa in 1964?
(A) Coloured (B) Whites
(C) Indian Africans (D) Blacks
32. **D**
33. How many sectors various economic activities have been divided into?
(A) Two (B) Three
(C) Four (D) Five
33. **B**
34. Which age group is considered the working population of any country?
(A) 20 – 40 years (B) 30 – 70 years
(C) 15 – 59 years (D) 15 – 40 years

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34. **C**
35. Which of the following country has the largest single concentration of the poor in the world?
(A) South Africa (B) Brazil
(C) India (D) China
35. **C**
36. How many Indians lived in poverty in 2011 -12?
(A) 27 crore (B) 35 crore
(C) 22 crore (D) 32 crore
36. **A**
37. What is the main activity of people of Palampur?
(A) Transport (B) Dairy
(C) Farming (D) Business
37. **C**
38. How many families of the upper caste live in Palampur?
(A) 120 (B) 80
(C) 60 (D) 110
38. **B**
39. Which party was formed by Chaudhary Devi Lal?
(A) Lok Party (B) Lok Dal
(C) Janata party (D) None of them
39. **B**
40. Which is the first country incorporated the provision of Universal Adult Franchise in the world?
(A) Australia (B) France
(C) New Zealand (D) Japan
40. **C**