

FIITJEE

IOQJS MOCK TEST – II PART – II

Time: 2:00 Hour

Max Marks: 120

Instructions:

Section I of this question paper has 12 questions.

- For each question in this section, only one of the four options is a correct answer.
- For each question, a correct answer will earn 3 marks, a wrong answer will earn (–1) mark, and an unattempted question will earn 0 marks.
- If you mark more than one option, it would be treated as a wrong answer.

Section II contains 6 questions worth 5 marks each. There is no negative marking.

- For questions 13 to 16, one or more option(s) may be correct.
 - * If you mark all correct options and no wrong option, you get full credit (5 marks).
 - * If you mark some correct options and no wrong option, you get 2 marks.
 - * If you mark any wrong option, you get zero marks.
- For question 17 and 18, only write your final answer in corresponding spaces in the answer sheet. No explanation / calculations are necessary.

Section III contains 6 questions of 9 marks each.

- For all the questions in this section, the process involved in arriving at the solution is more important than the final answer. Valid assumptions / approximations are perfectly acceptable. Please write your method clearly, explicitly stating all the reasoning / assumptions / approximations.

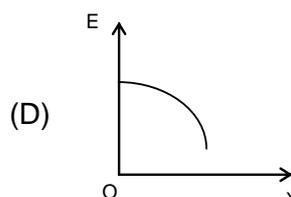
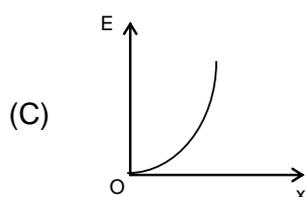
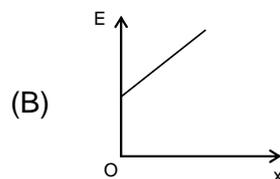
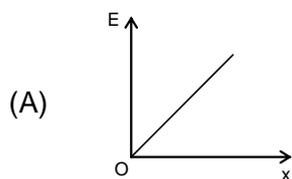
Name of the Candidate :

Enroll Number :

Date of Examination :

SECTION – I PHYSICS

1. A cylindrical conductor has uniform cross section. Resistivity of its material increases linearly from left end to right end. If a constant current is flowing through it and at a section of distance x from left end, magnitude of electric field intensity is E , which of the following graphs is correct?



2. A neutron, a proton and an electron are placed in a uniform electric field.
 (A) The forces acting on them will be equal.
 (B) Their accelerations may be equal.
 (C) Magnitude of acceleration may be equal.
 (D) Magnitude of acceleration will be different.

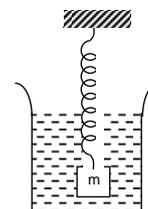
3. A cube of mass m and density D is suspended from the point P by a spring of stiffness k . The system is kept inside a beaker filled with a liquid of density d . The elongation in the spring, assuming $D > d$, is:

(A) $\frac{mg}{k} \left(1 - \frac{d}{D}\right)$

(B) $\frac{mg}{k} \left(1 + \frac{d}{D}\right)$

(C) $\frac{mg}{k} \left(1 + \frac{d}{D}\right)$

(D) None of these.



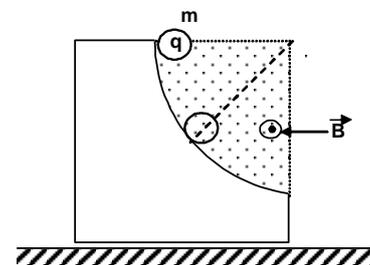
4. In the figure a charged sphere of mass m and charge q starts sliding from rest on a vertical fixed circular track of radius R from the position shown. There exists a uniform and constant horizontal magnetic field of induction B . The maximum force exerted by the track on the sphere is

(A) mg

(B) $3mg - qb\sqrt{2gR}$

(C) $3mg + qb\sqrt{2gR}$

(D) $mg - qb\sqrt{2gR}$



CHEMISTRY

5. Na_2CO_3 is called washing soda. It is used in washing powder for removal of hydrophobic dirt from fabric. The role of Na_2CO_3 in the washing process is to
- make water soft if hard water is used
 - make the solution alkaline
 - form scum directly combining with non-polar dirt
 - reduce the concentration of washing solution
6. What type of ores are subjected to calcination process?
- Ores containing metal and sulphur in combined form
 - Ores containing metal, oxygen and sulphur or any other non-metal **in combine** form
 - Ores containing metal and oxygen in combined form
 - Ores containing metal, sulphur and other impurities in free state (not in combined form)
7. $\text{CH}_4 + 4\text{Cl}_2 \longrightarrow \text{CCl}_4 + 4\text{HCl}$
- In above reaction carbon is
- substituted by chlorine
 - oxidized
 - displaced by hydrogen
 - combined with chlorine
8. The aqueous solution of the salt of which acid and base has a constant pH which does not depend on concentration of solution. It only changes with temperature?
- CH_3COOH and KOH
 - NH_4OH and HCl
 - HCN and NaOH
 - CH_3COOH and NH_4OH

BIOLOGY

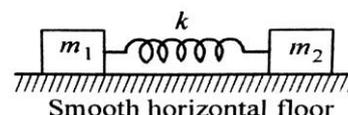
9. The relation between cellular immune response generated against hepatitis C virus is the critical determinant of the outcome of infect. Given below are the representative figures of cellular immune response in column I and various outcome of infection in column II.

Column – I		Column – II	
A.		i.	Acute
B.		ii.	Resolution

SECTION – II PHYSICS

13. A satellite close to earth is in orbit above the equator with a period of rotation of 1.5 hrs. If it is above a point P on the equator at some time, it will be above P again after time
 (A) 1.5 hrs.
 (B) 1.6 hrs. if it is rotating from west to east.
 (C) 24/17 hrs. if it is rotating from west to east.
 (D) 24/17 hrs. if it is rotating from east to west.

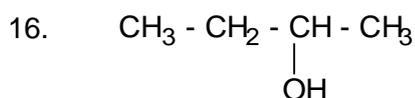
14. When two blocks of different masses connected by a stretched spring (as shown) start moving from rest towards each other under mutual interaction, then pick up the correct alternative or alternatives.
 (A) Their velocities are equal and opposite
 (B) Their acceleration are equal and opposite
 (C) The force acting on them are equal and opposite
 (D) Their momentum are equal and opposite



CHEMISTRY

15. In each case one litre solution contains the given acids, bases and salts. In which cases the pH of the solution(s) is/are correct?

- (A) $\left(\begin{array}{l} 10^{-2} \text{ M HCl} \\ 10^{-2} \text{ M HNO}_3 \\ 10^{-2} \text{ M NaCl} \end{array} \right) \text{pH} = 1.7 \text{ (log} 2 = 0.3)$ (B) $\left(\begin{array}{l} 10^{-4} \text{ M HCl} \\ 10^{-5} \text{ M NaNO}_3 \\ 10^{-2} \text{ M NaOH} \end{array} \right) \text{pH} = 2 \text{ (log} 0.99 = -0.004)$
- (C) $\left(\begin{array}{l} 10^{-4} \text{ M NaOH} \\ 10^{-4} \text{ M KOH} \\ 10^{-3} \text{ M KNO}_3 \end{array} \right) \text{pH} = 10.3$ (D) $\left(\begin{array}{l} 10^{-6} \text{ M H}_2\text{O} \\ 10^{-2} \text{ NaCl} \\ 10^{-4} \text{ KNO}_3 \end{array} \right) \text{pH} = 6$



The name(s) of above compound is/are

- (A) Butan-2-ol (B) 2-butanol
 (C) secondary butyl alcohol (D) isobutyl alcohol

BIOLOGY

- 17.A The numbers in the first column correspond to human, elephant, dog, mouse and carp. Which number indicates each organism?

(2.5 marks)

Number	Body temperature (°C)	Heart rate (beats/min)	Maximal speed of locomotion (m/s)
1	1°C – 30°C	30-40	1.5
2	38°C	450-550	3.5
3	34°C	60-100	18
4	36.2°C	22-28	11

5	36.6°C	60-90	10
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17.B The table below describes the structure and function of some organelles in eukaryotic cells. Complete the table by choosing from the list (1–13) to identify the empty boxes **a** to **e**.

(2.5 marks)

Organelle	Structure/feature	Function of feature
Nucleus	Nucleoli present	c.
a.	Inner membrane folded into cristae	d.
b.	Vesicles containing hydrolytic enzyme	Breakdown of old organelles
Smooth endoplasmic reticulum	Flattened membrane-bound sacs	e.

- | | |
|-----------------------------------|--------------------------------|
| 1. DNA replication | 2. Mitochondria |
| 3. Chloroplast | 4. Surface area |
| 5. Golgi apparatus | 6. Rough endoplasmic reticulum |
| 7. Lipid storage and synthesis | 8. Cell membrane |
| 9. Lysosomes | 10. Ribosomal RNA synthesis |
| 11. Processing proteins in a cell | 12. Storage of enzymes |

18. The birth records for 4 children lost at a hospital. The ABO blood group of 4 babies are known to be A, B, AB, and O. To determine parentage of all of their parents were tested for blood group. The father of third child wasn't found. The results are shown in the following table.

A. Match the babies with their parents by marking the right blood types in the table.

Families		Blood group of each parent	Blood group of a baby
Parents 1	Father	AB	
	Mother	O	
Parents 2	Father	A	
	Mother	O	
Parents 3	Father	Unknown	
	Mother	A	
Parents 4	Father	O	
	Mother	O	

B. What is /are the possible blood group(s) father could have?

SECTION – III PHYSICS

19. A slowly moving flatcar is 12.0 m long passing a point at straight road at 10 kph. A boy beside the road near to the point tosses rocks onto the moving flatcar at the rate of one per second.
- If the first rock just hits the front edge of the car, how many rocks will fall onto that car?
 - How many rocks will fall onto that car if the train begins to accelerate at 0.5 m/s^2 , just as the first rock hits the car?
20. The temperature of equal masses of three different liquids A, B and C are 15°C , 20°C and 30°C respectively. When A and B are mixed, their equilibrium temperature is 18°C . When B and C are mixed, it is 22°C . What will be the equilibrium temperature when liquid A and C are mixed?

CHEMISTRY

21. The modern periodic table contains 18 groups and seven periods. The first three periods contain non-transition elements and the periods starting from 4th to 7th contain transition as well as non-transition elements. Transition elements are present from group-3 to 12 and the other groups contain non-transition elements. Consider a part of the periodic table which contains elements from second periods to fifth period. The periods contain only non-transition element. No element of the given periodic table is an inert gas.

A	B	C	D	E	→ 2 nd period
F	G	H	I	J	→ 3 rd period
K	L	M	N	O	→ 4 th period
P	Q	R	S	T	→ 5 th period

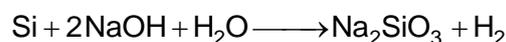
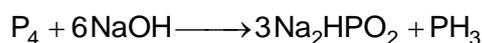
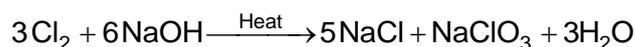
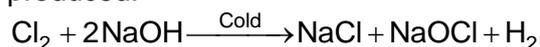
Answer the following questions on the basis of above write up.

- How many of the following species contain same number of electrons?
 $\text{H}, \text{G}^-, \text{I}^+, \text{F}^{2+}, \text{J}^{2+}$
- Which atoms of the second period are larger than C?
- If the formula of compound formed between elements B and D is BD_2 , what will be the formula of compound formed between B and E.
- Which ions of fourth period are isoelectronic with M?
- Which element contains maximum number of total electrons as well as highest number of electrons in the outermost shell.
- All the elements of the extreme right side group have a tendency to form diatomic molecules and mononegative ion(anions). Explain.
- The size of atoms of each period decreases from left to right. State the causes.
- Which two compounds elements of the periodic table can form the most ionic compound? Why?
- If E is the most electronegative element of the periodic table, what will be the atomic number or A?

22. Sodium hydroxide is prepared by electrolysis of aqueous solution of NaCl. It is a base. Since it is an ionic compound, the ionization to form free Na^+ and OH^- ions depends on the polarity of solvent. The choice of solvent is decided by considering the solvation of OH^- in solution. If the OH^- ions becomes extensively solvated the basic strength decreases due to unavailability of free OH^- ions. If water is used OH^- ions from hydrogen bond with H_2O molecules and basicity decreases. So the most suitable solvent for this purpose is non-protic polar solvent.

It is a reactive base and hygroscopic. When put in air it first changes to a liquid and followed by formation of solid.

It reacts with non-metal like some halogens, phosphorus, sulphur, silicon etc forming solution in which products are present as sodium salts and in some cases gases are produced.



Some metals like Al, Zn, Sn etc also dissolve in NaOH, initially forming the metal hydroxides as precipitate. The precipitate then dissolve by reacting with excess NaOH.

Answer the following questions.

- (i) Fused NaOH is a stronger base than aqueous NaOH. Why?
- (ii) What type of redox reaction does take place between NaOH solution and chlorine?
- (iii) The stopper of glass container becomes hard to open if NaOH is stored in it? True or false.
- (iv) Why is heat evolved when NaOH is mixed with water and acid solutions?
- (v) $\text{NaOH} \xrightarrow{\text{SO}_2} \text{P} \xrightarrow{\text{NaOH}} \text{Q}$
Identify P and Q
- (vi) AlCl_3 forms a white precipitate(A) when reacts with NaOH. The precipitate(A) dissolves in excess NaOH due to formation of a salt(B). Identify A and B.
- (vii) Which of the given substances react with NaOH?
 Cl_2 , HCl, NaCl, HOCl, NH_4Cl , Cl_2O_5
- (viii) When NaOH pellets are placed under air, it first changes to a liquid form and then after sometime it is converted to a solid. State chemical equations for the reaction(s) taking place in above observation.
- (ix) $\text{NaOH} \xrightarrow{\text{MgCl}_2} \underset{\text{Precipitate}}{(\text{X}) \downarrow} \xrightarrow{\Delta} (\text{Y}) + \text{H}_2\text{O}$
 $(\text{X}) + \text{HCl} \longrightarrow (\text{Z}) + \text{H}_2\text{O}$
Identify X, Y and Z and the type of reactions taking place in each step.

BIOLOGY

23. A

- a) _____ enzyme which join two DNA molecule. **(1 mark)**
- b) Research in animals has offered hope for the prevention of diseases via Assisted Reproductive Technology (ART) involving micromanipulation. One such technique is described below.

Step I: Donor oocyte → fertilized with intended parent sperm → removal of pronuclei → oocyte without pronuclei

Step II: Intended parent oocyte → fertilized with intended parent sperm → pronuclei transferred to donor oocyte without pronuclei.

Mark whether each statement is true (T) or false (F).

- a. ART described above will result in an offspring having three parents. ____
- b. The technique will be mainly useful when the intended male parent has mitochondria with mutant DNA. ____
- c. This technique will be suitable even if the intended female parent has 50% of the mitochondrial copies mutated. ____

(3 marks)

23. B Flower colour in a species of plant is determined by two gene pairs, R/B and C/c. The R allele is co-dominant to the B allele and the C allele is dominant to the c allele. If at least one C allele is present, the flowers will be coloured; otherwise, they will be white. The R/B allele pair determines whether the flower is red (RR), purple (RB) or blue (BB). Two of these plants are crossed to give 100 offspring which all have either white or purple flowers.

Use the table to answer the questions given below.

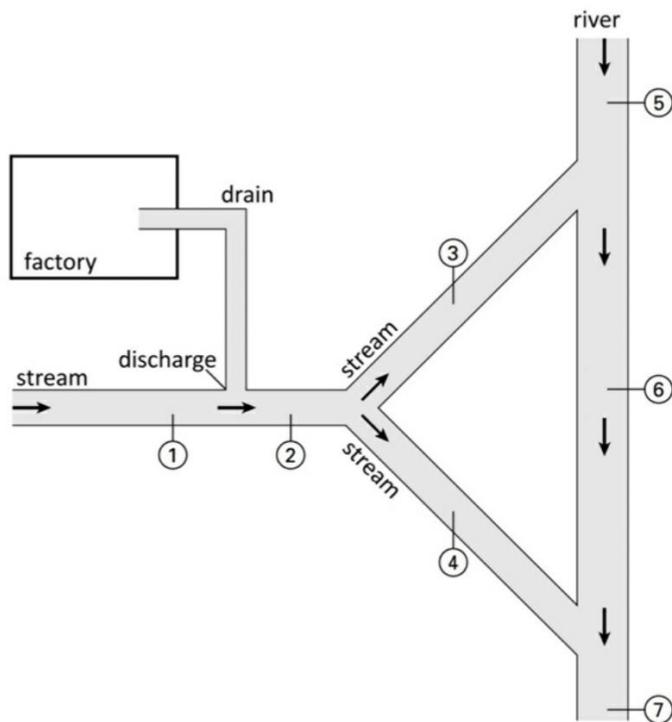
	Genotype		Genotype/Phenotype
1.	CCRR	8.	ccRB
2.	CCRB	9.	ccBB
3.	CCBB	10.	White
4.	CcRR	11.	Red
5.	CcRB	12.	Purple
6.	CcBB	13.	Blue
7.	ccRR		

What is/are the possible genotype(s) of the:

- a) White offspring? **(1 Mark)**
- b) Purple offspring? **(1 Mark)**
- c) red flowers? **(1 Mark)**
- d) blue flowers? **(1 Mark)**
- e) What are the possible genotypes of the parents if, of the 100 offspring, 25 have white flowers and 75 have purple flowers? **(1 Mark)**

- 24. A** A group of students would like to know how the discharge of waste water from a factory might influence water quality of a river .the picture shows 7 potential sampling locations 1 to 7 in relation to the location of factory and the river. Which locations are essential to be included in the sampling in order to draw valid conclusions about the pollution of the river by the factory?

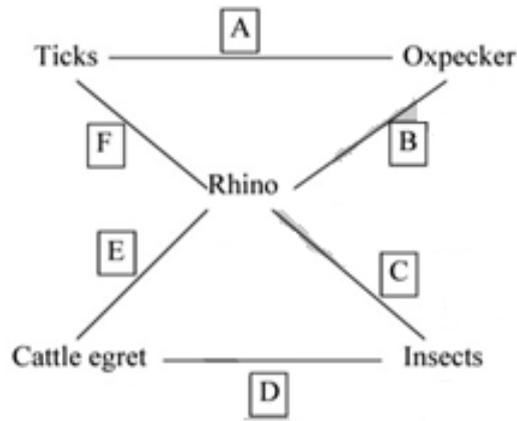
(1 mark)



- 24. B** On the African plain, large herbivores like black rhinoceros disturb insect communities as they move. Birds like cattle egret feeds on the displaced insects. Neither the displacement of insects nor the activity of birds has any effect on the rhino. Oxpecker (a small dark bird) removes ticks from the skin of the rhino. The bird gets food & the mammals get relief from parasites. An outline of these inter-relationships is given below. Match the alphabets with relationship that the organisms possess among themselves and then write only appropriate number in the space against each alphabet.

(3 marks)

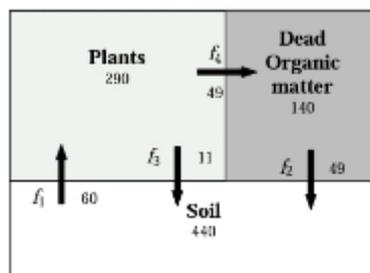
1. Predation
2. Parasitism
3. Commensalism
4. Amensalism
5. Mutualism
6. Competition



- A. _____
- B. _____
- C. _____
- D. _____
- E. _____
- F. _____

24. C The diagram given below is a simple representation of the cycling of calcium through a forest ecosystem. The ecosystem is represented by three compartments, plants, soil and dead organic matter. The pool size of each compartment is in units of kg/ha. The flux rates are represented by arrows linking the various compartments and are in units of kg/ha/yr. The arrows f_1 to f_4 indicate the different processes involved.

(4 marks)



The processes occur in the above diagram are: (choose from the options and write appropriate numbers)

- f1: _____
- f2: _____
- f3: _____
- f4: _____

Option:

- 1: Leaching**
- 2: Plant uptake**
- 3: Net mineralization**

4: Litter fall

5: Sedimentation

24. D "animals adapted to cold climates have shorter limbs and bodily appendages than animals adapted to warm climates".

This is an ecogeographical rule formulated by _____ and called as _____.

(1 mark)

Hints & Solutions

SECTION – I PHYSICS

1. **B**

Sol. If you take resistivity at a distance 'x' from left end as $\rho = (\rho_0 + \alpha x)$, then electric field intensity at this point will be $E = \frac{i\rho}{A}$, where i is the current flowing through the conductor.

Therefore $E \propto \rho$ and $E(x) = \frac{i}{A}(\rho_0 + \alpha x)$

\therefore Hence (B) is correct.

2. **D**

Sol. Force on neutron = 0 (as charge = 0)

Force on proton = qE

Force on electron = qE

Masses of proton and electron are different.

Hence their accelerations will be different.

\therefore (D) is correct.

3. **A**

Sol. The cube is in equilibrium under the following three forces,

(a) spring force kx, where x = elongation of the spring,

(b) gravitational force w, weight of the cube = mg

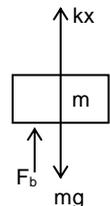
(c) buoyant force F_b (or upward thrust) imparted by the liquid on the cube given as $F_b = Vdg$, where V = volume of the immersed portion of the cube. For complete immersion, V = volume of the cube.

For equilibrium of the cube, $kx + F_b = mg$

$$\Rightarrow x = \frac{mg - F_b}{k} = \frac{mg - Vdg}{k}; \text{ where } V = (m/D)$$

$$\Rightarrow x = \frac{mg}{k} \left(1 - \frac{d}{D}\right)$$

Hence (A) is correct.



4. **C**

Sol. $F_m = qvB$, and directed radially outward.

$$\therefore N - mg \sin \theta - qvB = \frac{mv^2}{R}$$

$$\Rightarrow N = \frac{mv^2}{R} + mg \sin \theta + qvB$$

Hence at $\theta = \pi/2$

$$\Rightarrow N_{\max} = \frac{2mgR}{R} + mg + qB\sqrt{2gR} = 3mg + qB\sqrt{2gR}.$$

CHEMISTRY

5. **A**
Sol. Na_2CO_3 is used to reduce hardness of water by removing Ca^{2+} and Mg^{2+} through formation of insoluble precipitates like CaCO_3 and MgCO_3 .
6. **B**
Sol. Metal sulphides are not calcined.
Metal sulphates, sulphites, etc are calcined.
Ores containing metal and oxygen are already in combined oxide form. No need for calcination.
In free state, no calcinations is required.
7. **B**
Sol. Carbon is oxidized from -4 to +4.
8. **D**
Sol. It only changes with temperature.

BIOLOGY

9. **B**
Sol. The term acute infection is used to refer to microbe living inside a host for a limited period of time.
Chronic infection is when symptoms develop gradually, over weeks or months, and are slow to resolve.
Resolution is an active process with highly regulated cellular and biochemical events that are engaged to restore tissue function in health.
10. **B**
Sol. The value of 'c' and 'n' is **4c** and **2n** respectively.
11. **A**
Sol. Uracil is nitrogenous base present in RNA.
12. **C**
Sol. An autosomal recessive disorder means two copies of an abnormal gene must be present in order for the disease or trait to develop.

SECTION – II PHYSICS

13. **BD**
Sol. Let ω_o = the angular velocity of earth above its axis = $\frac{2\pi}{24}$ rad/hr
Let ω = angular velocity, of satellite.
 $\Rightarrow \omega = \frac{2\pi}{1.5}$
For a satellite rotating from west to east. (same as earth), the relative angular velocity $\omega_1 = \omega - \omega_o$
 \therefore Time period of rotation relative to earth = $\frac{2\pi}{\omega_1} = 1.6$ h
Now for a satellite rotating from east to west (opposite to earth) the relative angular velocity $\omega_2 = \omega + \omega_o$.

$$\text{Time period of rotation relative to earth} = \frac{2\pi}{\omega_2} = \frac{24}{17} \text{ hrs.}$$

14. **CD**

Sol. The spring pulls both the blocks with same force. Hence force on both blocks is equal and opposite.

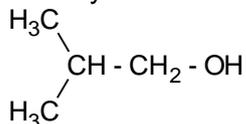
CHEMISTRY

15. **ACD**

- Sol. (A) $[H^+] = 10^{-2} + 10^{-2} = 2(10^{-2})$
 $pH = -\log[H^+] = -\log(2 \times 10^{-2}) = 2 - \log 2 = 2 - 0.3 = 1.7$
 NaCl is a neutral salt. It does not contribute to pH
- (B) $[H^+] = 10^{-4} \text{ M}$
 $[OH^-] = 10^{-2} \text{ M}$
 $[OH^-] - [H^+] = 10^{-2} - 10^{-4} = 10^{-2}(1 - 10^{-2}) = (1 - 0.01)10^{-2} = (0.99)10^{-2}$
 $pOH = -\log(0.99 \times 10^{-2}) = 2 - \log 0.99$
 $= 2 - (0.004) = 2.004$
 $\therefore pH = 14 - 2.004 = 11.996$
- (C) $[OH^-] = 10^{-4} + 10^{-4}$
 $\therefore [OH^-] = 2 \times 10^{-4}$
 $pOH = -\log(2 \times 10^{-4}) = 4 - \log 2 = 4 - 0.3 = 3.7$
 $pH = 14 - pOH = 14 - 3.7 = 10.3$
 KNO_3 contributes nothing
- (D) $pH = -\log[H^+] = -\log 10^{-6} = 6$
 In H_2O , $[H^+] = [OH^-] = 10^{-6}$
 $\therefore pH = pOH = 6$

16. **ABC**

Sol. Isobutyl alcohol is



BIOLOGY

17.

A. 1. carp 2. mouse 3. dog 4. elephant 5. human

B. a → Mitochondria (2)

b → Lysosomes (9)

c → Ribosomal RNA synthesis (10)

d → Increased surface area for enzymes (4)

e → Lipid storage and synthesis (7)

18.

A. Blood group of first child – A or B
 Blood group of second child – O or A
 Blood group of third child – A or AB
 Blood group of fourth child – O

B. The possible blood group of father of unknown child could be AB.

SECTION – III
PHYSICS

19. (a) Speed of flatcar is = 10 kph = 2.78 m/s

As the flatcar is 12.0 m in length, total time it takes to cross the point is = $\frac{12}{2.78} = 4.31$ s

As first rock hits the front edge of the car, let us take this time $t = 0$, thus in 4.0 s, five rocks will hit the car and fifth will fall on road.

- (b) If car begins to accelerate at 0.5 m/s^2 , time taken to cross the point is given by

$$S = ut + \frac{1}{2}at^2$$

$$\text{or } 12 = 2.78 t + \frac{1}{2}(0.5)t^2$$

$$\text{or } t^2 + 11.12 t - 48 = 0$$

$$\text{or } t = 3.32 \text{ s or } t = -14.44 \text{ s}$$

As time here can not be negative, it takes 3.32 seconds to cross the point, hence four rocks will fall on it.

20. Let specific heats of liquids are s_A , s_B and s_C respectively. Then for mixing of liquids A and B, we have heat lost by B = heat gained by A

$$\text{or } m \times s_B \times (20 - 18) = m \times s_A \times (18 - 15)$$

$$2s_B = 3s_A \quad \dots(1.60)$$

For mixing of liquids B and C, we have

Heat lost by C = heat gained by B

$$m \times s_C \times (30 - 22) = m \times s_B \times (22 - 20)$$

$$8s_C = 2s_B$$

$$\text{or } s_B = 4s_C \quad \dots(1.61)$$

From equation (1.60) and (1.61), we get

$$8s_C = 3s_A \quad \dots(1.62)$$

Now if liquids A and C are mixed, let their equilibrium temperature in T_C then we have

Heat lost by C = heat gained by A

$$m \times s_C \times (30 - T_e) = m \times s_A \times (T_e - 15)$$

$$\text{or } \frac{3s_A}{8} \times (30 - T_e) = s_A \times (T_e - 15)$$

$$\text{or } 90 - 3T_e = 8 T_e - 120$$

$$\text{or } 11T_e = 210$$

$$\text{or } T_e = \frac{210}{11} = 19.09 \text{ }^\circ\text{C}$$

CHEMISTRY

21.

(i). 4

Sol. Elements F, G, H, I, J are present in the same period. The number of electrons (atomic number) of the element increases from left to right inclusively by one unit.

∴ If the electron of atom H = x, then the electron of other elements will be

$$G = x - 1, F = x - 2, I = x + 1, J = x + 2$$

∴ To be isoelectronic with H, G and F will gain one and two electrons respectively. I and J atom will lose one and two electrons respectively.

∴ The isoelectronic species are F^{2-} , G^{-} , H , I^{+} , J^{2+}

(ii) A and B

(iii) BE_4

(iv) K^{2-} , L^{-} , N^{+} , O^{2+}

(v) T

(vi) They contain maximum number of electrons than other groups. So their tendency will be to gain electrons to complete octet. This group is the halogen group, so they can form diatomic molecules.

(vii) Due to increase in effective nuclear charge from left to right with constant valence shell.

(viii) The elements that form the most ionic compound are P and E. 'P' is the most electropositive and E is the most electronegative element.

(ix) E is fluorine means A is boron. The atomic number of boron is 5.

22.

(i) In fused NaOH, pure Na^{+} and OH^{-} ions are present. In aqueous solution Na^{+} and OH^{-} are not free, they are surrounded by water molecules. Hence the availability of free OH^{-} ions are less in aqueous solution.

∴ Fused NaOH is a stronger base than aq. NaOH.

(ii) Disproportionation reaction takes place between NaOH and Cl_2 . In this reaction the same atom or homonuclear molecule is reduced as well as oxidized.

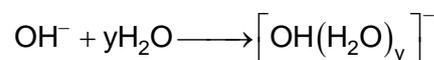
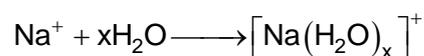
(iii) Gas contains silica. NaOH reacts with it forming silicates



This silicate deposit on glass.

(iv) $NaOH + H_2O \longrightarrow Na^{+}(aq) + OH^{-}(aq)$

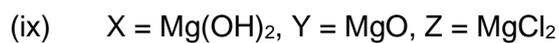
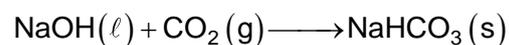
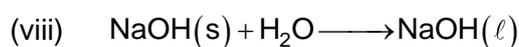
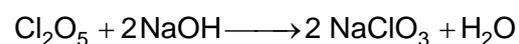
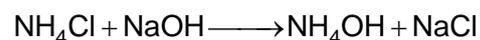
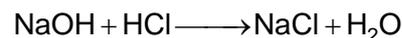
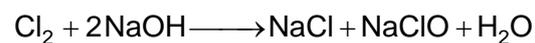
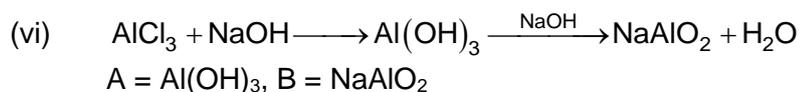
The $Na^{+}(aq)$ ions are formed due to hydration of Na^{+} by H_2O molecules. The same is correct for OH^{-} ions.



These processes are exothermic. So heat is evolved



Here formation of H_2O from H^+ and OH^- ions is exothermic. In addition to that hydration of Na^+ and Cl^- is also exothermic.



BIOLOGY

23. A

a) DNA ligase

b) $\text{a} \rightarrow \text{T}$; $\text{b} \rightarrow \text{F}$; $\text{c} \rightarrow \text{T}$

23. B

a) 7, 8 & 9

b) 2 & 5

c) 1 & 4

d) 3 & 6

e) 4 & 6

24. A

Ans. 1, 2, 5, 7

24. B

Ans.

A. 1

B. 5

C. 4

D. 1

E. 3

F. 2

24. C

Ans.

f1: _____ Plant uptake

f2: _____ Net mineralization

f3: _____ Leaching

f4: _____ Litter fall

24. D

Ans. Joel Asaph Allen in 1877, Allen's rule