A collection of

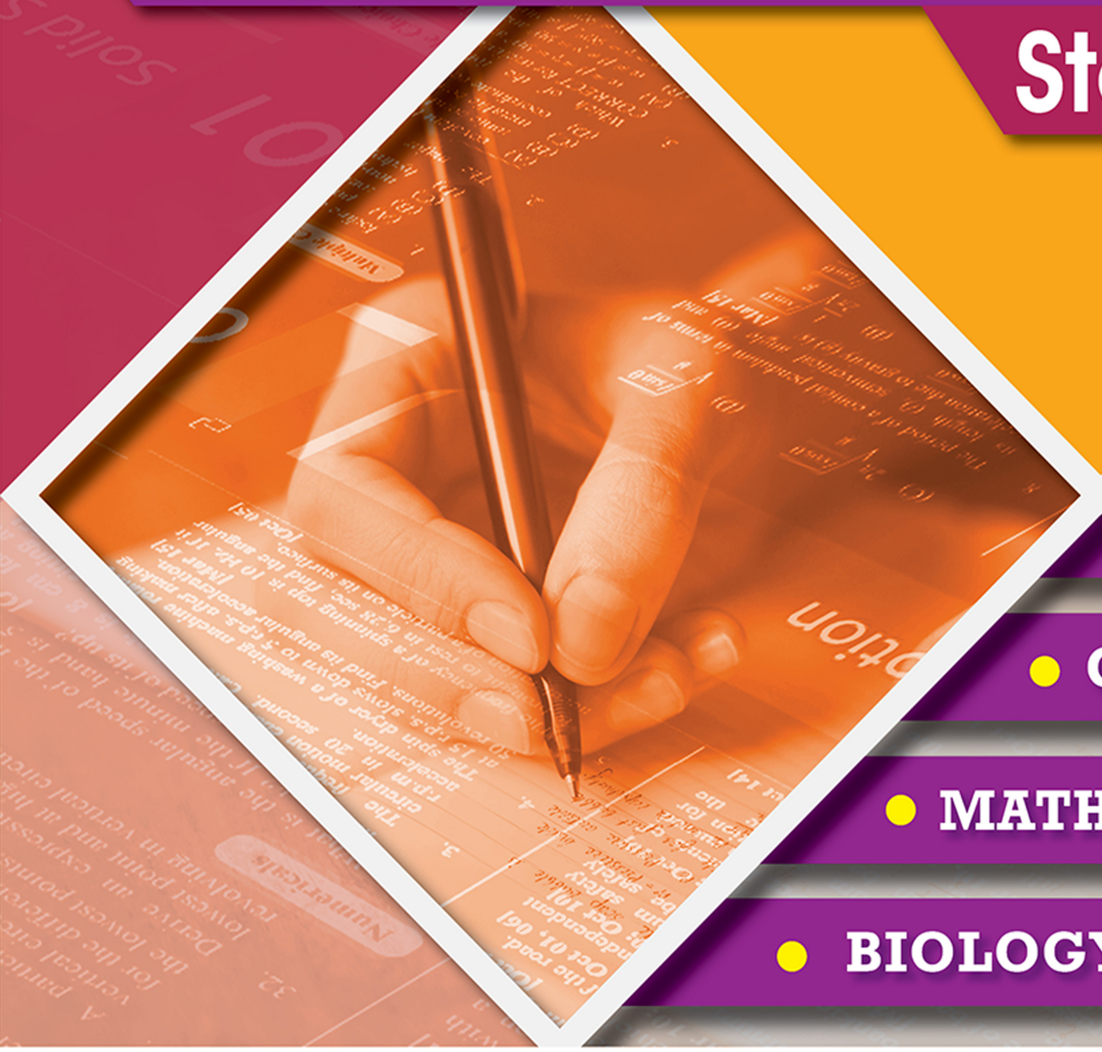
Board Questions

1996 to 2023

With Solutions

Chapterwise & Subtopicwise compilation of relevant board questions from 1996 to 2023

Std. XII Sci.



- PHYSICS
- CHEMISTRY
- MATHEMATICS
- BIOLOGY

Target Publications® Pvt. Ltd.

Written as per the latest HSC syllabus prescribed by the Maharashtra State Board of Secondary and Higher Secondary Education, Pune.

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Salient Features

- Subjects covered: Physics, Chemistry, Mathematics & Statistics (Part I & II) and Biology
- Covers questions from previous curriculum which fall under the latest syllabus from 1996 to 2023.
- Chapter wise and Subtopic wise segregation of Theory questions and Numericals.
- Detailed solutions are provided to difficult MCQs
- Important Inclusion: Log calculations for selective numericals.
- Answers and precise solutions provided to the questions as per *latest edition* of the textbook.

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PREFACE

Target's 'Board Questions with Solutions : Std. XII Sci.' is a compilation of all the relevant questions (MCQs + Theory Questions + Numericals) that have been asked in the previous year's HSC Maharashtra Board Papers of science stream for Physics, Chemistry, Mathematics & Statistics (Part I & II) and Biology. The objective of this book is to offer students quick access to previous year's relevant board questions along with their answers.

The chapter wise and subtopic wise (for Theory Questions & Numericals) segregation of questions enable students gauge the weightage given and type of questions preferred for a chapter. Flow of questions is set year wise with questions from the most recent examination placed last in a subtopic. Only those questions from previous years which fall under the latest syllabus prescribed by Maharashtra State Board of Secondary and Higher Secondary Education are included. The solutions are precise and supplied with suitable diagrams and graphs. Detailed solutions are provided to difficult MCQs. Log calculations are included for selective numericals to aid students.

Constructive criticism and feedback for improving the book are always appreciated. Please write to us on: mail@targetpublications.org

Best of luck to all the aspirants!

Publisher

Edition: Second

CONTENT

01 Rotational Dynamics

Multiple Choice Questions

1. A car is moving along a horizontal curve of radius 20 m and coefficient of friction between the road and wheels of the car is 0.25. If acceleration due to gravity is 9.8 m/s^2, then its maximum speed is **[Mar 08]**
(A) 3 m/s (B) 5 m/s (C) 7 m/s (D) 9 m/s

2. A body is acted upon by a constant torque. In 4 seconds its angular momentum changes from L to 4L. The magnitude of the torque is _______. **[Oct 08]**
(A) $\frac{L}{4}$ (B) $\frac{3L}{4}$ (C) 3L (D) 12L

3. Radius of gyration of a ring about a transverse axis passing through its centre is _______. **[Mar 09]**
(A) 0.5 × diameter of ring
(B) diameter of ring
(C) 2 × diameter of ring
(D) $(\text{diameter of ring})^2$

4. A stone is tied to a string and rotated in a horizontal circle with constant angular velocity. If the string is released, the stone flies _________. **[Oct 09, Mar 10]**
(A) radially inward
(B) radially outward
(C) tangentially forward
(D) tangentially backward

5. The radius of gyration of a solid sphere of mass M and radius R rotating about an axis with its diameter N is **[Mar 10]**
(A) $\sqrt{\frac{1}{5}}\cdot R$ (B) $\sqrt{\frac{2}{5}}\cdot R$
(C) $\sqrt{\frac{3}{5}}\cdot R$ (D) $\sqrt{\frac{7}{5}}\cdot R$

6. The moment of inertia of a thin uniform rod of mass M and length L, about an axis passing through a point, midway between the centre and one end, perpendicular to its length is **[Mar 13]**
(A) $\frac{48}{7}ML^2$ (B) $\frac{7}{48}ML^2$
(C) $\frac{1}{48}ML^2$ (D) $\frac{1}{16}ML^2$

7. If 'L' is the angular momentum and 'I' is the moment of inertia of a rotating body, then $\frac{L^2}{2I}$ represents its **[Oct 13]**
(A) rotational P.E. (B) total energy
(C) rotational K.E. (D) translational K.E.

8. A thin wire of length L and uniform linear mass density ρ is bent into a circular coil. Moment of inertia of the coil about tangential axis in its plane is _______. **[Oct 14]**
(A) $\frac{3\rho L^2}{8\pi^2}$ (B) $\frac{8\pi^2}{3\rho L^3}$ (C) $\frac{3\rho L^3}{8\pi^2}$ (D) $\frac{8\pi}{3\rho L^2}$

9. The period of a conical pendulum in terms of its length (l), semivertical angle (θ) and acceleration due to gravity (g) is: **[Mar 15]**
(A) $\frac{1}{2\pi}\sqrt{\frac{l\cos\theta}{g}}$ (B) $\frac{1}{2\pi}\sqrt{\frac{l\sin\theta}{g}}$
(C) $4\pi\sqrt{\frac{l\cos\theta}{4g}}$ (D) $4\pi\sqrt{\frac{l\tan\theta}{g}}$

10. The kinetic energy of a rotating body depends upon **[Mar 15]**
(A) distribution of mass only.
(B) angular speed only.
(C) distribution of mass and angular speed.
(D) angular acceleration only.

11. A particle rotates in U.C.M. with tangential velocity 'v' along a horizontal circle of diameter 'D'. Total angular displacement of the particle in time 't' is _______. **[Mar 16]**
(A) vt (B) $\left(\frac{v}{D}\right)-t$ (C) $\frac{vt}{2D}$ (D) $\frac{2vt}{D}$

12. A body of moment of inertia 5 kgm^2 rotating with an angular velocity 6 rad/s has the same kinetic energy as a mass of 20 kg moving with a velocity of _______. **[Mar 16]**
(A) 5 m/s (B) 4 m/s
(C) 3 m/s (D) 2 m/s

13. The difference in tensions in the string at lowest and highest points in the path of the particle of mass 'm' performing vertical circular motion is **[July 16]**
(A) 2 mg (B) 4 mg
(C) 6 mg (D) 8 mg

14. The body is rotating with uniform angular velocity (ω) having rotational kinetic energy (E). Its angular momentum (L) is: **[July 16]**
(A) $\frac{2E}{\omega}$ (B) $\frac{E^2}{\omega}$ (C) $\frac{E}{\omega^2}$ (D) $\frac{E}{2\omega}$

16. $F_{CP} = \frac{mv^2}{r}$

Multiplying and dividing the equation by mr^2, we get,

$F_{CP} = \frac{m^2v^2r^2}{mr^3}$

$\therefore$ $F_{CP} = \frac{L^2}{mr^3}$ ….($\because$ L = mvr)

18. P.E. = mgh

At highest point, h = 2r

$\therefore$ P.E. = 2 mgr

19. $I_c = MR^2 = 0.25 \times 0.5^2 = 0.0625$ kgm^2

Theory Questions

1.2 Characteristics of Circular Motion

1. Explain the concept of centripetal force. [Mar 17]

Ans: Centripetal force:

i. The force providing centripetal or radial acceleration is called as centripetal or radial force.

$F_{CPF} = -m\omega^2 \vec{r}$

where, r = radius of circular path.

ii. In magnitude, $F_{CPF} = mr\omega^2 = \frac{mv^2}{r} = mv\omega$

iii. The direction of this force is along the radius and towards centre (centre seeking).

2. Distinguish between centripetal force and centrifugal force. [Mar 10, 18]

Ans:

Sr. No.	Centripetal force	Centrifugal force
i.	Centripetal force is directed along the radius towards the centre of a circle.	Centrifugal force is directed along the radius away from the centre of a circle.
ii.	It is a real force.	It is a pseudo force.
iii.	It is considered in inertial frame of reference.	It is considered in non-inertial frame of reference.
iv.	In vector form, it is given by $\vec{F} = -\frac{mv^2}{r}\hat{r}_0$ with usual notations.	In vector form, it is given by $\vec{F} = +\frac{mv^2}{r}\hat{r}_0$ with usual notations.

3. What is the value of tangential acceleration in U.C.M.? [Mar 19]

Ans: Value of tangential acceleration in U.C.M. is always zero.

4. Define U.C.M.
Name the forces acting on a body executing nonuniform circular motion. [July 19]

Ans: Definition: *During circular motion, if the speed of the particle remains constant, it is called Uniform Circular Motion* (UCM).

Forces acting on the body executing non-uniform circular motion: Centripetal force provided partly by the weight of the body performing circular motion and partly by the normal reaction.

5. Define uniform circular motion. [Mar 20]

Ans: *Refer Subtopic 1.2: Q. No. 4 (Definition only)*

1.3 Applications of Uniform Circular Motion

1. Derive an expression for period of a conical pendulum. [Mar 08]

Ans:

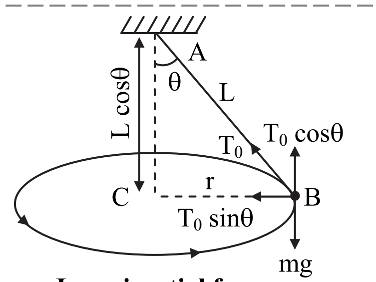
i. Consider the vertical section of a conical pendulum having bob (point mass) of mass m and string of length ‘L’.

ii. Here, θ is the angle made by the string with the vertical, at any position (semi-vertical angle of the cone)

iii. In a given position B, the forces acting on the bob are

a. its weight ‘mg’ directed vertically downwards

b. the force ‘T_0’ due to the tension in the string, directed along the string, towards the support A.



In an inertial frame

iv. As the motion of the bob is a horizontal circular motion, the resultant force must be horizontal and directed towards the centre C of the circular motion.

v. For this, tension (T_0) in the string is resolved into

a. $T_0 \cos\theta$: vertical component

b. $T_0 \sin\theta$: horizontal component

vi. The vertical component ($T_0 \cos\theta$) balances the weight ‘mg’.

$\therefore$ $mg = T_0 \cos\theta$ ….(1)

vii. The horizontal component $T_0 \sin\theta$ then becomes the resultant force which is centripetal.

$mr\omega^2 = T_0 \sin\theta$ ….(2)

Dividing equation (2) by equation (1),

$\omega^2 = \frac{g\sin\theta}{r\cos\theta}$ ….(3)

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3. State and prove principle of conservation of angular momentum. **[Mar 18, 23]**

Ans: **Statement**: *Refer Subtopic 1.10: Q. No. 1*

Proof: *Refer Subtopic 1.10: Q. No. 2*

4. Explain the principle of conservation of angular momentum with the help of two appropriate examples. **[July 19]**

Ans: **Statement and explanation:**

Refer Subtopic 1.10: Q. No. 1 and Q. No. 2

Examples:

i. The angular velocity of revolution of a planet around the sun in an elliptical orbit increases, when the planet comes closer to the sun and vice-versa.

ii. A person carrying heavy weights in his hands and standing on a rotating platform can change the speed of the platform.

iii. A diver performs somersaults by jumping from a high diving board keeping his legs and arms out stretched first, and then curling his body.

5. State the law of conservation of angular momentum. **[July 22]**

Ans: **Statement**: *Refer Subtopic 1.10: Q. No. 1*

1.11 Rolling Motion

1. Derive an expression for kinetic energy, when a rigid body is rolling on a horizontal surface without slipping. Hence find kinetic energy for a solid sphere. **[Mar 13]**

Ans: **Expression for kinetic energy of rolling sphere:**

i. Mass of the sphere is given to be M.

Let, v = linear velocity of the sphere

ω = angular velocity of the sphere

I = moment of inertia of the sphere

K = radius of gyration

ii. Total K.E of rolling body

= $(K.E)_{\text{translational}} + (K.E)_{\text{rotational}}$

$$\therefore (K.E)_{\text{rolling}} = \frac{1}{2}Mv^2 + \frac{1}{2}I\omega^2$$

$$= \frac{1}{2}Mv^2 + \frac{1}{2}MK^2\left[\frac{v^2}{r^2}\right]$$

….($\because$ $I = MK^2$ and $v = r\omega$)

$$\therefore (K.E)_{\text{rolling}} = \frac{1}{2}Mv^2\left[1+\frac{K^2}{r^2}\right] \quad ....(1)$$

Since the value of ‘K’ is different for different bodies, so $(K.E)_{\text{rolling}}$ also varies from body to body.

2. Obtain an expression for total kinetic energy of a rolling body in the form $\frac{1}{2}MV^2\left[1+\frac{K^2}{R^2}\right]$. **[Mar 16]**

Ans: *Refer Subtopic 1.11: Q. No. 1*

Numericals

1.2 Characteristics of Circular Motion

1. An object of mass 2 kg attached to wire of length 5 m is revolved in a horizontal circle. If it makes 60 r.p.m. Find its

i. angular speed

ii. linear speed

iii. centripetal acceleration

iv. centripetal force

[Mar 09]

Solution:

Given: m = 2 kg, r = 5 m, n = 60 r.p.m.= 1 r.p.s.

To find:
i. Angular Speed (ω)
ii. Linear Speed (v)
iii. Centripetal acceleration (a_{cp})
iv. Centripetal Force (F_{cp})

Formulae: i. $\omega = 2\pi n$ ii. $v = r\omega$
iii. $a_{cp} = r\omega^2$ iv. $F_{cp} = mr\omega^2$

Calculation: From formula (i),

$\omega = 2 \times 3.142 \times 1 =$ **6.284 rad/s**

From formula (ii),

$v = 5 \times 6.284 =$ **31.42 m/s**

From formula (iii),

$a = r\omega^2 = 5 \times (6.284)^2 =$ **197.44 m/s²**

From formula (iv),

$F_{cp} = mr\omega^2 = 2 \times 197.44 =$ **394.88 N**

Ans: i. The angular speed id **6.284 rad/s.**

ii. The linear speed of an object id **31.42 m/s.**

iii. The centripetal acceleration of an object is **197.44 m/s².**

iv. The centripetal force is **394.88 N.**

2. A car of mass 1500 kg rounds a curve of radius 250 m at 90 km/hour. Calculate the centripetal force acting on it. **[Mar 13]**

Solution:

Given: m = 1500 kg, r = 250 m,

$v = 90 \text{ km/h} = 90\times\frac{5}{18} = 25 \text{ m/s}$

To find: Centripetal force (F_{CP})

Formula: $F_{CP} = \frac{mv^2}{r}$

Calculation: From formula,

$$F_{CP} = \frac{1500\times(25)^2}{250}$$

$\therefore$ F_{CP} = **3750 N**

Ans: The centripetal force acting on the car is **3750 N**.

3. A racing car completes 5 rounds of a circular track in 2 minutes. Find the radius of the track if the car has uniform centripetal acceleration of π^2 m/s². **[Oct 13]**

Solution:

Given: 5 rounds = 2πr(5), t = 2 minutes = 120 s

To find: Radius (r)

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01 Solid State

Multiple Choice Questions

1. In body centred cubic structure, the space occupied is about _______. **[Mar 13]**
   (A) 68 % (B) 53 %
   (C) 38 % (D) 32 %
2. To prepare n-type semiconductor, the impurity to be added to silicon should have the following number of valence electrons: **[Mar 14]**
   (A) 2 (B) 3 (C) 4 (D) 5
3. The major binding force in diamond is _______. **[Oct 14]**
   (A) covalent bond
   (B) ionic bond
   (C) metallic bond
   (D) coordinate covalent bond
4. p-type semi-conductors are made by mixing silicon with impurities of _______. **[Mar 15]**
   (A) germanium (B) boron
   (C) arsenic (D) antimony
5. An ionic compound crystallises in FCC type structure with 'A' ions at the centre of each face and 'B' ions occupying corners of the cube. The formula of compound is _______. **[Mar 17]**
   (A) AB_4 (B) A_3B (C) AB (D) AB_3
6. Number of types of orthorhombic unit cell is _______. **[July 18]**
   (A) 7 (B) 3 (C) 4 (D) 2
7. The number of atoms per unit cell of body centred cube is: **[Mar 20]**
   (A) 1 (B) 2 (C) 4 (D) 6
8. The co-ordination number of atoms in body centred cubic structure (bcc) is _______. **[Mar 22]**
   (A) 4 (B) 6 (C) 8 (D) 12
9. The CORRECT relation between edge length and radius of an atom in simple cubic lattice is _______. **[July 22]**
   (A) $2a = r$ (B) $\sqrt{3}a = 4r$
   (C) $a = 2r$ (D) $\sqrt{2}a = 4r$
10. The relation between radius of sphere and edge length in body centered cubic lattice is given by formula: **[Mar 23]**
   (A) $\sqrt{3}r = 4a$ (B) $r = \frac{\sqrt{3}}{a} \times 4$
   (C) $r = \frac{\sqrt{3}}{4}a$ (D) $r = \frac{\sqrt{2}}{4} \times a$

Answers:

1. (D) 2. (D) 3. (A) 4. (B)
5. (B) 6. (C) 7. (B) 8. (C)
9. (C) 10. (C)

Solution:

5. As 'A' ions are present at the face centres of the 6 faces of the cube, the number of ions of 'A' in the unit cell = $\frac{1}{2} \times 6 = 3$
   As 'B' is present at the 8 corners of the cube, number of ions of B in the unit cell
   $= \frac{1}{8} \times 8 = 1$

∴ Ratio of atoms A : B = 3 : 1.
The formula of the compound is A_3B.

Theory Questions

1.2 Types of solids

1. Distinguish between crystalline solids and amorphous solids. [Mar 13, 14, 17, 19]

Ans:

	Crystalline solids	Amorphous solids
i.	The constituent particles are arranged in a regular and periodic manner.	The constituent particles are arranged randomly.
ii.	They have sharp and characteristic melting point.	They do not have sharp melting point. They gradually soften over a range of temperature.
iii.	They are anisotropic, i.e., have different physical properties in different direction.	They are isotropic, i.e., have same physical properties in all directions.
iv.	They have long range order.	They have only short range order.
e.g.	Ice, NaCl, etc.	Glass, rubber, plastics, etc.

1.3 Classification of crystalline solids

1. Classify the following molecular solids into different types:

i. HCl **ii. CO_2**
iii. Solid ice **iv. SO_2**
[July 18]

Ans:

i. HCl - Polar molecular solid
ii. CO_2 - Non-polar molecular solid
iii. Solid ice - Hydrogen bonded molecular solid
iv. SO_2 - Polar molecular solid

01 Mathematical Logic

Multiple Choice Questions

1. If A = {2, 3, 4, 5, 6}, then which of the following is not true? **[Oct 13]**
   (A) $\exists\, x \in A$ such that $x + 3 = 8$
   (B) $\exists\, x \in A$ such that $x + 2 < 5$
   (C) $\exists\, x \in A$ such that $x + 2 < 9$
   (D) $\forall\, x \in A$ such that $x + 6 \geq 9$

2. If $p \wedge q = F$, $p \rightarrow q = F$, then the truth values of p and q are : **[Oct 15]**
   (A) T, T (B) T, F
   (C) F, T (D) F, F

   OR

   If $p \wedge q$ is F, $p \rightarrow q$ is F then the truth values of p and q are _______ respectively. **[Mar 23]**
   (A) T, T (B) T, F
   (C) F, T (D) F, F

3. The negation of $p \wedge (q \rightarrow r)$ is **[Mar 16]**
   (A) $p \vee (\sim q \vee r)$ (B) $\sim p \wedge (q \rightarrow r)$
   (C) $\sim p \wedge (\sim q \rightarrow \sim r)$ (D) $\sim p \vee (q \wedge \sim r)$

4. Inverse of the statement pattern $(p \vee q) \rightarrow (p \wedge q)$ is **[July 16]**
   (A) $(p \wedge q) \rightarrow (p \vee q)$
   (B) $\sim(p \vee q) \rightarrow (p \wedge q)$
   (C) $(\sim p \vee \sim q) \rightarrow (\sim p \wedge \sim q)$
   (D) $(\sim p \wedge \sim q) \rightarrow (\sim p \vee \sim q)$

5. The negation of $p \wedge (q \rightarrow r)$ is _______. **[Mar 22]**
   (A) $\sim p \wedge (\sim q \rightarrow \sim r)$ (B) $p \vee (\sim q \vee r)$
   (C) $\sim p \wedge (\sim q \rightarrow r)$ (D) $p \rightarrow (q \wedge \sim r)$

6. The negation of $(p \vee \sim q) \wedge r$ is _______. **[July 22]**
   (A) $(\sim p \wedge q) \wedge r$ (B) $(\sim p \wedge q) \vee r$
   (C) $(\sim p \wedge q) \vee \sim r$ (D) $(\sim p \vee q) \wedge \sim r$

Answers:

1. (D) 2. (B) 3. (D) 4. (D)
5. (D) 6. (C)

Hints:

1. Consider option (D)
   For $x = 2 \in A$, we have $x + 6 = 8 < 9$
   i.e., $x = 2$ does not satisfy the condition $x + 6 \geq 9$
2. $p \rightarrow q = F \Rightarrow p \equiv T$ and $q \equiv F$
3. $\sim[p \wedge (q \rightarrow r)]$
   $\equiv \sim p \vee \sim(q \rightarrow r)$ …[De-Morgan's Law]
   $\equiv \sim p \vee (q \wedge \sim r)$ …[Negation of implication]
4. Inverse of $(p \vee q) \rightarrow (p \wedge q)$ is
   $\sim(p \vee q) \rightarrow \sim(p \wedge q)$
   $\equiv (\sim p \wedge \sim q) \rightarrow (\sim p \vee \sim q)$
5. $\sim[p \wedge (q \rightarrow r)]$
   $\equiv \sim p \vee \sim(q \rightarrow r)$
   $\equiv p \rightarrow [\sim(q \rightarrow r)]$ …[$\because p \rightarrow q \equiv \sim p \vee q$]
   $\equiv p \rightarrow [\sim(\sim q \vee r)]$
   $\equiv p \rightarrow (q \wedge \sim r)$
6. $\sim[(p \vee \sim q) \wedge r]$
   $\equiv \sim(p \vee \sim q) \vee \sim r$ …[De Morgan's law]
   $\equiv (\sim p \wedge q) \vee \sim r$ …[De Morgan's law]

Questions

Based on Exercise 1.1

1. Write down the following statements in symbolic form:
i. A triangle is equilateral if and only if it is equiangular.
ii. Price increases and demand falls. **[Mar 13]**

Solution:

i. Let p : A triangle is equilateral
   q : A triangle is equiangular

$\therefore$ Symbolic form of the given statement is $p \leftrightarrow q$.

ii. Let p : Price increases
   q : Demand falls

$\therefore$ Symbolic form of the given statement is $p \wedge q$.

2. If p : It is a day time, q : It is warm, write the compound statements in verbal form denoted by–
i. $p \wedge \sim q$ ii. $\sim p \rightarrow q$ iii. $q \leftrightarrow p$ **[Oct 14]**

Solution:

We have
p : It is day time
q : It is warm

$\therefore$ ~p : It is not daytime
~q : It is not warm

$\therefore$ Verbal forms of the given statements are

i. It is daytime but it is not warm.
ii. If it is not daytime, then it is warm.
iii. It is warm if and only if it is daytime.

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01 Reproduction in Lower and Higher Plants

Multiple Choice Questions

1. The types of pollination exhibited by *Vallisneria* and *Zea mays* respectively are______ **[Oct 08]**
(A) Anemophily and Hydrophily
(B) Entomophily and Hydrophily
(C) Hydrophily and Anemophily
(D) Hydrophily and Entomophily

2. The endosperm cells in an angiospermic plant has 18 chromosomes, the number of chromosomes in its roots cells will be _______ **[Mar 09]**
(A) 12 (B) 6 (C) 18 (D) 24

3. In porogamy, the pollen tube enters into the ovule through _______ **[Mar 09]**
(A) micropyle (B) integument
(C) chalaza (D) funicle

4. Egg apparatus consists of _______ **[Oct 09]**
(A) egg and antipodals
(B) egg and polar nuclei
(C) egg and synergids
(D) egg and secondary nucleus

5. Synergids are _______ **[Mar 10]**
(A) haploid (B) triploid
(C) diploid (D) tetraploid

6. How many meiotic divisions are required for the formation of 100 seeds? **[Oct 13]**
(A) 25 (B) 50 (C) 100 (D) 125

7. During fertilization, male gametes are carried by pollen tube. This is called **[Oct 13]**
(A) Syngamy (B) Mesogamy
(C) Polygamy (D) Siphonogamy

8. For formation of 50 seeds, how many minimum meiotic divisions are necessary? **[Mar 14]**
(A) 25 (B) 50 (C) 75 (D) 63

9. In bisexual flowers, maturation of gynoecium before androecium is known as ______. **[Mar 14]**
(A) protandry (B) protogyny
(C) gynandry (D) dicliny

10. If the number of chromosomes in an endosperm cell is 27, what will be the chromosome number in the definitive nucleus? **[Mar 15]**
(A) 9 (B) 18 (C) 27 (D) 36

11. Lever mechanism of pollination is observed in _______. **[Mar 15]**
(A) *Salvia* (B) *Jasmine*
(C) *Bougainvillea* (D) *Butea*

12. Vegetative propagation takes place with the help of leaves in _______ plant. **[Oct 15]**
(A) *Kalanchoe* (B) *Oxalis*
(C) *Cynodon* (D) *Dahlia*

13. How many meiotic divisions will be needed to produce 44 female gametophytes in angiosperms? **[Oct 15]**
(A) 11 (B) 22 (C) 44 (D) 66

14. Endosperm of angiosperm is _______. **[July 16]**
(A) haploid (B) diploid
(C) triploid (D) tetraploid

15. A versatile anther is an adaptation for _______ type of pollination. **[July 18]**
(A) anemophilous (B) entomophilous
(C) hydrophilous (D) ornithophilous

16. During double fertilization second male gamete fuses with _______. **[Mar 19]**
(A) antipodal cell
(B) egg cell
(C) secondary nucleus
(D) synergids

17. How many meiotic and mitotic divisions are required for the formation of male gametophyte from pollen mother cell? **[Mar 20]**
(A) 2 meiotic and 1 mitotic
(B) 1 meiotic and 1 mitotic
(C) 1 meiotic and 2 mitotic
(D) 2 meiotic and 2 mitotic

18. How many meiotic and mitotic divisions occur during the development of male gametophyte from the microspore mother cell? **[Mar 22]**
(A) One meiotic and two mitotic
(B) Two meiotic only
(C) Two mitotic only
(D) One mitotic and one meiotic

19. How many mitotic divisions take place during the formation of a female gametophyte from a functional megaspore? **[Mar 23]**
(A) One (B) Two
(C) Three (D) Four