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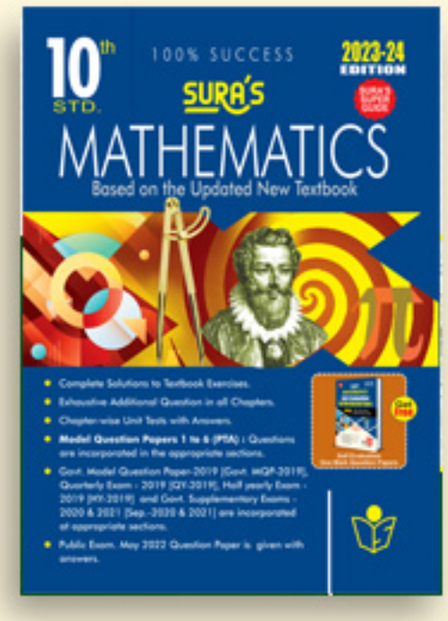

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- *Instant Supplementary Exam.* ***August 2022*** Question Paper is given with answers.

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Preface

Education is not the learning of facts.
It is rather training of the mind to think.
- **Albert Einstein**

Respected Principals, Correspondents, Head Masters / Head Mistresses, Teachers,

From the bottom of our heart, we at SURA Publications sincerely thank you for the support and patronage that you have extended to us for more than a decade.

It is in our sincerest effort we take the pride of releasing **SURA's Science Guide** for **10th Standard**. This guide has been authored and edited by qualified teachers having teaching experience for over a decade in their respective subject fields. This Guide has been reviewed by a reputed Professor who is currently serving as Head of the Department in an esteemed College.

With due respect to Teachers, I would like to mention that this guide will serve as a teaching companion to qualified teachers. Also, this guide will be an excellent learning companion to students with exhaustive exercises and in-text questions in addition to precise answers for textual questions.

In complete cognizance of the dedicated role of Teachers, I completely believe that our students will learn the subject effectively with this guide and prove their excellence in Board Examinations.

I once again sincerely thank the Teachers, Parents and Students for supporting and valuing our efforts. God Bless all.

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Syllabus

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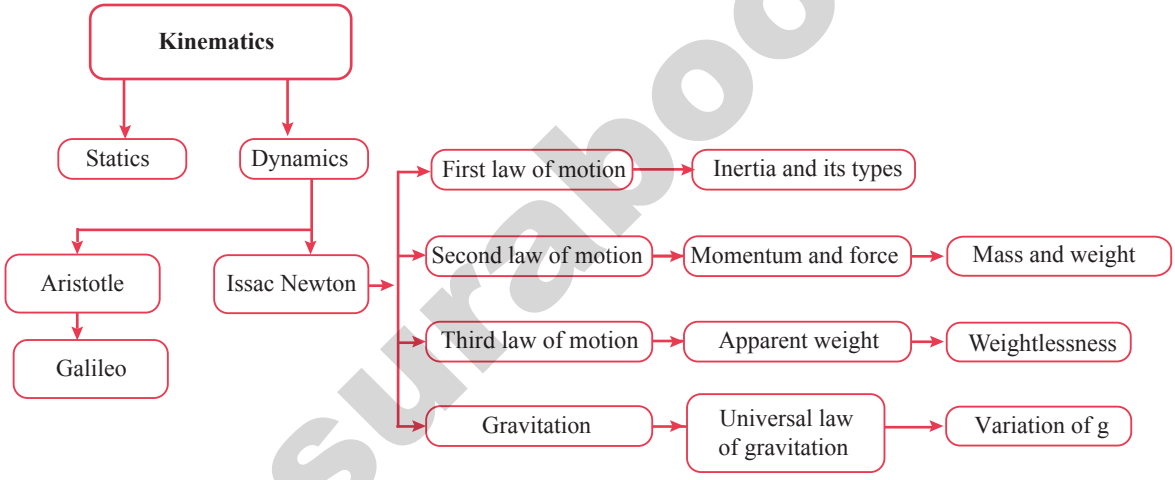
I MID TERM TEST (8 UNITS)					
August	3	9	16, 17	6, 9, 10, 13	4
September	4	0	18	3	2
QUARTERLY EXAM (14 UNITS)					
October	5	10	19, 20	7, 11, 14	4
November	6	11	21, 22	0	4
II MID TERM TEST (8 UNITS)					
December	0	0	23	0	
HALF YEARLY EXAM (FULL PORTION)					
January	FIRST REVISION TEST				
February	SECOND REVISION TEST				
March	THIRD REVISION TEST				

PHYSICS

UNIT 1

LAWS OF MOTION

CONCEPT MAP



MUST KNOW DEFINITIONS

Linear momentum	:	The product of mass and velocity of a moving body gives the magnitude of its linear momentum. It acts in the direction of the velocity of the body.
Like parallel forces	:	Two or more forces of equal or unequal magnitude acting along the same direction parallel to each other.
Unlike parallel forces	:	Two or more equal forces or unequal forces act along opposite directions parallel to each other.
Resultant Force	:	When several forces act simultaneously on the same body, then the combined effect of multiple forces can be represented by a single force, as resultant.
Moment of the couple	:	It is measured by the product of any one of the forces and the perpendicular distance between the line of action of two forces.

Impulse	:	When a force F acts on a body for a period of time t, then the product of force and time.
Weight	:	Weight is equal to gravitational force. Also weight (W) = mass × acceleration due to gravity. i.e W = *mg*
Mass	:	The quantity of matter contained in the body. Its SI unit is kilogram (*kg*).
Inertial mass	:	If mass is defined in association with force and inertia, it is termed as "inertial mass".
Gravitational mass	:	When the mass of a body is defined in association with the gravitational field, it is termed as "gravitational mass".
Apparent weight	:	Apparent weight is the weight of the body acquired due to the action of gravity and other external forces on the body.
Weightlessness	:	Whenever a body or a person falls freely under the action of Earth's gravitational force alone, it appears to have zero weight.

FORMULAE

1.	Linear Momentum	$p = mv$
2.	Parallel forces are acting in the same direction	$F_{net} = F_1 + F_2$
3.	Parallel unequal forces are acting in the opposite direction	$F_{net} = F_1 - F_2$ (if $F_1 > F_2$) $F_{net} = F_2 - F_1$ (if $F_2 > F_1$)
4.	Torque	$\tau = F \times d$
5.	Principle of moments	$F_1 \times d_1 = F_2 \times d_2$
6.	Moment of Couple	$M = F \times S$
7.	Force	$F = m \times a$
8.	Impulse	$J = \Delta P$
9.	Law of conservation of linear momentum	$m_1v_1 + m_2v_2 = m_1u_1 + m_2u_2$
10.	Newton's Universal law of gravitation	$F = \frac{GMm}{R^2}$ $[G = 6.674 \times 10^{-11}\ Nm^2\ kg^{-2}]$
11.	Acceleration due to gravity	$g = \frac{GM}{R^2}$
12.	Weight	$W = mg$
13.	Mass of the Earth	$M = \frac{gR^2}{G}$
14.	Acceleration	$a = \frac{v - u}{t}$

TEXTBOOK EVALUATION

I. CHOOSE THE CORRECT ANSWER :

1. Inertia of a body depends on ⊛
(a) weight of the object
(b) acceleration due to gravity of the planet
(c) mass of the object
(d) Both a & b **[Ans. (c) mass of the object]**

2. Impulse is equals to *[PTA-1]*
(a) rate of change of momentum
(b) rate of force and time
(c) change of momentum
(d) rate of change of mass
[Ans. (c) change of momentum]

3. Newton's III law is applicable
(a) for a body is at rest
(b) for a body in motion
(c) both a & b
(d) only for bodies with equal masses
[Ans. (c) both a & b]

4. Plotting a graph for momentum on the Y-axis and time on X-axis. Slope of momentum-time graph gives
(a) Impulsive force (b) Acceleration
(c) Force (d) Rate of force
[Ans. (c) Force]

5. In which of the following sport the turning of effect of force used? ⊛ *[Qy-2019]*
(a) swimming (b) tennis
(c) cycling (d) hockey **[Ans. (c) cycling]**

6. The unit of 'g' is ms^{-2}. It can be also expressed as
(a) cms^{-1} (b) Nkg^{-1}
(c) Nm^2kg^{-1} (d) cm^2s^{-2} **[Ans. (b) Nkg^{-1}]**

7. One kilogram force equals to ⊛
(a) 9.8 dyne (b) 9.8×10^4 N
(c) 98×10^4 dyne (d) 980 dyne
[Ans. (c) 98×10^4dyne]

8. The mass of a body is measured on planet Earth as M kg. When it is taken to a planet of radius half that of the Earth then its value will be ____kg.
(a) 4 M (b) 2 M
(c) M/4 (d) M **[Ans. (d) M]**

9. If the Earth shrinks to 50% of its real radius its mass remaining the same, the weight of a body on the Earth will
(a) decrease by 50% (b) increase by 50%
(c) decrease by 25% (d) increase by 300%
[Ans. (d) increase by 300%]

10. To project the rockets which of the following principle(s) is /(are) required?
[GMQP-2019; Sep-2021; FRT & Aug.-'22]
(a) Newton's third law of motion
(b) Newton's law of gravitation
(c) law of conservation of linear momentum
(d) both a and c **[Ans. (d) both a and c]**

II. FILL IN THE BLANKS :

1. To produce a displacement _____ is required. **[Ans. force/unbalanced force]** *[FRT-'22]*
2. Passengers lean forward when sudden brake is applied in a moving vehicle. This can be explained by _____ **[Ans. inertia of motion]**
3. By convention, the clockwise moments are taken as _____ and the anticlockwise moments are taken as _____ **[Ans. negative, positive]**
4. _____ is used to change the speed of car. **[Ans. Gear or Torque]**
5. A man of mass 100 kg has a weight of _____ at the surface of the Earth. ⊛ **[Ans. 980 N]**

III. STATE WHETHER THE FOLLOWING STATEMENTS ARE TRUE OR FALSE CORRECT THE STATEMENT IF IT IS FALSE:

1. The linear momentum of a system of particles is always conserved.
Ans. False.
Correct Statement : In the absence of external force, the linear momentum of a system of particle is always conserved.

2. Apparent weight of a person is always equal to his actual weight
Ans. False.
Correct Statement : Apparent weight of a person is not equal to his actual weight.

3. Weight of a body is greater at the equator and less at the polar region.

Ans. **False.**

Correct Statement : Weight of the body is **less** at equator, **more** at polar region.

4. Turning a nut with a spanner having a short handle is so easy than one with a long handle.

Ans. **False.**

Correct Statement : Turning a nut with a spanner having a **long handle** is so easy than one with a **short handle.**

5. There is no gravity in the orbiting space station around the Earth. So the astronauts feel weightlessness.

Ans. **False.**

Correct Statement : When space station and astronauts have equal acceleration, they are under free fall condition, so both astronaut and space station are in the state of weightlessness.

IV. MATCH THE FOLLOWING : *[PTA-1]*

	Column I		Column II
(a)	Newton's I law	-	propulsion of a rocket
(b)	Newton's II law	-	Stable equilibrium of a body
(c)	Newton's III law	-	Law of force
(d)	Law of conservation of linear momentum	-	Flying nature of bird

Ans.

	Column I		Column II
(a)	Newton's law	-	stable equilibrium of a body
(b)	Newton's II law	-	Law of force
(c)	Newton's III law	-	Flying nature of bird
(d)	Law of conservation of linear momentum	-	propulsion of a rocket

V. ASSERTION AND REASONING :

Mark the correct choice as

(a) If both the assertion and the reason are true and the reason is the correct explanation of assertion.

(b) If both the assertion and the reason are true, but the reason is not the correct explanation of the assertion.

(c) Assertion is true, but the reason is false.

(d) Assertion is false, but the reason is true.

1. **Assertion:** The sum of the clockwise moments is equal to the sum of the anticlockwise moments.

Reason: The principle of conservation of momentum is valid if the external force on the system is zero.

[Ans. (b) If both the assertion and the reason are true, but the reason is not the correct explanation of the assertion.]

2. **Assertion:** The value of '*g*' decreases as height and depth increases from the surface of the Earth.

Reason: '*g*' depends on the mass of the object and the Earth. **[Ans. (c) Assertion is true, but the reason is false]**

Hint: **'g' depends on the geometric radius of the Earth.**

VI. ANSWER BRIEFLY :

1. Define inertia. Give its classification. *[Aug.-'22]*

Ans. The inherent property of a body to resist any change in its state of rest or the state of uniform motion, unless it is influenced upon by an external unbalanced force, is known as **'inertia'.**

Classification:

(i) Inertia of rest

(ii) Inertia of motion

(iii) Inertial of direction

2. Classify the types of force based on their application. *[FRT & Aug.-'22]*

Ans. (i) **Like parallel forces:** Two or more forces of equal or unequal magnitude acting along the same direction, parallel to each other are called like parallel forces.

(ii) **Unlike parallel forces:** If two or more equal forces or unequal forces act along opposite directions parallel to each other, then they are called unlike parallel forces.

3. If a 5 N and a 15 N forces are acting opposite to one another. Find the resultant force and the direction of action of the resultant force

Ans.

$F_1 = 5$ N

$F_2 = 15$ N

Resultant force $= F_2 - F_1$ (if $F_2 > F_1$)

$= 15 - 5 = 10$

Resultant force $= 10$ N

Resultant force of 10 N is acting in the direction of F_2. (i.e.) greater force.

4. Differentiate mass and weight. ⊛ *[May-'22]*

Ans.

S.No	Mass	Weight
(i)	It is the quantity of matter contained in the body	It is the gravitational force exerted on a body due to the gravity.
(ii)	It is a scalar quantity	It is a vector quantity
(iii)	SI unit is kg (kilogram)	SI unit is N (newton)
(iv)	Mass of a body remains the same at any point on the Earth	Weight of a body varies from one place to another place on the Earth
(v)	Measured using a physical balance	Measured using a spring balance

5. Define moment of a couple.

Ans. (i) Rotating effect of a couple is known as **moment of a couple.**

(ii) It is measured by the product of any one of the forces and the perpendicular distance between the line of action of two forces.

(iii) Moment of a couple
= Force × perpendicular distance between the line of action of forces, $M = F \times S$

6. State the principle of moments. *[Qy-2019]*

Ans. (i) When a number of like or unlike parallel forces act on a rigid body and the body is in equilibrium then the algebraic sum of moments in clockwise direction is equals to the algebraic sum of moments in anticlockwise direction.

(ii) Moment in clockwise direction
= Moment in anticlockwise direction,
$F_1 \times d_1 = F_2 \times d_2$

7. State Newton's second law. ⊛ *[GMQP-2019; May-'22]*

Ans. (i) According to Newton's second law, "the force acting on a body is directly proportional to the rate of change of linear momentum of the body and the change in momentum takes place in the direction of the force".

(ii) $F = m \times a$
Force = mass × acceleration

8. Why a spanner with a long handle is preferred to tighten screws in heavy vehicles?

Ans. (i) The turning effect of a body depends upon the distance of the line of action of the applied force from the axis of rotation.

(ii) Larger the perpendicular distance, lesser is the force required to turn the body. So spanner with long handle is preferred.

9. While catching a cricket ball the fielder lowers his hands backwards. Why?

Ans. When the fielder pulls back his hands he experiences a smaller force for a longer interval of time leading to less damage to his hands.

10. How does an astronaut float in a space shuttle?

Ans. Astronauts are not floating but falling freely around the Earth due to their huge oribital velocity. Since spacestation and astronauts have equal acceleration, they are under free fall condition. (R = 0 refer case 4 in Table 1.2). Hence, both the astronauts and the spacestation are in the state of weightlessness.

VII. Solve the given problems :

1. Two bodies have a mass ratio of 3:4 The force applied on the bigger mass produces an acceleration of 12 ms^{-2}. What could be the acceleration of the other body, if the same force acts on it.

Given

Mass ratio of two bodies is 3 : 4

So let's assume

Mass of smaller body = $m_1 = 3$ kg

Mass of bigger body = $m_2 = 4$ kg

Acceleration due to force applied by bigger body = $a_2 = 12\ ms^{-2}$

To find : Acceleration due to the same force on the smaller body = a_1 = ?

Solution

According to Newton's second law of motion.

$F = m \times a$

$F_1 = m_1 a_1$ $\qquad F_2 = m_2 a_2$

$F_1 = 3a_1$ $\qquad F_2 = 4 \times 12 = 48$ N

As the force is the equal

$F_1 = -F_2$

$3a_1 = -48$

$\therefore\ a_1 = -\frac{48}{3} = -16\ ms^{-2}$

So acceleration due to the same force on the smaller body a_1 = **16 ms^{-2}**

2. A body of mass m is initially moving with a velocity u. When a force F acts on the body it picks up velocity v in t second so that the acceleration is a produced. Using this data derive the relation between the force, mass and acceleration. *[PTA-5]*

Ans. Initial momentum of the object = mu

Final momentum of the object = mv

The change in momentum

$= mv - mu$

$= m(v - u)$ ... (1)

Rate of change of momentum

$= \frac{\text{Change of momentum}}{\text{time}}$

$= \frac{m(v-u)}{t}$ ... (2)

According to Newton's second law of the motion, this is nothing but applied force.

$\therefore$ The applied force,

$F \alpha \frac{m(v-u)}{t}$

Acceleration, $a = \frac{v-u}{t}$

The applied force, $F \alpha ma$

$F = k\,ma\ (k = 1)$

$\therefore F = ma$

Force acting on an object is a product of its mass and acceleration.

GOVERNMENT EXAM QUESTIONS & ANSWERS

1 MARKS

1. Force has : *[FRT-'22]*

(a) Magnitude only
(b) Direction only
(c) Both direction and magnitude
(d) None of the above

[Ans. (c) Both direction and magnitude]

2. Unit of force in SI system is _____. *[FRT-'22]*

[Ans. Newton]

2 MARKS

1. Calculate the velocity of a moving body of mass 5 kg whose linear momentum is 2 kg ms^{-1}. *[GMQP-2019]*

Linear momentum = mass × velocity

Velocity = $\frac{\text{linear momentum}}{\text{mass}} = \frac{2}{5} = 0.4$ ms^{-1}.

2. Write short notes on gears. *[Sep-2020]*

Ans. Gears :

A gear is a circular wheel with teeth around its rim. It helps to change the speed of rotation of a wheel by changing the torque and helps to transmit power.

4 MARKS

1. Match the following :. *[FRT-'22]*

List - I			List - II
(1)	Newton's I law	-	Passengers leaning sideways
(2)	Newton's II law	-	Stable equilibrium of a body
(3)	Newton's III law	-	Law of force
(4)	Inertia of direction	-	Flying nature of a bird
		-	Falling of an object from upward to Earth

Ans.

List - I			List - II
(1)	Newton's I law	-	Stable equilibrium of a body
(2)	Newton's II law	-	Law of force
(3)	Newton's III law	-	Flying nature of bird
(4)	Inertia of direction	-	Passengers learning sideways

ADDITIONAL QUESTIONS & ANSWERS

CHOOSE THE CORRECT ANSWER 1 MARK

1. Physics that deals with the effect of force on bodies is _____.

(a) Kinematics (b) Dynamics
(c) Statics (d) Mechanics

[Ans. (d) Mechanics]

2. _____ deals with the bodies which are at rest under the action of forces.

(a) Statics (b) Kinematics
(c) Dynamics (d) Mechanics

[Ans. (a) Statics]

3. Study of moving bodies under the action of forces _____.

(a) Statics (b) Kinematics
(c) Dynamics (d) Mechanics

[Ans. (c) Dynamics]

54. The gravitational force between two objects becomes _____ when the masses of both objects are halved without altering the distance between them.

(a) $\frac{f}{4}$ (b) $\frac{f}{2}$

(c) f (d) 2f [Ans. (a) $\frac{f}{4}$]

Fill in the blanks

1. _____ deals with the motion of bodies without considering the cause of motion. [Ans. Kinematics]
2. Kinetics deals with the motion of bodies considering the ____. [Ans. cause of motion]
3. According to Aristotle, a moving body naturally comes to rest without any external force is termed as _____ . [Ans. natural motion]
4. If the body behaves contrary to their own natural state is called _____. [Ans. violent motion]
5. The two different mass bodies dropped, the _____ falls faster. [Ans. heavier]
6. Bodies of different size, shape and mass fall from a height in _____ reach the ground at the same time. [Ans. vacuum]
7. A body does not change its state during the period of time, then it is said to be at_____. [Ans. rest]
8. A body changes its state, then it is said to be in _____. [Ans. motion]
9. A sharp turn while driving a car, tend to lean sideways is due to _____. [Ans. inertia of direction]
10. Momentum is a _____ quantity. [Ans. vector]
11. An athlete can take a longer jump if he comes running from a distance compared to that when he jumps suddenly. This type of inertia is _____. [Ans. inertia of motion]
12. When a force of 1 N acts on a mass of 1 kg that is forced to move, the object moves with _____. [Ans. an acceleration of 1 ms^{-2}]
13. The acceleration in a body is due to _____. [Ans. unbalanced force]
14. When an object undergoes acceleration _____. [Ans. a force always acts on it]
15. Non - contact force is also known as _____ force. [Ans. field]
16. In balanced force, the resultant force is equal to _____. [Ans. zero]
17. The force which is equal to resultant but opposite in direction is called as ____. [Ans. equilibrant]
18. Torque is a _____ quantity. [Ans. vector]
19. Unit of torque is _____. [Ans. Nm]
20. Two equal and unlike parallel force is called _____. [Ans. couple]
21. If the object is rotated in clockwise direction, couple is _____ [Ans. negative]
22. The moment of a couple is the product of _____ and perpendicular distance between the forces. [Ans. force]
23. Steering wheel is based on the application of _____. [Ans. torque]
24. _____ helps to change the speed of the rotation. [Ans. Gears]
25. The algebraic sum of the moments in the clockwise direction is _____ to the algebraic sum moments in the anticlockwise. [Ans. equal]
26. The momentum of massive object at rest is _____. [Ans. zero]
27. The force of gravitation is inversely related to _____ [Ans. square of distance between masses]
28. When a person falls freely under the action of gravity has _____. [Ans. zero weight]
29. The apparent weight of an object _____ in an elevator while accelerating upward. [Ans. increases]
30. Everything in freely falling system, appears to be _____. [Ans. weightless]
31. When velocity of lift changes, apparent weight _____ from true weight. [Ans. differs]
32. Mass is the measure of _____. [Ans. matter]
33. Weight is the measure of force of _____ on an object. [Ans. gravity]
34. The unit of weight is _____. [Ans. newton]
35. The unit of mass is _____. [Ans. kilogram]
36. Mass which is associated with force and inertia is _____. [Ans. inertial mass]
37. The weight of a 1 kg mass object on Earth is _____. [Ans. 9.8 N]
38. Mass is associated with gravitational force is _____. [Ans. gravitational mass]
39. Astronauts are not floating but falling freely due to huge _____. [Ans. orbital velocity]

16. The geometric radius of the Earth is maximum in the equatorial region and minimum in the polar region.

Ans. True

17. The value of acceleration due to gravity on the surface of the moon is 3.625 ms^{-2}.

Ans. False. **Correct Statement:** The value of acceleration due to gravity on the surface of the moon is 1.625 ms^{-2}.

18. Astronauts are not floating but falling freely around the Earth due to their huge centripetal acceleration.

Ans. False. **Correct Statement :** Astronauts are not floating but falling freely around the Earth due to their huge orbital velocity.

MATCH THE FOLLOWING

I

(a)	Principle of moments	-	(1)	Rotating force
(b)	Torque	-	(2)	$GM \frac{m}{R^2}$
(c)	Gravitational force	-	(3)	$F_B = -F_A$
(d)	Newton's III law	-	(4)	Sum of clockwise moments = sum of anticlockwise moments

[Ans. a-4, b-1, c-2, d-3]

II

(a)	Statics	-	(1)	Force acting on moving bodies
(b)	Dynamics	-	(2)	Cause of motion
(c)	Kinematics	-	(3)	Not considering the cause of motion
(d)	Kinetics	-	(4)	Force acting on rest bodies

[Ans. a-4, b-1, c-3, d-2]

III

(a)	Natural motion	-	(1)	Force independent
(b)	Violent motion	-	(2)	Push or Pull
(c)	Inertia	-	(3)	Dependent
(d)	Force	-	(4)	Inability to change its state

[Ans. a-3, b-1, c-4, d-2]

IV

(a)	Moment of force	-	(1)	1 gram force
(b)	Two equal & unlike force	-	(2)	Torque
(c)	Principle of moments	-	(3)	Couple
(d)	980 dyne	-	(4)	$F_1 \times d_1 = F_2 \times d_2$

[Ans. a-2, b-3, c-4, d-1]

V

	Quantity		Unit	
(a)	Acceleration due to gravity	-	(1)	$N\ m^2kg^{-2}$
(b)	Inertial mass	-	(2)	N
(c)	Universal gravitational constant	-	(3)	ms^{-2}
(d)	Weight	-	(4)	kg

[Ans. a-3, b-4, c-1, d-2]

VI

(a)	Impulse	-	(1)	5.972×10^{24} kg
(b)	Mass of Earth	-	(2)	Nm
(c)	Linear momentum	-	(3)	Ns
(d)	Torque	-	(4)	p=mv

[Ans. a-3, b-1, c-4, d-2]

VII

	Column I		Column II	
(a)	Galileo	-	(1)	Cause of motion
(b)	Newton	-	(2)	Mass energy relation
(c)	Aristotle	-	(3)	Natural rest of moving body
(d)	Einstein	-	(4)	Acceleration due to gravity is same for all objects.

[Ans. a-4, b-1, c-3, d-2]

VIII

(a)	Rocket propulsion	-	(1)	Stars
(b)	Astronauts	-	(2)	linear momentum
(c)	Wobble	-	(3)	Weightlessness
(d)	Tug of war	-	(4)	unbalanced force
(e)	Action of a lever	-	(5)	unlike parallel force

[Ans. a-2, b-3, c-1, d-5, e-4]

13. Give examples for the cases in which the time of action of force is very short to have a large force?

Ans.
(i) Striking a hammer on a nail.
(ii) Hitting cricket ball with the bat.
(iii) We get hurt more while we slip down on a concrete floor than on a mud floor.
(iv) Both the floors experience same amount of change in momentum. But in concrete floor the large amount of force acts in shorter interval of time. So it hurts more.
(v) When the fielder pulls back his hands he experiences a smaller force for a longer interval of time leading to less damage to his hands.

14. If 25 N of force is used to compress a spring, then how much reactive force exerted by spring?

Ans. Reactive force by spring = – 25 N.
When a 25 N of forces is used to compress a spring, then same amount of force will be exerted by the spring in the opposite direction. This is according to Newton's III law of motion. i.e., For every action there is an equal and opposite reaction.

15. Is it possible to open a cap of pen with one hand? If not give reason.

Ans.
(i) Yes, it is possible. Two equal & opposite forces are required to produce required amount of torque. Two fingers can be used.
(ii) Rotational motion produced by a single finger is less than two fingers producing equal & opposite forces.

16. What happens to the weight of a person while he goes from polar region to equator?

Ans.
(i) The value of g is maximum in polar region and minimum at the equator region.
(ii) Since weight W = mg, as g varies, the weight of the person is more at poles than at the equator region.

17. Classify the following things into like parallel and unlike parallel forces (Dragging water from well, force applied to crow bar, weight balance, turning pen cap)

Ans.

Dragging water from well	- Like parallel forces
Force applied to crow bar	- Unlike parallel forces
Weight balance	- Like parallel forces
Turning pen cap	- Unlike parallel forces

NUMERICAL PROBLEMS

1. Weight of a person inside the lift while at rest is 50 N. What is the weight he feels when lift moves up with an acceleration of 9.8 ms^{-2}.

Ans. R = $m(g + a)$ (R → Apparent weight)

mg = 50 N

ma = 50 N

R = $mg + ma$ = 50 + 50

R = 100 N

Here Apparent weight (R) is greater than the actual weight mg (=W)

2. A 20g bullet moving at 300 m/s stops after penetrating 2 cm of bone. Calculate the average force exerted by the bullet.

Given

Mass of the bullet, m = 20×10^{-3} kg
Initial velocity, u = 300 m/s
Final velocity, v = 0
Distance, s = 2 cm = 2×10^{-2} m

To find : Force exerted by the bullet, f = ?

Solution

Using equations of motion,

$v^2 = u^2 + 2as$

$0 = (300)^2 + 2(a) \times 2 \times 10^{-2}$

$$a = -\frac{(300)^2}{4\times10^{-2}} = -\frac{9\times10^4}{4\times10^{-2}}$$

$a = -2.25 \times 10^6$ m/s^2

$a = 2.25 \times 10^6$ m/s^2

Average force,

$F = ma$

$= 20 \times 10^{-3} \times 2.25 \times 10^6$

$F = 45 \times 10^3 = 4.5 \times 10^4$ N

3. A bullet of mass 50 g moving with a speed of 300 ms^{-1} is brought to rest in 1s. Find the impulse and the force.

14. A pistol fired a bullet of mass 50 g triggered with a speed 250 ms^{-1} penetrated into a wooden plank comes to rest at 1 ms. Find the impulse and average force offered by the planks.

Given

Mass, m = 50 g = 50 × 10^{-3} kg
Final speed, v = 0
Initial speed, u = 250 ms^{-1}
Time, t = 1ms = 10^{-3} s

To find : J = F × t = ? Average force, F = ma = ?

Solution

$$F = \frac{m(v-u)}{t} = \frac{50\times10^{-3}[0-250]}{1\times10^{-3}s}$$

F = 12500 = 1.25 × 10^4 N
J = F × t = 1.25 × 10^4 × 10^{-3}
J = **12.5 Ns**

15. Force of 50 N acts perpendicular on a body, which is fixed at a point O. The distance of point of action of force from O is 5 cm. Find the momentum of force.

Given

Force, F =50 N; Distance, d = 5 cm

To find : Momentum of force= F × d

Solution

Momentum of force, = 50 × 5 × 10^{-2}
= 250 × 10^{-2}
= **2.5 Nm**

16. A person of weight 50 kg is moving down in an elevator Calculate downward acceleration offered by the elevator whose reaction force is 400 N on the surface.

Given Weight = 50 kg

To find : Acceleration, a = ? (downward)
Reaction, R = 400 N

Solution

R = m (g – a)
400 = 50 (10 – a)
400 = 500 – 50 a
500 = 500 – 400
50 a = 100

$$a = \frac{100}{50}$$

Downward acceleration, a = **20 ms^{-1}**

17. Calculate the force of gravitation between two bodies of weight 50 kg and 10 kg respectively place at 10 m apart. If their distance increased to 100 % then find the change in percentage of force. (New force is 75% less than the original force)

Given

Mass of body 1, m_1 = 50 kg
Mass of body 2, m_2 = 10 kg
Distance, R = 10 m
Universal gravitation constant, G = 6.67 × 10^{-11} Nm^2 kg^{-2}

To find : Force of gravitation, $F = \frac{Gm_1m_2}{R^2}$

Solution

$$F = \frac{6.67\times10^{-11}\times50\times10}{10^2}$$

Force, F = **33.35 × 10^{-11} N**

LONG ANSWERS 7 MARKS

1. What are the concepts prepared by Galileo?

Ans.
(i) The natural state of all earthly bodies is either the state of rest or the state of uniform motion.
(ii) An body in motion will continue to be in the same state of motion as long as no external force is applied.
(iii) When force is applied on bodies, they resist any change in their state. This property of bodies is called "inertia".
(iv) When dropped from a height in vacuum, bodies of different size, shape and mass fall at the same rate and reach the ground at the same time.

2. Give the application of torque.

Ans.
(i) **Gears :** A gear is a circular wheel with teeth around its rim. It helps to change the speed of rotation of a wheel by changing the torque and helps to transmit power.
(ii) **Seasaw :** When the heavier person comes closer to the pivot point (fulcrum) the distance of the line of action of the force decreases. It causes less amount of torque to act on it. This enables the lighter person to lift the heavier person.
(iii) **Steering Wheel :** A small steering wheel enables you to manoeuore a car easily by transferring a torque to the wheels with less effort.

3. Give examples for Newton's third law.

Ans. **(i)** When birds fly, they push the air downwards by their wings (Action).

(ii) The air pushes the bird upwards (Reaction).

(iii) When a person swims, he pushes the water using hands backwards (Action), the water pushes the swimmer in forward direction (Reaction).

(iv) Rockets expel gas at high velocity (Action). The downward moving gas pushes the rocket in upward direction (Reaction).

(v) When we fire a bullet, the gun recoils back, Bullet is moving forward (action). The gun equalise this forward action by moving backward (reaction).

4. Derive the Relation between g and G.

Ans. **(i)** Let, M be the mass of the Earth and m be the mass of the object.

(ii) The entire mass of the Earth is assumed to be concentrated at its centre. The radius of the Earth is R (= 6378 km = 6400 km approximately).

(iii) By Newton's law of gravitation, the force acting on the object is given by

$$F = G M m / R^2 \quad \ldots (A)$$

(iv) According to Newton second law, the force acting on the object is given by the product of its mass and acceleration. Here acceleration of the is under the action of gravity hence $a = g$.

$$F = ma = mg$$

$$F = \text{weight} = mg \quad \ldots (B)$$

Comparing equations (A) and (B), we get

$$mg = G M m / R^2$$

Acceleration due to gravity

$$g = \frac{GM}{R^2}$$

Higher order thinking (HOTS)

1. Why does the recoil of a heavy gun on firing not so strong as of a light gun using the same cartridges?

Ans. Recoil velocity of a gun $\propto \frac{1}{m}$. So light rifle recoils with large velocity than the heavy rifle.

2. If a body moves with uniform velocity, what is the net force acting on a body?

Ans. If a body moves with uniform velocity, the acceleration of body is zero.

$\therefore$ net force acting on the body is zero.

$F = ma$ $[a = 0]$

3. Meteorites are shooting stars. They completely burn out while they hit Earth's atmosphere. Apply impulse concept to explain their burning action.

Ans. A shooting star is a small piece of rock that hits Earth's atmosphere. It heats up due to air temperature. They enter with very high speeds. When it strikes with high speed in short duration (i.e. impulse = $p = \lambda t$) causes burning. But when hit the ground, it becomes cool.

4. A rocket with a lift - off mass 20,000 kg is blasted upwards with an initial acceleration of 5.0 ms^{-2}. Calculate the initial thrust (Force) of the blast.

Ans. **Given**

Initial mass of the rocket, $m = 20{,}000$ kg

Initial acceleration, $a = 50\ ms^{-2}$

(Upward direction)

Let initial thrust of the blast be T

To find : $T = mg + ma$

Solution

$$T = m(g + a)$$

$$= 20{,}000\ (9.8 + 50)$$

$$T = 2 \times 10^4 \times 59.8$$

Initial thrust,

$$T = 119.6 \times 10^4\ N$$

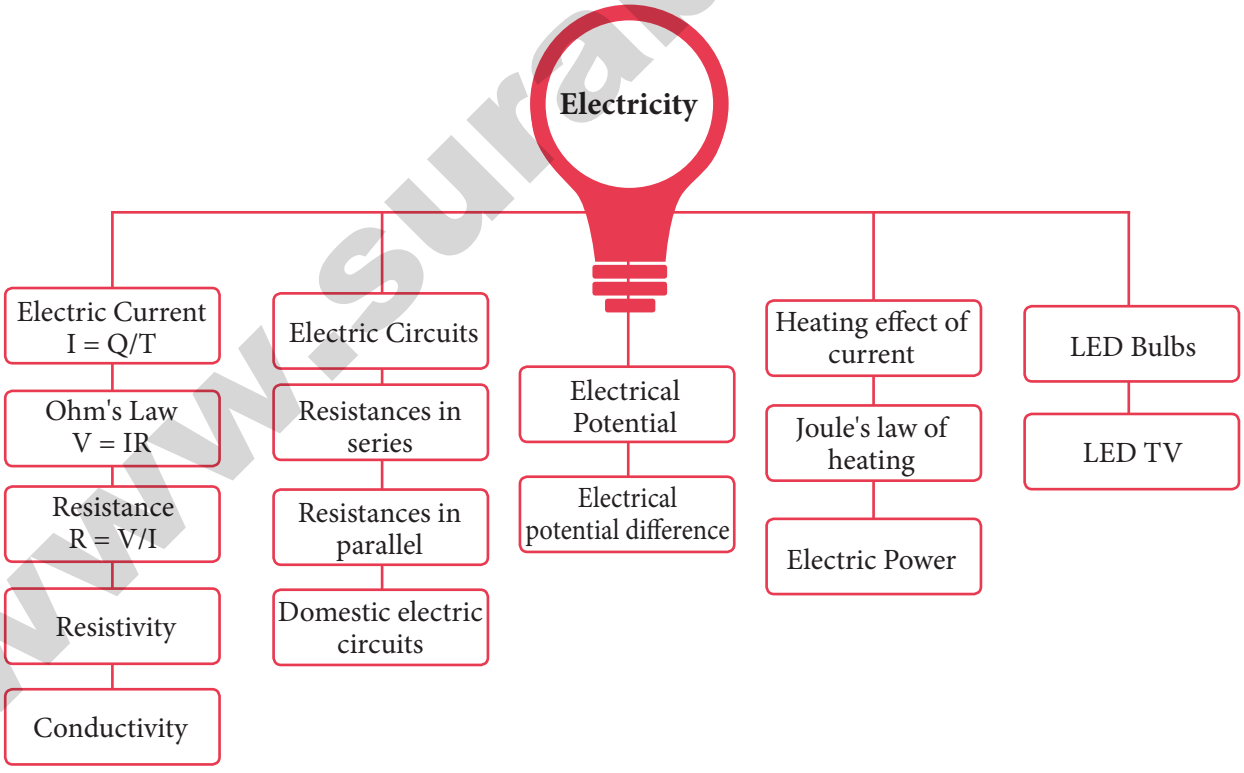
☆ ☆ ☆

UNIT

4

ELECTRICITY

CONCEPT MAP



MUST KNOW DEFINITIONS

Electric current	:	Rate of flow of charges in a conductor.
Specific resistance (or) electrical resistivity of a material	:	Resistance of a conductor of unit length and unit area of cross section.
Electrical resistance	:	It is the ratio between the potential difference across the ends of the conductor and the current flowing through it.
Electrical conductance	:	It is the reciprocal of resistance.
Electrical conductivity	:	The reciprocal electrical resistivity of a material.
Electric power	:	The rate of consumption of electrical energy.
One watt	:	One watt is the power consumed when a electric device is operated at a potential difference of one volt and it carries a current of one ampere.
Ohm's law	:	The relation between the potential difference and current.
Unit of potential difference (or) One Volt	:	One volt is the potential difference between two points, if one joule of work is done in moving one coulomb of charge from one point to another against the electric force.
Electric potential difference	:	The amount of work done in moving a unit positive charge from one point to another against the electric force.

FORMULAE

1.	**Electric Current**	$I = \frac{Q}{t} = \frac{\text{Charge}}{\text{Time}}$
2.	**Potential difference**	$V = \frac{W}{Q} = \frac{\text{worke done}}{\text{charge}}$
3.	**Ohm's law**	$V = IR$; $R = \frac{V}{I}$
4.	**Electrical Resistivity (or)specific resistance**	$\rho = \frac{RA}{L}$
5.	**Conductance**	$G = \frac{1}{R} = \frac{1}{\text{resistance}}$
6.	**Conductivity**	$\sigma = \frac{1}{\rho} = \frac{1}{\text{resistivity}}$
7.	**Equivalent resistance in a series combinations**	$R_s = R_1 + R_2$
8.	**When 'n' resistors are connected in a series combinations**	$R_s = nR$; when 'n' resistors are connected in parallel. $R_p = \frac{R}{n}$

9.	Total resistance in the circuit	$\frac{1}{R_p} = \frac{1}{R_1} + \frac{1}{R_2} + \frac{1}{R_3}$
10.	Parallel connection of series resistors	$R_{total} = R_{P1} + R_{P2}$
11.	Parallel connection of series resistors	$\frac{1}{R_{total}} = \frac{1}{R_{S1}} + \frac{1}{R_{S2}}$
12.	Joule's law of heating	$H = I^2 Rt$; $H = VI t$
14.	Electric power	$P = \frac{work}{time} = \frac{VIt}{t}$ (or) $P = V I$
15.	Electrical energy	E = power × time = $VI t = VQ$
16.	Resistance	Resistance (R) = $\frac{\text{Voltage (V)}}{\text{Current (I)}}$
17.	Electric power	$P = \frac{V^2}{R}$

TEXTBOOK EVALUATION

I. CHOOSE THE BEST ANSWER :

1. Which of the following is correct? ⊗

(a) Rate of change of charge is electrical power
(b) Rate of change of charge is current
(c) Rate of change of energy is current
(d) Rate of change of current is charge.

[Ans. (b) Rate of change of charge is current]

2. SI unit of resistance is *[Qy-'19; Sep-2021; SRT-'22]*

(a) mho (b) joule
(c) ohm (d) ohm meter

[Ans. (c) ohm]

3. In a simple circuit, why does the bulb glow when you close the switch? *[Sep-2021]*

(a) The switch produces electricity
(b) Closing the switch completes the circuit
(c) Closing the switch breaks the circuit
(d) The bulb is getting charged

[Ans. (b) Closing the switch completes the circuit]

4. Kilowatt hour is the unit of ⊗

(a) resistivity *[GMQP-2019; Aug.-'22]*
(b) conductivity
(c) electrical energy
(d) electrical power **[Ans. (c) electrical energy]**

II. FILL IN THE BLANKS :

1. When a circuit is open, _____cannot pass through it. **[Ans. current]**
2. The ratio of the potential difference to the current is known as _____. **[Ans. resistance]**
3. The wiring in a house consists of _____ circuits. ⊗ **[Ans. parallel]**
4. The power of an electric device is a product of _____ and _____. **[Ans. voltage, current]**
5. LED stands for _____. **[Ans. Light Emitting Diode]**

III. State whether the following statements are true or false: If false correct the statement

1. **Ohm's law states the relationship between power and voltage.**

Ans. **False.**
Correct Statement : Ohm's law states the relationship between **current and voltage**.

2. **MCB is used to protect house hold electrical appliances.**

Ans. **True.**

3. **The SI unit for electric current is the coulomb.**

Ans. **False.**
Correct Statement : The SI unit for electric current is the **ampere**

4. **One unit of electrical energy consumed is equal to 1000 kilowatt hour.**

Ans. **False.**
Correct Statement : One unit of electrical energy consumed is equal to **1 kilowatt hour**

5. **The effective resistance of three resistors connected in series is lesser than the lowest of the individual resistances.**

Ans. **False.**
Correct Statement: The effective resistance of three resistors connected in series is **greater than** the highest of the individual resistances.

IV. Match the items in column- I to the items in column-II : *[PTA-5]*

COLUMN-I			COLUMN-II	
(i)	electric current	-	(a)	volt
(ii)	potential difference	-	(b)	ohm metre
(iii)	specific resistance	-	(c)	watt
(iv)	electrical power	-	(d)	joule
(v)	electrical energy	-	(e)	ampere

[Ans. (i)-e, (ii)-a, (iii)-b, (iv)-c, (v)-d

V. Assertion and Reason type questions:

Mark the correct choice as

(a) if both the assertion and the reason are true and the reason is the correct explanation of the assertion.

(b) if both the assertion and the reason are true, but the reason is not the correct explanation of the assertion.

(c) if the assertion is true, but the reason is false.

(d) if the assertion is false, but the reason is true.

1. **Assertion:** Electric appliances with a metallic body have three wire connections.
Reason: Three pin connections reduce heating of the connecting wires.

[Ans. (c) If the assertion is true, but the reason is false]

Hint: The metallic body of the electrical appliances is connected to the third pin which is connected to the Earth. This is a safety precaution and avoids eventual shock. By this, extra charge flowing through the metallic body is passed to the Earth and avoid shocks.

2. **Assertion:** In a simple circuit the point of highest potential is positive terminal of the battery.
Reason: The current flows towards the point of the highest potential.

[Ans. (c) If the assertion is true, but the reason is false]

3. **Assertion:** LED bulbs are far better than incandescent bulbs.
Reason: LED bulbs consume less power than incandescent bulbs.

[Ans. (a) If both the assertion and the reason are true and the reason is the correct explanation of the assertion]

VI. Very short answer questions :

1. **Define the unit of current.**

Ans. The current flowing through a conductor is said to be one ampere, when a charge of one coulomb flows across any cross -section of a conductor, in one second. Hence,

$$1 \text{ ampere} = \frac{1 \text{coulomb}}{1 \text{second}}$$

2. **What happens to the resistance, as the conductor is made thicker?**

Ans. (i) Resistance decreases.

(ii) **Reason :** Resistance is inversely proportional to area of cross section A.

i.e., $R \propto \frac{1}{A}$ - here, $A = \pi r^2$

Where, r is the radius which determines the thickness.

3. Why is tungsten metal used in bulbs, but not in fuse wires?

Ans. (i) Tungsten has high melting point, it can bear high heat for glowing.

(ii) But in fuse wire, the wire will not melt when a large amount of current is passed through it, but the appliance will get damaged.

4. Name any two devices, which are working on the heating effect of the electric current. ⊗

Ans. Electric iron box, electric toaster, electric oven, and electric heater.

VII. Short Answer Questions :

1. Define electric potential and potential difference. ⊗

Ans. **Electric potential :** The electric potential at a point is defined as, "the amount of work done in moving a unit positive charge from infinity to that point against the electric force".

Electric Potential difference : The electric potential difference between two points is defined as the amount of work done in moving a unit positive charge from one point to another point against the electric force.

2. What is the role of the earth wire in domestic circuits?

Ans. (i) The earth wire provides a low resistance path to the electric current.

(ii) It sends the current from the body of the appliance to the Earth, whenever a live wire accidentally touches the body of metallic electric appliance.

(iii) Thus, the Earth wire serves as a protective conductor, which saves us from electric shocks.

3. State Ohm's law. ⊗ *[SRT-'22]*

Ans. (i) At a constant temperature, the steady current 'I' flowing through a conductor is directly proportional to the potential difference 'V' between the two ends of the conductor.

(ii) $I \propto V$

(iii) $I = \left(\frac{1}{R}\right) V$

(iv) $\boxed{V = IR}$

4. Distinguish between the resistivity and conductivity of a conductor.

Ans.

	Resistivity	Conductivity
(i)	It is the resistance of a conductor of unit length and unit area of cross section.	It is the reciprocal of electrical resistivity.
(ii)	Its unit is ohm metre.	It's unit is ohm^{-1} metre^{-1} (or) mho metre^{-1}
(iii)	$\rho = \frac{RA}{l}$	$\sigma = \frac{1}{\rho}$

5. What connection is used in domestic appliances and why?

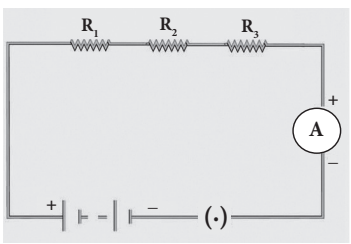
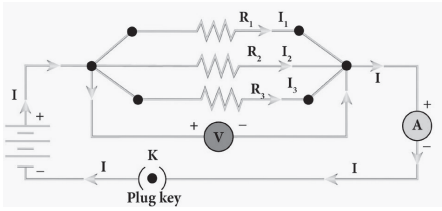
Ans. (i) Parallel connection is used, so that the disconnection of one circuit does not affect the other circuit.

(ii) Parallel connection supplies an equal voltage to all.

VIII. Long Answer Questions :

1. With the help of a circuit diagram derive the formula for the resultant resistance of three resistances connected: a) in series and b) in parallel ⊗

Ans.

S. No	Resistors in series	Resistors in parallel
1.		

ADDITIONAL QUESTIONS & ANSWERS

CHOOSE THE CORRECT ANSWER 1 MARK

1. A series circuit consists of three resistors with values of 140, 250 and 220. The total resistance is _____.
(a) 330 (b) 610
(c) 720 (d) None of the above
[Ans. (b) 610]

2. When will be the current flow in a circuit?
(a) A switch is closed
(b) A switch is opened
(c) Switch is either open or closed
(d) None of the above
[Ans. (a) A switch is closed]

3. When one of three series resistors is removed from a circuit and the circuit is reconnected the current _____.
(a) increase by half (b) increases
(c) decreases by half
(d) none of the above [Ans. (b) increases]

4. A parallel circuit consist of three resistors with values of 430, 210 and 100. The total resistance is _____.
(a) 0.017 ohm (b) 58.82 ohm
(c) 58.82 kilo ohm (d) None of the above
[Ans. (b) 58.82 ohm]

5. According to Ohm's law if voltage increase and resistance stays the same and _____.
(a) Resistance decreases
(b) Current increases
(c) Current remains the same
(d) Current decreases
[Ans. (b) Current increases]

6. The amount of work done in joules when one unit electric charges moves from one point to another point in an electric circuit is called _____.
(a) Resistance (b) Potential difference
(c) Current (d) charge
[Ans. (b) Potential difference]

7. If resistance decreases, then current will _____
(a) increase (b) double
(c) decrease (d) constant
[Ans. (a) increase]

8. The resistance of material depends on _____.
(a) Temperature
(b) Length of conductor
(c) Area of cross-section
(d) All the above [Ans. (d) All the above]

9. The relation between potential difference (V) and current (I) is: _____.
(a) $V \propto I$ (b) $V \propto I^2$
(c) $V \propto \frac{I}{1}$ (d) None of the above
[Ans. (d) None of the above]

10. The relation between potential difference (V) and current (I) was discovered by: _____
(a) Volt (b) Ohm
(c) Newton (d) Ampere
[Ans. (b) Ohm]

11. Give the name of components which is designed to oppose the flow of current.
(a) Capacitor (b) Resistors
(c) Fuse wire (d) Inductor
[Ans. (b) Resistors]

12. The resistance of a conductor directly proportional to _____.
(a) Length (b) Area
(c) Volt (d) Current
[Ans. (a) Length]

13. Which of the following laboratory apparatus is used during the verification of Ohm's law?
(a) Voltmeter (b) Ammeter
(c) Rheostat (d) All the above
[Ans. (d) All the above]

14. The resistance of a conductor is inversely proportional to its _____.
(a) Volt (b) Length
(c) Area (d) None of the above
[Ans. (c) Area]

15. Why battery is used in the circuit?
(a) Measure Current
(b) Maintain a potential difference
(c) Oppose the current
(d) Measure potential
[Ans. (b) Maintain a potential difference]

16. What happens when ammeter connected in parallel?
(a) Open circuited (b) Closed Circuited
(c) Short circuited (d) None of the above
[Ans. (c) Short circuited]

17. Conductance is expressed in terms of: _____
(a) mho (b) ohm/m
(c) ohm (d) mho/m [Ans. (a) mho]

18. If two unequal resistors connected in parallel then _____.
(a) The voltage is same in both resistor
(b) The current is same in both resistor
(c) The voltage is larger in one of the resistor
(d) The current is large in one of the resistor
[Ans. (a) The voltage is same in both resistor]

19. What does a switch do?
(a) Oppose the current
(b) Open and close the circuit
(c) Provide current (d) Store the energy.
[Ans. (b) Open and close the circuit]

20. If there are two bulbs i.e 150W bulb and 60W bulb so which has more resistance?
(a) 60 W (b) 150 W
(c) Both a and b (d) None of the above
[Ans. (a) 60 W]

21. If resistance of a wire is r ohms and wire is stretched to double its length, then what is its resistance?
(a) r (b) 2r
(c) 4r (d) r/2 [Ans. (c) 4r]

22. In parallel combination, resistance decrease due to increase in _____.
(a) Area of cross section
(b) Voltage (c) Length
(d) Current [Ans. (d) Current]

23. The device which easily closes or opens an electric circuit is called as: _____.
(a) Switch (b) Cell
(c) Key (d) Bulb [Ans. (c) Key]

24. A small wire presents inside the bulb is called _____.
(a) Conductor (b) Filament
(c) Insulator (d) None of the above
[Ans. (b) Filament]

25. If one of the resistors in a parallel circuit is removed, the total resistance will be _____.
(a) Doubled (b) Decreases
(c) Increases (d) Constant
[Ans. (c) Increases]

26. All good conductors have high _____.
(a) Resistance (b) Specific resistance
(c) Voltage (d) None of the above
[Ans. (d) None of the above]

27. A short circuit has _____.
(a) Non resistance (b) No conductance
(c) Low current (d) None of the above
[Ans. (d) None of the above]

28. If the resistance in a series circuit doubles, total current will be _____.
(a) doubles (b) halved
(c) same (d) Increases
[Ans. (b) halved]

29. What happens to current and resistance if the voltage is doubled?
(a) Current doubles and resistance doubles
(b) Current doubles and resistance is halved
(c) Current remains the same and resistance doubles
(d) Current doubles and resistance remains the same
[Ans. (d) Current doubles and resistance remains the same]

30. Which is considered to be the common reference for a parallel circuit?
(a) Current (b) Resistance
(c) Power (d) Voltage
[Ans. (d) Voltage]

31. Why are copper wires used as connecting wires?
(a) Low resistivity (b) Low conductivity
(c) High Resistivity (d) Both A and B
[Ans. (a) Low resistivity

32. Direction of conventional current is from: ____
(a) Negative terminal to positive terminal
(b) In both the directions
(c) Positive terminal to negative terminal
(d) None of the above
[Ans. (c) Positive terminal to negative terminal]

33. Conductivity is the _____ of resistivity.
(a) opposite (b) reciprocal
(c) equal (d) none of the above
[Ans. (b) reciprocal]

34. 1 Ampere is given as _____.
(a) 1C × 1s (b) 1C / 1s
(c) 1s / 1C (d) None of the above
[Ans. (b) 1 C / 1 s]

Match the following

I

1.	George Simon Ohm	a.	Lightning conductor
2.	Alessandro Volta	b.	Ohm's law
3.	James Prescott Joule	c.	LED TV
4.	James P. Mitchell	d.	Nature of heat
5.	Benjamin Franklin	e.	Electrochemical cell

[Ans. 1-b, 2-e, 3-d, 4-c, 5-a]

II

1.	Fix the magnitude of the current in the circuit	a.	Ammeter
2.	Current	b.	Galvanometer
3.	Direction of current	c.	Ground connection
4.	Potential difference	d.	Resistor
5.	Protection to the electrical components	e.	Voltmeter

[Ans. 1-d, 2-a, 3-b, 4-e, 5-c]

III

1.	LED bulb	a.	Tungsten
2.	Earth wire	b.	Heating device
3.	MCB	c.	Third wire
4.	Filament	d.	Fuse wire
5.	Geyser	e.	Semiconductor

[Ans. 1-e, 2-c, 3-d, 4-a, 5-b]

IV

(a)	Electric potential	-	(1)	$ohm^{-1}metre^{-1}$
(b)	Resistance	-	(2)	ohm^{-1}
(c)	Electrical resistivity	-	(3)	volt
(d)	Conductance	-	(4)	ohm
(e)	Electrical conductivity	-	(5)	ohm metre

[Ans. a-3, b-4, c-5, d-2, e-1]

V

(a)	Heating device	-	(1)	Joules heating effect
(b)	Fuse wire	-	(2)	Nichrome
(c)	Electric bulb	-	(3)	Neutral wire
(d)	Red insulation	-	(4)	Tungsten
(e)	Black insulation	-	(5)	live wire

[Ans. a-2, b-1, c-4, d-5, e-3]

VI

1.	Resistivity (ρ)	a.	$\frac{1}{R_{S1}}+\frac{1}{R_{S2}}$
2.	Electric power (P)	b.	$\frac{RA}{l}$
3.	Amount of heat in any resistor (H)	c.	$(R_{P1}+R_{P2})$
4.	Parallel connection of series resistors	d.	$\frac{V^2t}{R}$
5.	Series connection of parallel resistors	e.	I^2R

[Ans. 1-b, 2-e, 3-d, 4-a, 5-c]

VII

(a)	Ammeter	-	(1)	Heating Effect
(b)	Voltmeter	-	(2)	Rheostat
(c)	Electric Oven	-	(3)	potential difference
(d)	Variable resistor	-	(4)	current

[Ans. a-4, b-3, c-1, d-2]

Assertion and Reason

Mark the correct choice as

(a) If both the assertion and the reason are true and the reason is the correct explanation of the assertion.

(b) If both the assertion and the reason are true, but the reason is not the correct explanation of the assertion.

(c) If the assertion is true, but the reason is false

(d) If the assertion is false but the reason is true.

1. **Assertion:** The kinetic energy of the electrons increases when temperature of the wire increases.

Reason: An increasing temperature conductivity of metallic wire decreases.

[Ans. (b) If both the assertion and the reason are true, but the reason is not the correct explanation of the assertion]

2. **Assertion:** In a simple battery, the point of lowest potential is +ve terminal of the battery.

Reason: The current flows to higher potential as to lower potential.

[Ans. (d) If the assertion is false but the reason is true]

3. **Assertion:** Bending a wire does not affect electrical resistance.
Reason: Resistance of wire is proportional to resistivity of material.
[Ans. (a) If both the assertion and the reason are true and the reason is the correct explanation of the assertion]

4. **Assertion:** An ammeter is always connected in series whereas a voltmeter is connected in parallel.
Reason: An ammeter has a low resistance while voltmeter has high resistance.
[Ans. (b) If both the assertion and the reason are true, but the reason is not the correct explanation of the assertion]

5. **Assertion:** When a wire is not connected to battery, no current flows.
Reason: Charge does not flow in particular direction.
[Ans. (a) If both the assertion and the reason are true and the reason is the correct explanation of the assertion]

6. **Assertion:** A voltmeter must be connected in parallel and should have a high resistance.
Reason: The introduction of the voltmeter in the circuit must not affect the potential difference.
[Ans. (a) If both the assertion and the reason are true and the reason is the correct explanation of the assertion]

7. **Assertion:** In parallel combination of electrical appliances, the total power consumption is equal to the sum of powers of the individual appliances
Reason: Charges move from higher potential to lower potential.
[Ans. (b) If both the assertion and the reason are true, but the reason is not the correct explanation of the assertion]

8. **Assertion:** In a series combination of electric bulbs, the bulb of 30 watts emits more light than that of lower bulbs.
Reason: The 30W bulb in series gets more current than low power bulbs.
[Ans. (c) If the assertion is true, but the reason is false]

9. **Assertion:** Two resistors connected in series, the total resistance is greater than the highest of the individual resistance.
Reason: In series connection current in each resistor is same.
[Ans. (a) If both the assertion and the reason are true and the reason is the correct explanation of the assertion]

10. **Assertion:** The effective resistance in a parallel combination is less than the series.
Reason: The potential difference across each resistance is same.
[Ans. (d) If the assertion is false but the reason is true]

11. **Assertion:** In series, one appliance is disconnected others also do not work.
Reason: Current cannot pass in this case.
[Ans. (a) If both the assertion and the reason are true and the reason is the correct explanation of the assertion]

12. **Assertion:** Overloading happens when a large no. of appliances are connected in series.
Reason: All the electric points are connected in parallel in the domestic circuit.
[Ans. (b) If both the assertion and the reason are true, but the reason is not the correct explanation of the assertion]

13. **Assertion:** When a large current passes through the circuit, the fuse wire melts due to joules heating effect.
Reason: Fuse wire has low melting point and high resistance.
[Ans. (a) If both the assertion and the reason are true and the reason is the correct explanation of the assertion]

USE THE ANALOGY TO FILL IN THE BLANK

1. **AC : reverses direction :: DC : _____**
Ans. One direction.

2. **Conductivity : degree of conductance :: _____ : measure of resisting power.**
Ans. Resistance

3. **Conductors: less resistivity :: _____ : more resistivity**
Ans. Insulators

4. **$R_p : \frac{R}{n} : R_s :$ _____**
Ans. nR

5. **Series : high resistance : parallel : _____**
Ans. Less resistance

6. **Heating effect : Nichrome :: filament : _____ .**
Ans. Tungsten

7. **Electric power : hp :: Electric energy : _____**
Ans. 1 unit (or) 1kWh

(iii) An LED display uses LEDs for backlight and an array of LEDs act as pixels.

(iv) LEDs emitting white light are used in monochrome (black and white) TV; Red, Green and Blue (RGB) LEDs are used in colour television.

8. How does a parallel circuit differ from a series circuit?

Ans.

Criteria	Series	Parallel
Equivalent resistance	More than the highest resistance.	Less than the lowest resistance.
Amount of current	Current is less as resistance is more.	Current is more as resistance is less.
Switching ON/OFF	If one appliance is disconnected, others also do not work.	If one appliance is disconnected, others will work independently.

9. What is MCB?

Ans. (i) The fuse box contains either a fuse wire or a miniature circuit breaker (MCB).

(ii) The function of the fuse wire or a MCB is to protect the house hold electrical appliances from overloading due to excess current.

(iii) MCB is a switching device, which can be activated automatically as well as manually.

(iv) It has a spring attached to the switch, which is attracted by an electromagnet when an excess current passes through the circuit.

(v) Hence, the circuit is broken and the protection of the appliance is ensured.

10. Does the current in the circuit change when the length or area of cross section or the material of the conductor is changed?

Ans. (i) The current becomes one half of the initial value when the length of the conductor is doubled.

(ii) The current is doubled when the area of cross section is doubled.

(iii) The current changes when the material of the conductor is changed from copper to nichrome.

11. What is meant by overloading and short circuit?

Ans. **Overloading :** When the amount of current passing through a wire exceeds the maximum permissible limit, the wires get heated to such an extent that a fire may be caused.

Short circuit :

(i) When a live wire comes in contact with a neutral wire, it causes a 'short circuit'.

(ii) This happens when the insulation of the wires get damaged due to temperature changes or some external force.

(iii) Due to a short circuit, the effective resistance in the circuit becomes very small, which leads to the flow of a large current through the wires.

(iv) This results in heating of wires to such an extent that a fire may be caused in the building.

12. How to reduce damages due to lightning?

Ans. (i) A lightning conductor is a metal rod, mounted on tall buildings.

(ii) When the lightning strikes the building, the metal rod provides a low resistance path to the charges.

(iii) As the charges flow through this rod, the building is saved from any damage.

LONG ANSWERS 7 MARKS

1. Water boils in an electric kettle in 15 mins. after switching on. If the length of the heating wire is decreased to $\frac{1}{3}$ of its initial value, then in how much time will the same amount of water boil with the same supply voltage?

Ans. Supply Voltage is same

Amount of heat produced is also same

Time taken to heat water t = 15 min.

$$H = \frac{V^2}{R}.t$$

$$[H = I^2Rt \Rightarrow (V = IR) \therefore I = \frac{V}{R}]$$

$$\therefore \frac{R_1}{R_2} = \frac{t_1}{t_2} \quad \ldots (1)$$

$$R \propto l \qquad [R = \rho \frac{l}{A}]$$

$$\frac{R_1}{R_2} = \frac{l_1}{l_2} \quad \ldots (2)$$

From (1) and (2)

$$\frac{l_1}{l_2} = \frac{t_1}{t_2} = \frac{15}{t_2} \quad \ldots (3)$$

$$l_2 = \frac{1}{3} l_1$$

$$\Rightarrow \frac{l_1}{l_2} = 3$$

Sub in (3) $3 = \frac{15}{t_2}$

$$\therefore t_2 = \frac{15}{3} = 5 \text{ min.}$$

Time taken to heat $\frac{1}{3}$ length of the wire = 5 min.

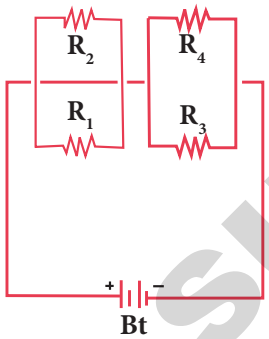
2. Find the effective resistance of series connection of parallel resistors.

Ans. The connection of a set of parallel resistors that are connected in series, is a series – parallel circuit.

(i) Let R_1 and R_2 be connected in parallel to give an effective resistance of R_{P1}.

(ii) Similarly, let R_3 and R_4 be connected in parallel to give an effective resistance of R_{P2}.

(iii) Then, both of these parallel segments are connected in series (Figure).



Bt

Series-parallel combination of resistors

For parallel connection, the effective resistance is $\frac{1}{R_p} = \frac{1}{R_1} + \frac{1}{R_2}$

Using equation

$$\frac{1}{R_{P1}} = \frac{1}{R_1} + \frac{1}{R_2}$$

$$\frac{1}{R_{P2}} = \frac{1}{R_3} + \frac{1}{R_4}$$

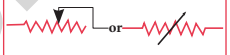
R_{P1} & R_{P2} are connected in series

Finally, using equation $R_s = R_1 + R_2$ the net effective resistance is given by

$$R_{total} = R_{P1} + R_{P2}$$

3. Write any five electrical components used in electrical circuit and draw its symbol.

Ans.

Component		Use Of The Component	Symbol Used
(i)	A resistor	Used to fix the magnitude of the current through the circuit	
(ii)	Variable resistor or Rheostat	Used to select the magnitude of the current through a circuit.	
(iii)	Ammeter	Used to measure the current.	
(iv)	Voltmeter	Used to measure the potential difference.	
(v)	Galvano meter	Used to detect the current and its direction.	

NUMERICAL PROBLEMS

1. 100 W bulb draws 680 mA current. How much time will be required to pass 30 C of charge through the bulb?

Given

Charge passing through bulb, Q = 30 C

Current drawn by 100 W bulb,

I = 680 mA = 680×10^{-3} A

To find : Time taken to pass through the bulb t =? $t = \frac{Q}{I}$

Solution

$$I = \frac{Q}{t} = \frac{30}{680 \times 10^{-3}}$$

$$= 44.117 \text{ seconds}$$

Time required, t = **44.1 min**

2. A current of 6 A flows through metal wire. How many coulombs of charge pass through the wire in 2 minutes?

Given

Current flowing through the wire, I = 6 A

Time taken, t = 2 minutes = 2 × 60 = 120 S

To find : Amount of charge passing through wire, q = ?

Solution

$$I = \frac{Q}{t}$$

$$\Rightarrow \quad Q = I \times t = 6 \times 120 = 720 \text{ C}$$

Charge, Q = **720 C**

3. The amount of work done to move 20C charge from one point to another is 220J. What is the potential difference between these two points?

Given

Amount work done W = 220 J

Quantity of charge q = 20 C

To find : Potential difference between two points, V = ?

Solution

$$V = \frac{W}{q} = \frac{220}{20}$$

$$= 11 \text{ V}$$

Voltage, V = **11 Volt**

4. The potential difference between two conductor is 110 V. How much work in moving 5 C charge from one conductor to the other?

Given

Potential difference, V = 110 V

Charge, q = 5 C

To find : Work done, W = ?

Solution

$$V = \frac{W}{q} \quad \therefore q \times V = W$$

$$W = 5 \times 110 = 550 \text{ J}$$

Work, W = **550 J**

5. An electric heater works for 30 min at 120 V and takes energy of 1.2 kWh. What is the current drawn by the heater?

Given

Electrical energy,

E = 1.2 kWh = 1.2×10^3 Wh

Time, t = 30 min $\frac{1}{2}$ hour

Potential, V = 120 V

To find : Current drawn by the heater, I = ?

Solution

Energy, E = VIt $\therefore$ $I = \frac{E}{Vt} = \frac{(1.2 \times 10^3)}{120 \times \frac{1}{2}}$

$$I = \frac{(1.2 \times 10^3) \times 2}{120} = 20 \text{ A}$$

Current, I = **20 A**

6. What is the resistance of heating element of the heater when 20 A current passing through it at a potential of 220 V?

Given

Current passing through heater I = 20 A

To find : Resistance of heating element R = ?

Solution

$$V = IR \Rightarrow \frac{V}{I} = \frac{220}{20} = 11 \ \Omega$$

Resistance, R = **11 Ω**

7. A 110 V light bulb takes 0.9 A current and operates 12h / day. Determine the energy consumed by the bulb for 30 days.

Given

Potential V = 110 V

Current passing through bulb, I = 0.9 A

Time, t = 12h / day

For 30 days, time t = 12 × 30

= 360 h

To find : Energy consumed, E = ?

Solution

E = VIt

= 0.9 × 110 × 12 × 30

= 35.64 kwh

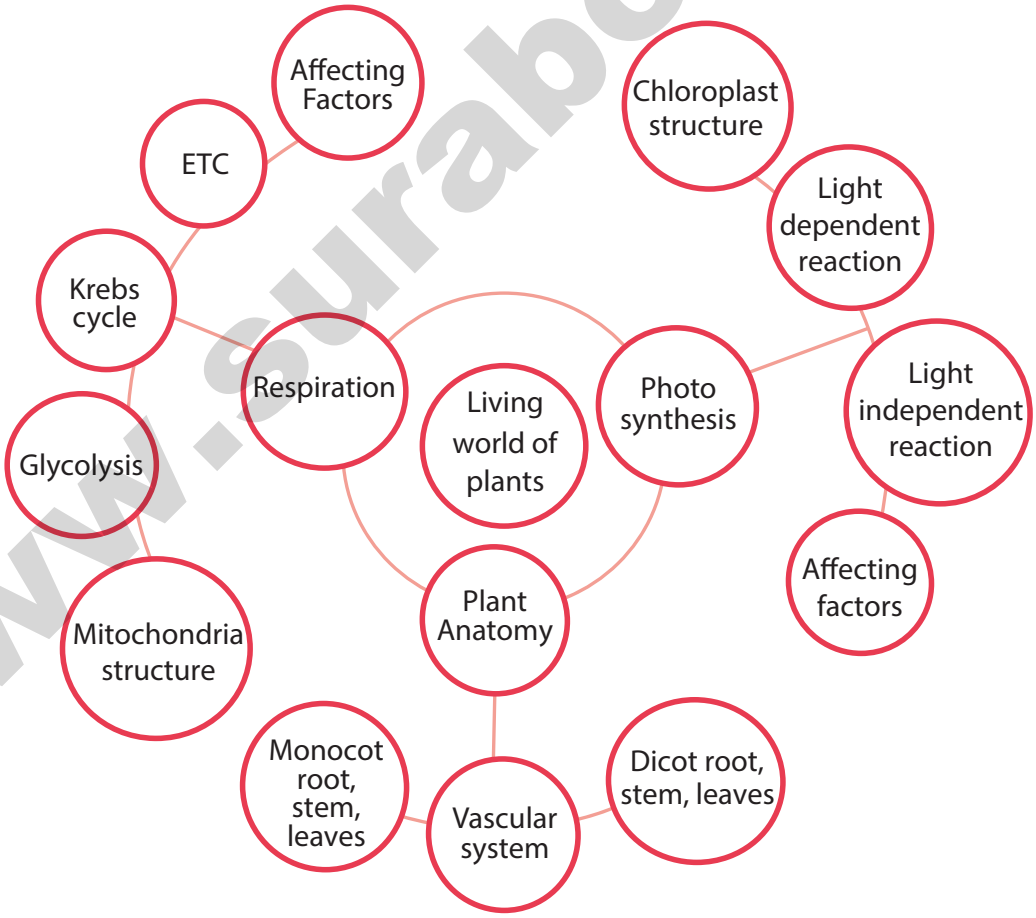
Energy, E = **35.64 kwh**

BIOLOGY

UNIT 12

Plant Anatomy and Plant Physiology

CONCEPT MAP



MUST KNOW DEFINITIONS

Tissues	:	Tissues are the group of cells that are similar or dissimilar in structure and origin, but perform similar function.
Vascular tissues	:	Xylem and phloem.
Stele	:	All tissues inner to endodermis constitute stele.
Casparian strip	:	The endodermal cells of roots show band like thickenings on their radial and inner tangential walls.
Mesophyll	:	The ground tissue that is present between both epidermal layers is called **mesophyll** in a dicot leaf.
Grana	:	Stack of thylakoids seen in stroma of chloroplast.
Plastids	:	Plastids are double membrane bound organelles found in plants and some algae.
Chloroplast	:	Chloroplasts are green plastids containing green pigment.
Light reaction	:	Phase of photosynthesis requiring the presence of light.
Dark reaction	:	Phase of photosynthesis which takes place in the absence of light.
Primary pigment	:	Chlorophyll 'a' molecules which trap solar energy.
Glycolysis	:	Breakdown of one molecule of glucose (6 carbon) into two molecules of pyruvic acid (3 carbon).
Oxysome	:	Racket shaped particles found in inner mitochondrial membrane and involved in ATP synthesis.
Accessory pigments	:	Chlorophyll 'b' and carotenoids which absorb solar energy and pass it to reaction centre (Chlorophyll 'a').
Photosynthetic pigments	:	Pigments involved in photosynthesis.
Ground tissue	:	The entire mass of parenchyma cells next to hypodermis and extending to the centre is called **ground tissue.**

TEXTBOOK EVALUATION

I. CHOOSE THE CORRECT ANSWER :

1. Casparian strips are present in the _____ of the root. *[GMQP-2019]*

(a) cortex (b) pith
(c) pericycle (d) endodermis

[Ans. (d) endodermis]

2. The endarch condition is the characteristic feature of *[FRT-'22; May & Aug.-'22]*

(a) root (b) stem
(c) leaves (d) flower

[Ans. (b) stem]

3. The xylem and phloem arranged side by side on same radius is called _____.

(a) radial (b) amphivasal
(c) conjoint (d) None of these

[Ans. (c) conjoint]

4. Which is formed during anaerobic respiration *[GMQP-2019; Sep-2020; FRT-'22]*

(a) Carbohydrate
(b) Ethyl alcohol
(c) Acetyl CoA
(d) Pyruvate

[Ans. (b) Ethyl alcohol]

5. **Kreb's cycle takes place in** *[PTA-3; Qy-2019]*
(a) chloroplast
(b) mitochondrial matrix
(c) stomata
(d) inner mitochondrial membrane
[Ans. (b) mitochondrial matrix]

6. **Oxygen is produced at what point during photosynthesis?** ⊗ *[PTA-4]*
(a) when ATP is converted to ADP.
(b) when CO_2 is fixed.
(c) when H_2O is splitted.
(d) All of these. **[Ans. (c) when H_2O is splitted]**

II. Fill in the blanks :

1. The innermost layer of cortex in root is called _____. ⊗ **[Ans. Endodermis]**
2. Xylem and phloem are arranged in an alternate radii constitute a vascular bundle called _____. *[FRT-'22]* **[Ans. Radial Bundles]**
3. Glycolysis takes place in _____. **[Ans. cytoplasm]**
4. The source of O_2 liberated in photosynthesis is _____. **[Ans. water]**
5. _____ is ATP factory of the cells. ⊗ **[Ans. Mitochondria]**

III. State whether the statements are true or false. Correct the false statement :

1. **Phloem tissue is involved in the transport of water in plant.** ⊗
Ans. **False.**
Correct Statement : Phloem tissue is involved in the transport of **food** in plant.

2. **The waxy protective covering of a plant is called as cuticle.**
Ans. **True.**

3. **In monocot stem cambium is present in between xylem and phloem.** ⊗
Ans. **False.**
Correct Statement : In **dicot** stem, cambium is present between xylem and phloem.

4. **Palisade parenchyma cells occur below upper epidermis in dicot root.** *[FRT-'22]*
Ans. **False.**
Correct Statement : Palisade parenchyma cells occur below upper epidermis in dicot **leaf.**

5. **Mesophyll contains chlorophyll.** *[FRT-'22]*
Ans. **True.**

6. **Anaerobic respiration produces more ATP than aerobic respiration.** ⊗
Ans. **False.**
Correct Statement : Aerobic respiration produces more ATP than **anaerobic** respiration.

IV. Match the following :

1.	Amphicribral	-	*Dracaena*
2.	Cambium	-	Translocation of food
3.	Amphivasal	-	Fern
4.	Xylem	-	Secondary growth
5.	Phloem	-	Conduction of water

Ans.

1.	Amphicribal	-	Fern
2.	Cambium	-	Secondary growth
3.	Amphivasal	-	*Dracaena*
4.	Xylem	-	Conduction of water
5.	Phloem	-	Translocation of food

V. Answer in a sentence :

1. **What is collateral vascular bundle?** ⊗
Ans. Collateral vascular bundle is one type of conjoint vascular bundle in which xylem lies towards the centre and phloem lies towards the periphery.
(i) When cambium is present in collateral bundles it is called open. **Eg : Dicot stem.**
(ii) When collateral bundle without cambium is called closed. **Eg: Monocot stem.**

2. **Where does the carbon that is used in photosynthesis come from?**
Ans. The carbon that is used in photosynthesis comes from carbon dioxide from atmosphere.

3. **What is the common step in aerobic and anaerobic pathway?** ⊗ *[PTA-5]*
Ans. Glycolysis is the common step in aerobic and anaerobic pathway.

4. **Name the phenomenon by which carbohydrates are oxidized to release ethyl alcohol.**
Ans. Fermentation or Anaerobic respiration.

VI. Short answer questions :

1. Give an account on vascular bundle of dicot stem.

Ans. (i) Vascular bundles are conjoint, collateral, endarch and open.

(ii) They are arranged in the form of a ring around the pith.

2. Write a short note on mesophyll.

Ans. (i) The tissue present between the upper and lower epidermis of a dicot leaf is called **mesophyll.**

(ii) It is differentiated into Palisade parenchyma and Spongy parenchyma.

Palisade parenchyma :

(i) It is found just below the upper epidermis. The cells are elongated.

(ii) These cells have more number of chloroplasts.

(iii) The cells do not have intercellular spaces and they take part in photosynthesis.

Spongy parenchyma :

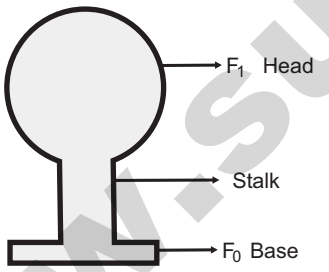
(i) It is found below the palisade parenchyma tissue.

(ii) Cells are almost spherical or oval and are irregularly arranged.

(iii) Cells have intercellular spaces. It helps in gaseous exchange.

3. Draw and label the structure of oxysomes.

Ans.



4. Name the three basic tissue system in flowering plants.

Ans. (i) Epidermal tissue system

(ii) Ground tissue system

(iii) Vascular tissue system

5. What is photosynthesis and where in a cell does it occur? *[PTA-3; Sep-2021]*

Ans. (i) Photosynthesis is a process by which autotrophic organisms like green plants, algae and chlorophyll containing bacteria utilize the energy from sunlight to synthesize their own food.

(ii) In this process, carbon dioxide combines with water in the presence of sunlight and chlorophyll to form carbohydrates and oxygen is released as a byproduct.

Carbon dioxide + Water ⟶ Glucose + Water + Oxygen

(iii) It occurs in the chloroplast of plant cells.

(iv) Light reaction occures in grana of chloroplast and dark reaction occurs in strong of chloroplast.

6. What is respiratory quotient? *[PTA-1; Sep-2021; May & Aug.-'22]*

Ans. (i) Respiratory quotient is the ratio of volume of carbon dioxide liberated and the volume of oxygen consumed during respiration.

(ii) It is expressed as

$$RQ = \frac{\text{Volume of } CO_2 \text{ liberated}}{\text{Volume of } O_2 \text{ consumed}}$$

7. Why should the light dependent reaction occur before the light independent reaction?

Ans. (i) During light dependent process photosynthetic pigments absorb the light energy, and convert it into chemical energy ATP and $NADPH_2$. This reaction occurs in the presence of light in the grana of chloroplast.

(ii) During light independent reaction CO_2 is reduced into carbohydrates with the help of light generated ATP and $NADPH_2$. This occurs in stroma of chloroplast.

(iii) Thus light dependent reaction occurs before the light independent reaction.

8. Write the reaction for photosynthesis. *[FRT-'22; May-'22]*

Ans. $6CO_2 + 12H_2O \xrightarrow[\text{chlorophyll}]{\text{Light}} C_6H_{12}O_6 + 6H_2O + 6O_2\uparrow$

Carbon dioxide + Water ⟶ Glucose + Water + Oxygen

VII. Long answer questions :

1. Differentiate the following

a) **Monocot root and Dicot root** *[Sep-2020]*

b) **Aerobic and Anaerobic respiration** *[GMQP-2019; Sep-2021; FRT & Aug.-'22]*

Ans. a) **Monocot root and dicot root**

S. No.	Tissues	Monocot Root	Dicot Root
1.	Number of Xylem	Polyarch	Tetrarch
2.	Cambium	Absent	Present (During secondary growth only)
3.	Secondary Growth	Absent	Present
4.	Pith	Present	Absent
5.	Conjunctive Tissue	Sclerenchyma Eg: Maize	Parenchyma Eg: Bean

b) **Aerobic respiration and anaerobic Respiration :**

S. No.	Aerobic Respiration	Anaerobic Respiration
1.	Organic food is completely oxidised with the help of oxygen.	Organic food is broken down in the absence of oxygen.
2.	Glucose is broken down into carbon dioxide, water and energy.	Glucose is converted into ethanol or lactic acid.
3.	Lot of energy is produced	Very small quantity of energy is produced
4.	It is a complex process and occurs in three major steps.	It is a simpler process.

2. Describe and name three stages of cellular respiration that aerobic organisms use to obtain energy from glucose.

Ans. **Cellular respiration:** The Biochemical process occuring **within cells** where the food is **oxidized** to obtain **energy** is known as **cellular respiration.**

Stages of aerobic respiration :

(a) Glycolysis (Glucose splitting) :

(i) It is the breakdown of one molecule of glucose (6 carbon) into two molecules of pyruvic acid (3 carbon).

(ii) It takes place in cytoplasm of the cell.

(b) Krebs Cycle :

(i) This cycle occurs in mitochondrial matrix.

(ii) At the end of glycolysis, 2 molecules of pyruvic acid enter into mitochondria.

(iii) The oxidation of pyruvic acid into CO_2 and water takes place through this cycle.

(iv) It is also called **Tricarboxylic Acid Cycle (TCA).**

(c) Electron Transport Chain :

(i) It is accomplished through a system of electron carrier complex called **electron transport chain** (ETC) located on the inner membrane of the mitochondria.

(ii) $NADH_2$ and $FADH_2$ molecules formed during glycolysis and Krebs cycle are oxidised to NAD^+ and FAD^+ to release the energy via electrons.

(iii) The electrons, move through the system and release energy which is trapped by ADP to synthesize ATP. This is called **oxidative phosphorylation.**

(iv) In this process, O_2 the ultimate acceptor of electrons gets reduced to water.

3. How does the light dependent reaction differ from the light independent reaction? What are the end product and reactants in each? Where does each reaction occur within the chloroplast? *[FRT-'22]*

Ans.

S. No.	Light dependent reaction	Light Independent reaction
1.	It takes place in the presence of light and is called as Light **reaction of photosynthesis or Hill reaction.**	This takes place independent of the presence of light and is called dark **reaction of photosynthesis or biosynthetic phase.**
2.	It takes place in the grana of the chloroplast.	It takes place in the stroma of the chloroplast.
3.	Photosynthetic pigments absorb the light energy and convert it into chemical energy ATP and $NADPH_2$.	CO_2 from the atmosphere is reduced into carbohydrates with the help of light generated ATP and $NADPH_2$.
4.	The inputs are water, solar energy, photosynthetic pigments.	The inputs are CO_2 from the atmosphere and ATP and $NADPH_2$ from the light reaction.
5.	The end products are ATP and $NADPH_2$.	The end product is glucose.

VIII. Higher Order Thinking Skills (HOTS)

1. **The reactions of photosynthesis make up a biochemical pathway.** ⊛
   - (A) **What are the end product of light and dark reaction of photosynthesis?** *[PTA-5]*
   - (B) **Explain how the biochemical pathway of photosynthesis recycles many of its own reactions and identify the recycled reactants.**

Ans. (A) End product of light reaction: ATP, $NADPH_2$, $O_2\uparrow$, H_2O

End product of dark reaction: Glucose or Carbohydrate

(B)

(i) The end products ADP. NADP of dark reaction are the reactants of the light dependent reaction.

(ii) ATP and $NADPH_2$ formed from light reaction are converted to ADP and NADP through Calvin cycle.

(iii) Both ADP and NADP are recycled back into the light reaction.

(iv) Recycled reactions: ADP and NADP.

2. **Where do the light dependent reaction and the Calvin cycle occur in the chloroplast?** ⊛

Ans. (i) The light dependent reaction refers to the light reaction of photosynthesis or Hill reaction and occurs in the grana of chloroplast.

(ii) The Dark reaction (Calvin cycle) occurs in the stroma of chloroplast.

PTA Questions & Answers

2 MARKS

1. **What is vascular bundle?** *[PTA-1]*

Ans. (i) A strand of conducting vessels in the stem or leaves of a plant.

(ii) They are present in the form of bundles called vascular bundles.

(iii) It consists of Xylem and Phloem tissues.

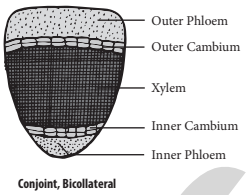
(iv) **Xylem:** Conducts water and minerals to different part of the plant.

(v) **Phloem:** Conducts food materials to different part of the plant.

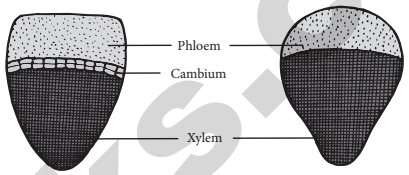
4 MARKS

1. **Draw and label the different types of Conjoint vascular bundles.** (* Part of 7 Marks) *[PTA-4]*

Ans.



Conjoint, Bicollateral



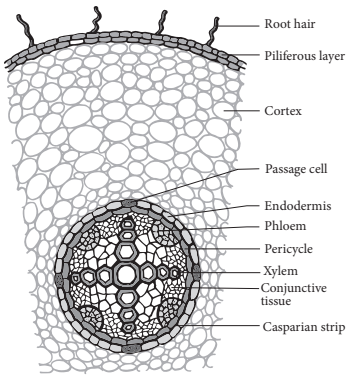
Conjoint, collateral and open — Conjoint, collateral and closed

2. **Draw the structure of a dicot root and label the parts.** *[PTA-6]*

(OR)

Explain the internal structure of Dicot root with a neat diagram. *[FRT-'22]*

Ans.



A sector enlarged

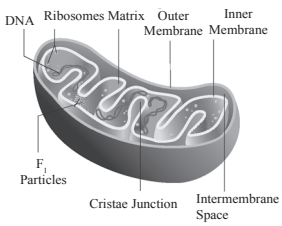
Transverse section of Dicot root

GOVERNMENT EXAM QUESTIONS & ANSWERS

2 MARKS

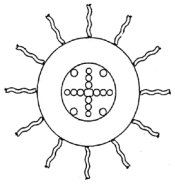
1. **Draw the ultrastructure of mitochondria and label the parts.** *[Qy-2019]*

Ans.



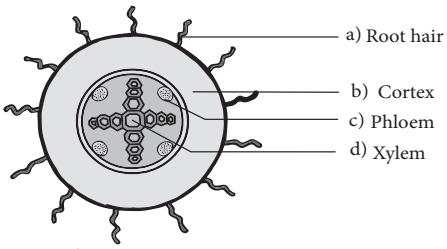
Structure of Mitochondria

2. Copy the given diagram and mark the following parts.



(a) root hair (b) cortex
(c) phloem
(d) xylem *[FRT-'22]*

Ans.

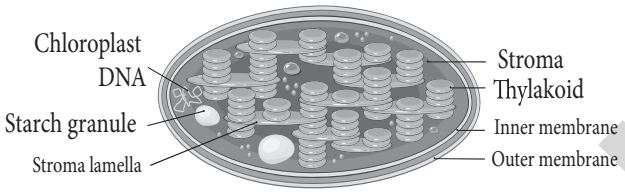


Ground plan

4 MARKS

1. Describe the ultrastructure of a chloroplast.

Ans. Structure of Chloroplast : *[FRT-'22]*



- Chloroplasts are green plastids containing green pigment called **chlorophyll.**
- Chloroplasts are oval shaped organelles having a diameter of 2-10 micrometer and a thickness of 1-2 micrometer.

(i) **Envelope :** Chloroplast envelope has outer and inner membranes which is seperated by intermembrane space.

(ii) **Stroma :**

- Matrix present inside to the membrane is called **stroma**.
- It contains DNA, 70 S ribosomes and other molecules required for protein synthesis.

(iii) **Thylakoids :**

It consists of thylakoid membrane that encloses thylakoid lumen. Photosynthetic pigments are present in thylakoids. Thylakoids forms a stack of **disc like structures** called a grana (singulargranum).

(iv) **Grana:** Thylakoids arranged in the form of discs stacked one above the other called granum. Grana are inter connected by stroma lamella.

2. What are the factors affecting photosynthesis? *[Aug.-'22]*

Ans. Factors Affecting Photosynthesis :

a) Internal Factors :

i) Pigments ii) Leaf age
iii) Accumulation of carbohydrates
iv) Hormones

b) External Factors :

i) Light ii) Carbon dioxide
iii) Temperature iv) Water
v) Mineral elements

ADDITIONAL QUESTIONS & ANSWERS

CHOOSE THE CORRECT ANSWER 1 MARK

1. Amphivasal bundle belongs to _____ type of vascular bundle.
(a) concentric (b) collateral
(c) conjoint (d) radial
[Ans. (a) concentric]

2. Exarch and tetrarch xylem are a feature of __
(a) dicot stem (b) dicot leaf
(c) monocot root (d) dicot root
[Ans. (d) dicot root]

3. The _____ is called starch sheath in a dicot stem.
(a) epidermis (b) pericycle
(c) endodermis (d) hypodermis
[Ans. (c) endodermis]

4. Protoxylem lacuna refers to a _____.
(a) thickening (b) arrangement of xylem
(c) a cavity (d) exarch xylem
[Ans. (c) a cavity]

5. Mitochondria was discovered by _____.
(a) Sachs (b) Kelvin
(c) Melvin (d) Kolliker
[Ans. (d) Kolliker]

6. _____ are racket shaped particles seen is inner mitochondrial membrane.
(a) Porin (b) ATP
(c) Oxysome (d) Grana
[Ans. (c) Oxysome]

7. Respiratory quotient for aerobic respiration is _____.
(a) 2 (b) infinity
(c) 1 (d) 0 **[Ans. (c) 1]**

8. _____ is the outer most layer.
(a) Stomata (b) Epidermis
(c) Periderm (d) Skin
[Ans. (b) Epidermis]

122. The matrix of a chloroplast contains _____ ribosomes. [Ans. 70S]

123. In _____, carbon dioxide combines with water in the presence of sunlight and chlorophyll to form carbohydrates. [Ans. photosynthesis]

124. During photosynthesis, _____ is released as a by product. [Ans. oxygen]

Match the following

I

A)	Artificial photosynthesis	1)	Melvin Calvin
B)	Biosynthetic phase	2)	C. N. R. Rao
C)	Father of Plant Anatomy	3)	Sachs
D)	Tissue system	4)	Nehemiah Grew

	A	B	C	D
(a)	1	2	3	4
(b)	2	1	4	3
(c)	3	2	1	4
(d)	4	1	2	3

[Ans. (b) A - 2, B - 1, C- 4, D - 3]

II

A)	F_1 particles	1)	Calvin
B)	Dark reaction	2)	Light reaction
C)	Grana	3)	Cristae
D)	Photosystems	4)	Chlorophylls

[Ans. A - 3, B - 1, C - 2, D - 4]

III

A)	Cambium	1)	Casparian strips
B)	Sclerenchyma	2)	Endodermis
C)	Starch grains	3)	Mechanical strength
D)	Endodermis	4)	Open vascular bundle

[Ans. A - 4, B - 3, C - 2, D - 1]

IV

(a)	Chloroplast	-	(1)	70 S ribosomes
(b)	Stroma	-	(2)	Colourless
(c)	Thylakoids	-	(3)	Fret channels
(d)	Leucoplast	-	(4)	Chlorophyll
(e)	Grana	-	(5)	Grana

[Ans. a-4, b-1, c-5, d-2, e-3]

V

(a)	Vascular tissue	-	(1)	prevention of water loss
(b)	Ground tissue	-	(2)	Cytoplasm
(c)	Dermal tissue	-	(3)	photosynthesis
(d)	Glycolysis	-	(4)	ATP
(e)	Light reaction	-	(5)	transport of food

[Ans. a-5, b-3, c-1, d-2, e-4]

VI

(a)	Mitochondira	-	(1)	Monocot root
(b)	Pith	-	(2)	Power house
(c)	ETC	-	(3)	Sclerenchyma
(d)	Medullary ray	-	(4)	Inner membrane of Mitochondria
(e)	Bundle sheath	-	(5)	Parenchyma

[Ans. a-2, b-1, c-4, d-5, e-3]

VII

(a)	Hypodermis	-	(1)	Epiblema
(b)	Epidermis	-	(2)	Green plants
(c)	Rhizodermis	-	(3)	Suberin
(d)	Photosynthesis	-	(4)	Bulliform cells
(e)	Casparian strips	-	(5)	Collenchyma

[Ans. a-5, b-4, c-1, d-2, e-3]

VIII

(a)	Calvin cycle	-	(1)	monocot stem
(b)	Krebs cycle	-	(2)	Stroma of chloroplast
(c)	Open collateral bundle	-	(3)	Thylakoid membrane of chloroplast
(d)	Closed collateral bundle	-	(4)	dicot stem
(e)	Hill's reaction	-	(5)	Mitochondrial matrix

[Ans. a-2, b-5, c-4, d-1, e-3]

IX Match the columns I, II and III correctly :

Column I	Column II	Column III
Dermal Tissue	Parenchyma tissue	Transport of water and minerals
Ground Tissue system	Epidermis	Food storage

Analogy type questions. Identify the first words and their relationship and suggest a suitable word for the fourth blank

1. **Internal factors : Pigments :: External factors : _____.**
Ans. Light.

2. **Chlorophyll 'a' : Primary pigment :: Chlorophyll 'b' : _____.**
Ans. Accessory pigments.

3. **Anaerobic respiration : Without oxygen :: Aerobic respiration : _____.**
Ans. With oxygen.

4. **Glycolysis : Cytoplasm :: Kreb's cycle : _____.**
Ans. Mitochondrial membrane.

5. **Light dependent photosynthesis : Robin Hill :: Light independent reactions : _____.**
Ans. Melvin Calvin.

6. **Proto xylem lies towards center : Endarch**
Proto xylem lies towards periphery : _____
Ans. Exarch

7. **Four xylem group : tetrarch**
Many xylem group : _____
Ans. polyarch

8. **Conducts water and minerals : Xylem**
Conducts food materials : _____
Ans. Phloem

9. **Xylem surrounds phloem: Amphivasal**
Phloem surrounds xylem : _____
Ans. Amphicribral

Answer in a word

1. **A process common to aerobic and anaerobic respiration.**
Ans. Glycolysis.

2. **Energy currency of cell.**
Ans. ATP.

3. **Power house of the cell.**
Ans. Mitochondria membrane.

4. **Primary pigment.**
Ans. Chlorophyll 'a'.

5. **Another name for dark reaction.**
Ans. Calvin cycle.

6. **Matrix of chloroplast.**
Ans. Stroma.

7. **Coloured plastids.**
Ans. Chromoplast.

8. **Tissue responsible for secondary growth.**
Ans. Cambium.

9. **Arrangement of xylem in a root.**
Ans. Exarch.

10. **Arrangement of xylem in a stem.**
Ans. Endarch.

11. **ATP formation occuring during electron transport chain of aerobic respiration.**
Ans. Oxidative phosphorylation.

12. **Where do we see radial, exarch and tetrarch vascular bundle.**
Ans. Dicot root.

13. **The other name of epiblema.**
Ans. Rhizodermis.

14. **Shape of oxysome.**
Ans. Tennis racket shaped

15. **Location of oxysomes**
Ans. Cristae of Mitochondria.

16. **Which enzyme is released by yeast during fermentation?**
Ans. Zymase.

17. **Which is the first product of kreb's cycle?**
Ans. Citric acid.

18. **The end product of oxidative phosphorylation is _____ .**
Ans. ATP + H_2O.

19. **Substance present in casparian strips.**
Ans. Suberin.

Answer in a sentence

1. **How are plant tissues classified?**
Ans. (i) Meristematic tissue.
(ii) Permanent tissue.

2. **Name the types of concentric bundles.**
Ans. Amphivasal and Amphicribral.

3. **What is endarch xylem?**
Ans. Protoxylem lies towards the centre and metaxylem lies towards the periphery. Eg: stem.

4. **What is exarch xylem?**
Ans. Protoxylem lies towards the periphery and metaxylem lies towards the centre. Eg: roots.

5. What is protoxylem lacuna?

Ans. In mature vascular bundle of monocot stem, the lower most protoxylem disintegrates and form a cavity called protoxylem lacuna.

6. Give the equation for aerobic respiration.

Ans. $C_6H_{12}O_6 + 6O_2 \rightarrow 6CO_2 + 6H_2O + ATP$.

Give reasons for the following statements

1. Monocot leaf is described as Isobilateral clear.

Ans. **Reason :** There is no demarcation between upper and lower surface of a monocot leaf. Both the leaf surfaces appear to be similar and are hence described as **isobilateral.**

2. More number of stomata occur in lower epidermis of leaf.

Ans. **Reason :** The upper epidermis of the leaf is directly exposed to sunlight. More water will be lost by transpiration from the upper epidermis. Hence the stomata are more on the lower epidermis to reduce water loss by transpiration.

3. Glycolysis is common to aerobic and anaerobic respiration.

Ans. **Reason:** Glycolysis requires the substrate glucose only. It is not dependent on presence of oxygen.

4. Pith is not differentiated in monocot stems.

Ans. **Reason :** Monocot stems have vascular bundles scattered in the ground tissue. So there is no pith region in monocot stem.

5. Mitochondria is referred to as the power house of the cell.

Ans. **Reason:** Mitochondria (singular: mitochondrion) are organelles within eukaryotic cells that produce adenosine triphosphate (ATP) which form the energy currency of the cell, So mitochondria is referred as the **"Power house of the cell"**.

6. Cristae increases the inner surface area of the mitochondria.

Ans. **Reason :** The inner mitochondrial membrane gives rise to finger like projections called cristae. These cristae increase the inner surface area (fold in inner membrane) of the mitochondria to hold variety of enzymes.

Very short answers — 2 marks

1. What is protoxylem lacuna?

Ans. In mature vascular bundle, the lower most protoxylem disintegrates and form a cavity. This is called protoxylem lacuna. Eg. monocot stem.

2. What are casparian strips?

Ans. The cells of endodermis in roots show band like thickenings on their radial and inner tangential walls called **casparian strips.**

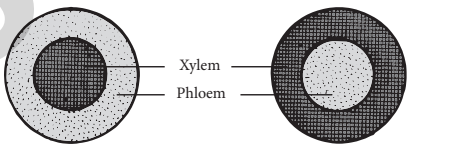
3. How are Plastids classified?

Ans. There are three types of plastids.

(i) Chloroplast - green coloured plastids
(ii) Chromoplast - yellow, red, orange coloured plastids
(iii) Leucoplast - colourless plastids

4. Draw diagrams to represent the types of concentric vascular bundles.

Ans.



Concentric and Amphicribral *Concentric and Amphivasal*

5. What is starch sheath?

Ans. (i) In a dicot stem, endodermis is the inner most layer of cortex.
(ii) It consists of a single layer of barrel shaped cells, which contain starch grains and is called **starch sheath**.

6. What are bulliform cells?

Ans. In monocot leaf, some cells of upper epidermis are large and thin walled. They are known as **bulliform cells.**

7. What are grana?

Ans. (i) In the stroma of a chloroplast, some of the thylakoids are arranged in the form of discs stacked **one above** the other.
(ii) These stacks are termed as grana. They are interconnected to each other by membranous lamellae called **Fret channels.**

8. What is reaction centre in photosynthesis?

Ans. Chlorophyll 'a' is the primary pigment in chloroplast that traps solar energy and converts it into electrical and chemical energy. Thus it is called the **reaction centre in photosynthesis**.

9. Differentiate Dicot leaf and Monocot leaf.

Ans.

S.No.	Dicot Leaf	Monocot Leaf
1.	The other name is Dorsiventral leaf.	The other name is Isobilateral leaf.
2.	Mesophyll is differentiated into palisade and spongy parenchyma.	Mesophyll is not differentiated into palisade and spongy parenchyma.
3.	Eg. Mango leaf	Eg. Grass leaf

10. What are pigment systems?

Ans. Reaction centres (primary pigments) and the harvesting centre (accessory pigments) together are called **photosystems.** They are involved in form pigment systems.

11. Differentiate external and cellular respiration.

Ans.

No.	External respiration	Cellular respiration
1.	It is a physical process.	It is a chemical process.
2.	Exchange of gases take place.	Food is oxidised to produce energy.

12. What is electron transport chain?

Ans. (i) It is a system of electron carrier complex located on the inner membrane of mitochondria.

(ii) As the electrons with energy move through the system, ATP is formed. This is called **oxidative phosphorylation.**

13. What is anaerobic respiration?

Ans. Anaerobic respiration takes place without oxygen. Glucose is converted into ethanol (Ethanol fermentation by yeast) or lactic acid (lactic acid fermentation by bacteria).

$C_6H_{12}O_6 \rightarrow 2CO_2 + 2\,C_2H_5OH$ + Energy (ATP)

SHORT ANSWERS — 4 MARKS

1. List the functions of chloroplast.

Ans. (i) Photosynthesis.
(ii) Storage of starch.
(iii) Synthesis of fatty acids.
(iv) Storage of lipids.
(v) Formation of chloroplasts.

2. Name the internal factors affecting photosynthesis.

Ans. (i) Pigments.
(ii) Leaf age.
(iii) Accumulation of carbohydrates.
(iv) Hormones.

3. Name the external factors affecting photosynthesis.

Ans. (i) Light.
(ii) Carbon dioxide.
(iii) Temperature.
(iv) Water.
(v) Mineral elements.

4. List the functions of mitochondria.

Ans. (i) Mitochondria is the main organelle of cell respiration.
(ii) They produce a large number of ATP molecules. So they are called as **power houses of the cell or ATP factory of the cell.**
(iii) It helps the cells to maintain normal concentration of calcium ions.
(iv) It regulates the metabolic activity of the cell.

LONG ANSWERS — 7 MARKS

1. Write a note on vascular tissue system.

Ans. (i) It consists of xylem and phloem tissues.
(ii) They are present in the form of bundles called **vascular bundles**.
(iii) Xylem conducts water and minerals to different parts of the plant.
(iv) Phloem conducts food materials to different parts of the plant.

There are three different types of vascular bundles namely :

(i) Radial (ii) Conjoint
(iii) Concentric

(i) **Radial Bundles :**

Xylem and phloem are present in different radii alternating with each other. Eg: roots.

(ii) **Conjoint bundles :** Xylem and phloem lie on the same radius. There are two types of conjoint bundles.

a) **Collateral :**

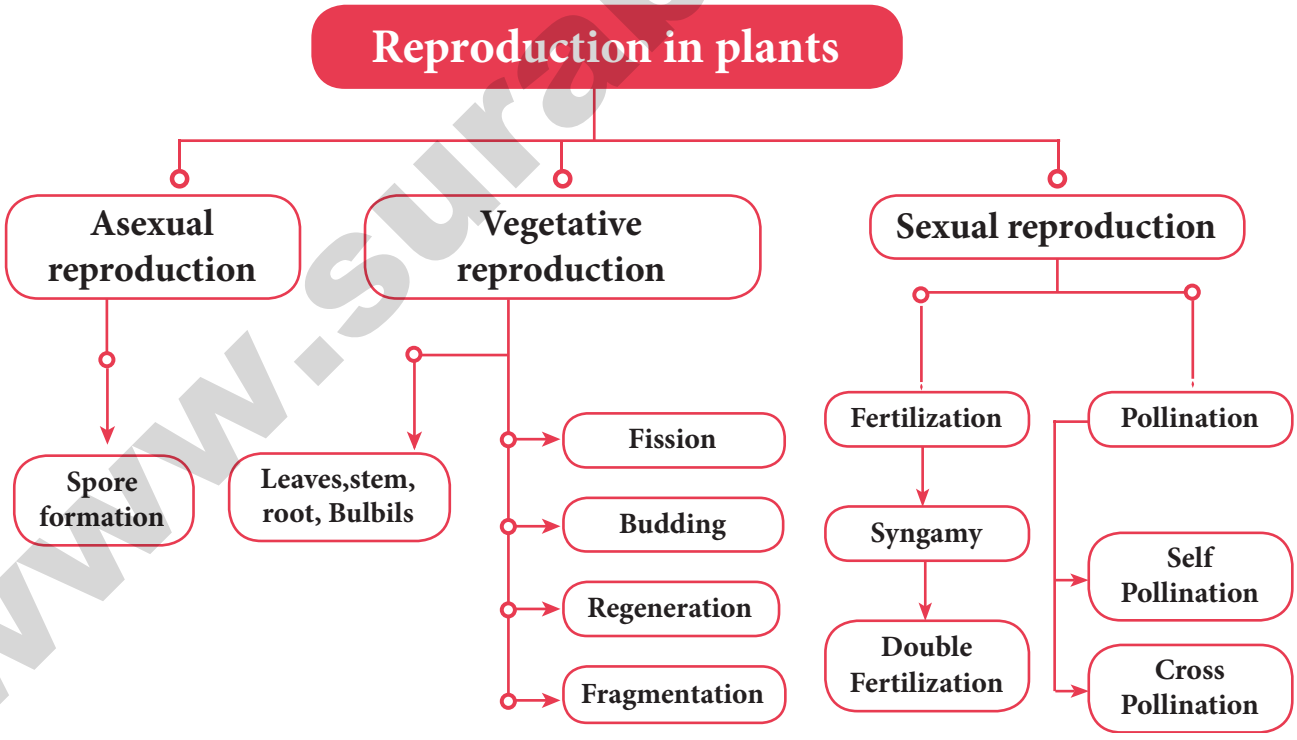
(i) Xylem lies towards the centre and phloem lies towards the periphery.

(ii) When cambium is present in collateral bundles, it is called open. **Eg:** dicot stem and collateral bundle without cambium is called **closed**. **Eg:** monocot stem.

UNIT 17

Reproduction in plants and Animals

CONCEPT MAP



TEXTBOOK EVALUATION

I. CHOOSE THE CORRECT ANSWER :

1. **The plant which propagates with the help of its leaves is _____ .** ⊗
(a) Onion (b) Neem
(c) Ginger (d) *Bryophyllum*
[Ans. (d) *Bryophyllum*]

2. **Asexual reproduction takes place through budding in _____ .**
(a) *Amoeba* (b) Yeast
(c) *Plasmodium* (d) Bacteria
[Ans. (b) Yeast]

3. **Syngamy results in the formation of _____ .** ⊗ *[Sep-2021]*
(a) Zoospores (b) Conidia
(c) Zygote
(d) Chlamydospores **[Ans. (c) Zygote]**

4. **The essential parts of a flower are _____ .**
(a) Calyx and Corolla
(b) Calyx and Androecium
(c) Corolla and Gynoecium
(d) Androecium and Gynoecium
[Ans. (d) Androecium and Gynoecium]

5. **Anemophilous flowers have _____.** ⊗
(a) Sessile stigma
(b) Small smooth stigma
(c) Colored flower
(d) Large feathery stigma
[Ans. (d) Large feathery stigma]

6. **Male gametes in angiosperms are formed by the division of _____ .** *[May-'22]*
(a) Generative cell
(b) Vegetative cell
(c) Microspore mother cell
(d) Microspore **[Ans. (a) Generative cell]**

7. **What is true of gametes?** ⊗
(a) They are diploid.
(b) They give rise to gonads.
(c) They produce hormones.
(d) They are formed from gonads.
[Ans. (d) They are formed from gonads]

8. **A single highly coiled tube where sperms are stored, get concentrated and mature is known as**
(a) Epididymis (b) Vasa efferentia
(c) Vas deferens
(d) Seminiferous tubules **[Ans. (a) Epididymis]**

9. **The large elongated cells that provide nutrition to developing sperms are** *[Sep-2021]*
(a) Primary germ cells (b) Sertoli cells
(c) Leydig cells (d) Spermatogonia
[Ans. (b) Sertoli cells]

10. **Estrogen is secreted by** ⊗
(a) Anterior pituitary (b) Primary follicle
(c) Graafian follicle (d) Corpus luteum
[Ans. (c) Graafian follicle]

11. **Which one of the following is an IUCD?**
(a) Copper - T (b) Oral pills
(c) Diaphragm (d) Tubectomy
[Ans. (a) Copper - T]

II. FILL IN THE BLANKS :

1. The embryo sac in a typical dicot at the time of fertilization is _____ .
[Ans. seven cells and eight nuclei]

2. After fertilization, the ovary develops into _____ . ⊗ **[Ans. fruit]**

3. *Planaria* reproduces asexually by _____.
[Ans. Regeneration]

4. Fertilization is _____ in humans.
[Ans. Internal]

5. The implantation of the embryo occurs at about _____ day of fertilization. ⊗ **[Ans. 6 - 7]**

6. _____ is the first secretion from the mammary gland after child birth. ⊗
[Ans. Colostrum]

7. Prolactin is a hormone produced by _____. **[Ans. anterior pituitary]**

III. Match the following :

a)

Column 1	Column 2
Fission	Spirogyra
Budding	Amoeba
Fragmentation	Yeast

Ans.

Column 1	Column 2
Fission	Amoeba
Budding	Yeast
Fragmentation	Spirogyra

III. b) Match the following terms with their respective meanings:

a)	Parturition	1)	Duration between pregnancy and birth
b)	Gestation	2)	Attachment of zygote to endometrium
c)	Ovulation	3)	Delivery of baby from uterus
d)	Implantation	4)	Release of egg from Graafian follicle

[Ans. a - 3, b - 1, c - 4, d - 2]

IV. State whether the following statements are True of False. Correct the false statement:

1. Stalk of the ovule is called pedicel.

Ans. False.

Correct Statement : Stalk of the ovule is called funicle.

2. Seeds are the product of asexual reproduction.

Ans. False.

Correct Statement : Seeds are the product of sexual reproduction.

3. Yeast reproduces asexually by means of multiple fission.

Ans. False.

Correct Statement : Yeast reproduces asexually by budding.

4. The part of the pistil which serves as a receptive structure for the pollen is called as style.

Ans. False.

Correct Statement : The part of the pistil which serves as a receptive structure for the pollen is called stigma.

5. Insect pollinated flowers are characterized by dry and smooth pollen.

Ans. False.

Correct Statement : Wind pollinated flowers are characterized by dry and smooth pollens.

(or)

Correct Statement : Insect pollinated flowers are characterized by large and spiny pollens.

6. Sex organs produce gametes which are diploid.

Ans. False.

Correct Statement : Sex organs produce gametes which are haploid.

7. LH is secreted by the posterior pituitary.

Ans. False.

Correct Statement : LH is secreted by the anterior pituitary.

8. Menstrual cycle ceases during pregnancy.

Ans. True.

9. Surgical methods of contraception prevent gamete formation.

Ans. False.

Correct Statement : Surgical methods of contraception prevent fertilization.

10. The increased level of estrogen and progesterone is responsible for menstruation.

Ans. False.

Correct Statement : The decrease in level of estrogen and progesterone is responsible for menstruation.

V. Answer in a word or sentence :

1. If one pollen grain produces two male gametes, how many pollen grains are needed to fertilize 10 ovules?

Ans. 10 pollen grains.

2. In which part of the flower germination of pollen grains takes place?

Ans. Stigma.

3. Name two organisms which reproduces through budding.

Ans. Yeast and Hydra.

4. Mention the function of endosperm.

Ans. Endosperm provides food to the developing embryo.

5. Name the hormone responsible for the vigorous contractions of the uterine muscles.

Ans. Oxytocin.

6. What is the enzyme present in acrosome of sperm? ⊗

Ans. Hyaluronidase.

7. When is World Menstrual Hygiene Day observed?

Ans. May 28.

8. What is the need for contraception? ⊗

Ans. It is a birth control measure.

9. Name the part of the human female reproductive system where the following occurs. (a) Fertilization (b) Implantation

Ans. (a) Fertilization - Fallopian tube
(b) Implantation - Uterus.

VI. Short answer question :

1. What will happen if you cut planaria into small fragments?

Ans. (i) Planaria can be cut into any number of pieces and each piece gives rise to a complete organism.
(ii) The ability of the lost body parts of an individual organism to give rise to a whole new organism is called regeneration.
(iii) It takes place by specialized mass of cells e.g *Hydra* and *Planaria*.

2. Why is vegetative propagation practiced for growing some type of plants? ⊗ *[PTA-1]*

Ans. (i) Vegetative propagation helps us to introduce plants in new areas where seed germination fails to produce plants due to conditions of environment.
(ii) Vegetative propagation is the only method of mutiplication in plants like banana, seedless grapes and orange that have lost their capacity to produce seeds through sexual reproduction.

3. How does binary fission differ from multiple fission? ⊗

Ans.

Binary fission	Multiple fission
Single parent cell splits into two daughter cells.	Single parent cell splits into many daughter cells.
Cyst formation is absent.	Cyst formation is present.
It occurs in favourable conditions	It occurs in unfavourable conditions
Eg : Amoeba	Eg : Plasmodium

4. Define triple fusion. ⊗

[GMQP-2019; Qy-2019; May-'22]

Ans. (i) During fertilization process in Angiosperms, the pollen grain produces two sperms.
(ii) One sperm, fuses with the egg and forms a diploid zygote.
(iii) Another sperm fuses with the secondary nucleus (2n) of the embryo sac and forms a triploid primary endosperm nucleus. This is called triple fusion.

5. Write the characteristics of insect pollinated flowers. *[PTA-6]*

Ans. (i) To attract insects, these flowers are brightly coloured, have smell, and nectar.
(ii) The pollen grains are larger in size, the exine is pitted, spiny etc. So that they can adhere to the stigma.

6. Name the secondary sex organs in male. ⊗ *[May-22]*

Ans. The secondary sex organs in male include the vas deferens, epididymis, seminal vesicle, prostate gland and penis.

7. What is colostrum? How is milk production hormonally regulated? *[PTA-2]*

Ans. (i) The first fluid which is released from the mammary gland after child birth is called **colostrum**.
(ii) Milk production from alveoli of mammary glands is stimulated by **prolactin** secreted from the **anterior pituitary**.
(iii) The ejection of milk is stimulated by posterior pituitary hormone oxytocin.

8. How can menstrual hygiene be maintained during menstrual days? *[PTA-4]*

Ans. (i) Sanitary pads should be changed regularly, to avoid infections due to microbes from vagina and sweat from genitals.
(ii) Use of warm water to clean genitals helps to get rid of menstrual cramps.
(iii) Wearing loose clothing rather than tight-fitting clothes will ensure the airflow around the genitals and prevent sweating.

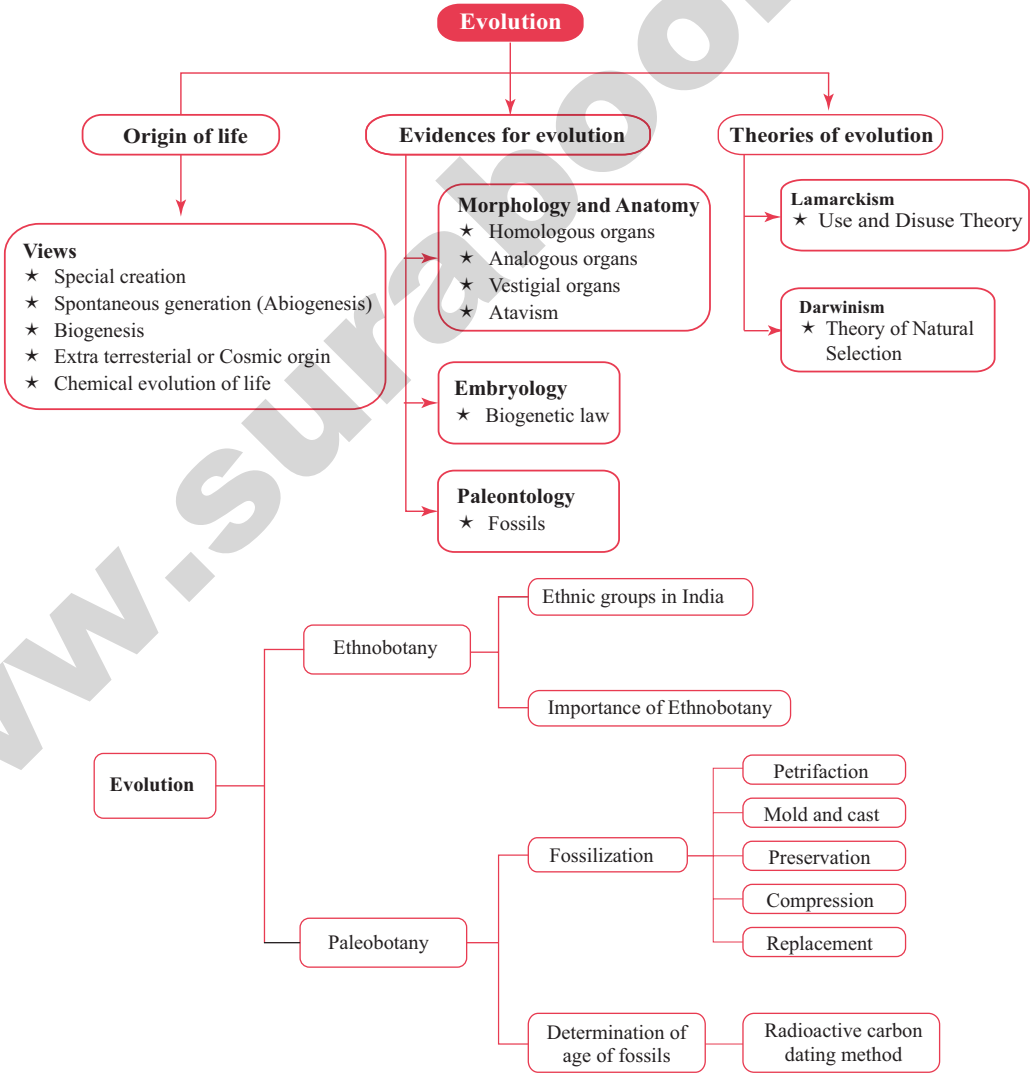
9. How does developing embryo gets its nourishment inside the mother's body? *[PTA-6]*

Ans. (i) The developing embryo gets its nourishment inside the mother's body with the help of Placenta. It is a **disc shaped** structure attached

UNIT 19

Origin and Evolution of Life

CONCEPT MAP



MUST KNOW DEFINITIONS

Fossils	:	Preserved part of a plant / animal that has died long back.
Homologous organs	:	Organs with similar developmental pattern but look dissimilar and adapted for different functions.
Analogous organs	:	Organs of different animals which have different origin and different structure but perform same function.
Palaeontology	:	Study of Fossils.
Vestigial organs	:	Degenerated and non-functional organs of animals.
Atavism	:	Reappearance of ancestral characters in some individuals.
Acquired characters	:	The characters developed by the animals during their life time in response to the environmental changes.
Ethnobotany	:	Study of a region's plants and their practical uses.
Ontogeny	:	Stages of development of the individual animal.
Phylogeny	:	Evolutionary history of the entire race of the animal.
Astrobiology	:	It deals with the origin, evolution and distribution of life in the Universe.
Biogenesis	:	Life originates from pre-existing life.
Evolution	:	Gradual changes occuring in living organisms over a period of time.
Biogenetic law /Recapitulation Theory	:	Ontogeny recapitulates Phylogeny.

TEXTBOOK EVALUATION

I. CHOOSE THE CORRECT ANSWER :

1. Biogenetic law states that _____.

(a) Ontogeny and phylogeny go together
(b) Ontogeny recapitulates phylogeny
(c) Phylogeny recapitulates ontogeny
(d) There is no relationship between phylogeny and ontogeny

[Ans. (b) Ontogeny recapitulates phylogeny]

2. The 'use and disuse theory' was proposed by _____ . ⊗

(a) Charles Darwin (b) Ernst Haeckel
(c) Jean Baptiste Lamarck
(d) Gregor Mendel

[Ans. (c) Jean Baptiste Lamarck]

3. Paleontologists deal with ⊗

(a) Embryological evidences
(b) Fossil evidences
(c) Vestigial organ evidences
(d) All the above **[Ans. (b) Fossil evidences]**

4. The best way of direct dating fossils of recent origin is by ⊗ *[PTA-1]*

(a) Radio - carbon method
(b) Uranium lead method
(c) Potassium - argon method
(d) Both (a) and (c)

[Ans. (a) Radio - carbon method]

5. The term Ethnobotany was coined by

(a) Khorana (b) J.W. Harshberger
(c) Ronald Ross
(d) Hugo de Vries **[Ans. (b) J.W. Harshberger]**

II. FILL IN THE BLANKS :

1. The characters developed by the animals during their life time, in response to the environmental changes are called _____.

[Ans. acquired characters]

2. The degenerated and non-functional organs found in an organism are called _____. ⊗

[Ans. vestigial organs]

3. The forelimbs of bat and human are examples of _____ organs. [Ans. homologous]

4. The theory of natural selection for evolution was proposed by _____ . *[PTA-6]*
[Ans. Charles Darwin]

III. State true or false. Correct the false statement:

1. **The use and disuse theory of organs' was postulated by Charles Darwin.** ⊗ *[PTA-5]*

Ans. False.
Correct Statement : The Use and Disuse theory of organs was postulated by Lamarck.

2. **The homologous organs look similar and perform similar functions but they have different origin and developmental pattern.**

Ans. False.
Correct Statement : The homologous organs look dissimilar and perform different functions but they have similar origin and developmental pattern.

3. **Birds have evolved from reptiles.** ⊗ *[PTA-5]*

Ans. True.

IV. Match the following : *[PTA-5]*

	Column A	Column B
(a)	Atavism	caudal vertebrae and vermiform appendix
(b)	Vestigial organs	a forelimb of a cat and a bat's wing
(c)	Analogous organs	rudimentary tail and thick hair on the body
(d)	Homologous organs	a wing of a bat and a wing of an insect
(e)	Wood park	radiocarbon dating
(f)	W. F. Libby	Thiruvakkarai

Ans.

	Column A	Column B
(a)	Atavism	rudimentary tail and thick hair on the body
(b)	Vestigial organs	caudal vertebrae and vermiform appendix
(c)	Analogous organs	a wing of a bat and a wing of an insect
(d)	Homologous organs	a forelimb of a cat and a bat's wing
(e)	Wood park	Thiruvakkarai
(f)	W. F. Libby	radiocarbon dating

V. Answer in a word or sentence :

1. **A human hand, a front leg of a cat, a front flipper of a whale and a bat's wing look dissimilar and adapted for different functions. What is the name given to these organs?**

Ans. Homologous organs.

2. **Which organism is considered to be the fossil bird?** ⊗

Ans. Archaeopteryx.

3. **What is the study of fossils called?** ⊗

Ans. Palaeontology.

VI. Short answers questions :

1. **The degenerated wing of a kiwi is an acquired character. Why is it an acquired character?** *[PTA-3]*

Ans. (i) When there is a change in the environment, the animals respond to the change.
(ii) They develop adaptive structures. The characters developed by the animals during their life time, in response to the environmental changes are called acquired characters.
(iii) Lamarck's use and disuse theory states that if an organ is used constantly, the organ develops well and gets strengthened. When an organ is not used for a long time, it gradually degenerates.
(iv) Degenerated wing of kiwi is an example for organ of disuse.
Degeneration of wings in kiwi is due to disuse of wings over generations since they have learns to walk on land for all their needs. This is an acquired character in response to their habitat. According to Lamarck such characters are passed to the off springs by inheritance.

2. **Why is Archaeopteryx considered to be a connecting link?**

Ans. (i) Archaeopteryx is the oldest known fossil bird.
(ii) It is considered to be a connecting link between reptiles and birds. It had wings with feathers, like a bird. It had long tail, clawed digits and conical teeth, like a reptile.

3. **Define Ethnobotany and write its importance.** *[PTA-2; Sep-2020; Aug.-'22]*

Ans. (i) Ethnobotany is the study of a region's plants and their practical uses through the traditional knowledge of the local culture of people.

(ii) The term Ethnobotany was coined by **J. W. Harshberger in 1895** to include the study of plants used by the primitive and aboriginal people.

Importance of Ethnobotany :

(i) It provides traditional uses of plant.

(ii) It gives information about certain unknown and known useful plants.

(iii) The ethnomedicinal data will serve as a useful source of information for the chemists, pharmacologists and practitioners of herbal medicine.

(iv) Tribal communities utilize ethnomedicinal plant parts like bark, stem, roots, leaves, flower bud, flowers, fruits, seeds, oils, resins, dyes, gum for the treatment of diseases like diarrhoea, fever, headache, diabetes, jaundice, snakebites, leprosy, etc.

4. How can you determine the age of the fossils? *[GMQP-2019; Sep-2020]*

Ans. (i) The age of fossils is **determined by radioactive elements** present in it.

(ii) They may be carbon, uranium, lead or potassium. It is used in paleobotany and anthropology for determining the age of human fossils and manuscripts.

Radioactive carbon (C^{14}) dating method :

(i) This method was discovered by W.F. Libby (1956).

(ii) Carbon consumption of animals and plants stops after death and since then, only the decaying process of C^{14} occurs continuously.

(iii) The time passed since death of a plant or animal can be calculated by measuring the amount of C^{14} present in their body.

VII. Long Answer Questions :

1. Natural selection is a driving force for evolution - How? *[PTA-6; GMQP-2019]*

Ans. Survival of the fittest or Natural selection:

(i) During the struggle for existence, the organisms which can overcome the challenging situation, **survive** and **adapt** to the surrounding environment.

(ii) Organisms which are unable to face the challenges, are unfit to survive and disappear.

(iii) The process of selection of organisms with favourable variation is called as **natural selection.**

Origin of species: According to Darwin, **new species originates by the gradual accumulation of favourable variations** for a number of generations. Hence natural selection is a driving force for evolution since it leads to formation of new species.

2. How do you differentiate homologous organs from analogous organs?

Ans.

No.	Homologous organs	Analogous organs
(a)	The homologous organs are those which have inherited from common ancestors.	Analogous organs are those which have inherited from different ancestors.
(b)	They look dissimilar and adapted for different function.	They look similar and perform similar functions.
(c)	They have similar developmental pattern.	They have different developmental pattern.
(d)	Their mode of development and basic structure of bone are similar.	Their mode of development and basic structures are different.
(e)	**Eg:** Human hand, the front leg of a cat, flipper of a whale and a bat's wing.	**Eg:** The wings of a bat, the wings of a bird and wings of an insect.

3. How does fossilization occur in plants? *[PTA-1]*

Ans. The process of formation of fossil in the rocks is called **fossilization.**

Common methods of fossilization includes

(i) Petrifaction
(ii) Mold and Cast
(iii) Preservation
(iv) Compression
(v) Infiltration

(i) A plant fossil is any preserved part of a plant that has died long back.

(ii) A replica of a plant is preserved in sedimentary rocks by mold and cast fossilization method.

(iii) Original remains can be preserved in **ice or amber** (tree sap).

(iv) They protect the organisms from decay. The entire plant is preserved.

Assertion and Reason

Direction :

(a) Both Assertion and Reason are true and Reason is correct explanation of Assertion.
(b) Both Assertion and Reason are true but Reason is not the correct explanation of Assertion.
(c) Assertion is true but Reason is false.
(d) Both Assertion and Reason are false.

1. **Assertion (A):** *Ginkgo biloba* is a living fossil.
Reason (R): *Ginkgo biloba* has persisted and remain unchanged for the past several million years, while its relatives disappeared.
[Ans. (a) Both Assertion and Reason are true and Reason is correct explanation of Assertion]

2. **Assertion (A):** The first form of life could have come from pre-existing non - living inorganic molecule.
Reason (R): This is the basis of chemical evolution of life.
[Ans. (a) Both Assertion and Reason are true and Reason is correct explanation of Assertion]

3. **Assertion (A):** When an organism dies, the hard part of the bodies settle at the bottom of sea floors and are covered by sediments.
Reason (R): A replica of the organism is formed.
[Ans. (c) Assertion is true but Reason is false]

Analogy type questions. Identify the first words and their relationship and suggest a suitable word for the fourth blank

1. **Somatic variation : Not heritable :: Germinal variation: _____.**
Ans. Heritable

2. **Continuous variation : Skin Colour of an individual :: Discontinuous variation : _____.**
Ans. Six or more fingers in Humans.

3. **Intraspecific struggle : Same species :: Interspecific struggle : _____.**
Ans. Different species.

Answer in a word

1. **Spontaneous generation of life.**
Ans. Abiogenesis.

2. **Units of life from outer space (Cosmic origin) .**
Ans. Panspermia.

3. **Human hand and Bat's wings belong to which type of organs.**
Ans. Homologous organs.

4. **Ontogeny recapitulates Phylogeny.**
Ans. Biogenetic law / Recapitulation theory.

5. **What is the name of Study of fossils?**
Ans. Palaeontology.

6. **Name the book published by Lamarck.**
Ans. Philosophic Zoologique.

7. **Write an example of an Acquired character.**
Ans. Degenerated wing of kiwi.

8. **Name of the Ship in which Charles Darwin went on a voyage.**
Ans. H. M. S. Beagle.

9. **Islands visited by Charles Darwin.**
Ans. Galapagos.

10. **Another name for natural selection.**
Ans. Survival of the fittest.

11. **Location of fossil wood park.**
Ans. Thiruvakkarai.

12. **Branch of science dealing with presence of of extra terrestrial life in the Universe.**
Ans. Astrobiology / Exobiology.

Give reasons for the following statements

1. **When an organ is not used for a long time, it degenerates.**
Ans. **Reason :** According to "Use and disuse theory", if an organ is used constantly, the organ develops well and gets strengthened. When an organ is not used for a long time. otherwise it gradually degenerates.

2. **Vermiform appendix in man is called as vestigial organs.**
Ans. **Reason :** The degenerated and non-functional organs of animals are called vestigial organs. The same organs are found to be well developed and functional, in some of the related forms. In man vermiform appendix serves no function and a vestigial organs.

Very short answers — 2 marks

1. **Give some examples of vestigial organs in man.**
Ans. Vermiform appendix, Nictitating membrane, Caudal Vertebra and Coccyx.

2. Explain the Theory of Special Creation.

Ans. (i) This idea states that life on Earth is a divine creation and also attributes to **supernatural event** at a particular time in the past.

(ii) It also emphasize that life has not changed ever since its origin.

3. What is theory of Cosmic origin?

Ans. **Extraterrestrial or Cosmic orgin:** Some scientists still believe that life came from outer space. This states that units of life called **spores (Panspermia)** were transferred to different planets including Earth. This is still an idea of some Astronomers.

4. Explain Biogenesis.

Ans. (i) It was speculated by Louis Pasteur (1862) that **life originates from pre-existing life.**

(ii) He showed that pre-sterilised flasks kept closed airtight, with killed yeast, did not give rise to any life form, while in another flask kept open to air living organisms arose from killed yeast.

5. What is theory of Spontaneous generation or Abiogenesis?

Ans. (i) According to this theory **life originated** spontaneously from **lifeless matter**.

(ii) It was believed that fishes originated from mud, frogs from moist soil and insects from decaying matter.

6. Explain Atavism.

Ans. The reappearance of ancestral characters in some individuals is called **atavism.** Presence of rudimentary tail in new born babies, presence of thick hair on the Human body are examples of atavism.

7. State the Biogenetic law / Recapitulation theory.

Ans. (i) It was given by Ernst Haeckel.

(ii) According to this theory, ontogeny recapitulates **Phylogeny**.

(iii) The stages of development of the individual animal repeats the evolutionary history of the entire race of the animal.

8. What is Paleobotany?

Ans. Paleobotany is derived from Greek words *paleon* that means "old" and *botany* the study of plants. It is the **branch of Paleontology** that deals with recovery and identification of plant remains of geological past.

9. What is Astrobiology / Exobiology?

Ans. (i) Astrobiology / Exobiology is the science which looks for the presence of extra terrestrial life in the universe.

(ii) Astrobiology deals with the origin, evolution and distribution of life in the universe and to investigate the possibility of life in other world.

10. What are extremophiles?

Ans. The organisms which live in extreme environmental conditions on earth are called **extremophiles.**

11. What are living fossils?

Ans. These are living organisms that are similar in appearance to their fossilized distant ancestors and usually have no extinct close features. E.g: *Ginko biloba*.

12. Define a fossil.

Ans. A plant fossil is any preserved part of a plant that has died long back. Fossils may be a prehistoric impression that may be hundred to millions of years old. Majority of the plant fossils are disarticulated parts of plants, it is rare to find plants to be preserved as whole.

13. What is Geologic time scale?

Ans. The Geological time scale is a system of chronological dating that relates geological rock strata to time, and is used by geologists, paleontologists, and other Earth scientists to describe the timing and relationships of events that have occurred during Earth's history.

SHORT ANSWERS 4 MARKS

1. What is Goldilock zone for life?

Ans. The major concept in astrobiology is the habitable zone

Goldilock Zone is a criteria to be fulfilled if a planet can support the existence of life.

(i) It must have an orbit at just the right distance from its star (Sun) that it allows liquid water to exist.

(ii) Thus, the distance need to be neither too hot or not too cold and is often referred as **Goldilock Zone for life.**

2. Explain Chemical evolution of life.

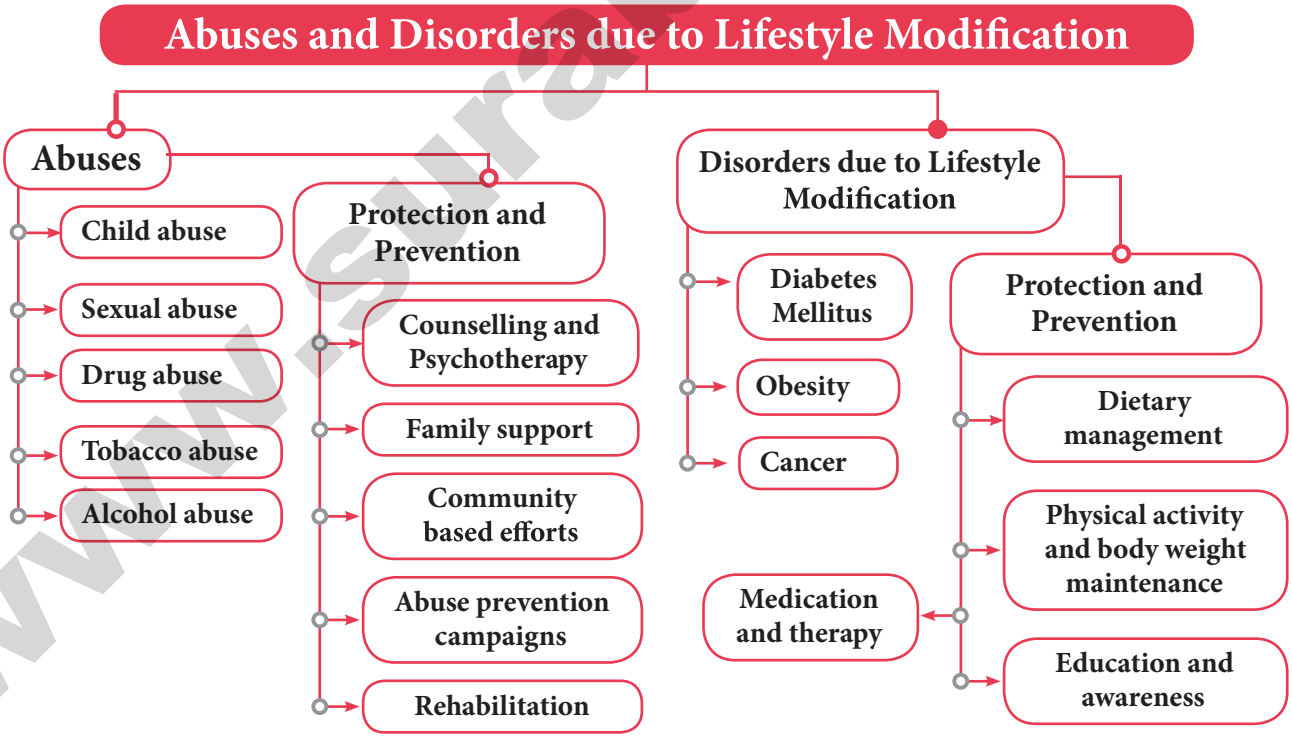
Ans. (i) This idea was developed by **Oparin (1922)** and **Haldane (1929)**. They proposed that with the conditions prevailing on earth, life arose by a series of sequential chemical reactions.

(ii) The first form of life could have come from pre-existing non-living inorganic molecules

UNIT

21 HEALTH AND DISEASES

CONCEPT MAP



MUST KNOW DEFINITIONS

Abuse	:	**Abuse** refers to cruel, violent harmful or injurious treatment of another Human being.
Drug Addiction	:	A person who is habituated to a drug due to its prolonged use is called **drug addict**. This is called **drug addiction or drug abuse**.
Emphysema	:	Inflammation of lung alveoli, decrease surface area for gas exchange and cause emphysema.
Metastasis	:	The cancerous cells migrate to distant parts of the body and affect new tissues. This process is called **metastasis**.
Myocardial Infarction	:	Death of a part of heart muscle following stoppage / cessation of blood supply to it.
Psychotropic drugs	:	Drugs act on the brain and alter behaviour, consciousness and power of thinking perception. **(mood altering drugs)**
Hyperglycemia	:	Elevated blood glucose levels.
Insulin	:	Hormone produced by pancreas which controls blood sugar levels.
Oncology	:	Study of cancer.
Carcinogen	:	Cancer causing agent.
Retrovirus	:	Group to which HIV belongs to.
Detoxification	:	The first phase of treatment in drug de-addiction is **detoxification**. The drug is stopped gradually and the addict is helped to overcome the withdrawal symptoms.
Glycosuria	:	Excess glucose exerted in urine.
Obesity	:	Obesity is the state in which there is an accumulation of excess body fat with an abnormal increase in body weight.
Atherosclerosis	:	Narrowing of blood vessels due to deposition of cholesterol.
Chemotherapy	:	Administration of anti cancerous drugs to treat cancer.
Interferons	:	Biological response modifiers used to activate immune system and destroy tumours.

TEXTBOOK EVALUATION

I. CHOOSE THE CORRECT ANSWER :

1. Tobacco consumption is known to stimulate secretion of adrenaline. The component causing this could be ⊗

(a) Nicotine (b) Tannic acid
(c) Curcumin (d) Leptin

[Ans. (a) Nicotine]

2. World 'No Tobacco Day' is observed on

[PTA-1; Aug.-'22]

(a) May 31 (b) June 6
(c) April 22 (d) October 2

[Ans. (a) May 31]

3. Cancer cells are more easily damaged by radiations than normal cells because they are ⊗

(a) Different in structure
(b) Non-dividing
(c) Mutated Cells
(d) Undergoing rapid division

[Ans. (d) Undergoing rapid division]

4. Which type of cancer affects lymph nodes and spleen?

(a) Carcinoma (b) Sarcoma
(c) Leukemia (d) Lymphoma

[Ans. (d) Lymphoma]

5. **Excessive consumption of alcohol leads to** *[GMQP-2019]*
(a) Loss of memory
(b) Cirrhosis of liver
(c) State of hallucination
(d) Supression of brain function
[Ans. (b) Cirrhosis of liver]

6. **Coronary heart disease is due to**
(a) *Streptococci* bacteria
(b) Inflammation of pericardium
(c) Weakening of heart valves
(d) Insufficient blood supply to heart muscles
[Ans. (d) Insufficient blood supply to heart muscles]

7. **Cancer of the epithelial cells is called** *[PTA-6]*
(a) Leukemia (b) Sarcoma
(c) Carcinoma (d) Lipoma
[Ans. (c) Carcinoma]

8. **Metastasis is associated with**
(a) Malignant tumour (b) Benign tumour
(c) Both (a) and (b) (d) Crown gall tumour
[Ans. (a) Malignant tumour]

9. **Polyphagia is a condition seen in**
(a) Obesity (b) Diabetes mellitus
(c) Diabetes insipidus (d) AIDS
[Ans. (b) Diabetes mellitus]

10. **Where does alcohol effect immediately after drinking?**
(a) Eyes (b) Auditory region
(c) Liver
(d) Central nervous system
[Ans. (d) Central nervous system]

II. State whether True or False, if false write the correct statement:

1. **AIDS is an epidemic disease.**
Ans. **False.**
Correct Statement : AIDS is an **pandemic** disease.

2. **Cancer causing genes are called Oncogenes.**
Ans. **True.**

3. **Obesity is characterized by tumour formation.**
Ans. **False.**
Correct Statement : Cancer is characterized by tumour formation.

4. **In leukemia both WBCs and RBCs increase in number.**
Ans. **False.**
Correct Statement : In Leukemia **WBC increases** in number.

5. **Study of cause of disease is called etiology.**
Ans. **True.**

6. **AIDS is not transmitted by contact with a patient's clothes.**
Ans. **True.**

7. **Type 2 diabetes mellitus results due to insulin deficiency.**
Ans. **False.**
Correct Statement : Type 1 diabetes mellitus results due to Insulin deficiency.

8. **Carcinogens are cancer causing agents.**
Ans. **True.**

9. **Nicotine is a narcotic drug.**
Ans. **False.**
Correct Statement: Nicotine is not a narcotic drug. It is a addictive drug.

10. **Cirrhosis is associated with brain disorder.**
Ans. **False.**
Correct Statement : Cirrhosis is associated with liver disorder.

III. Expand the following abbreviations :

1. IDDM 2. HIV 3. BMI
4. AIDS 5. CHD 6. NIDDM

Ans.
1. **IDDM** - Insulin Dependent Diabetes Mellitus.
2. **HIV** - Human Immunodeficiency Virus.
3. **BMI** - Body Mass Index.
4. **AIDS** - Acquired Immuno Deficiency Syndrome.
5. **CHD** - Coronary Heart Disease.
6. **NIDDM** - Non-Insulin Dependent Diabetes Mellitus.

IV. Match the following :

1.	Sarcoma	-	Stomach cancer
2.	Carcinoma	-	Excessive thirst
3.	Polydipsia	-	Excessive hunger
4.	Polyphagia	-	Lack of blood flow to heart muscle
5.	Myocardial Infarction	-	Connective tissue cancer

Ans.

1.	Sarcoma	-	Connective tissue cancer
2.	Carcinoma	-	Stomach cancer
3.	Polydipsia	-	Excessive thirst
4.	Polyphagia	-	Excessive hunger
5.	Myocardial Infarction	-	Lack of blood flow to heart muscle

V. Fill in the blanks :

1. Cirrhosis is caused in liver due to excessive use of _____. [Ans. Alcohol]
2. A highly poisonous chemicals derived from tobacco is _____. [Ans. Nicotine]
3. Blood cancer is called _____. *[PTA-4]* [Ans. Leukaemia
4. Less response of a drug to a specific dose with repeated use is called _____. [Ans. drug tolerance]
5. Insulin resistance is a condition in _____ diabetes mellitus. [Ans. Type 2]

VI. Analogy type questions. Identify the first words and their relationship and suggest a suitable word for the fourth blank :

1. **Communicable: AIDS: Non communicable: _____**

Ans. Diabetes mellitus.

2. **Chemotherapy: Chemicals: Radiation therapy: _____**

Ans. Radiation.

3. **Hypertension: Hypercholesterolomia: Glycosuria: _____**

Ans. Hyperglycemia.

VII. Answer in a sentence :

1. **What are psychotropic drugs?** *[PTA-2]*

Ans.
(i) There are certain drugs called psychotropic drugs which act on the brain and alter the behaviour, consciousness, power of thinking and perception.
(ii) They are **referred as mood altering drugs**.

2. **Mention the diseases caused by tobacco smoke.**

Ans. Bronchitis, Pulmonary tuberculosis, Emphysema, Oral cancer, Lung Cancer, hypoxia, Gastric and duodenal ulcers.

3. **What are the contributing factors for Obesity?** *[PTA-5; Sep-2021; Aug.-'22]*

Ans. Genetic factors, Physical inactivity, Eating habits (over eating), Endocrine factors.

4. **What is adult onset diabetes?**

Ans.
(i) **Type 2 Non-Insulin Dependent Diabetes Mellitus** is called **adult onset diabetes**
(ii) Affecting middle aged and elder people.
(iii) It develops slowly and later becomes stable.

5. **What is metastasis?**

Ans.
(i) The cancerous cells migrate to distant parts of the body and affect new tissues.
(ii) This process is called **metastasis.**

6. **How does insulin deficiency occur?**

Ans.
(i) In the case of Type I insulin dependent diabetes, the β-cells of the pancreas get destroyed.
(ii) This results in deficiency of insulin produced by the pancreas, since β-cells produce insulin.
(iii) In the case of non - insulin dependent diabetes mellitus, insulin production by the pancreas is normal but its action is impaired.
(iv) Thus in both cases, deficiency of insulin is observed.

VIII. Short answer questions :

1. **What are the various routes by which transmission of human immuno deficiency virus takes place?** *[PTA-1]*

Ans. **HIV is transmitted generally by**
(i) Sexual contact with infected person.
(ii) Use of contaminated needles or syringes.
(iii) By transfusion of contaminated / infected blood or blood products.
(iv) From infected mother to her child through placenta.

2. **How is a cancer cell different from a normal cell ?** *[PTA-4; Sep-2021]*

Ans.

S.No.	Cancer Cell	Normal cell
1.	The size of the nucleus is large.	They have normal small sized nucleus.
2.	The nucleoli are very prominent.	The nucleoli are less prominent.
3.	They can multiply indefinitely.	They have fixed rate of multiplication.

ADDITIONAL QUESTIONS & ANSWERS

CHOOSE THE CORRECT ANSWER 1 MARK

1. _____ is not related to NIDDM.
(a) Insulin administration
(b) Controlled by medicine
(c) Obese
(d) Insulin action impaired
[Ans. (a) Insulin administration]

2. _____ help reduce blood sugar levels.
(a) Sweet potato (b) Tomato
(c) Beet root (d) Cane sugar
[Ans. (b) Tomato]

3. ____ is not a method of treatment for cancer.
(a) Surgery (b) Immunotherapy
(c) Vasectomy
(d) Radiation therapy [Ans. (c) Vasectomy]

4. AIDS affects the _____ system.
(a) circulatory (b) nervous
(c) immune (d) digestive
[Ans. (c) immune]

5. _____ is not a symptom of AIDS.
(a) Increase in number of WBC
(b) Lack of appetite
(c) Weight loss
(d) Swelling of lymph nodes
[Ans. (a) Increase in number of WBC]

6. World AIDS day is observed on _____.
(a) 1st December (b) 15th December
(c) 24th November (d) 1st May
[Ans. (a) 1st December]

7. Obesity is not a risk factor for _____.
(a) AIDS (b) diabetes
(c) arthritis (d) CHD
[Ans. (a) AIDS]

8. Excess hunger is called _____
(a) polyphagia (b) polydipsia
(c) polyuria (d) glycosuria
[Ans. (a) polyphagia]

9. Sexually abused children show symptoms of _____.
(a) frequent urinary infection
(b) head ache
(c) sore head (d) migraine
[Ans. (a) frequent urinary infection]

FILL IN THE BLANKS

1. The _____ act aims to protect children from sexual offences. [Ans. Posco]
2. The _____ provides a social worker who can help an abused child. [Ans. child helpline]
3. The National Commission for protection of Child Rights was set up in _____. [Ans. March 2007]
4. The psychotrophic drugs are classified based on their mode of action on the _____. [Ans. brain]
5. _____ is an example of a metabolic disorder. [Ans. Diabetes mellitus]
6. Desirable level for blood serum cholesterol should be less than _____ for Indi[Ans. [Ans. 200 mg / dl]
7. Non-Malignant tumours are also called _____. [Ans. benign tumour]
8. HIV belongs to a group of viruses called _____. [Ans. retroviruses]
9. World Cancer Day is observed on _____ every year. [Ans. 4th February]
10. Intake of flax seeds can help reduce blood _____ levels. [Ans. sugar]
11. Nicotine is a _____. [Ans. alkaloid]
12. _____ is a carcinogenic agent present in tobacco. [Ans. Benzopyrene]
13. Anti-Tobacco Act was passed on _____. [Ans. May 1st 2004]
14. Cancerous tumours are described as _____. [Ans. malignant]
15. _____ is a test to confirm presence of HIV. [Ans. ELISA / Western blot]
16. HIV attacks the _____ of the body. [Ans. lymphocytes]
17. The word oncos means _____. [Ans. tumour]
18. A new growth or tumour is also known as _____. [Ans. Neoplasm]
19. Death of heart muscle tissue leads to _____. [Ans. myocardial infarction]
20. Deficient blood supply to heart muscles is called _____. [Ans. ischemia]
21. _____ causing agents are called Carcinogens. [Ans. Cancer]
22. Betel and tobacco chewing causes _____ cancer. [Ans. oral]

10th STD

INSTANT SUPPLEMENTARY EXAM AUGUST - 2022

Reg. No.

Part - III

Science (With Answers)

Time Allowed : 3.00 Hours] **[Maximum Marks:** 75

Instructions : 1. Check the question paper for fairness of printing. If there is any lack of fairness, inform the Hall Supervisor immediately.
2. Use **Blue** or **Black** ink to write and underline pencil to draw diagrams.

Note : This Question Paper contains **four** parts.

PART - I

Note: (i) Answer **all** the questions. **(12 × 1 = 12)**
(ii) Choose the most appropriate answer from the given **four** alternatives and write the option code and the corresponding answer.

1. To project the rockets which of the following principle(s) is /(are) required?
   (a) Newton's Third Law of Motion
   (b) Newton's Universal Law of Gravitation
   (c) Law of Conservation of Linear Momentum
   (d) Both (a) and (c)

2. The gram molecular mass of oxygen is :
   (a) 16 g (b) 18 g
   (c) 32 g (d) 17 g

3. _____ is an important metal to form amalgam.
   (a) Ag (b) Hg (c) Mg (d) Al

4. Kilowatt hour is the unit of :
   (a) Resistivity
   (b) Conductivity
   (c) Electrical Energy
   (d) Electrical Power

5. The number of periods and groups in the periodic table are _____.
   (a) 6, 16 (b) 7, 17
   (c) 8, 18 (d) 7, 18

6. During transpiration, there is loss of :
   (a) Carbon dioxide (b) Oxygen
   (c) Water
   (d) Carbon monoxide

7. Which one of the following hormones is naturally not found in plants?
   (a) 2, 4-D (b) GA3
   (c) Gibberellin (d) IAA

8. World 'No Tobacco Day' is observed on :
   (a) May 31 (b) June 6
   (c) April 22 (d) October 2

9. Which of the following is / are a fossil fuel?
   (i) Tar (ii) Coal (iii) Petroleum
   (a) (i) only (b) (i) and (ii) only
   (c) (ii) and (iii) only (d) All of the above

10. Identify the exocrine gland.
    (a) Pituitary gland (b) Adrenal gland
    (c) Salivary gland (d) Thyroid gland

11. The endarch condition is the special characteristic feature of :
    (a) Root (b) Stem
    (c) Leaves (d) Flower

12. The heart of fishes possess _____ chambers.
    (a) 3 (b) 4 (c) 2 (d) 5

PART - II

Note: Answer **any seven** questions. Question No. **22** is **compulsory.** **(7 × 2 = 14)**

13. Classify the types of force based on their application.

14. State Snell's Law.

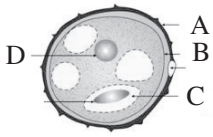
15. Define One Calorie.

16. Classify the following substances into deliquescent, hygroscopic.
    (a) Conc. Sulphuric acid
    (b) Copper Sulphate Penta hydrate

(c) Silica Gel
(d) Calcium Chloride
(e) Gypsum Salt

17. Why fossil fuels are to be conserved?

18. Identify the parts A, B, C, and D.



19. What do you understand by the term Phenotype and Genotype?

20. Why are thyroid hormones referred as 'personality hormone'?

21. Why is the colour of the blood red?

22. A person with myopia can see objects placed at a distance of 4m. If he wants to see objects at a distance of 20m, What should be the focal length and power of the concave lens he must wear?

PART - III

Note: Answer **any seven** questions. Question No. **32** is **compulsory.** **(7 × 4 = 28)**

23. Differentiate the eye defects : Myopia and Hypermetropia.

24. Describe Rocket Propulsion.

25. Write any four features of natural and artificial radiation.

26. Differentiate reversible and irreversible reactions.

27. What happens when the salt $MgSO_4.7H_2O$ is heated? Write the equation.

28. (i) What is respiratory quotient?
(ii) What are the factors affecting photosynthesis?

29. Differentiate Aerobic and Anaerobic respiration.

30. What are the contributing factors for obesity?

31. Define Ethnobotany and write its importance.

32. Calculate the resistance of a conductor through which a current of 2 A passes, when the potential difference between its ends is 30 V.

PART - IV

Note : Answer **all** the questions. Draw diagrams wherever **necessary.** **(3 × 7 = 21)**

33. (a) (i) Define inertia.
(ii) Explain the types of inertia with examples.

(OR)

(b) State Newton's Laws of Motion.

34. (a) (i) Define Relative Atomic Mass.
(ii) Define Atomicity.
(iii) Give any two examples for heterodiatomic molecules.

(OR)

(b) Give the salient features of "Modern atomic theory".

35. (a) (i) What is transpiration?
(ii) Give the importance of transpiration.

(OR)

(b) (i) List the functions of blood.
(ii) Draw the pictures of Granulocytes.

☆ ☆ ☆

Answers

PART - I

1. (d) Both (a) and (c)
2. (c) 32 g
3. (b) Hg
4. (c) Electrical Energy
5. (d) 7, 18
6. (c) Water
7. (a) 2, 4-D
8. (a) May 31
9. (c) (ii) and (iii) only
10. (c) Salivary gland
11. (b) Stem
12. (c) 2