

10<sup>th</sup>  
STD.

SEPTEMBER 2017

Supplementary Exam Question Paper With Answers

Time Allowed : 2½ Hours]

SCIENCE

[Maximum Marks : 75

SECTION - I

(MARKS : 15)

**Note:**(i) Answer all the **15** questions.

(ii) Choose the correct answer from the alternatives given in the brackets.

**15 × 1 = 15**

- Mendel observed 7 pairs of contrasting characters in *Pisum Sativum*. Which one of the following is not a part of that?  
(Tall and dwarf, Yellow and green seed colour, Terminal and axial flower, Smooth and rough stem)
- An example of protozoan infecting our intestine is \_\_\_\_\_.  
(*Plasmodium vivax*, *Entamoeba histolytica*, *Trypanosoma gambiense*, *Taenia solium*)
- The part of brain which controls emotional reactions in our body is \_\_\_\_\_.  
(Cerebellum, Cerebrum, Thalamus, Hypothalamus)
- Which of the following is correctly matched?  
(False fruit – mango, Multiple fruit – apple, Aggregate fruit – polyalthia, Caryopsis – banana)
- Mitral valve is found between \_\_\_\_\_.  
(Right auricle and right ventricle, Left auricle and left ventricle, Right ventricle and pulmonary artery, Left ventricle and aorta)
- The phloem in the plants is responsible for \_\_\_\_\_.  
(Transport of water, Transport of food, Transport of minerals, Transport of oxygen)
- An example of water - borne disease is \_\_\_\_\_.  
(Scabies, *Dracunculiasis*, Trachoma, Typhoid)
- In an exothermic process, solubility increases with \_\_\_\_\_ in temperature.  
(increase / decrease)
- Vinegar is present in acetic acid. Curd contains \_\_\_\_\_ acid.  
(Lactic acid / Tartaric acid)
- Any metal mixed with mercury is called an amalgam. The amalgam used for dental filling is \_\_\_\_\_.  
(Ag – Sn amalgam / Cu – Sn amalgam)
- IUPAC name of the first member of alkyne is \_\_\_\_\_.  
(Ethene / Ethyne)

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12. One light year is equal to \_\_\_\_\_.  
( $365.25 \times 24 \times 60 \times 60 \times 3 \times 10^8$  m,  $1 \times 24 \times 60 \times 60 \times 3 \times 10^8$  m,  $360 \times 24 \times 60 \times 60 \times 3 \times 10^8$  m)
13. The mass of a person is 5 kg. The weight of that person on the surface of the earth will be \_\_\_\_\_. (50 N, 35 N, 49 N, 490 N)
14. The atomic number of natural radioactive element is \_\_\_\_\_.  
(greater than 82, less than 82, not defined, atleast 82)
15. An object is placed 20 cm from a convex lens whose focal length is 10 cm. The image distance is \_\_\_\_\_. (50 cm, 20 cm, 6.66 cm, 10 cm)

**SECTION - II**

**(MARKS : 40)**

**Note :** Answer **any twenty** questions.

**20 × 2 = 40**

16. Match the following :

Character	Dominant Trait	Recessive Trait
Seed shape	Wrinkled	Round
Seed colour	Green	Yellow
Stem height	Tall	Dwarf
Flower position	Terminal	Axial

17. The inheritable characters vary in different species and within the same species. Name the variation in the following cases.
- (i) The eye colour among the human beings are varied as blue, black, brown, green etc. This is called as \_\_\_\_\_ variation.
- (ii) The dentition in the rabbit and the elephant are not the same. This is called as \_\_\_\_\_ variation.
18. In dogs, the barking trait is dominant over the silent trait. Using punnet square, work out the possible puppies born to two barking parents with genotype (Rr).
19. Match the following :

Disease		Symptoms	
(i)	Amoebiasis	(a)	Chills, shivering and rise in temperature
(ii)	Tuberculosis	(b)	Patches on skin and nails with itching sensation
(iii)	Ringworm	(c)	Abdominal pain with blood and mucus in stools
(iv)	Malaria	(d)	Persistent cough and loss of body weight

20. **Assertion (A) :** All spinal nerves are mixed nerves.

**Reason (R) :** Each spinal nerve has a sensory root and a motor root.

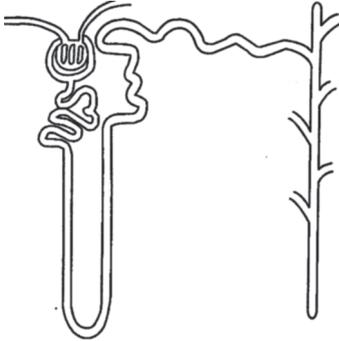
- (i) Both (A) and (R) are true and (R) explains (A).  
 (ii) Both (A) and (R) are true but (R) doesn't explain (A).  
 (iii) Only (A) is true but (R) is false.  
 (iv) (A) is false but (R) is true.

21. Draw the given diagram and label the following parts :



- (i) Exine                      (ii) Tube nucleus

22. Copy the diagram and label any two parts.



23. Mention any four adaptations seen in the camel so that it can live successfully in deserts.

24. (i) Social attachment among animals is called \_\_\_\_\_ .  
(Imprinting / Cross fostering)  
(ii) Case study of Mr. Arun Venkatraman was about \_\_\_\_\_ .  
(Dog / Dholes)

25. Sugar solution is converted into alcohol. In the above reaction

- (i) What kind of process takes place ?  
(ii) Which micro - organism is involved ?

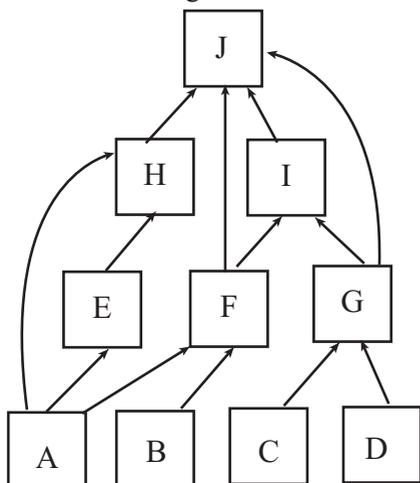
26. Match the following :

A		B	
(i)	Ammonotelic	(a)	Annelids
(ii)	Ureotelic	(b)	Fish
(iii)	Uricotelic	(c)	Mammal
(iv)	Nephridia	(d)	Birds

27. Describe the change that occurs in a touch-me-not plant when it is touched?

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28. Observe the following Food Web.



- (i) Find out the wrong statement :
- a) 'A' is a producer                      b) 'F' is a herbivore  
 c) 'H' is an omnivore                      d) 'I' is a climax carnivore
- (ii) Find out how many food chains are present in the above food web.
29. Pick out the appliances that can conserve electric energy.  
 Fluorescent bulbs, copper choke, solar water heater, electric water heater, tungsten bulbs, electronic choke.
30. Fossil fuels are formed by decomposition of biomass buried under the earth over millions of years ago.
- (i) Name any one fossil fuel.  
 (ii) Which fuel is used in the production of fertilizers?
31. Find the odd one out:
- (i) bio alcohol, green diesel, bio ethers, petroleum.  
 (ii) cholera, typhoid, scabies, dysentery.
32. Beaker 'A' has chalk powder mixed with water and Beaker 'B' has protein dissolved in water.
- (i) Which solution shows Brownian movement?  
 (ii) Identify the solution that has particle size greater than 2000 Å.  
 (iii) Which beaker contains colloidal solution?  
 (iv) Say whether colloidal solution is homogeneous or heterogeneous.
33. Take 10 g of common salt and dissolve it in 40 g of water. Find the concentration of solution in terms of weight percent.
34. Give a single term substitute for each of the following :
- (i)  $6.023 \times 10^{23}$  molecules  
 (ii) 22.4 litres of gas at STP  
 (iii)  $1/12^{\text{th}}$  part of the mass of one atom of carbon - 12  
 (iv) Half of relative molecular mass

35. Correct the wrong statement.
- Hydrochloric acid is an organic acid.
  - The ideal pH of blood is 5.5.
36. When lead powder is added to copper chloride solution a displacement reaction occurs and solid copper is formed.
- Write the equation for the reaction.
  - Why does the displacement reaction occur?
37. **Assertion** : In thermite welding, aluminium powder and  $\text{Fe}_2\text{O}_3$  are used.  
**Reason** : Aluminium powder is a strong oxidising agent. Does the reason satisfy the assertion?
38. Guess who am I ?
- I am a constituent of blood pigment. When I am less in quantity, the person is anaemic.
  - I am formed when matrix and flux react.
39. An organic compound A is widely used as a preservative in pickle and has a molecular formula  $\text{C}_2\text{H}_4\text{O}_2$ . This compound reacts with ethanol to form a sweet smelling compound B.
- Identify the compounds A and B.
  - Name the process and write corresponding chemical equation.
40. The important use of cryogenics is cryogenic fuels. What do you mean by cryogenic fuels ?
41. Give any two differences between Mass and Weight.
42. Complete the table choosing the right terms within the brackets.  
(Zinc, Copper, Carbon, Lead, Lead dioxide, Aluminium)

+ve electrode	Lead acid accumulator	.....
-ve electrode	Lechlanche cell	.....

43. Correct the mistakes, if any, in the following statements.
- A good source of energy would be one which would do a small amount of work per unit volume of mass.
  - Any source of energy we use to do work is consumed and can be used again.
44. Draw the schematic diagram of an electric circuit consisting of a battery of two cells of 1.5 V each, three resistance of 5 ohm, 10 ohm and 15 ohm respectively and a plug key all connected in series.
45. Correct the mistakes, if any, in the following statements.
- The magnetic field is a quantity that has magnitude only.
  - Outside the bar magnet, the magnetic field lines emerge from the south pole and merge at the north pole.
46. Write down the names of the specified parts of the human eye.
- Dark muscular diaphragm that controls the pupil.
  - The screen where the image is formed by the eye lens.
47. A needle placed at 30 cm from the lens forms an image on a screen placed 60 cm on the other side of the lens. Identify the type of lens and determine the focal length.

## SECTION - III

(MARKS : 20)

- Note:** (i) Answer **any four** questions by choosing **one** question from each part.  
 (ii) Each questions carries **five** marks.  
 (ii) Draw diagrams wherever necessary.

 $4 \times 5 = 20$ 

## PART - I

48. What is immunity ? Write a note on the various types of immunity.  
 49. Name the endocrine glands and their location in the human body. Describe any two of them in detail.

## PART - II

50. What is self-pollination? Mention its merits and demerits.  
 51. In your locality people are affected due to water scarcity. What measures will you take to deal with the problem of the water scarcity? (Any five)

## PART - III

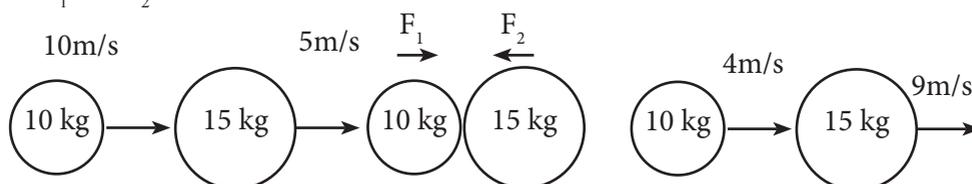
52. Find how many moles of atoms are there in:  
 (i) 2 g of nitrogen (ii) 23 g of sodium  
 (iii) 40 g of calcium. (iv) 1.4 g of lithium  
 (v) 32 g of sulphur.

53. Complete the following table :

Molecular Formula	Common Name	IUPAC Name
$\text{CH}_3\text{CH}_2\text{CH}_2\text{CH}_2\text{OH}$	_____	_____
_____	Dimethyl ketone (Acetone)	_____
_____	_____	Propanal
$\text{HCOOH}$	_____	_____
_____	_____	Butanone

## PART - IV

54. (i) Newton's first law of motion gives a qualitative definition of force. Justify.  
 (ii) The figure represents two bodies of masses 10 kg and 15 kg, moving with an initial velocity of  $10 \text{ ms}^{-1}$  and  $5 \text{ ms}^{-1}$  respectively. They collide with each other. After collision, they move with velocities  $4 \text{ ms}^{-1}$  and  $9 \text{ ms}^{-1}$  respectively. The time of collision is 2 s. Now calculate  $F_1$  and  $F_2$ .



55. (i) The optical prescription of a pair of spectacle is :  
 Right eye : – 3.5 D      Left eye : – 4.00 D
- (a) Name the defect of the eye.  
 (b) Are these lenses thinner at the middle or at the edges ?  
 (c) Which lens has a greater focal length?
- (ii) Define power of lens and give its unit.



## ANSWERS

### Section - I

- |                                    |                                                                   |
|------------------------------------|-------------------------------------------------------------------|
| 1. Smooth and rough stem           | 2. Entamoeba histolytica                                          |
| 3. Hypothalamus                    | 4. Aggregate fruit – polyalthia                                   |
| 5. Left auricle and left ventricle | 6. Transport of food                                              |
| 7. Typhoid                         | 8. decrease                                                       |
| 9. Lactic acid                     | 10. Ag – Sn amalgam                                               |
| 11. Ethyne                         | 12. $365.25 \times 24 \times 60 \times 60 \times 3 \times 10^8$ m |
| 13. 49 N                           | 14. greater than 82                                               |
| 15. 6.66 cm                        |                                                                   |

### Section - II

16.

Character	Dominant Trait	Recessive Trait
Seed shape	Round	Wrinkled
Seed colour	Yellow	Green
Stem height	Tall	Dwarf
Flower position	Axial	Terminal

17. (a) Intra specific (b) Inter specific.

18.

	Barking Type	Barking Type
Parents	Rr	Rr
Gametes	R r	R r

F<sub>1</sub>

♂	R	r
♀	RR	Rr
	Rr	rr

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Punnet square

RR	Rr	rr
1	2	1
Barking Trait	Barking Trait	Silent trait
Genotypic ratio	= 1 : 2 : 1	
Phenotypic ratio	= 3 : 1	

	Disease		Symptoms
19.	(i) Amoebiasis	(c)	Abdominal pain with blood and mucus in stools
	(ii) Tuberculosis	(d)	Persistent cough and loss of body weight
	(iii) Ringworm	(b)	Patches on skin and nails with itching sensation
	(iv) Malaria	(a)	Chills, shivering and rise in temperature

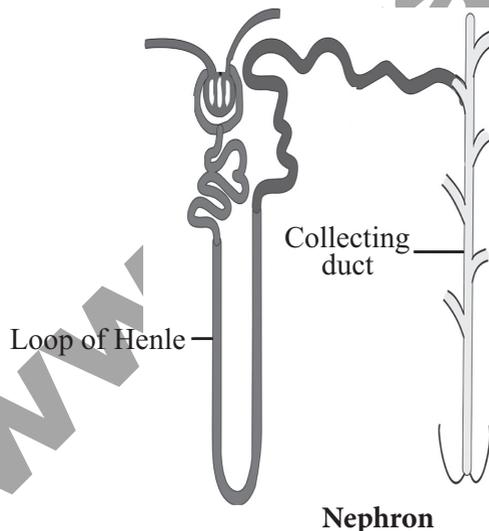
20. (i) Both 'A' and 'R' are true and 'R' explains 'A'.

21. (i) Exine



(ii) Tube nucleus

22.



23. (a) The skin of camel is doubly thick.  
 (b) The skin contains water-storing osmotic cells to conserve water, as they live in deserts.  
 (c) They have thick bushy eyebrows covering the eyes to protect their eyes from sand storms.  
 (d) Their nostrils can be closed during desert storms to prevent the entry of sand particles.
24. (i) Imprinting (ii) Dholes

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25. (i) Fermentation (ii) Yeast
26. Match the following :

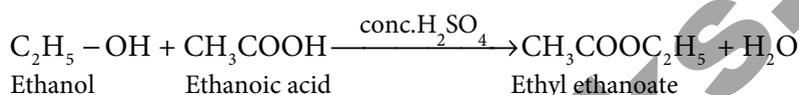
A		B	
(i)	Ammonotelic	(b)	Fish
(ii)	Ureotelic	(c)	Mammal
(iii)	Uricotelic	(d)	Birds
(iv)	Nephridia	(a)	Annelids

27. 1. If we touch the plant at one point, all the leaflets show the folding movement.  
 2. This indicates that the stimulus at one point is communicated.  
 3. The folding is caused by a change in the turgidity of the leaflets brought about by the movement of water into and out of the parenchymatous cells of the pulvinus or swollen leaf base.
28. (i) Wrong statement : d) 'I' is a climax carnivore  
 (ii) Number of food chains in the food web : 10.
29. To conserve electric energy, following appliances are used:  
 (i) Fluorescent bulbs.  
 (ii) Solar water heater.  
 (iii) Electronic choke.
30. (i) Coal / Petroleum / Natural gas  
 (ii) Natural gas
31. (a) Petroleum. It is a fossil fuel and the others are bio fuels.  
 (b) Scabies. It is a water washed disease and the others are water borne diseases.
32. (i) The protein solution in beaker 'B' shows Brownian movement.  
 (ii) The solution in beaker A has particle size greater than 2000 Å.  
 (iii) Beaker 'B' contains colloidal solution.  
 (iv) Colloidal solution is heterogeneous in nature.
33. Weight of Common Salt (Solute) = 10g.  
 Weight of Water (Solvent) = 40g.  
 Weight percent =  $\frac{\text{Weight of the solute}}{\text{Weight of solute} + \text{Weight of solvent}} \times 100$   

$$= \frac{10}{10 + 40} \times 100 = 20\%$$
- The concentration of solution in terms of weight percent = 20%.
34. Give a single term substitute for each of the following:  
 (i) 1 mole (or) Avogadro Number  
 (ii) Molar Volume  
 (iii) Atomic Mass Unit (amu)  
 (iv) Vapour density

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35. (i) Hydrochloric acid is an **inorganic** acid.  
 (ii) The ideal pH for blood is **7.4**.
36. (i)  $\text{Pb} + \text{CuCl}_2 \rightarrow \text{PbCl}_2 + \text{Cu}\downarrow$ .  
 (ii) A more reactive element displaces a less reactive element from its compounds. Lead being more reactive than copper. It has displaced copper from its salt.
37. Yes. The reason satisfies the assertion.
38. (i) Iron (Fe) (ii) Slag
39. (i) Compound used in pickles as a preservative is vinegar – Acetic acid–  $\text{CH}_3\text{COOH}$ .  
 When Acetic acid reacts with ethanol, in the presence of conc.  $\text{H}_2\text{SO}_4$ , it forms ester with sweet smell.  
 (ii) The process is called Esterification.



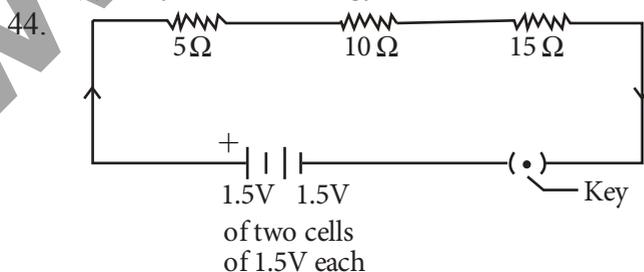
Compound	Molecular formula	Name
A	$\text{CH}_3\text{COOH}$	Acetic acid (or) ethanoic acid
B	$\text{CH}_3\text{COOC}_2\text{H}_5$	Ethyl ethanoate

40. (i) Cryogenic fuels are fuels that require storage at extensively low temperatures in order to maintain them in a liquid state.  
 (ii) It constitutes liquified gases such as liquid hydrogen which is mainly used for rockets as a fuel.  
 (iii) It produces energy at very low temperature. Eg. Liquid hydrogen.

Mass	Weight
Fundamental quantity.	Derived quantity.
It is the amount of matter contained in a body.	It is the gravitational pull acting on the body.
Its unit is kilogram.	Its unit is Newton.

+ve electrode	Lead acid accumulator	<b><u>Lead dioxide</u></b>
- ve electrode	Leclanche cell	<b><u>Zinc</u></b>

43. (a) A good source of energy would be one which would do a **large** amount of work per unit volume of mass.  
 (b) Any source of energy we use to do work is consumed and **cannot** be used again.



45. (i) Magnetic field is a quantity that has **both magnitude and direction**.  
 (ii) Outside the bar magnet, the magnetic field lines emerge from the **north** pole and merge at the **south** pole.
46. (i) Iris (ii) Retina
47.  $u = -30 \text{ cm}$  ;  $v = 60 \text{ cm}$

The type of lens is convex lens

$$\frac{1}{f} = \frac{1}{v} - \frac{1}{u} = \frac{1}{60} - \left( \frac{1}{-30} \right)$$

$$\frac{1}{f} = \frac{1}{60} + \frac{1}{30}$$

$$\frac{1}{f} = \frac{1}{f} = \frac{1+2}{60} = \frac{3}{60}$$

$$f = \frac{60}{3} = 20 \text{ cm}$$

### Section - III

#### PART - I

#### 48. Immunity:

It is the body's defence against or the specific resistance exhibited towards infectious organisms.

#### Types of Immunity:

##### 1. Natural or Innate Immunity

It enables an individual to develop resistance to the disease, to which, the particular species is immune.

Eg. Plant diseases do not affect animals.

##### 2. Acquired or Specific Immunity

The resistance against some infectious diseases developed by an individual during lifetime, on exposure to the infections is called acquired or specific immunity.

##### a) Active acquired Immunity

It is developed by our body, during the first infection of any pathogen. The antibodies produced in the blood remains for a long period and kill the similar pathogens, whenever they enter the body.

##### Naturally Active Acquired Immunity

Antibody production is stimulated naturally after recovery from a disease.

##### Artificially Active Acquired Immunity

Antibody synthesis is stimulated by administration of vaccines or any other man-made methods.

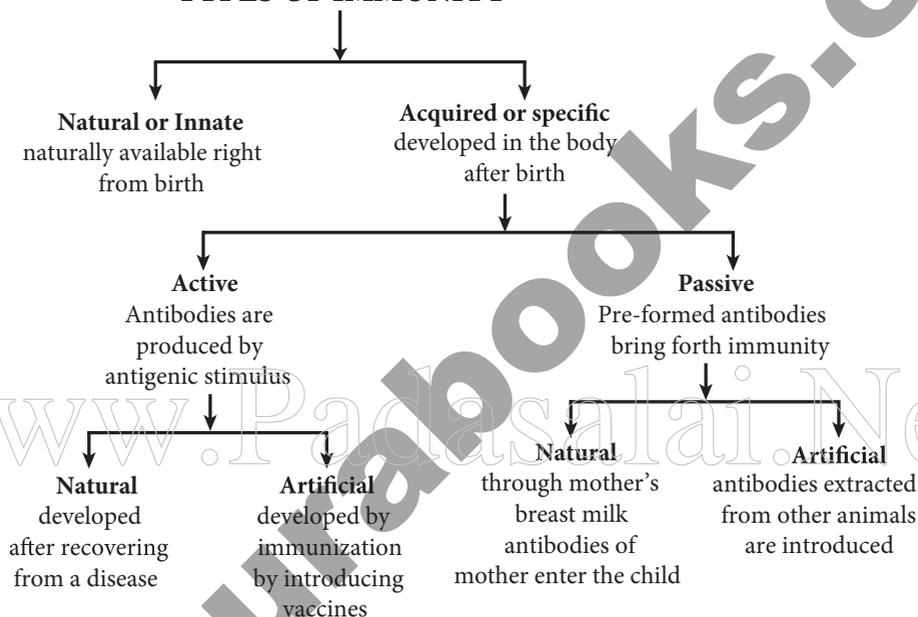
b) **Passive acquired Immunity**

A ready-made antibody is introduced from outside, instead of stimulating the body to produce antibody with antigenic stimulus.

**Naturally Passive Acquired Immunity**

Readymade antibody is taken from the mother's blood into the foetus. Artificial Passive Acquired Immunity

If the readymade antibody is given to an individual artificially (produced in some other animal and extracted), it is called Artificial Passive Acquired Immunity. This is not permanent.

**TYPES OF IMMUNITY**

49.

No.	Name of the endocrine gland	Location in human body
1.	Pituitary gland	Head.
2.	Pineal gland	Head
3.	Thyroid gland	Neck – one lobe on each side of larynx
4.	Parathyroid gland	Neck
5.	Thymus gland	Thorax
6.	Pancreas – Islets of Langerhans	Abdomen
7.	Adrenal gland	Abdomen - one on top of each kidney
8.	Gonads – testes in man, ovaries in women	Abdomen

- I. **Thyroid Gland** : The bilobed thyroid gland is located in the neck, one lobe on each side of larynx. It produces a hormone called thyroxine which has a amino acid tyrosine and iodine.

*Functions of Thyroxine :*

1. It increases the rate of metabolism.
2. It stimulates a rise in the body temperature.
3. It indirectly affects the growth of the body and is also called personality hormone.

*Thyroid disorders :*

1. *Hypothyroidism* - less secretion of thyroxine. It causes diseases like
  - (a) Simple goitre - Thyroid gland bulges as a swelling.
    - It is caused due to Iodine deficiency in diet.
  - (b) Myxoedema - Low metabolic rate, thickening of skin, lowered heart beat etc in adults.
  - (c) Cretinism - Stunted growth in children with retarded mental development.
2. *Hyperthyroidism* : Excess production of thyroxine causes Grave's disease or exophthalmic goitre. The symptoms are high metabolic rate, high blood pressure, loss of weight, fatigue etc.

**II. Islets of Langerhans :** The endocrine cells seen in the pancreas are called islets of langerhans. It consists of two types of cells. Alpha cells produce a hormone called glucagon and beta cells produce a hormone called insulin.

*Insulin* : It promotes the uptake of glucose by the cells for tissue oxidation. It favours conversion of glucose into glycogen and its storage in the liver and the muscles.

*Glucagon* : It influences the conversion of glycogen into glucose thus raising blood glucose level when the blood glucose level is low.

*Diabetes mellitus* : Less production of insulin causes diabetes mellitus in which excess unused glucose is excreted in the urine. A proper balance between insulin and glucagon is necessary to maintain proper blood glucose level (80 - 120 mg/dl of blood).

**PART - II****50. Self pollination :**

The transfer of pollen grains from the anther of a flower to the stigma of the same flower or another flower of the same plant is known as self pollination.

**Merits :**

1. Self pollination is certain in bisexual flowers.
2. Flowers do not depend on agents for pollination.
3. There is no wastage of pollen grains.

**Demerits :**

1. The seeds are less in number.
2. Endosperm is minute. Therefore, the seeds produce weak plants.
3. New varieties of plants cannot be produced.

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51. To meet out the water scarcity, we must adopt several ways to increase the water supply.
- (i) **Seeding clouds:** Seeding clouds with dry ice or potassium iodide particles sometimes can initiate rain, if water laden clouds and conditions that favour precipitation are present.
  - (ii) **Desalination (Reverse osmosis):** Desalination of ocean water is a technology that has great potential for increasing freshwater. In desalination, the common methods of evaporation and recondensation are involved.
  - (iii) **Dams, reservoirs and canals :** Dams and storage reservoirs tap run off water in them and transfer the water from areas of excess to deficit areas using canals and underground pipes.
  - (iv) **Water Shed Management :** The management of rainfall and resultant run-off is called watershed management. Water shed is an area characterized by construction of small dams to hold back water which will provide useful wildlife habitat and stock watering facilities.
  - (v) **Rain Water Harvesting :** Rain water harvesting essentially means collecting rain water from the roof of building or courtyards and storing it underground for later use. The process of rain water harvesting is not only simple but also economically beneficial. It helps in meeting the increased demand for water, particularly in urban areas and prevent flooding of living areas.

**PART - III**

52. (i) No. of moles in 2 g of nitrogen =  $\frac{\text{given mass}}{\text{atomic mass}}$
- $$= \frac{2}{14} = 0.142 \text{ mole.}$$
- (ii) No. of moles in 23 g of sodium atom =  $\frac{\text{given mass}}{\text{atomic mass}}$
- $$= \frac{23}{23} = 1 \text{ mole.}$$
- (iii) No. of moles in 40 g of calcium =  $\frac{40}{40} = 1 \text{ mole.}$
- (iv) No. of moles in 1.4 g of lithium =  $\frac{\text{given mass}}{\text{atomic mass}}$
- $$= \frac{1.4}{7} = 0.2 \text{ mole.}$$
- (v) No. of moles in 32 g of sulphur =  $\frac{32}{32} = 1 \text{ mole.}$

53.

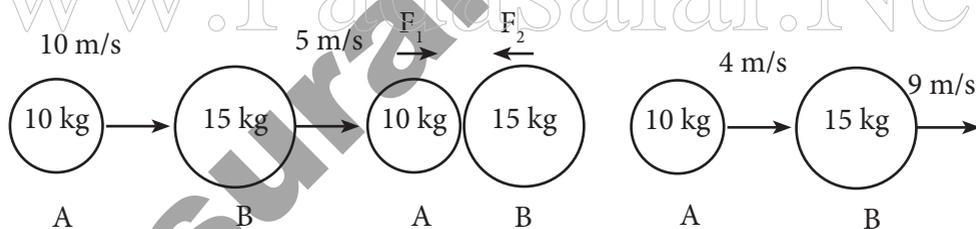
Molecular Formula	Common Name	IUPAC Name
$\text{CH}_3\text{CH}_2\text{CH}_2\text{CH}_2\text{OH}$	<i>n-Butyl alcohol</i>	<i>1-Butanol</i>
	Dimethyl ketone (Acetone)	<i>Propanone</i>
$\text{CH}_3\text{CH}_2\text{CHO}$	<i>Propionaldehyde</i>	Propanal
$\text{HCOOH}$	<i>Formic acid</i>	<i>Methanoic acid</i>
$\text{CH}_3\text{CH}_2-\underset{\text{O}}{\underset{\parallel}{\text{C}}}-\text{CH}_3$	<i>Ethyl methyl ketone</i>	Butanone

## PART - IV

54. (i) **Newton's first law of motion** states that an object remains in the state of rest or of uniform motion in a straight line unless compelled to change that state by an applied unbalanced force.

**Reason :** We tend to remain at rest with respect to the seat, until the driver applies brake to stop the motor car. With the application of brake, the car slows down but our body tends to continue in the same state of motion because of inertia. A sudden application of brake may cause injury to us by collision with the panels in front.

(ii)



Mass of a body A, ( $m_1$ )	= 10 kg
Mass of a body B, ( $m_2$ )	= 15 kg
Initial velocity of A, ( $u_1$ )	= 10 m/s
Initial velocity of B, ( $u_2$ )	= 5 m/s
Final velocity of A, ( $v_1$ )	= 4 m/s
Final velocity of B, ( $v_2$ )	= 9 m/s
The time of collision, ( $t$ )	= 2 seconds.

According to Newton's second law of motion,

Force acting on B (action),  $F_1 = \text{mass of B} \times \text{acceleration on B}$

$$F_1 = \frac{m_2(v_2 - u_2)}{t}$$

$$= \frac{15(9-5)}{2} = \frac{15 \times 4}{2} = 30\text{N}$$

$$F_1 = 30\text{ N}$$

Force acting on A (reaction),

$$F_2 = \text{mass of A} \times \text{acceleration on A}$$

$$F_2 = \frac{m_1(v_1 - u_1)}{t}$$

$$= \frac{10(4-10)}{2} = \frac{10 \times (-6)}{2} = -30\text{ N}$$

$$F_2 = -30\text{ N}$$

According to Newton's third law of motion

$$F_1 = -F_2$$

$$\therefore F_1 = -30\text{ N}$$

$$F_2 = -30\text{ N}$$

55. (i) (a) Myopia or short sightedness.  
 (b) Thinner in the middle. (concave lens)  
 (c) Right eye :  $f = \frac{1}{P} = \frac{1}{-3.5} = -0.285$

$$\text{Left eye : } f = \frac{1}{P} = \frac{1}{-4} = -0.25$$

Hence the lens used for right eye has greater focal length.

- (ii) The power of a lens is defined as the reciprocal of its focal length. It is represented by the letter P. The power P of a lens of focal length f is given by  $P = \frac{1}{f}$ .

The SI unit of power of a lens is 'dioptré'. It is denoted by the letter D. If f is expressed in meter, then, power is expressed in dioptré. Thus 1 dioptré is the power of a lens whose focal length is 1 meter. The power of a convex lens is positive and that of a concave lens is negative.

