

Answers to RST/Set-3

SECTION – A

1. (a) During respiration, the exchange of gases occurs in the alveoli of the lungs.
2. (b) Transpiration: creates a suction force which pulls water inside the plant.
3. (a) Promote cell division.
4. (b) tongue
5. (c) 3 : 1
6. (c) fish eating birds
7. (c) (i) and (iii)
8. (b) Both A and R are true, and R is not the correct explanation of A.
9. (c) A is true but R is false.
10. (a) The experimental set up done by Amita shows that carbon dioxide is necessary for photosynthesis.
 - (b) Potassium hydroxide has been kept in the watch glass in set up (i).
Potassium hydroxide absorbs carbon dioxide gas present in the bell jar.
 - (c) In set up (i), the leaf of the plant remains colourless showing the absence of starch. This is due to the carbon dioxide in set up (i) has been absorbed by potassium hydroxide and the plant has not performed photosynthesis in the absence of carbon dioxide.
11. A. The inner wall of alimentary canal is not digested because it has the following protective mechanisms:
 - (i) The gastric mucin secreted by the gastric mucosa acts as buffer, which reduces high gastric acidity and prevents injury to the inner wall of the alimentary canal.
 - (ii) The enzymes are secreted only when food is present in the alimentary canal and they are in an inactive form.

OR

- B. The opening and closing of the stomatal pore is a function of the guard cells. The guard cells swell when water flows into them causing the stomatal pore to open. Similarly, the stomatal pore closes if the guard cells shrink. As large amount of water is lost through these stomata, the plant closes these pores when it does not require carbon dioxide for photosynthesis.
12. (a) 1,000 Joules of energy will be available to the organism of the 2nd trophic level.
 - (b) Only green plants can make their own food from sunlight. Green plants therefore, always occupy the 1st trophic level in a food chain.

13. A reflex action is a sudden, automatic and involuntary response to a stimulus, which does not involve the conscious will of the brain.

Steps involved:

- (i) Stimulus – A change in the environment (like heat, pain, touch) is detected.
- (ii) Receptor – A sense organ (like skin) receives the stimulus.
- (iii) Sensory neuron – Carries the message from the receptor to the spinal cord.
- (iv) Interneuron (Relay neuron) – Located in the spinal cord; processes the information and forms a response without involving the brain immediately.
- (v) Motor neuron – Carries the command from the spinal cord to the effector organ.
- (vi) Effector – A muscle or gland that shows the response (like pulling the hand away).

14. In a dihybrid cross, when two contrasting pairs of traits were considered simultaneously, only one parental combination appeared in F_1 generation. In F_2 generation after self pollination, four combinations of traits appeared. Out of these four combinations, two were parental type traits and two were new combinations.

Parents : Round, yellow seed × Wrinkled, green seed
 RRYy × rryy

Gametes : \textcircled{RY} \textcircled{ry}

F_1 Progeny : RrYy (Round, yellow seeds)

Selfing : RrYy × RrYy

Gametes : \textcircled{RY} , \textcircled{Ry} , \textcircled{rY} , \textcircled{ry} \textcircled{RY} , \textcircled{Ry} , \textcircled{rY} , \textcircled{ry}

F_2 progeny :

	RY	Ry	rY	ry
RY	RRYY Round, yellow	RRYy Round, yellow	RrYY Round, yellow	RrYy Round, yellow
Ry	RRYy Round, yellow	RRyy Round, green	RrYy Round, yellow	Rryy Round, green
rY	RrYY Round, yellow	RrYy Round, yellow	rrYY Wrinkled, yellow	rrYy Wrinkled, yellow
ry	RrYy Round, yellow	Rryy Round, green	rrYy Wrinkled, yellow	rryy Wrinkled, green

– The phenotypic ratio of the F₂ generation is

Round, yellow- seeded plants 9	:	Round, green- seeded plants 3	:	Wrinkled, yellow- seeded plants 3	:	Wrinkled green- seeded plants 1
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If 1120 plants were obtained in F₂ progeny, the number of plants having new combinations were

$$\text{Round and green seeds} = \frac{3}{16} \times 1120 = 210$$

$$\text{Wrinkled and yellow seeds} = \frac{3}{16} \times 1120 = 210$$

Conclusion:

We can conclude that round and yellow colour seeds are dominant. Occurrence of new combinations show that genes for round and yellow colour seeds are inherited independently of each other. This law is known as ‘Law of Independent Assortment.’

15. (a) (i) Urea, Uric acid

(ii) – The amount of water reabsorbed depends on how much excess water there is in the body.

– How much of dissolved waste there is to be excreted.

OR

(b) Steps involved in urine formation:

- **Glomerular filtration:** Nitrogenous wastes, glucose, water, amino acid filter from the blood into Bowman’s capsule of the nephron.
- **Tubular reabsorption:** Useful substances from the filtrate are reabsorbed back by capillaries surrounding the nephron.
- **Secretion:** Urea, extra water and salts are secreted into the tubule which open up into the collecting duct and then into the ureter.

(c) A – Branch of renal artery

B – Glomerulus

C – Tubular part of nephron

D – Collecting duct

(d) Urine contains pigment urochrome which imparts yellow colour to the urine.

16. A. (a) (i) Rose — vegetative propagation by stem

(ii) Yeast — budding

(iii) *Planaria* — regeneration.

- (b) Fragmentation is an asexual method of reproduction in which an organism simply breaks up into smaller pieces upon maturation. These pieces or fragments grow into new individuals. e.g. *Spirogyra*.
- (c) (i) They can produce a large number of offspring in a small period of time.
(ii) The offspring are adapted to survive in the same environment.

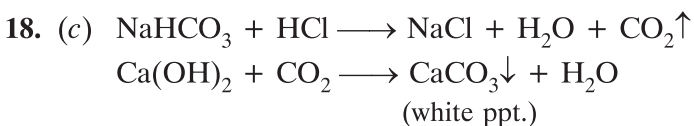
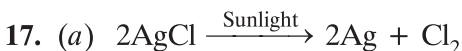
OR

- B. (a) In human females, placenta provides nutrition from the mother's blood to the embryo. It facilitates movement of glucose and oxygen from the mother to the embryo. The developing embryo also generates waste substances which are removed by transferring into the mother's blood through placenta.
- (b) **Four ways of preventing pregnancy are:**
- (i) Use of mechanical barriers such as condom.
(ii) Use of surgical methods such as vasectomy for male and tubectomy for female.
(iii) Use of chemical methods such as oral and vaginal pills.
(iv) Use of copper T.

Two advantages of using these preventive methods are:

- (i) These methods help in avoiding unwanted pregnancy and keeping gap between two children.
(ii) These methods help in limiting the sexually transmitted diseases.

SECTION – B



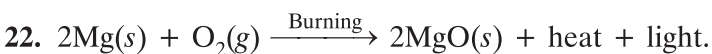
19. (c) In beaker 'P' zinc reacts with CuSO_4 and forms ZnSO_4 as zinc is more reactive than copper



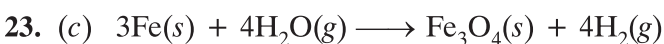
In beaker 'Q' silver does not react with CuSO_4 as silver is less reactive than copper.

20. (d) They can undergo the same chemical reactions

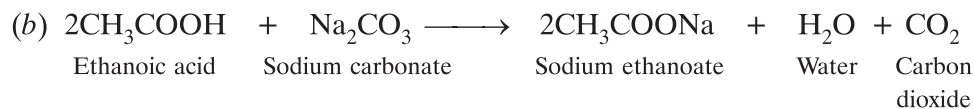
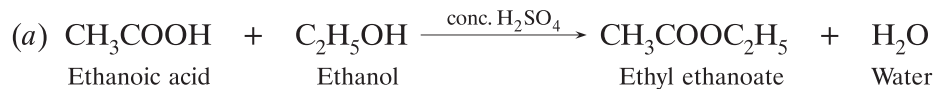
21. (d) Clove oil and vanilla essence



It is combination reaction because two elements combine to form one compound.

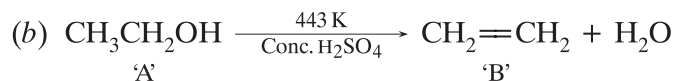


29. A. X' is ethanoic acid.



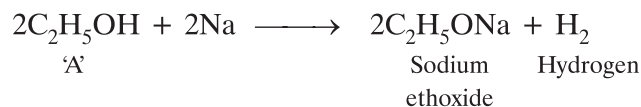
OR

B. (a) 'A' is $\text{CH}_3\text{CH}_2\text{OH}$, 'B' is $\text{CH}_2=\text{CH}_2$ (Ethene), 'C' is CH_3-CH_3 (Ethane).
(Ethanol)



(d) Hydrogenation reaction is used to convert vegetable oil to vegetable ghee.

(e) Sodium ethoxide and hydrogen gas are formed.



SECTION - C

30. (c) Both concave mirror and convex lens can make a parallel beam of light when light from a point source is incident on it.

31. (c) there is no atmosphere to scatter sunlight in space

32. (b) Both A and R are true, and R is not the correct explanation of A.

33. Power of lens,
$$P = \frac{1}{f \text{ (in metres)}}$$

$$\Rightarrow 1.5 = \frac{1}{f}$$

$$\Rightarrow f = \frac{1}{1.5} = \frac{2}{3} = +0.67 \text{ m} = +67 \text{ cm}$$

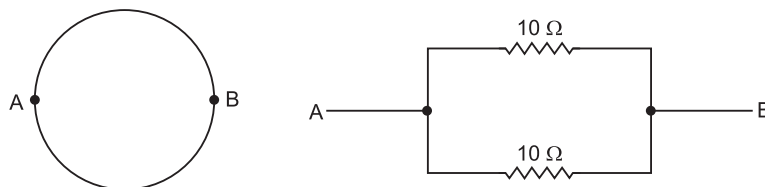
Hence the focal length of the given corrective lens is 67 cm. The positive value of focal length indicates that the prescribed lens is converging, i.e. convex lens.

34. A. (a) As the wire is bent at its mid-point, thus resistance of each semi-circle

$$R = \frac{20}{2} = 10 \Omega$$

Effective resistance between A and B

$$R_{\text{effective}} = \frac{10 \times 10}{10 + 10} = \frac{100}{20} = 5 \Omega.$$



(b) $P = 1000 \text{ W}, t = 30 \text{ min} = \frac{1}{2} \text{ h}$

Electric energy consumed $W = Pt = 1000 \text{ W} \times \frac{1}{2} \text{ h} = 500 \text{ Wh} = 0.5 \text{ kWh}$

OR

- B. (a) R_1 and R_2 are connected in series, so the resistance is

$$R_s = R_1 + R_2 = 6 + 6 = 12 \Omega$$

Now, we can see R_s and R_3 are in parallel, the net resistance is

$$\frac{1}{R_p} = \frac{1}{R_s} + \frac{1}{R_3} = \frac{1}{12} + \frac{1}{12} = \frac{1+1}{12}$$

$$R_p = \frac{12}{2} = 6 \Omega$$

So the effective resistance of the given electric circuit is 6Ω .

- (b) $V = 6 \text{ V}, R = 6 \Omega, I = ?$

$$V = IR$$

$$I = \frac{V}{R} = \frac{6}{6} = 1 \text{ A}$$

The current recorded by ammeter is 1 A .

35. According to question, for a virtual image

$$m = +\frac{1}{3}, u = -18 \text{ cm}$$

But, $m = -\frac{v}{u} = +\frac{1}{3}$

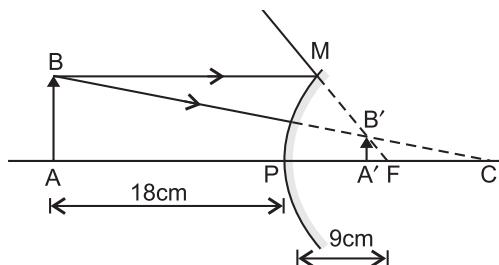
$\Rightarrow v = -\frac{u}{3} = -\frac{-18}{3} = +6 \text{ cm}$

Using mirror formula,

$$\begin{aligned} \frac{1}{f} &= \frac{1}{v} + \frac{1}{u} = \frac{1}{6} + \frac{1}{-18} \\ &= \frac{1}{6} - \frac{1}{18} = \frac{3-1}{18} = \frac{2}{18} = \frac{1}{9} \end{aligned}$$

$\therefore f = +9 \text{ cm}$

So, the focal length of the given spherical mirror is 9 cm. The positive sign shows the given mirror is convex in nature.



36. Let the resistance of fuse wire that melts at 5 A be R_1 . Then heat produced every second is,

$$H = I_1^2 R_1 = 5^2 R_1 = 25R_1 \quad \dots(i)$$

Let the resistance of new fuse wire for current I_2 be R_2 . For the same heat,

$$H = I_2^2 R_2 = 10^2 R_2 = 100R_2 \quad \dots(ii)$$

From equation (i) and (ii), we have

$$100R_2 = 25R_1$$

$$\Rightarrow \frac{R_2}{R_1} = \frac{1}{4}$$

But $R \propto \frac{1}{A}$ (A = Area of cross-section of wire)

$$\therefore \frac{R_2}{R_1} = \frac{A_1}{A_2} = \frac{1}{4} \Rightarrow A_2 = 4A_1$$

$$\Rightarrow \pi r_2^2 = 4\pi r_1^2 \Rightarrow r_2 = 2r_1$$

Therefore, the radius of new fuse wire would be larger and twice that of earlier one.

37. (a) (i) Magnitude of current
(ii) Strength of the magnetic field
(iii) Orientation of the conductor in the magnetic field
(iv) Length of the conductor (any three)
- (b) When the current carrying conductor is placed at right angles (or perpendicular) to the direction of the magnetic field.
- (c) Fleming's Left-hand rule
Electric motor/Microphones/Generator (any one)
38. (a) In bright sunlight, the iris contracts the pupil to allow less light to enter the eye and in dim light, the iris expands the pupil to admit more light to see the object clearly. Therefore, it takes sometime to increase the size of pupil in dim light.
- (b) The person is suffering from myopia/near sightedness.
- (c) Presbyopia is a defect of vision in which the power of accommodation of the eye decreases with age. For most of the people, the near point gradually recedes and the far point comes closer.

Presbyopia can be corrected by using bi-focal lens, where upper part of the spectacles has concave lens and the lower part has convex lens.

OR

(d) When the crystalline lens of eye becomes hazy (or even opaque) due to the formation of thin membrane over it, this causes partial or complete loss of vision. This defect of eye is called cataract. The vision of the defected eye can be restored by the cataract surgery.

39. A. (a) Bulbs in parallel provide more illumination. This is because

(i) each bulb gets same voltage and is equal to the applied voltage.

(ii) each bulb draws required current from the mains. Hence, they work properly.

(b) When one bulb in each circuit get fused,

In series: Rest of the bulbs will not glow. This is because in series arrangement, there is only a single path available for the flow of current.

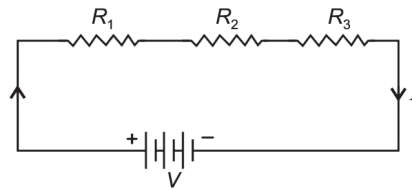
In parallel: Rest of the bulbs will continue to glow as in parallel connection,

(i) individual branch in the circuit completes its own circuit.

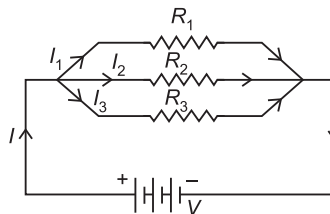
(ii) different paths are available for the flow of current.

(c) Circuit diagram

For series,



For parallel,



OR

B. (a) **Case I:**

Using,

$$P = VI, \text{ we get}$$

$$I = \frac{P}{V} = \frac{880}{220} = 4 \text{ A}$$

and

$$P = \frac{V^2}{R} \Rightarrow R = \frac{(220)^2}{880} = 55 \Omega$$

Case II:

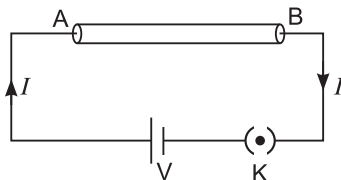
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$$I = \frac{P}{V} = \frac{330}{220} = 1.5 \text{ A}$$

- $$R = \frac{V^2}{P} = \frac{(220)^2}{330} = 146.67 \Omega$$

- (b) When an electric current passes through a purely resistive circuit (like very high resistance wire), the source energy continually get dissipated entirely in the form of heat. This known as heating effect of electric current.
- (c) **Heat produced in a resistor:** Consider a wire AB having a resistance 'R' connected across the terminals of a cell. Let V be the potential difference applied by cell across the ends of a wire.

Let W be the work done in carrying the charge q across the conductor, then



$$V = \frac{W}{q} \text{ or } W = V \times q \quad \dots(i)$$

but $q = I \times t$

So, $W = V \times It \quad \dots(ii)$

This work done will appear in the form of heat produced in the wire, i.e.

$$H = VIt \quad \dots(iii)$$

Using Ohm's law, $V = IR$

So, $H = (IR) It = I^2Rt$

This is the expression for the heat produced in the wire. This is called Joule's law of heating.