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Your JEE Guide

MP Board Class X · Science

Sample Question Paper 4 · Session 2026-27

Time allowed: 3 hours **Maximum marks: 75**

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This is an original practice paper written to the MPBSE 2027 sample question paper pattern; it is not issued by MPBSE.

General instructions:

1. All questions are compulsory.
2. Questions 1 to 5 are 30 objective type questions. Each carries 1 mark.
3. Internal options are given in questions 18 to 23.
4. Marks of each question are indicated against it.
5. Answer questions 6 to 17 in about 30 words each.
6. Answer questions 18 to 20 in about 75 words each.
7. Answer questions 21 to 23 in about 120 words each.
8. Draw neat and clean labelled diagrams wherever required.

1.	**(i)** *Choose the correct option and write it:* In the electrolysis of acidified water, the gas collected at the cathode is: (a) hydrogen (b) chlorine (c) oxygen (d) carbon dioxide	1
	(ii) The acid present in tomatoes is: (a) lactic acid (b) oxalic acid (c) methanoic acid (d) tartaric acid	1
	(iii) The number of single covalent bonds in a molecule of ethane (C_2H_6) is: (a) 5 (b) 8 (c) 6 (d) 7	1
	(iv) Which of the following diseases is caused by a virus and spreads through sexual contact? (a) typhoid (b) syphilis (c) HIV-AIDS (d) gonorrhoea	1
	(v) The mirror used in solar furnaces to concentrate sunlight is: (a) plane (b) concave (c) any of these (d) convex	1
	(vi) If the current through a resistor is doubled, the heat produced in the same time becomes: (a) four times (b) double (c) the same (d) half	1

2.	**(i)** *Fill in the blanks:* The reaction between an acid and a base to form salt and water is called _____.	1
	(ii) Non-metals generally form _____ oxides.	1
	(iii) Blood vessels that carry blood towards the heart are called _____.	1
	(iv) The fusion of a male gamete with a female gamete is called _____.	1
	(v) Dentists use a _____ mirror to see large images of teeth.	1
	(vi) The SI unit of potential difference is the _____.	1
3.	**(i)** *Write True or False:* Flushing packets of chips with nitrogen helps to prevent rancidity.	1
	(ii) Graphite is used as a lubricant.	1
	(iii) All metals react with dilute hydrochloric acid to give hydrogen gas.	1
	(iv) Pollen grains are produced in the ovary of a flower.	1
	(v) In the human eye, the amount of light entering is controlled by the iris.	1
	(vi) The resistivity of a metal wire changes when its length is changed.	1
4.	**(i)** *Answer in one word or one sentence:* Name the gas that turns lime water milky.	1
	(ii) Write the formula of the salt formed when sodium hydroxide reacts with sulphuric acid.	1
	(iii) Name the hormone secreted by the testes.	1
	(iv) Which blood cells fight infection?	1
	(v) Write the formula for the equivalent resistance of two resistors R_1 and R_2 in parallel.	1
	(vi) Name the safety device that breaks a circuit when the current becomes too large.	1

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5. Match each device in column A with its use in column B: — 6

Column A	Column B
(i) Ammeter	(a) changes the resistance in a circuit
(ii) Voltmeter	(b) measures current
(iii) Rheostat	(c) corrects hypermetropia
(iv) Concave lens	(d) disperses white light
(v) Convex lens	(e) measures potential difference
(vi) Glass prism	(f) corrects myopia

6.	What is rancidity? Write two ways to prevent it.	2
7.	Hydrochloric acid is a strong acid but acetic acid is a weak acid. Explain.	2
8.	Why are ionic compounds soluble in water but not in kerosene or petrol?	2
9.	Give two reasons why carbon forms a very large number of compounds.	2
10.	Name the organs of the human excretory system.	2
11.	Write two functions of saliva.	2
12.	Why is the pancreas called both an exocrine and an endocrine gland?	2
13.	Name two sexually transmitted diseases caused by bacteria and two caused by viruses.	2
14.	Distinguish between a dominant and a recessive trait.	2
15.	Why does a pencil partly dipped in water appear bent at the water surface?	2
16.	Why is a concave mirror used as a shaving mirror?	2
17.	Why are copper and aluminium wires usually used for electricity transmission?	2
18.	Write balanced chemical equations for: (a) zinc reacting with sodium hydroxide solution; (b) heating sodium hydrogencarbonate; (c) dilute sulphuric acid reacting with copper oxide. **OR** What are esterification and saponification? Write one equation for each.	3
19.	How do plants respond to stimuli without a nervous system? Explain with the example of the touch-me-not plant. **OR** What is pollination? Distinguish between self-pollination and cross-pollination, and name two agents of cross-pollination.	3

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20.	A 1100 W heater and a 100 W bulb, both rated at 220 V, are connected in parallel to a 220 V supply. Find the resistance of the heater and the total current drawn. **OR** What is presbyopia? State its cause and how it is corrected.	3
21.	Compare metals and non-metals in four physical properties, with one example each. **OR** How is copper obtained from copper glance (Cu_2S)? Write the equations.	4
22.	Describe the three main parts of the human brain and one function of each. How is the brain protected? **OR** Name four endocrine glands in human beings, with one hormone and one function of each.	4
23.	With a ray diagram, show the image formed by a convex lens when the object is between F and 2F. Describe the image and give one use of this arrangement. **OR** How is a rainbow formed? Explain with the role of water droplets.	4

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Answers and Marking Scheme

Marks for each step are shown in brackets. Any correct alternative method gets full credit.

Question 1

(i) **(a)** hydrogen. *Working:* Its volume is twice that of the oxygen collected at the anode.

(ii) **(b)** oxalic acid. *Working:* Tomatoes contain oxalic acid.

(iii) **(d)** 7. *Working:* One C–C bond and six C–H bonds.

(iv) **(c)** HIV-AIDS. *Working:* Gonorrhoea and syphilis are bacterial.

(v) **(b)** concave. *Working:* A concave mirror converges the light at its focus.

(vi) **(a)** four times. *Working:* $H = I^2Rt$.

Question 2

(i) neutralisation.

(ii) acidic.

(iii) veins.

(iv) fertilisation.

(v) concave.

(vi) volt.

Question 3

(i) True: nitrogen keeps out oxygen.

(ii) True: its layers slide over one another.

(iii) False: copper, silver and gold do not.

(iv) False: they are produced in the anther.

(v) True: it changes the size of the pupil.

(vi) False: resistivity depends only on the material and its temperature.

Question 4

(i) Carbon dioxide.

(ii) Na_2SO_4.

(iii) Testosterone.

(iv) White blood cells.

(v) $1/R = 1/R_1 + 1/R_2$.

(vi) A fuse (or circuit breaker).

5. (i) – (b) measures current; (ii) – (e) measures potential difference; (iii) – (a) changes the resistance in a circuit; (iv) – (f) corrects myopia; (v) – (c) corrects hypermetropia; (vi) – (d) disperses white light

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6. The oxidation of fats and oils in food, which changes its smell and taste (1). Prevention: adding antioxidants, keeping food in airtight containers, flushing packets with nitrogen, refrigeration (any two) (1).

7. In water, hydrochloric acid ionises almost completely, giving many H^+ ions (1). Acetic acid ionises only partly, giving few H^+ ions (1).

8. Water is a polar solvent that can separate the ions (1). Kerosene and petrol are non-polar solvents and cannot do so (1).

9. Catenation: carbon atoms link with one another to form long chains, branches and rings (1). Tetravalency: each carbon atom can bond with four other atoms, including oxygen, nitrogen and halogens (1).

10. A pair of kidneys and a pair of ureters (1), the urinary bladder and the urethra (1).

11. Salivary amylase breaks down starch into sugar (1). Saliva moistens and lubricates food so that it is easy to swallow (1).

12. It releases pancreatic juice with digestive enzymes into the small intestine through a duct (1). It also secretes the hormones insulin and glucagon directly into the blood (1).

13. Bacterial: gonorrhoea and syphilis (1). Viral: HIV-AIDS and warts (1).

14. A dominant trait is expressed even when only one copy of its gene is present (Tt) (1). A recessive trait is expressed only when both copies are present (tt) (1).

15. Light from the part under water is refracted away from the normal as it passes from water into air (1). So that part appears raised, and the pencil seems bent (1).

16. When the face is between the pole and the focus (1), the mirror forms an erect, enlarged image, so fine details are seen clearly (1).

17. They have very low resistivity, so less energy is lost as heat (1). They are also flexible and widely available; aluminium is light (1).

18. (a) $Zn + 2NaOH \rightarrow Na_2ZnO_2 + H_2$ (1). (b) $2NaHCO_3 \rightarrow Na_2CO_3 + H_2O + CO_2$ (1). (c) $CuO + H_2SO_4 \rightarrow CuSO_4 + H_2O$; the solution turns blue (1).

OR Esterification: a carboxylic acid reacts with an alcohol in the presence of an acid catalyst to form a sweet-smelling ester: $CH_3COOH + C_2H_5OH \rightarrow CH_3COOC_2H_5 + H_2O$ (1½). Saponification: an ester is heated with sodium hydroxide to give the alcohol and the sodium salt of the acid (soap): $CH_3COOC_2H_5 + NaOH \rightarrow C_2H_5OH + CH_3COONa$ (1½).

19. Plant cells communicate using electrical and chemical signals (1). When a touch-me-not (Mimosa) leaf is touched, the signal travels to nearby cells, which change shape by losing water (1). So the leaves fold within seconds; this movement is not due to growth (1).

OR Pollination is the transfer of pollen grains from the anther to the stigma (1). Self-pollination: within the same flower or another flower of the same plant; cross-pollination: to a flower of a different plant (1). Agents: insects, wind, water, birds (any two) (1).

20. $R = V^2/P = 220^2/1100 = 44\ \Omega$ (1½). Total power = 1200 W, so $I = P/V = 1200/220 \approx 5.45$ A (1½).

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OR A defect of old age in which a person cannot see nearby objects clearly (1). It happens because the ciliary muscles weaken and the eye lens loses flexibility, so the power of accommodation falls (1). It is corrected with convex lenses; people with both myopia and presbyopia use bifocal lenses (1).

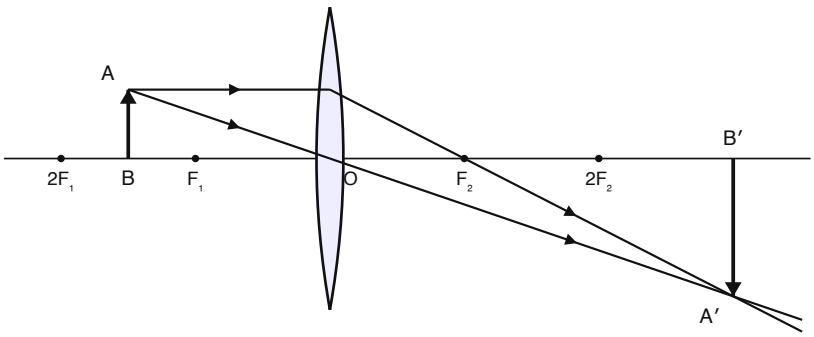
21. Lustre: metals are shiny (gold); non-metals are dull (sulphur), except iodine (1). Malleability and ductility: metals can be beaten into sheets and drawn into wires (aluminium, copper); non-metals are brittle (1). Conduction: metals conduct heat and electricity (silver, copper); non-metals do not, except graphite (1). State: metals are solid except mercury; non-metals are solid or gas, bromine is a liquid (1).

OR The ore is concentrated and roasted in air: $2Cu_2S + 3O_2 \rightarrow 2Cu_2O + 2SO_2$ (2). The copper(I) oxide reacts with the remaining sulphide to give copper: $2Cu_2O + Cu_2S \rightarrow 6Cu + SO_2$ (1). The copper is then refined electrolytically (1).

22. Forebrain (cerebrum): thinking, memory, receiving sensory information and controlling voluntary actions (1). Midbrain: controls some involuntary actions such as the size of the pupil (½). Hindbrain: the medulla controls breathing, heartbeat and blood pressure; the cerebellum controls posture and balance (1½). The brain is protected by the skull and by fluid-filled membranes that absorb shocks (1).

OR Thyroid: thyroxine, regulates metabolism (1). Pancreas: insulin, controls blood sugar (1). Adrenal: adrenaline, prepares the body for emergencies (1). Pituitary: growth hormone, controls growth (1).

23. Ray diagram (2):



The image is formed beyond 2F on the other side (1); it is real, inverted and enlarged. Use: a projector, which forms an enlarged image on a screen (1).

OR A rainbow is seen in the sky after a shower, opposite the Sun (1). Each tiny water droplet acts like a small prism (1). Sunlight is refracted and dispersed on entering the drop, reflected inside it, and refracted again on leaving (1). Different colours leave at different angles and reach our eyes as a band of colours (1).

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