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# SCIENCE

## COMPULSORY QUESTIONS

COLLECTED FROM ALL PREVIOUS  
YEAR QUESTION PAPERS

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Getting in:

- It gives me pride and pleasure in bringing to you, this wonderful booklet.
- The compulsory questions are collected from almost all the available previous years' question papers, which will give an idea about to study the topics which will help you to tackle these compulsory questions.

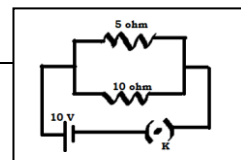
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**P H Y S I C S**

1	An object is placed at a distance of 20cm from a convex lens of focal length 10cm. Find the image distance and nature of the image.[repeated]
2	State newton's second law.
3	What are the types of inertia ? Give an example for each type.
4	An object of height 3cm is placed at 10cm from a concave lens of focal length 15cm.find the size of the image.
5	A beam of light passing through a diverging lens of focal length 0.3m appears to be focused at a distance 0.2m behind the lens.find the position of the object. [repeated]
6	Draw a ray diagram to show the image formed by a convex lens when the object is placed between F and 2F.[repeated]
7	If an object of mass 5kg moves with linear momentum 2kgm/s. Calculate the velocity of the object.
8	I) At what height from the centre of the earth surface, the acceleration due to gravity will be 1/4th of its value on the surface of the earth. Ii) In common what is the value of least distance of distinct vision of a human? [PTA]
9	a) Calculate the velocity of a moving body of mass 5kg whose linear momentum is 2.5 kgm/s.[repeated] b) A man of mass 100kg has a weight of ___ at the surface of the earth.
10	A mechanic unscrew a nut by applying a force of 140 N with a spanner of length 40 cm. What should be the length of the spanner if a force of 40 N is applied to unscrew the same nut?
11	a)Calculate the velocity of a moving body of mass 5kg whose linear momentum is 2.5 kgm/s.
12	Calculate the resistance of a conductor through which a current of 2 A passes, when the potential difference between its ends is 30 V. [repeated]
13	Draw a ray diagram to show the image formed by a convex lens when the object is placed between F and 2F.
14	what are the functions of control rods in nuclear reactor ?
15	The resistance of a wire of length 10 m is 2 ohm. If the area of cross section of the wire is $2 \times 10 \text{ m}^2$ , determine its (i) resistivity (ii) conductance and (iii) conductivity.
16	Find the height of the image formed by a concave lens of focal length 15 cm on an object 3 cm high. [repeated]
17	Calculate the coefficient of cubical expansion of a zinc bar. Whose volume is increased $0.25 \text{ m}^3$ from $0.3 \text{ m}^3$ due to the change in its temperature of 50K.
18	A torch bulb is rated at 3 V and 600 ma. Calculate it's a) power b) resistance c) energy consumed if it is used for 4 hour. [repeated]
19	An electric heater of resistance $5 \Omega$ is connected to an electric source. If a current of 6 A flows through the heater, then find the amount of heat produced in 5 minutes. [repeated]
20	Lesson 1 book back 1 mark :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
21	Two resistors when connected in parallel give the resultant resistance of 2 ohm; but when connected in series the effective resistance becomes 9 ohm. Calculate the value of each resistance.
22	The work done in moving a charge of 10 C across two points in a circuit is 100 J. What is the potential difference between the points? [repeated]
23	A charge of 12 coulomb flows through a bulb in 5 second. What is the current through the bulb? [repeated]
24	By convention, the clockwise moments are taken as _____ and the anticlockwise moments are taken as _____
25	Two bodies have a mass ratio of 3:4 The force applied on the bigger mass produces an acceleration of $12 \text{ ms}^{-2}$ .What could be the acceleration of the other body, if the same force acts on it.
26	A sound wave has a frequency of 200 Hz and a speed of $400 \text{ ms}^{-1}$ in a medium. Find the wavelength of the sound wave.
27	Air temperature in the Rajasthan desert can reach $46^\circ\text{C}$ . What is the velocity of sound in air at that temperature? ( $V_0 = 331 \text{ ms}^{-1}$ )

28	Three resistors of $1\ \Omega$ , $2\ \Omega$ and $4\ \Omega$ are connected in parallel in a circuit. If a $1\ \Omega$ resistor draws a current of $1\ \text{A}$ , find the current through the other two resistors. [repeated]
29	A strong sound signal is sent from a ship towards the bottom of the sea. It is received back after $1\ \text{s}$ . What is the depth of sea given that the speed of sound in water $1450\ \text{ms}^{-1}$ ?
30	$^{88}\text{Ra}^{226}$ experiences three $\alpha$ - decay. Find the number of neutrons in the daughter element.
31	$^{92}\text{U}^{235}$ experiences one $\alpha$ - decay and one $\beta$ - decay. Find number of neutrons in the final daughter nucleus that is formed.
32	Calculate the amount of energy released when a radioactive substance undergoes fusion and results in a mass defect of $2\ \text{kg}$ .
33	Calculate the amount of energy released when a radioactive substance undergoes fusion and results in a mass defect of $1\ \text{kg}$ .
34	Refer unit 4: solved problem 3: In the circuit diagram given below, three resistors $R_1$ , $R_2$ and $R_3$ of $5\ \Omega$ , $10\ \Omega$ and $20\ \Omega$ respectively are connected as shown. Calculate: [repeated]
35	The resistance of a wire of length $10\ \text{m}$ is $2\ \text{ohm}$ . If the area of cross section of the wire is $2 \times 10^{-7}\ \text{m}^2$ , determine its (i) resistivity (ii) conductance and (iii) conductivity [repeated]
36	Unit:6: Solved problem 6.2 : A radon specimen emits radiation of $3.7 \times 10^3\ \text{gbq}$ per second. Convert this disintegration in terms of curie. (one curie = $3.7 \times 10^{10}$ disintegration per second)
37	Example Problem 5.1 1. At what temperature will the velocity of sound in air be double the velocity of sound in air at $0^\circ\text{C}$ ?
38	A piece of wire of resistance $10\ \text{ohm}$ is drawn out so that its length is increased to three times its original length. Calculate the new resistance.
39	A piece of wire having a resistance of $5\ \text{ohm}$ cut into five equal parts. If the five parts of the wire are connected in parallel, then find the effective resistance of the combination? [PTA]
40	Calculate the resistance of a conductor through which a current of $2\ \text{A}$ passes, when the potential difference between its ends is $30\ \text{V}$ . [repeated]
41	Unit 4 solved problem 2. Calculate the current and the resistance of a $100\ \text{W}$ , $200\ \text{V}$ electric bulb in an electric circuit.
42	Unit 4 hot qn: How many electrons are passing per second in a circuit in which there is a current of $5\ \text{A}$ ? [EXPECTED]
43	i) What will be the impact of temperature and pressure while dissolving carbon di oxide in water? ii) Does pure water conduct electricity? Justify your answer. [PTA]
44	For a person with hypermetropia, the near point has moved to $1.5\ \text{m}$ . Calculate the focal length of the correction lens in order to make his eyes normal.
45	The ratio of mass of two planets is $2:3$ and the ratio of their radii is $4:7$ . Find the ratio of their acceleration due to gravity. [repeated]
46	If a $25\ \text{N}$ and $15\ \text{N}$ forces acting opposite to one another. Find the resultant force and the direction of action of the resultant force. [repeated]
47	If a $5\ \text{N}$ and $15\ \text{N}$ forces acting opposite to one another. Find the resultant force and the direction of action of the resultant force.
48	Unit 3 hot: If you keep ice at $0^\circ\text{C}$ and water at $0^\circ\text{C}$ in either of your hands, in which hand you will feel more chillness? Why?
49	A person with myopia can see objects placed at a distance of $4\ \text{m}$ . If he wants to see objects at a distance of $20\ \text{m}$ , what should be the focal length and power of the concave lens he must wear?
50	A source producing a sound of frequency $500\ \text{Hz}$ is moving towards a listener with a velocity of $30\ \text{ms}^{-1}$ . The speed of the sound is $330\ \text{ms}^{-1}$ . What will be the frequency heard by listener? [repeated]
51	A Beam of light converges at point p. now a lens is placed in the path of the convergent beam $12\ \text{cm}$ from P. at what point does the beam converges if the lens is convex lens of focal length $20\ \text{cm}$ ?
52	A series of circuit contains 3 resistors- $140\ \text{ohm}$ , $250\ \text{ohm}$ and $220\ \text{ohm}$ . Find the total resistance.
53	A strong sound signal is sent from a ship towards the bottom of the sea. It is received back after $2\ \text{s}$ . What is the depth of sea given that the speed of sound in water $1450\ \text{ms}^{-1}$ ? [created question-numerical values changed]
54	An electric iron consumes energy at the rate of $420\ \text{W}$ when heating is at the maximum rate and $180\ \text{W}$ when heating is at the minimum rate. The applied voltage is $220\ \text{V}$ . What is the current in each case?
55	Power of a lens is $-4\ \text{D}$ . What is its focal length $f$ ? (use the formula: power of lens = $1/f$ (or) $f = 1/p$ ) [repeated]
56	Derive the ideal gas equation.
57	Light rays travel from vacuum into a glass whose refractive index is $1.5$ . If the angle of incidence is $30^\circ$ , calculate the angle of refraction inside the glass.
58	A Force of $5\ \text{N}$ applied on a body produces an acceleration of $5\ \text{cm s}^{-2}$ . Calculate the mass of the body.

59	A source producing a sound of frequency 90 Hz is approaching a stationary listener with a speed equal to $(1/10)$ of the speed of sound. What will be the frequency heard by the listener?
60	A lift is moving downwards with an acceleration of $1.8ms^{-2}$ . What is apparent weight realised by a man of mass 50kg?
61	i) Draw the ray diagram of image formation in simple microscope ii) Find the position and write its nature and size of the image formed by Simple microscope
62	i) Electric power lines in electrical post, hang very low in hot summer, why? ii) An electric heater of resistance $5\ \Omega$ is connected to an electric source. If a current of 6 A flows through the heater, then find the amount of heat produced in a 5 minutes.
63	Calculate the total resistance in the circuit: $\rightarrow$
64	Find the resultant force A) $F_1=5N$ $\rightarrow$ <span style="border: 1px solid black; display: inline-block; width: 50px; height: 20px; vertical-align: middle;"></span> $F_2=15N$ $\rightarrow$ <span style="border: 1px solid black; display: inline-block; width: 50px; height: 20px; vertical-align: middle;"></span> B) $F_1=9N$ $\rightarrow$ <span style="border: 1px solid black; display: inline-block; width: 50px; height: 20px; vertical-align: middle;"></span> $\leftarrow$ $F_2=3N$ <span style="border: 1px solid black; display: inline-block; width: 50px; height: 20px; vertical-align: middle;"></span>



## C H E M I S T R Y

1	Find the molecular mass of CO <sub>2</sub> . [C-12g, O-16g]
2	Calculate the number of molecules in 36gm of H <sub>2</sub> O.
3	Calculate the % of oxygen in Al <sub>2</sub> (SO <sub>4</sub> ) <sub>3</sub> . (Atomic mass: Al-27, O-16, S -32)
4	A is a silvery white metal. A combines with O <sub>2</sub> to form B at 800°C the alloy of A is used in making aircraft. Find A and B.[repeated]
5	Calcium carbonate is decomposed on heating in the following reaction $CaCO_3 \rightarrow CaO + CO_2$ i. How many moles of Calcium carbonate are involved in this reaction? ii. Calculate the gram molecular mass of calcium carbonate involved in this reaction iii. How many moles of CO <sub>2</sub> are there in this equation?
6	If the pH of a solution is 4.5, what is its pOH?
7	What is the pH of $1.0 \times 10^{-5}$ molar solution of KOH?
8	A)calculate the number of moles of a sample that contains $12.046 \times 10^{23}$ atoms of iron ? B) calculate the gram molar mass of Ca <sub>3</sub> (PO <sub>4</sub> ) <sub>2</sub> .
9	Calculate the pH of $1.0 \times 10^{-4}$ molar solution of HNO <sub>3</sub> .
10	$N_2 + 3 H_2 \rightarrow 2 NH_3$ (the atomic mass of nitrogen is 14,and that of hydrogen is 1) 1 mole of nitrogen( __g) + 3 moles of hydrogen ( __g) $\rightarrow$ 2 moles of ammonia ( __g)
11	Calculate the number of moles in 1) 27g of Al 2) $1.51 \times 10^{23}$ molecules of NH <sub>4</sub> Cl[repeated]
12	Calculate the number of water molecule present in one drop of water which weighs 0.18 g.
13	Calculate the gram molecular mass of the following. 1) H <sub>2</sub> O 2) CO <sub>2</sub> 3) Ca <sub>3</sub> (PO <sub>4</sub> ) <sub>2</sub> [repeated]
14	Calculate the molecular mass of CO <sub>2</sub> .
15	give the IUPAC names of 1) CH <sub>3</sub> CHO 2) CH <sub>3</sub> CH <sub>2</sub> COCH <sub>3</sub>
16	Find the percentage of nitrogen in ammonia.
17	Metal A belongs to period 3 and group 13. A in red hot condition reacts with steam to form B. A with strong alkali forms C. Find A,B and C with reactions
18	Calculate the % of each element in calcium carbonate. (Atomic mass: C-12, O-16, Ca -40) [repeated]
19	1.5 g of solute is dissolved in 15 g of water to form a saturated solution at 298K. Find out the solubility of the solute at the temperature.
20	3.5 litres of ethanol is present in 1.5 litres of aqueous solution of ethanol. Calculate volume percent of ethanol solution. [repeated]
21	Lemon juice has a pH 2, what is the concentration of H <sup>+</sup> ions?
22	A solution is prepared by dissolving 45 g of sugar in 180 g of water. Calculate the mass percentage of solute.
23	Calcium carbonate is decomposed on heating in the following reaction $CaCO_3 \rightarrow CaO + CO_2$ i) How many moles of Calcium Carbonate are involved in this reaction? ii) Calculate the gram molecular mass of Calcium Carbonate involved in this reaction. iii) How many moles of CO <sub>2</sub> are there in this equation? [repeated]
24	Calculate the percentage density of calcium carbonate.(Ca=40,C=12,O=16)
25	A is a reddish brown metal, which combines with O <sub>2</sub> at $< 1370\ K$ gives B, a black coloured compound. At a temperature $> 1370\ K$ , A gives C which is red in colour. Find A,B and C with reaction.
26	'A' is a blue coloured crystalline salt. On heating it loses blue colour and to give 'B'. When water is added, 'B' gives back to 'A'. Identify A and B, write the equation.
27	1.5 g of solute is dissolved in 15 g of water to form a saturated solution at 298K. Find out the solubility of the solute

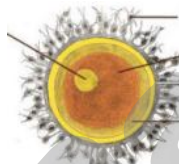


	at the temperature.
28	16 grams of NaOH is dissolved in 100 grams of water at 25°C to form a saturated solution. Find the mass percentage of solute and solvent.
29	a) Identify the bond between H and F in HF molecule. b) What property forms the basis of identification? c) How does the property vary in periods and in groups?
30	a) What happens when $\text{MgSO}_4 \cdot 7\text{H}_2\text{O}$ is heated? Write the appropriate equation
31	Calculate the pH of 0.001 molar solution of HCl.
32	An organic compound 'A' is widely used as a preservative and has the molecular formula $\text{C}_2\text{H}_4\text{O}_2$ . This compound reacts with ethanol to form a sweet smelling compound 'B'. (i) Identify the compound 'A'. (ii) Write the chemical equation for its reaction with ethanol to form compound 'B'. (iii) Name the process.
33	Calculate the pH of $1 \times 10^{-4}$ molar solution of NaOH.
34	Vinu dissolves 50 g of sugar in 250 ml of hot water, Sarath dissolves 50 g of same sugar in 250 ml of cold water. Who will get faster dissolution of sugar? and Why?
35	The hydroxyl ion concentration of a solution is $1 \times 10^{-9}$ M. What is the pOH of the solution?
36	Calculate the pH of 0.01 M $\text{HNO}_3$ ?
37	How many grams are there in the following? i. 2 moles of hydrogen molecule, $\text{H}_2$ ii. 3 moles of chlorine molecule, $\text{Cl}_2$ iii. 5 moles of sulphur molecule, $\text{S}_8$ iv. 4 moles of phosphorous molecule, $\text{P}_4$
38	The hydroxide ion concentration of a solution is $1 \times 10^{-11}$ M. What is the pH of the solution?
39	The molecular formula of an alcohol is $\text{C}_4\text{H}_{10}\text{O}$ . The locant number of its -OH group is 2. (i) Draw its structural formula. (ii) Give its IUPAC name. (iii) Is it saturated or unsaturated?
40	Lesson 10: example 4: Calculate the pH of a solution in which the concentration of the hydrogen ions is $1.0 \times 10^{-8}$ mol litre $^{-1}$ .
41	A solid compound 'A' decomposes on heating into 'B' and a gas 'C'. On passing the gas 'C' through water, it becomes acidic. Identify A, B and C.
42	When an aqueous solution of potassium chloride is added to an aqueous solution of silver nitrate, a white precipitate is formed. Give the chemical equation of this reaction.
43	Find the amount of urea which is to be dissolved in water to get 500 g of 10% w/w aqueous solution?
44	a.calculate the pH of 0.01M $\text{HNO}_3$ . b.A solution was prepared by dissolving 25g sugar in 100g of water. Calculate the mass percentage of the solute.
45	a. a solution is prepared by dissolving 45g of sodium chloride in 180g of water. Calculate the mass percentage of the solute. b.7.5 litres of ethanol is present in 15 litres of aqueous solution of ethanol. Calculate volume percent of ethanol solution.
46	A solution is prepared by dissolving 45 g of sugar in 180 g of water. Calculate the mass percentage of solute. [repeated]
47	Metal A belongs to period 3 and group 13. A in red hot condition reacts with steam to form B. A with strong alkali forms C. Find A,B and C with reactions
48	A is a metal. It belongs to the boron family in the modern periodic table. It is one of the best reducing agent so, it reduces the iron oxide into iron. Metal A is used in the manufacture of cooking vessel. Identify 'A'.write the chemical equation for reducing character.
49	The electronic configuration of metal A is 2,8,18,1. The metal A when exposed to air and moisture forms B a green layered compound. A with con. $\text{H}_2\text{SO}_4$ forms C and D along with water. D is a gaseous compound. Find A,B,C and D.
50	Give the structural formula for - cyclobutane, benzene
51	Calculate the % of sulphur in $\text{H}_2\text{SO}_4$
52	16 grams of NaOH is dissolved in 100 grams of water at 25°C to form a saturated solution. Find the mass percentage of solute and solvent.
53	Calculate the number of moles of a sample that contains $12.046 \times 10^{23}$ atoms of iron ?
54	Calculate the volume of ethanol in 200 ml solution of 20% v/v aqueous solution of ethanol.
55	1)Can nickel spatula be used to stir copper sulphate solution ? Justify your answer. 2)Name the simplest ketone and give its structural formula.
56	State true or false.(if false,correct it.) 1) In our daily life, solution of syrups, mouth wash, antiseptic solution, household disinfectants etc., the concentration of the ingredients is expressed as w/w. 2)In ointments, antacid, soaps, etc., the concentration of solutions is expressed as v/v.
57	State avogadro's law.
58	1)Name the acid that renders aluminium passive. Why?

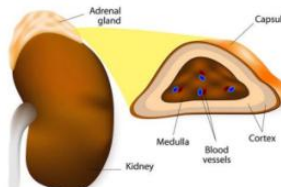
	2) Calculate the number of moles in $1.51 \times 10^{23}$ molecules of $\text{NH}_4\text{Cl}$
59	Find the mass percentage composition of methane ( $\text{CH}_4$ )
60	i) From the following clues identify the group number in the periodic table and write the names of any two elements of that group. a. The atoms of this group have very stable electronic configuration b. These elements are mostly unreactive II) Why ethene is more reactive than ethane?
61	Compound A is a colourless, crystalline, hydrated salt of magnesium. On heating it becomes an anhydrous salt. The number of water molecules lost by compound A is equal to number of water molecules present in green vitriol on heating. i) Identify compound A ii) Give the Chemical equation for this heating reaction.
62	I) Calculate the mass of water required in grams to dissolve 10g of sucrose to produce the mass percentage of 10% solution. ii) Which one of the following reactions is feasible? support your answer. a) $2\text{NaCl} + \text{F}_2 \rightarrow 2\text{NaF} + \text{Cl}_2$ b) $\text{NaF} + \text{Cl}_2 \rightarrow \text{NaCl} + \text{F}_2$
63	From the value of ionic product of water at $25^\circ\text{C}$ , find out the concentration of hydroxyl ions. (At $25^\circ\text{C}$ concentration of hydrogen ions in water is $10^{-7}\text{mol/dm}^3$ ) [PTA]
64	i) 'X' is an element that belongs to 1st group of the modern periodic table. 'X' is a gas and its covalent radius value is $0.37 \text{ \AA}$ . Identify and write the chemical symbol of 'X'. ii) A is a metal and belongs to Boron family in modern periodic table acts as a good reducing agent. It reduces iron oxide into iron. It is used to make household utensils. Write the balanced chemical equation for the reduction of iron oxide by 'A'.

## B I O L O G Y

	Give the importance of transpiration
	A) Draw and label the structure of oxysomes. B) Write the overall reaction for photosynthesis.[repeated]
	B) draw and label the structure of oxysomes.
	Draw the structure of pollen grain and label its parts.
	What do you understand by phenotype and genotype ?
	P is a gene required for the synthesis of vitamin A. It is integrated with genome of Q to produce genetically modified plant R. 1) What is P, Q and R ? 2) State the importance of R in India.
	Write the events involved in the sexual reproduction of a flowering plant. a. Discuss the first event and write the types. b. Mention the advantages and the disadvantages of that event.
	Once a person starts taking drugs or alcohol it is difficult to get rid of the habit. why? list any 3 activities based on 4R approach to conserve natural resources.
	Draw a diagram to show vegetative reproduction by stem.



[repeated]



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