NaukriPhod.

"Moti kitaab chhodo. Seedha nichod padho."

RRB NTPC • SSC CGL • SSC CHSL

The Science Post-Mortem Memory Cards & PYQ Module (Top 100 Most-Asked Science PYQs)

PART I: TOP 20 MOST-ASKED EVERYDAY SCIENCE TRAPS & MEMORY CARDS (HIGHEST FREQUENCY)

Q1. Which foul-smelling chemical compound is added to odourless LPG cylinders so that gas leaks can be detected immediately? [RRB NTPC 2021–24 • SSC CHSL 2023–25 PYQ]

(A) Methyl Isocyanate (B) Ethyl Mercaptan (C) Chloropicrin (D) Formaldehyde

Answer: (B) Ethyl Mercaptan (C_2H_5SH) — LPG consists mainly of Propane and Butane, which are naturally odourless.
NaukriPhod. Trick: LPG Leak = Ethyl Mercaptan; Bhopal Gas Tragedy (1984) = Methyl Isocyanate; Tear Gas = Chloropicrin!

Q2. Which chemical compound is sprayed into clouds to induce 'Artificial Rain' (Cloud Seeding)? [RRB NTPC 2021–24 • SSC CHSL 2023–25 PYQ]

(A) Silver Nitrate ($AgNO_3$) (B) Silver Iodide (AgI) (C) Silver Bromide (AgBr) (D) Silver Chloride (AgCl)

Answer: (B) Silver Iodide (AgI) — Mimics ice crystals inside clouds to trigger rainfall (Dry Ice is also used).
NaukriPhod. Trick: Artificial Rain = Silver Iodide; Election Voter Ink = Silver Nitrate; Black & White Photography = Silver Bromide!

Q3. Which heat-resistant polymer is used to coat the surface of Non-Stick Cookware (frying pans)? [RRB NTPC 2021–24 • SSC CHSL 2023–25 PYQ]

(A) Bakelite (B) Teflon (PTFE) (C) PVC (D) Neoprene

Answer: (B) Teflon (Polytetrafluoroethylene — PTFE) — Repels oil and water and withstands high cooking temperatures.
NaukriPhod. Trick: Pan's Non-Stick Surface = Teflon; Pan's Black Handle & Electric Switches = Bakelite (Thermosetting plastic).

Q4. Optical Fiber cables, the sparkling of a Diamond, and desert Mirages work on which optical principle? [RRB NTPC 2021–24 • SSC CHSL 2023–25 PYQ]

(A) Diffraction (B) Total Internal Reflection (TIR) (C) Dispersion (D) Polarization

Answer: (B) Total Internal Reflection (TIR) — Occurs when light travels from a denser to a rarer medium above the critical angle.
NaukriPhod. Trick: Diamond + Mirage + Endoscopy + Optical Fiber (Narinder Kapany) = Always Total Internal Reflection!

Q5. What is the chemical name and formula of 'Laughing Gas', used by dentists as a mild anesthetic? [RRB NTPC 2021–24 • SSC CHSL 2023–25 PYQ]

(A) Nitric Oxide (NO) (B) Nitrous Oxide (N_2O) (C) Nitrogen Dioxide (NO_2) (D) Nitrogen Pentoxide (N_2O_5)

Answer: (B) Nitrous Oxide (N_2O) — Colourless gas discovered by Joseph Priestley that induces euphoria.
NaukriPhod. Trick: It takes 2 people (N_2O) to laugh together → Nitrous Oxide = N_2O!

Q6. Which metal has such a low melting point (29.76°C) that it melts immediately when kept on the palm of a human hand? [RRB NTPC 2021–24 • SSC CHSL 2023–25 PYQ]

(A) Tungsten (B) Gallium (Ga) (C) Sodium (D) Bismuth

Answer: (B) Gallium (Ga) — Along with Caesium (Cs), it melts just below normal human body temperature (37°C).
NaukriPhod. Trick: Liquid at Room Temp (25°C) = Mercury; Melts on Palm (30°C) = Gallium & Caesium; Highest MP = Tungsten.

Q7. What is the chemical name of 'Blue Vitriol' (Neela Thotha), used as a fungicide in Bordeaux mixture? [RRB NTPC 2021–24 • SSC CHSL 2023–25 PYQ]

(A) Ferrous Sulphate (B) Copper Sulphate Pentahydrate ($CuSO_4 \cdot 5H_2O$) (C) Zinc Sulphate (D) Magnesium Sulphate

Answer: (B) Copper Sulphate ($CuSO_4 \cdot 5H_2O$) — Turns white when heated as it loses its 5 water molecules of crystallization.
NaukriPhod. Trick: Blue Vitriol = Copper ($CuSO_4$); Green Vitriol = Iron ($FeSO_4$); White Vitriol = Zinc ($ZnSO_4$); Oil of Vitriol = H_2SO_4.

Q8. When iron rusts in the presence of oxygen and moisture, what happens to the weight of the iron nail? [RRB NTPC 2021–24 • SSC CHSL 2023–25 PYQ]

(A) It decreases (B) It increases (C) Remains exactly the same (D) First decreases, then zero

Answer: (B) It increases — Rust is hydrated ferric oxide ($Fe_2O_3 \cdot xH_2O$); added oxygen and water increase mass.
NaukriPhod. Trick: Rust adds Oxygen + Water to Iron → Weight ALWAYS Increases (strength decreases, weight increases)!

Q9. To prevent iron from rusting, 'Galvanization' is performed by coating iron with a thin layer of which metal? [RRB NTPC 2021–24 • SSC CHSL 2023–25 PYQ]

(A) Copper (B) Zinc (Zn) (C) Tin (D) Aluminium

Answer: (B) Zinc (Zn) — Zinc is more reactive than iron and acts as a sacrificial anode even if scratched.
NaukriPhod. Trick: Galvanization = Always Zinc (Zn) coating on Iron!

Q10. 'Aqua Regia' (Royal Water), which can dissolve noble metals like Gold and Platinum, is a freshly prepared 3 : 1 mixture of: [RRB NTPC 2021–24 • SSC CHSL 2023–25 PYQ]

(A) 3 HNO_3 : 1 HCl (B) 3 Conc. HCl : 1 Conc. HNO_3 (C) 3 H_2SO_4 : 1 HCl (D) 3 HCl : 1 H_2SO_4

Answer: (B) 3 parts Concentrated HCl : 1 part Concentrated HNO_3 — Students often flip the 3 : 1 ratio in the exam hall.
NaukriPhod. Trick: "H-C-L" has 3 letters = 3 parts! HNO_3 has the number '3' already written, so it gets 1 part!

Q11. Which gas is released when Calcium Carbide (CaC_2) reacts with moisture, commonly used for the artificial ripening of fruits? [RRB NTPC 2021–24 • SSC CHSL 2023–25 PYQ]

(A) Methane (CH_4) (B) Acetylene / Ethyne (C_2H_2) (C) Propane (C_3H_8) (D) Butane (C_4H_{10})

Answer: (B) Acetylene (C_2H_2) — Also used in oxy-acetylene torches for welding metals; natural ripening hormone is Ethylene (C_2H_4).
NaukriPhod. Trick: Natural Plant Ripening Hormone = Ethylene (C_2H_4); Carbide Artificial Ripening & Welding = Acetylene (C_2H_2)!

Q12. Which is the ONLY vein in the human body that carries pure (oxygenated) blood? [RRB NTPC 2021–24 • SSC CHSL 2023–25 PYQ]

(A) Vena Cava (B) Pulmonary Vein (C) Renal Vein (D) Hepatic Vein

Answer: (B) Pulmonary Vein — Carries oxygenated blood from the Lungs to the Left Atrium of the heart.
NaukriPhod. Trick: All veins carry deoxygenated blood EXCEPT Pulmonary Vein; all arteries carry pure blood EXCEPT Pulmonary Artery!

Q13. What is the chemical function of 'Heavy Water' (Deuterium Oxide, D_2O, molecular mass 20) in a nuclear reactor? [RRB NTPC 2021–24 • SSC CHSL 2023–25 PYQ]

(A) Nuclear Fuel (B) Moderator (slows down fast neutrons) (C) Shielding wall (D) Catalyst

Answer: (B) Moderator — Slows down fast neutrons to sustain fission; Cadmium or Boron rods are used as Control Rods (absorb neutrons).
NaukriPhod. Trick: Moderator (Slows neutrons) = Heavy Water (D_2O) & Graphite; Control Rods (Stops reaction) = Cadmium & Boron.

Q14. Tooth decay begins when the pH of the mouth falls below what critical value, corroding Calcium Hydroxyapatite enamel? [RRB NTPC 2021–24 • SSC CHSL 2023–25 PYQ]

(A) Below 7.0 (B) Below 5.5 (C) Below 6.5 (D) Below 4.0

Answer: (B) Below 5.5 — Bacteria in the mouth produce acids from sugar; basic toothpaste neutralizes this acid.
NaukriPhod. Trick: Tooth Decay pH < 5.5; Acid Rain pH < 5.6 (Just 0.1 difference between teeth and rain!).

Q15. Which vitamin contains the metal 'Cobalt' (Co) and has the chemical name Cyanocobalamin? [RRB NTPC 2021–24 • SSC CHSL 2023–25 PYQ]

(A) Vitamin B1 (B) Vitamin B12 (C) Vitamin B6 (D) Vitamin B2

Answer: (B) Vitamin B12 (Cyanocobalamin) — Deficiency causes Pernicious Anemia and nerve damage.
NaukriPhod. Trick: "Cobal" in Cyano-cobal-amin = Cobalt in Vitamin B12!

Q16. What is the audible frequency range of sound waves for a healthy human ear? [RRB NTPC 2021–24 • SSC CHSL 2023–25 PYQ]

(A) 0 Hz to 20 Hz (B) 20 Hz to 20,000 Hz (20 kHz) (C) Above 20,000 Hz (D) 200 Hz to 5,000 Hz

Answer: (B) 20 Hz to 20,000 Hz (20 kHz) — Below 20 Hz is Infrasonic (earthquakes/elephants); above 20 kHz is Ultrasonic (bats/SONAR).
NaukriPhod. Trick: 20-20 Cricket Match = 20 Hz to 20 kHz Audible Range!

Q17. Why are danger signals and traffic stop lights always coloured Red? [RRB NTPC 2021–24 • SSC CHSL 2023–25 PYQ]

(A) Red has shortest wavelength (B) Red has longest wavelength and is scattered the least by fog/smoke (C) Red has highest frequency (D) Red is absorbed by air

Answer: (B) Red has the longest wavelength and scatters the least — In VIBGYOR, Red has the maximum wavelength (λ) and minimum scattering.
NaukriPhod. Trick: Red = Longest Wavelength = Least Scattering (seen from far); Violet/Blue = Shortest λ = Maximum Scattering (Blue Sky).

Q18. Which synthetic polymer (polyamide fiber) is five times stronger than steel and used to make Bulletproof Jackets? [RRB NTPC 2021–24 • SSC CHSL 2023–25 PYQ]

(A) Rayon (B) Kevlar (C) Dacron (Terylene) (D) Orlon

Answer: (B) Kevlar — Developed by Stephanie Kwolek; Bulletproof glass windows are made of Lexan (Polycarbonate).
NaukriPhod. Trick: Bulletproof Vest/Jacket = Kevlar; Bulletproof Glass = Lexan / Polycarbonate!

Q19. When water is added to Quicklime (CaO), which compound is formed with a hissing sound and intense heat (Exothermic reaction)? [RRB NTPC 2021–24 • SSC CHSL 2023–25 PYQ]

(A) Calcium Carbonate (B) Slaked Lime — Calcium Hydroxide $Ca(OH)_2$ (C) Calcium Chloride (D) Gypsum

Answer: (B) Slaked Lime — $Ca(OH)_2$ — Used for whitewashing walls; reacts slowly with CO_2 in air to form a shiny $CaCO_3$ finish.
NaukriPhod. Trick: Quicklime = CaO (Dry); add water ("slake" thirst) → Slaked Lime = $Ca(OH)_2$; Marble/Limestone = $CaCO_3$.

Q20. Why does a coin placed at the bottom of a bucket filled with water appear raised (closer to the surface)? [RRB NTPC 2021–24 • SSC CHSL 2023–25 PYQ]

(A) Total Internal Reflection (B) Refraction of Light (C) Dispersion of Light (D) Interference

Answer: (B) Refraction of Light — Light rays bend away from the normal when travelling from water (denser) to air (rarer).
NaukriPhod. Trick: Bent pencil in water + Raised coin/swimming pool floor + Twinkling stars = Always Refraction!

PART II: HIGH-YIELD BIOLOGY — HUMAN BODY SYSTEMS, VITAMINS, DISEASES & BOTANY

Q21. Which fat-soluble vitamin plays an essential role in the blood clotting process? [RRB NTPC 2021–24 • SSC CHSL 2023–25 PYQ]

(A) Vitamin A (B) Vitamin C (C) Vitamin K (D) Vitamin B1

Answer: (C) Vitamin K (Phylloquinone) — Synthesizes clotting factors in the liver to prevent excessive bleeding.
NaukriPhod. Trick: K = "Khoon ka Thakka" (Blood Clotting); Fat-soluble = KEDA (Vitamins K, E, D, A); Water-soluble = B & C.

Q22. Which part of the human brain regulates body temperature (thermostat), hunger, thirst, and controls the Pituitary gland? [RRB NTPC 2021–24 • SSC CHSL 2023–25 PYQ]

(A) Cerebellum (B) Hypothalamus (C) Medulla Oblongata (D) Pons

Answer: (B) Hypothalamus — Called the 'Master of the Master Gland' (controls Pituitary) and acts as the body's thermometer.
NaukriPhod. Trick: Hunger, Thirst, Love, Sweat & Body Temp = Hypothalamus; Balance/Posture = Cerebellum; Heartbeat/Vomiting = Medulla.

Q23. Which two cell organelles in eukaryotes possess their own circular DNA and ribosomes (Semi-autonomous organelles)? [RRB NTPC 2021–24 • SSC CHSL 2023–25 PYQ]

(A) Lysosome & Golgi (B) Mitochondria & Plastids (Chloroplasts) (C) Vacuole & ER (D) Ribosome & Centrosome

Answer: (B) Mitochondria and Plastids (Chloroplasts) — Can synthesize some of their own proteins independently.
NaukriPhod. Trick: Only the 2 Energy Makers — Mitochondria (ATP) & Chloroplast (Photosynthesis) — own their personal DNA!

Q24. Where is 'Bile Juice' produced in the human body, and where is it stored before being released into the small intestine? [RRB NTPC 2021–24 • SSC CHSL 2023–25 PYQ]

(A) Pancreas & Liver (B) Produced in Liver; Stored in Gall Bladder (C) Stomach & Spleen (D) Gall Bladder & Pancreas

Answer: (B) Produced in Liver; Stored in Gall Bladder — Bile is alkaline, contains NO digestive enzymes, yet emulsifies fats.
NaukriPhod. Trick: Factory = Liver (largest gland); Warehouse = Gall Bladder; Job = Breaks large fat globules into tiny droplets!

Q25. What is the average lifespan of human Red Blood Corpuscles (RBCs / Erythrocytes), and which organ is called their 'Graveyard'? [RRB NTPC 2021–24 • SSC CHSL 2023–25 PYQ]

(A) 60 days; Liver (B) 120 days; Spleen (Tilli) (C) 90 days; Bone Marrow (D) 14 days; Kidney

Answer: (B) 120 days; Spleen — RBCs are formed in Red Bone Marrow and destroyed in the Spleen (also acts as the blood bank).
NaukriPhod. Trick: Born in = Bone Marrow; Lives = 120 Days (no nucleus in mammals except camel/llama); Buried in = Spleen!

Q26. Which organ in the human body acts as both an Exocrine and an Endocrine gland (Mixed / Heterocrine Gland)? [RRB NTPC 2021–24 • SSC CHSL 2023–25 PYQ]

(A) Thyroid Gland (B) Pancreas (C) Adrenal Gland (D) Pituitary Gland

Answer: (B) Pancreas — Secretes pancreatic digestive juice via ducts and Insulin/Glucagon hormones directly into blood.
NaukriPhod. Trick: Pancreas = 2-in-1 Mixed Gland; Beta cells of Islets of Langerhans secrete Insulin (deficiency causes Diabetes Mellitus).

Q27. Which part of the donor's eye is transplanted during an Eye Donation surgery, and where is the image formed in a normal eye? [RRB NTPC 2021–24 • SSC CHSL 2023–25 PYQ]

(A) Retina & Iris (B) Transplanted: Cornea; Image formed on: Retina (C) Pupil & Cornea (D) Lens & Optic Nerve

Answer: (B) Cornea is transplanted; Retina forms a Real & Inverted image — Rod cells sense dim light; Cone cells sense colour.
NaukriPhod. Trick: Cornea = Donated Window; Iris = Controls Pupil size; Retina = Cinema Screen (Real & Inverted); C for Cone = C for Colour!

Q28. Which plant vascular tissue transports water upward from roots, and which transports food prepared in leaves? [RRB NTPC 2021–24 • SSC CHSL 2023–25 PYQ]

(A) Phloem & Xylem | (B) Water: Xylem; Food: Phloem | (C) Cortex & Pith | (D) Stomata & Guard Cells

Answer: (B) Water: Xylem (unidirectional); Food: Phloem (bidirectional) — Together they form the vascular bundle.
NaukriPhod. Trick: "Jal" (Water) = Xylem; "Phal" (Food) = Phloem!

Q29. Which connective tissue connects Bone to Bone, and which connects Muscle to Bone in the human body? [RRB NTPC 2021–24 • SSC CHSL 2023–25 PYQ]

(A) Tendon & Ligament | (B) Bone–Bone: Ligament; Muscle–Bone: Tendon | (C) Cartilage & Axon | (D) Areolar & Adipose

Answer: (B) Bone to Bone: Ligament; Muscle to Bone: Tendon — Adipose tissue under the skin stores fat as an insulator.
NaukriPhod. Trick: Memorize the two 3-letter codes: "B–L–B" (Bone–Ligament–Bone) and "M–T–B" (Muscle–Tendon–Bone)!

Q30. Deficiency of Vitamin B3 (Niacin) causes 'Pellagra' (4D Syndrome), while deficiency of Vitamin B1 (Thiamine) causes: [RRB NTPC 2021–24 • SSC CHSL 2023–25 PYQ]

(A) Scurvy | (B) Beriberi | (C) Rickets | (D) Xerophthalmia

Answer: (B) Beriberi — Affects the nervous and cardiovascular systems, especially in regions eating polished white rice.
NaukriPhod. Trick: B1 (Thiamine) = Beriberi; B2 (Riboflavin) = Cheilosis; B3 (Niacin) = Pellagra; B9 (Folic Acid) = Anemia.

Q31. What is the chemical name of Vitamin D (the Sunshine Vitamin) and Vitamin E (the Anti-Sterility / Beauty Vitamin)? [RRB NTPC 2021–24 • SSC CHSL 2023–25 PYQ]

(A) Retinol & Ascorbic | (B) Vit D: Calciferol; Vit E: Tocopherol | (C) Thiamine & Biotin | (D) Phylloquinone & Niacin

Answer: (B) Vitamin D: Calciferol; Vitamin E: Tocopherol — Vit D deficiency causes Rickets in children and Osteomalacia in adults.
NaukriPhod. Trick: Vit D absorbs Calcium for bones → "Calciferol"; Vit E prevents sterility ("Toko mat, sundar hai") → "Tocopherol"!

Q32. Which diagnostic test is specifically performed to confirm 'Typhoid Fever' (caused by *Salmonella typhi* bacteria)? [RRB NTPC 2021–24 • SSC CHSL 2023–25 PYQ]

(A) ELISA Test (B) Widal Test (C) Mantoux Test (D) RT-PCR Test

Answer: (B) Widal Test — Typhoid affects the small intestine and spreads through contaminated water/food.
NaukriPhod. Trick: Typhoid = Widal Test; Tuberculosis (TB) = Mantoux Test & BCG Vaccine; HIV/AIDS = ELISA Test.

Q33. 'Minamata Disease' (neurological disorder) and 'Itai-Itai Disease' (ouch-ouch bone disease) are caused by water pollution of which heavy metals? [RRB NTPC 2021–24 • SSC CHSL 2023–25 PYQ]

(A) Lead & Arsenic (B) Mercury (Minamata) & Cadmium (Itai-Itai) (C) Nitrate & Fluoride (D) Copper & Zinc

Answer: (B) Mercury (Hg) causes Minamata; Cadmium (Cd) causes Itai-Itai — Excess Nitrate in water causes Blue Baby Syndrome.
NaukriPhod. Trick: M for Minamata = M for Mercury (Fish); Cadmium = Itai-Itai; Nitrate = Blue Baby; Arsenic = Blackfoot Disease.

Q34. Which plant hormone (phytohormone) is a growth INHIBITOR that causes wilting of leaves and stomatal closure during drought stress? [RRB NTPC 2021–24 • SSC CHSL 2023–25 PYQ]

(A) Auxin (B) Abscisic Acid (ABA) (C) Gibberellin (D) Cytokinin

Answer: (B) Abscisic Acid (ABA) — Known as the 'Stress Hormone' in plants; Auxin, Gibberellin, and Cytokinin are growth promoters.
NaukriPhod. Trick: Auxin = Shoot tip bending to light; Cytokinin = Cell division; Gibberellin = Stem height; ABA = "Ab Bas!" (Stops growth).

Q35. The cell wall of Plants is made of Cellulose, whereas the cell wall of Fungi is composed of which tough polysaccharide? [RRB NTPC 2021–24 • SSC CHSL 2023–25 PYQ]

(A) Pectin (B) Chitin (C) Starch (D) Glycogen

Answer: (B) Chitin — Plants store food as Starch, whereas Animals and Fungi store reserve food as Glycogen.
NaukriPhod. Trick: Plant Cell Wall = Cellulose; Fungal Cell Wall & Insect Exoskeleton = Chitin; Animal Cells = NO Cell Wall!

Q36. In the DNA Double Helix (proposed by Watson and Crick in 1953), Adenine (A) pairs with Thymine (T), whereas in RNA, Adenine pairs with: [RRB NTPC 2021–24 • SSC CHSL 2023–25 PYQ]

(A) Cytosine (C) (B) Uracil (U) (C) Guanine (G) (D) Adenine (A)

Answer: (B) Uracil (U) — RNA is single-stranded and contains Uracil in place of Thymine (Guanine always pairs with Cytosine via 3 H-bonds).
NaukriPhod. Trick: DNA = A=T (2 bonds) & G≡C (3 bonds); in RNA, Thymine is replaced by Uracil (U)!

Q37. How many pairs of chromosomes are present in a normal human somatic cell, and which parent determines the biological sex of the child? [RRB NTPC 2021–24 • SSC CHSL 2023–25 PYQ]

(A) 22 pairs; Mother (B) 23 pairs (46 total); Father (XY) (C) 24 pairs; Father (D) 46 pairs; Both

Answer: (B) 23 pairs (46 chromosomes); Father (XY) — 22 pairs are Autosomes; the 23rd pair is Allosomes (XX in female, XY in male).
NaukriPhod. Trick: Read carefully whether exam asks "Pairs" (23) or "Total Number" (46)! Y-chromosome comes only from Father.

Q38. Who is revered as the 'Father of Genetics' for his laws of inheritance discovered using Garden Pea (*Pisum sativum*) plants? [RRB NTPC 2021–24 • SSC CHSL 2023–25 PYQ]

(A) Charles Darwin (B) Gregor Johann Mendel (C) Carl Linnaeus (D) Robert Hooke

Answer: (B) Gregor Johann Mendel — Darwin gave Natural Selection; Linnaeus gave Binomial Nomenclature; Hooke discovered the Cell (1665).
NaukriPhod. Trick: Mendel = Pea Genetics; Linnaeus = Taxonomy (2-word naming); Robert Hooke = Dead Cell; Leeuwenhoek = Living Cell.

Q39. In which part of the female reproductive system does 'Fertilization' (fusion of sperm and ovum) actually take place? [RRB NTPC 2021–24 • SSC CHSL 2023–25 PYQ]

(A) Uterus (Womb) (B) Fallopian Tube (Oviduct) (C) Ovary (D) Cervix

Answer: (B) Fallopian Tube (Oviduct) — The fertilized zygote later implants and develops into an embryo in the Uterus.
NaukriPhod. Trick: Trap Alert: Do NOT mark Uterus! Fertilization = Fallopian Tube; Baby's growth/implantation = Uterus!

Q40. Which digestive enzyme in gastric juice digests proteins inside the highly acidic (HCl) environment of the human stomach? [RRB NTPC 2021–24 • SSC CHSL 2023–25 PYQ]

(A) Trypsin (B) Pepsin (C) Ptyalin (D) Maltase

Answer: (B) Pepsin —Pepsin works in acidic medium (Stomach); Trypsin digests proteins in alkaline medium (Small Intestine).
NaukriPhod. Trick: P for Protein = P for Pepsin (Stomach, Acidic); Rennin digests milk protein Casein in infants.

Q41. Accumulation of which acid in human muscles during intense physical exercise causes muscle cramps and fatigue? [RRB NTPC 2021–24 • SSC CHSL 2023–25 PYQ]

(A) Uric Acid (B) Lactic Acid (C) Pyruvic Acid (D) Citric Acid

Answer: (B) Lactic Acid — Formed by anaerobic respiration in muscle cells when oxygen supply is insufficient.
NaukriPhod. Trick: Muscle Cramps (Anaerobic) & Curd = Lactic Acid; Joint Gout pain = Uric Acid crystals!

Q42. Which Kingdom in R.H. Whittaker's Five-Kingdom Classification (1969) includes all unicellular Prokaryotes like Bacteria and Blue-Green Algae? [RRB NTPC 2021–24 • SSC CHSL 2023–25 PYQ]

(A) Protista (B) Monera (C) Fungi (D) Plantae

Answer: (B) Kingdom Monera — Protista includes unicellular Eukaryotes (like Amoeba, Paramecium, Euglena, Plasmodium).
NaukriPhod. Trick: Unicellular Prokaryotes (no true nucleus: Bacteria) = Monera; Unicellular Eukaryotes (Amoeba) = Protista!

Q43. Which plant division is called the 'Amphibians of the Plant Kingdom' because they live on soil but require water for sexual reproduction? [RRB NTPC 2021–24 • SSC CHSL 2023–25 PYQ]

(A) Thallophyta (B) Bryophyta (Mosses & Liverworts) (C) Pteridophyta (D) Gymnosperms

Answer: (B) Bryophyta (e.g., Funaria, Marchantia, Riccia) — Lack true vascular tissues (xylem/phloem); Pteridophytes are first vascular plants.
NaukriPhod. Trick: Amphibians of Plant Kingdom = Bryophyta; Naked-seed plants = Gymnosperms (Pinus, Cycas).

Q44. Which mineral element is essential for the synthesis of 'Thyroxine' hormone by the Thyroid gland, whose deficiency causes Goitre? [RRB NTPC 2021–24 • SSC CHSL 2023–25 PYQ]

(A) Calcium (B) Iodine (C) Iron (D) Sodium

Answer: (B) Iodine — Lack of iodine in diet causes enlargement of the thyroid gland in the neck (Simple Goitre).
NaukriPhod. Trick: Thyroid (Largest Endocrine gland) needs Iodine → Deficiency = Goitre!

Q45. What is the balloon-like structure inside the human Lungs where the actual exchange of Oxygen (O_2) and Carbon Dioxide (CO_2) takes place? [RRB NTPC 2021–24 • SSC CHSL 2023–25 PYQ]

(A) Bronchi (B) Alveoli (C) Trachea (D) Pleura

Answer: (B) Alveoli — Provide a massive surface area surrounded by capillaries for gas diffusion.
NaukriPhod. Trick: Lungs unit = Alveoli; Kidney unit = Nephron; Brain unit = Neuron!

PART III: HIGH-YIELD CHEMISTRY — CHEMICAL FORMULAS, ACIDS, METALS, ALLOYS & PERIODIC TABLE

Q46. How many molecules of water of crystallization are present in one formula unit of Washing Soda ($Na_2CO_3 \cdot xH_2O$)? [RRB NTPC 2021–24 • SSC CHSL 2023–25 PYQ]

(A) 5 molecules (B) 10 molecules ($Na_2CO_3 \cdot 10H_2O$) (C) 2 molecules (D) ½ molecule

Answer: (B) 10 molecules ($Na_2CO_3 \cdot 10H_2O$) — Used in glass, soap, and paper industries and for removing permanent hardness of water.
NaukriPhod. Trick: Washing clothes needs 10 buckets of water → $Na_2CO_3 \cdot 10H_2O$! (Gypsum = $2H_2O$; POP = $\frac{1}{2}H_2O$; $CuSO_4 = 5H_2O$; $FeSO_4 = 7H_2O$).

Q47. Which organic acid is naturally present in Tomatoes and Spinach, and is also used to remove stubborn rust and ink stains from clothes? [RRB NTPC 2021–24 • SSC CHSL 2023–25 PYQ]

(A) Malic Acid (B) Oxalic Acid (C) Tartaric Acid (D) Acetic Acid

Answer: (B) Oxalic Acid — Calcium oxalate crystals are also the main cause of human kidney stones.
NaukriPhod. Trick: Tomato/Spinach + Kidney Stones + Ink/Rust Stain Remover = Always Oxalic Acid! (Apple = Malic Acid).

Q48. What is the percentage of actual Silver (Ag) present in the alloy called 'German Silver'? [RRB NTPC 2021–24 • SSC CHSL 2023–25 PYQ]

(A) 50% (B) 0% (Zero Percent) (C) 20% (D) 10%

Answer: (B) 0% (Zero Percent) — German Silver is an alloy of Copper (Cu) + Zinc (Zn) + Nickel (Ni); it only looks silvery.
NaukriPhod. Trick: Exam's classic trick: German Silver has 0% Silver (Cu+Zn+Ni), and Lead Pencils have 0% Lead (100% Graphite)!

Q49. Which highly reactive alkali metals are so soft they can be cut with a knife and are stored immersed in Kerosene Oil? [RRB NTPC 2021–24 • SSC CHSL 2023–25 PYQ]

(A) Calcium & Magnesium (B) Sodium (Na) & Potassium (K) (C) Iron & Zinc (D) White Phosphorus

Answer: (B) Sodium (Na) and Potassium (K) — They react violently with air and moisture; White Phosphorus is stored under cold water.
NaukriPhod. Trick: Stored in Kerosene = Sodium & Potassium; Stored in Cold Water = White Phosphorus!

Q50. Why is 'Graphite' a good conductor of electricity, unlike Diamond, even though both are pure allotropes of Carbon? [RRB NTPC 2021–24 • SSC CHSL 2023–25 PYQ]

(A) It has sp^3 tetrahedral bonds (B) Each Carbon atom is bonded to only 3 others, leaving 1 free delocalized electron (C) It contains metal impurities (D) It is amorphous

Answer: (B) Presence of one free valence electron per carbon atom — Hexagonal layers also slide over each other, making Graphite a dry lubricant.
NaukriPhod. Trick: Diamond = 4 bonds (sp^3, 0 free electrons, insulator); Graphite = 3 bonds (sp^2, 1 free electron, conductor)!

Q51. 'Cinnabar' (HgS) and 'Galena' (PbS) are the principal sulphide ores of which two metals respectively? [RRB NTPC 2021–24 • SSC CHSL 2023–25 PYQ]

(A) Copper & Tin (B) Mercury (Cinnabar) & Lead (Galena) (C) Silver & Zinc (D) Iron & Aluminium

Answer: (B) Mercury (Hg) and Lead (Pb) — Pitchblende (Uraninite) is the chief ore of Uranium; Monazite sand (Kerala) is the ore of Thorium.
NaukriPhod. Trick: Cinnabar (Sindoor) = Mercury (HgS); Galena = Lead (PbS); Calamine/Zinc Blende = Zinc; Bauxite = Aluminium.

Q52. Who formulated the 'Modern Periodic Law' in 1913, arranging elements by Atomic Number (Z) instead of Mendeleev's Atomic Mass? [RRB NTPC 2021–24 • SSC CHSL 2023–25 PYQ]

(A) Dmitri Mendeleev (B) Henry Moseley (C) John Newlands (D) Johann Döbereiner

Answer: (B) Henry Moseley (1913) — The Modern Periodic Table has 18 vertical columns (Groups) and 7 horizontal rows (Periods).
NaukriPhod. Trick: Triads = Döbereiner; Octaves = Newlands; Atomic Mass (1869) = Mendeleev; Modern Atomic Number (1913) = Moseley!

Q53. Which element has the highest 'Electronegativity', and which element has the highest 'Electron Affinity' in the Periodic Table? [RRB NTPC 2021–24 • SSC CHSL 2023–25 PYQ]

(A) Chlorine & Fluorine (B) Electronegativity: Fluorine (F); Electron Affinity: Chlorine (Cl) (C) Oxygen & Nitrogen (D) Caesium & Francium

Answer: (B) Highest Electronegativity: Fluorine; Highest Electron Affinity: Chlorine — Due to Fluorine's tiny 2p subshell repulsion, Chlorine beats it in Electron Affinity.
NaukriPhod. Trick: 50:50 Trap: Electronegativity = Fluorine (#1); Electron Gain Enthalpy / Affinity = Chlorine (#1)!

Q54. Which inert gas (Group 18) is filled inside incandescent electric bulbs along with Nitrogen to prevent oxidation of the Tungsten filament? [RRB NTPC 2021–24 • SSC CHSL 2023–25 PYQ]

(A) Helium (B) Argon (Ar) (C) Radon (D) Xenon

Answer: (B) Argon (Ar) — Argon is the most abundant noble gas in the Earth's atmosphere (~0.93%).
NaukriPhod. Trick: Electric Bulb = Argon; Diver's Cylinder & Balloons = Helium; Stranger Gas = Xenon; Radioactive Gas = Radon.

Q55. What is the chemical name of 'Milk of Magnesia', widely used as an antacid to neutralize excess stomach acidity? [RRB NTPC 2021–24 • SSC CHSL 2023–25 PYQ]

(A) Magnesium Sulphate (B) Magnesium Hydroxide — $Mg(OH)_2$ (C) Magnesium Chloride (D) Magnesium Oxide

Answer: (B) Magnesium Hydroxide — $Mg(OH)_2$ — A mild base with a pH of ~10.5; Magnesium Sulphate ($MgSO_4 \cdot 7H_2O$) is Epsom Salt.
NaukriPhod. Trick: Milk of Magnesia = $Mg(OH)_2$ (pH 10.5 Antacid); Caustic Soda = NaOH; Caustic Potash = KOH.

Q56. In the 'Vulcanization of Rubber', natural rubber is heated with 3%–5% of which non-metal to improve its elasticity and strength? [RRB NTPC 2021–24 • SSC CHSL 2023–25 PYQ]

(A) Carbon (B) Sulphur (S) (C) Phosphorus (D) Silicon

Answer: (B) Sulphur (S) — Discovered by Charles Goodyear; forms cross-links between polyisoprene chains.
NaukriPhod. Trick: Natural Rubber monomer = Isoprene; Vulcanization (Hardening) = Always Sulphur (S)!

Q57. Atoms of different elements like Argon ($_{18}Ar^{40}$) and Calcium ($_{20}Ca^{40}$) that have the SAME Mass Number (40) but different Atomic Numbers are called: [RRB NTPC 2021–24 • SSC CHSL 2023–25 PYQ]

(A) Isotopes (B) Isobars (C) Isotones (D) Isomers

Answer: (B) Isobars — Isotopes have the same Atomic Number (Protons); Isotones have the same number of Neutrons.
NaukriPhod. Trick: Iso-TOP-e = Same Proton (Z); Iso-BAR (Bhaar/Weight) = Same Mass Number (A); Iso-to-N-e = Same Neutrons!

Q58. Which radioactive isotope is used in the radiation therapy treatment of Cancer, and which is used to treat Thyroid Goitre? [RRB NTPC 2021–24 • SSC CHSL 2023–25 PYQ]

(A) Carbon-14 & U-235 (B) Cancer: Cobalt-60; Thyroid: Iodine-131 (C) Sodium-24 & P-32 (D) Radium & Polonium

Answer: (B) Cancer: Cobalt-60; Thyroid: Iodine-131 — Carbon-14 is used for fossil dating; Uranium-238 is used for rock/Earth age dating.
NaukriPhod. Trick: C for Cancer = C for Cobalt-60; Thyroid = Iodine-131; Blood Clot detection = Sodium-24; Fossils = Carbon-14.

Q59. Which metal catalyst is used in the 'Hydrogenation of Vegetable Oils' to convert unsaturated liquid oils into solid Vanaspati Ghee? [RRB NTPC 2021–24 • SSC CHSL 2023–25 PYQ]

(A) Platinum (B) Nickel (Ni) (C) Vanadium Pentoxide (D) Copper

Answer: (B) Nickel (Ni) — Converts unsaturated carbon-carbon double/triple bonds into saturated single bonds.
NaukriPhod. Trick: Oil to Ghee (Hydrogenation) = Nickel (Ni); Ammonia (Haber's Process) = Iron (Fe); H_2SO_4 (Contact Process) = V_2O_5.

Q60. What is 'Dry Ice', and what phase transition does it undergo directly at room pressure? [RRB NTPC 2021–24 • SSC CHSL 2023–25 PYQ]

(A) Frozen H_2O; Melting

(B) Solid Carbon Dioxide (CO_2); Sublimation

(C) Solid Nitrogen; Evaporation

(D) Solid Ammonia; Condensation

Answer: (B) Solid Carbon Dioxide (CO_2); Sublimation — Turns directly from solid into gas without becoming liquid.
NaukriPhod. Trick: Sublimation Squad (Solid → Gas directly): Camphor (Kapoor), Naphthalene balls, Ammonium Chloride (NH_4Cl), Iodine, and Dry Ice!

Q61. What is the composition of 'Water Gas' (Syngas) and 'Producer Gas' respectively? [RRB NTPC 2021–24 • SSC CHSL 2023–25 PYQ]

(A) $CH_4 + CO_2$

(B) Water Gas: ($CO + H_2$); Producer Gas: ($CO + N_2$)

(C) Butane + Propane

(D) $CO_2 + H_2O$

Answer: (B) Water Gas: $CO + H_2$; Producer Gas: $CO + N_2$ — Both contain toxic Carbon Monoxide (CO) as the main combustible component.
NaukriPhod. Trick: Water (H_2O) has Hydrogen → Water Gas = $CO + H_2$! Air has 78% Nitrogen → Producer Gas = $CO + N_2$!

Q62. Which is the MOST abundant metal in the Earth's crust, and which is the MOST abundant element overall in the Earth's crust? [RRB NTPC 2021–24 • SSC CHSL 2023–25 PYQ]

(A) Iron & Silicon

(B) #1 Metal: Aluminium (8.1%); #1 Element: Oxygen (46.6%)

(C) Iron & Nitrogen

(D) Calcium & Hydrogen

Answer: (B) Most abundant Metal: Aluminium; Most abundant Element: Oxygen — Silicon (27.7%) is the 2nd most abundant element (metalloid).
NaukriPhod. Trick: Earth Crust Order "O–Si–Al–Fe": Oxygen (#1 Element) → Silicon (#2) → Aluminium (#1 Metal) → Iron (#2 Metal).

Q63. What colour does 'Phenolphthalein' indicator turn in an Acidic solution versus a Basic (Alkaline) solution? [RRB NTPC 2021–24 • SSC CHSL 2023–25 PYQ]

(A) Red in Acid; Blue in Base

(B) Colourless in Acid; Pink in Base

(C) Yellow in Acid; Red in Base

(D) Pink in Acid; Colourless in Base

Answer: (B) Colourless in Acid; Pink in Base — Methyl Orange turns Red in Acid and Yellow in Base.
NaukriPhod. Trick: Phenolphthalein: Base = Baby Pink (Acid = Clear/Colourless); Methyl Orange: Acid = Red, Base = Yellow.

Q64. Why does Carbon Monoxide (CO) emitted from incomplete combustion of fuel cause rapid suffocation and death? [RRB NTPC 2021–24 • SSC CHSL 2023–25 PYQ]

(A) It freezes the lungs

(B) It binds with Haemoglobin 200× faster than Oxygen to form stable Carboxyhaemoglobin

(C) It clots the blood

(D) It dissolves red blood cells

Answer: (B) Forms stable Carboxyhaemoglobin, blocking oxygen transport — Has ~200–250 times higher affinity for haemoglobin than O_2.
NaukriPhod. Trick: CO + Haemoglobin = Carboxyhaemoglobin (starves the brain of oxygen; never sleep in a closed room with a coal angithi!).

Q65. Which acid is known as the 'King of Chemicals' (Oil of Vitriol) and is used as the electrolyte in Lead-Acid Car Batteries? [RRB NTPC 2021–24 • SSC CHSL 2023–25 PYQ]

(A) Hydrochloric Acid (HCl) (B) Sulphuric Acid (H_2SO_4) (C) Nitric Acid (HNO_3) (D) Acetic Acid

Answer: (B) Sulphuric Acid (H_2SO_4) — Also the main contributor (along with HNO_3) to Acid Rain.
NaukriPhod. Trick: Car Battery + King of Chemicals + Oil of Vitriol + Acid Rain = Always Sulphuric Acid (H_2SO_4)!

Q66. In the 'Reactivity Series of Metals', which of these metals is the MOST reactive, and which is the LEAST reactive? [RRB NTPC 2021–24 • SSC CHSL 2023–25 PYQ]

(A) Iron & Copper

(B) Most Reactive: Potassium (K); Least Reactive: Gold (Au) / Platinum

(C) Zinc & Silver

(D) Aluminium & Mercury

Answer: (B) Most Reactive: Potassium (K); Least Reactive: Gold (Au) — Metals below Hydrogen (Cu, Hg, Ag, Au, Pt) cannot displace H_2 from dilute acids.
NaukriPhod. Trick: Top Order "K–Na–Ca–Mg–Al–Zn–Fe–Pb–[H]–Cu–Hg–Ag–Au" ("Kedar Nath Ka Mali Aloo Zara Feeke Pakata Hai").

Q67. According to the electronic concept of Redox reactions, what is 'Oxidation' and what is 'Reduction' in terms of electrons? [RRB NTPC 2021–24 • SSC CHSL 2023–25 PYQ]

(A) Gain & Loss of electrons

(B) Oxidation: Loss of electrons; Reduction: Gain of electrons

(C) Loss of protons

(D) Gain of neutrons

Answer: (B) Oxidation is Loss of electrons; Reduction is Gain of electrons — The substance that gets oxidized acts as the Reducing Agent.
NaukriPhod. Trick: Memorize the 6-letter code "OIL RIG": Oxidation Is Loss (of e^-); Reduction Is Gain (of e^-)!

Q68. Which chemical process is used by soaps and detergents to clean oily dirt from clothes in water? [RRB NTPC 2021–24 • SSC CHSL 2023–25 PYQ]

(A) Calcination | (B) Micelle Formation (Emulsification) | (C) Saponification | (D) Esterification

Answer: (B) Micelle Formation — The hydrophobic tail attaches to oily dirt while the ionic hydrophilic head faces outward into water.
NaukriPhod. Trick: Making soap (Alkaline hydrolysis of fats) = Saponification; Cleaning action of soap = Micelle Formation!

Q69. Which compound is known as 'Philosopher's Wool' (formed when Zinc burns in air)? [RRB NTPC 2021–24 • SSC CHSL 2023–25 PYQ]

(A) Zinc Chloride | (B) Zinc Oxide (ZnO) | (C) Zinc Carbonate | (D) Zinc Sulphide

Answer: (B) Zinc Oxide (ZnO) — ZnO and Al_2O_3 are the two classic 'Amphoteric Oxides' (react with both acids and bases).
NaukriPhod. Trick: Philosopher's Wool = ZnO; Amphoteric Oxide Twins (Acid + Base both) = Al_2O_3 and ZnO!

Q70. What is the general molecular formula of Alkanes (saturated), Alkenes (double bond), and Alkynes (triple bond)? [RRB NTPC 2021–24 • SSC CHSL 2023–25 PYQ]

(A) C_nH_{2n}, C_nH_{2n+2}, C_nH_{2n-2} | (B) Alkane: C_nH_{2n+2}; Alkene: C_nH_{2n}; Alkyne: C_nH_{2n-2} | (C) C_nH_n for all | (D) C_nH_{2n+1}

Answer: (B) Alkane: C_nH_{2n+2}; Alkene: C_nH_{2n}; Alkyne: C_nH_{2n-2} — Successive members of a homologous series differ by a $-CH_2-$ unit (14 u mass).
NaukriPhod. Trick: Vowel Order "A–E–Y" (+2, 0, −2): AlkAne = 2n+2; AlkEne = 2n; AlkYne = 2n−2!

PART IV: HIGH-YIELD PHYSICS — LIGHT, ELECTRICITY, SOUND, MECHANICS & THERMODYNAMICS

Q71. Which spherical mirror is used by Dentists, in Shaving Mirrors, and in Vehicle Headlights, versus in Vehicle Rear-View Side Mirrors? [RRB NTPC 2021–24 • SSC CHSL 2023–25 PYQ]

(A) Convex & Concave | (B) Dentist/Headlight: Concave; Rear-View Side Mirror: Convex | (C) Plane Mirror for both | (D) Cylindrical Mirror

Answer: (B) Dentist/Headlight/Shaving: Concave Mirror; Rear-View: Convex Mirror — Concave converges light/magnifies close objects; Convex diverges light.
NaukriPhod. Trick: Teeth live in a "Cave" → Dentist & Close-up = ConCave; Side Mirror needs eXtra wide view = ConveX!

Q72. What is the SI unit of 'Resistivity' (Specific Resistance), and on what factors does the resistivity of a copper wire depend? [RRB NTPC 2021–24 • SSC CHSL 2023–25 PYQ]

(A) Ohm; Length & Area | (B) Ohm-meter (Ω·m); Depends ONLY on Material nature & Temperature | (C) Mho; Thickness | (D) Ampere-meter

Answer: (B) Ohm-meter (Ω·m); Material & Temperature only — Stretching a wire changes its Resistance (R = ρL/A), but its Resistivity (ρ) stays constant!

NaukriPhod. Trick: Trap Alert: Stretching a wire to double length makes Resistance 4× (2^2), while Resistivity (ρ) remains UNCHANGED!

Q73. What is the exact value of 1 commercial 'Unit' of electrical energy (1 Kilowatt-hour) in Joules, and 1 Horsepower (HP) in Watts? [RRB NTPC 2021–24 • SSC CHSL 2023–25 PYQ]

(A) 3.6×10^5 J; 1000 W | (B) 1 kWh = 3.6×10^6 Joules; 1 HP = 746 Watts | (C) 3.6×10^3 J; 786 W | (D) 10^6 J; 500 W

Answer: (B) 1 kWh = 3.6×10^6 Joules (3.6 MJ); 1 HP = 746 Watts — kWh is a unit of Energy (not Power!).

NaukriPhod. Trick: Memorize both exact numbers: 1 Unit (kWh) = 3.6×10^6 J; 1 Horsepower = 746 Watts!

Q74. What is the minimum distance required between a sound source and a reflecting wall to hear a distinct 'Echo' in air (at ~20°C)? [RRB NTPC 2021–24 • SSC CHSL 2023–25 PYQ]

(A) 10 meters | (B) 17.2 meters | (C) 34.4 meters | (D) 25 centimeters

Answer: (B) 17.2 meters — Persistence of human hearing is 0.1 second, so d = (v × t)/2 = (344 × 0.1)/2 = 17.2 m.

NaukriPhod. Trick: Distinct Echo minimum distance = 17.2 meters; Distinct Vision minimum distance for human eye = 25 cm!

Q75. The 'Pitch' (shrillness) of a sound wave depends on which physical property, and 'Loudness' depends on which property? [RRB NTPC 2021–24 • SSC CHSL 2023–25 PYQ]

(A) Amplitude & Frequency | (B) Pitch depends on Frequency; Loudness depends on Amplitude | (C) Wavelength & Speed | (D) Time period only

Answer: (B) Pitch: Frequency (Hz); Loudness: Amplitude (measured in Decibels dB) — A lion's roar has high amplitude (loud) but low frequency (low pitch).

NaukriPhod. Trick: Mosquito buzz = High Pitch (High Frequency); Lion roar = High Loudness (High Amplitude)!

Q76. Why does a cricket player pull his hands backward while catching a fast-moving cricket ball? [RRB NTPC 2021–24 • SSC CHSL 2023–25 PYQ]

(A) Newton's 1st Law | (B) To increase the time of contact (Δt), which reduces the rate of change of momentum and Force (Newton's 2nd Law) | (C) To increase friction | (D) Conservation of Energy

Answer: (B) Increases time (Δt) to reduce Impact Force (Newton's 2nd Law: F = Δp / Δt) — 1st Law defines Force/Inertia; 2nd Law measures Force.
NaukriPhod. Trick: Dust falling from carpet / Passenger jerking in bus = 1st Law (Inertia); Catching ball = 2nd Law; Rocket/Gun Recoil = 3rd Law!

Q77. What happens to the apparent weight of a person standing on a weighing scale inside a Lift (Elevator) when the cable snaps (Free Fall)? [RRB NTPC 2021–24 • SSC CHSL 2023–25 PYQ]

(A) Becomes Double | (B) Becomes Zero (Weightlessness) | (C) Remains unchanged | (D) Increases slightly

Answer: (B) Becomes Zero (Weightlessness) — Downward acceleration equals gravity (a = g), so R = m(g − g) = 0.
NaukriPhod. Trick: Lift Accelerating Up = Heavier m(g+a); Accelerating Down = Lighter m(g−a); Constant Speed = Normal mg; Free Fall = ZERO!

Q78. What is the 'Escape Velocity' required for a rocket launched from the Earth's surface to permanently escape Earth's gravitational field? [RRB NTPC 2021–24 • SSC CHSL 2023–25 PYQ]

(A) 7.9 km/s | (B) 11.2 km/s | (C) 2.38 km/s | (D) 42.1 km/s

Answer: (B) 11.2 km/s — Formula $v_e = \sqrt{(2gR)}$, which is completely independent of the mass of the rocket!
NaukriPhod. Trick: Earth Escape Velocity = 11.2 km/s; Near-Earth Orbital Velocity = 7.9 km/s; Moon Escape Velocity = 2.38 km/s.

Q79. Why are falling raindrops spherical in shape, and why does hot soup taste better than cold soup? [RRB NTPC 2021–24 • SSC CHSL 2023–25 PYQ]

(A) Viscosity | (B) Surface Tension | (C) Capillarity | (D) Atmospheric Pressure

Answer: (B) Surface Tension — Liquids minimize surface area (forming spheres); heating soup reduces its surface tension so it spreads over the tongue.
NaukriPhod. Trick: Spherical Drops / Floating Needle / Hot Soup = Surface Tension; Oil rising in lamp wick / Blotting paper = Capillarity!

Q80. At what exact temperature does water have its MAXIMUM Density and MINIMUM Volume (Anomalous Expansion of Water)? [RRB NTPC 2021–24 • SSC CHSL 2023–25 PYQ]

(A) 0°C (B) 4°C (277 K) (C) 100°C (D) −4°C

Answer: (B) 4°C — When heated from 0°C to 4°C, water contracts (volume decreases, density increases) instead of expanding!
NaukriPhod. Trick: At 4°C: Density is Peak (Maximum) and Volume is Pit (Minimum)!

Q81. At what numerical value do the Celsius (°C) and Fahrenheit (°F) thermometers show the exact same reading? [RRB NTPC 2021–24 • SSC CHSL 2023–25 PYQ]

(A) +40° (B) −40° (−40°C = −40°F) (C) 0° (D) −273.15°

Answer: (B) −40° — Derived from C/5 = (F − 32)/9; Absolute Zero temperature is 0 Kelvin = −273.15°C.
NaukriPhod. Trick: Don't forget the minus sign: −40° is where Celsius and Fahrenheit meet!

Q82. An electric 'Transformer' works on the principle of Mutual Induction and operates ONLY on which type of electric current? [RRB NTPC 2021–24 • SSC CHSL 2023–25 PYQ]

(A) Direct Current (DC) only (B) Alternating Current (AC) only (C) Both AC and DC (D) Static Charge

Answer: (B) Alternating Current (AC) only — Steps up or steps down AC voltage while keeping the frequency (50 Hz in India) constant.
NaukriPhod. Trick: Transformer = AC Only (Frequency stays 50 Hz); Rectifier = AC to DC; Inverter = DC to AC!

Q83. In the Electromagnetic Spectrum, which wave has the HIGHEST frequency and penetrating power, and which has the LONGEST wavelength? [RRB NTPC 2021–24 • SSC CHSL 2023–25 PYQ]

(A) X-Rays & UV Rays (B) Highest Frequency: Gamma Rays; Longest Wavelength: Radio Waves (C) Microwaves & Infrared (D) Cosmic & Visible

Answer: (B) Highest Frequency/Energy: Gamma Rays; Longest Wavelength: Radio Waves — TV remotes and night-vision cameras use Infrared (IR) waves.
NaukriPhod. Trick: Order from Longest λ to Highest Frequency "R-M-I-V-U-X-G": Radio → Micro → Infrared → Visible → UV → X-Ray → Gamma!

Q84. Two resistors of 6 Ω and 3 Ω are connected in PARALLEL across a battery. What is their equivalent resistance? [RRB NTPC 2021–24 • SSC CHSL 2023–25 PYQ]

(A) 9 Ω (B) 2 Ω (C) 4.5 Ω (D) 0.5 Ω

Answer: (B) 2 Ω — Household appliances are always connected in Parallel so each gets equal voltage (220 V).
NaukriPhod. Trick: Parallel Product ÷ Sum: $(R_1 \times R_2)/(R_1 + R_2) = (6 \times 3)/(6 + 3) = 18/9 = 2\ \Omega$!

Q85. If the velocity (speed) of a moving car is DOUBLED, its Kinetic Energy (KE = ½mv^2) becomes how many times its original value? [RRB NTPC 2021–24 • SSC CHSL 2023–25 PYQ]

(A) 2 times (B) 4 times (C) 8 times (D) Half

Answer: (B) 4 times — Since KE = ½mv^2 = p^2/(2m), doubling velocity (or momentum) squares the Kinetic Energy (2^2 = 4).
NaukriPhod. Trick: Velocity becomes n times → Kinetic Energy becomes n^2 times (2× speed = 4× KE; 3× speed = 9× KE)!

Q86. Where is the value of acceleration due to gravity ('g') MAXIMUM and MINIMUM on the Earth? [RRB NTPC 2021–24 • SSC CHSL 2023–25 PYQ]

(A) Equator & Poles (B) Maximum at Poles; Minimum at Equator (and Zero at Earth's Center) (C) Same everywhere (D) Maximum at Center

Answer: (B) Maximum at Poles; Minimum at Equator; Zero at Center of Earth — Polar radius is smaller than equatorial radius ($g \propto 1/R^2$).
NaukriPhod. Trick: Mass (m) is constant everywhere in the universe; Weight (W = mg) is Max at Poles, Min at Equator, Zero at Center & 1/6th on Moon!

Q87. Which three colours are known as the 'Primary Colours of Light' (Additive Primary Colours)? [RRB NTPC 2021–24 • SSC CHSL 2023–25 PYQ]

(A) Red, Yellow, Blue (B) Red, Green, and Blue (RGB) (C) Cyan, Magenta, Yellow (D) Red, Orange, Violet

Answer: (B) Red, Green, and Blue (RGB) — Mixing Red + Green + Blue light in equal proportions produces pure White Light.
NaukriPhod. Trick: TV & Phone Screens use RGB = Red, Green, Blue are the 3 Primary Colours of Light!

Q88. Dynamic lift of an aeroplane wing and the blowing off of tin roofs during a high-speed storm are explained by which theorem? [RRB NTPC 2021–24 • SSC CHSL 2023–25 PYQ]

(A) Pascal's Law (B) Bernoulli's Principle (based on Conservation of Energy) (C) Archimedes' Principle (D) Hooke's Law

Answer: (B) Bernoulli's Principle — Where fluid speed is high, pressure becomes low; Pascal's Law explains Hydraulic brakes/lifts.
NaukriPhod. Trick: Aeroplane Wing / Storm Roof / Atomizer spray = Bernoulli; Hydraulic Brakes = Pascal; Floating Ship/Submarine = Archimedes.

Q89. If the focal length of a concave lens is −50 cm (−0.5 m), what is the Power of the lens in Dioptres (D)? [RRB NTPC 2021–24 • SSC CHSL 2023–25 PYQ]

(A) +2.0 D (B) −2.0 D (C) −0.5 D (D) +0.02 D

Answer: (B) −2.0 Dioptre (D) — Power P = 1 / f(in meters) = 100 / f(in cm) = 100 / (−50) = −2.0 D.
NaukriPhod. Trick: Concave Lens Power is ALWAYS Negative (−); Convex Lens Power is ALWAYS Positive (+); Divide 100 by cm!

Q90. Which of the following pairs contains ONLY 'Vector Quantities' (have both magnitude and direction)? [RRB NTPC 2021–24 • SSC CHSL 2023–25 PYQ]

(A) Work & Energy (B) Velocity, Momentum, Force, and Acceleration (C) Speed & Distance (D) Electric Current & Pressure

Answer: (B) Velocity, Momentum, Force, and Acceleration — Work, Power, Energy, Speed, Pressure, and Electric Current are ALL Scalars!
NaukriPhod. Trick: Trap Alert: Even though Electric Current & Pressure have arrows in diagrams, both are SCALAR quantities!

PART V: SCIENTIFIC INSTRUMENTS, MILESTONE DISCOVERIES & RANK-DECIDER PYQS

Q91. How are an 'Ammeter' (measures current) and a 'Voltmeter' (measures potential difference) connected in an electric circuit? [RRB NTPC 2021–24 • SSC CHSL 2023–25 PYQ]

(A) Parallel & Series (B) Ammeter in Series (Zero ideal R); Voltmeter in Parallel (Infinite ideal R) (C) Both in Series (D) Both in Parallel

Answer: (B) Ammeter: Series; Voltmeter: Parallel — An ideal Ammeter has ZERO resistance; an ideal Voltmeter has INFINITE resistance.
NaukriPhod. Trick: "A–S" (Ammeter = Series, 0 resistance) and "V–P" (Voltmeter = Parallel, ∞ resistance)!

Q92. What does a SUDDEN fall in the mercury reading of a 'Barometer' indicate about the weather? [RRB NTPC 2021–24 • SSC CHSL 2023–25 PYQ]

(A) Clear sunny weather (B) Arrival of a Storm / Cyclone (C) Slow rainfall (D) Extreme cold

Answer: (B) Arrival of a Storm / Cyclone — A slow fall indicates rain; a steady rise indicates clear, fair weather.
NaukriPhod. Trick: Barometer Sudden Drop = Storm/Cyclone; Slow Drop = Rain; Steady Rise = Clear Sky!

Q93. Which instrument is used to measure the purity/density of Milk, and which measures the depth of the Ocean? [RRB NTPC 2021–24 • SSC CHSL 2023–25 PYQ]

(A) Manometer & Altimeter | (B) Milk Purity: Lactometer; Ocean Depth: Fathometer | (C) Pyrometer & Barometer | (D) Viscometer & Odometer

Answer: (B) Lactometer (works on Archimedes' principle) & Fathometer — Pyrometer measures extreme temperatures (like the Sun's surface).
NaukriPhod. Trick: Milk (Lactose) = Lactometer; Ocean Depth = Fathometer; High Temp (Sun) = Pyrometer; Altitude = Altimeter; Blood Pressure = Sphygmomanometer.

Q94. Who discovered the 'Electron', 'Proton' (and Atomic Nucleus), and 'Neutron' respectively? [RRB NTPC 2021–24 • SSC CHSL 2023–25 PYQ]

(A) Bohr, Dalton, Chadwick | (B) Electron: J.J. Thomson; Proton/Nucleus: Rutherford (Goldstein); Neutron: James Chadwick | (C) Faraday, Curie, Planck | (D) Fermi, Roentgen, Pauli

Answer: (B) Electron: Thomson (1897); Proton/Nucleus: Rutherford/Goldstein; Neutron: Chadwick (1932) — Goldstein discovered canal rays (anode rays).
NaukriPhod. Trick: Classic Hindi Mnemonic: "Eent (e^- = Thomson) Par (Proton = Rutherford/Goldstein) Naach (Neutron = Chadwick)"!

Q95. Who discovered the world's first antibiotic 'Penicillin' in 1928, and from which organism was it extracted? [RRB NTPC 2021–24 • SSC CHSL 2023–25 PYQ]

(A) Louis Pasteur; Bacteria | (B) Alexander Fleming; Fungus (Mould *Penicillium notatum*) | (C) Edward Jenner; Virus | (D) Robert Koch; Algae

Answer: (B) Alexander Fleming; Fungus (*Penicillium notatum*) — Edward Jenner discovered the world's 1st vaccine (Smallpox, 1796).
NaukriPhod. Trick: 1st Antibiotic (Penicillin from Fungus) = Alexander Fleming; 1st Vaccine (Smallpox) = Edward Jenner; Rabies Vaccine = Louis Pasteur.

Q96. For which discovery was Albert Einstein awarded the 1921 Nobel Prize in Physics? [RRB NTPC 2021–24 • SSC CHSL 2023–25 PYQ]

(A) Theory of Relativity ($E=mc^2$) | (B) Law of the Photoelectric Effect | (C) Brownian Motion | (D) Gravitational Waves

Answer: (B) Law of the Photoelectric Effect — Explains the particle nature of light (photons ejecting electrons from a metal surface, used in Solar Cells).
NaukriPhod. Trick: Trap Alert: Einstein won the Nobel Prize for the Photoelectric Effect, NOT for $E = mc^2$ (Relativity)!

Q97. What is the normal Blood Pressure of a healthy adult human, and what do the two numbers represent? [RRB NTPC 2021–24 • SSC CHSL 2023–25 PYQ]

(A) 80/120 mmHg

(B) 120/80 mmHg (120 = Systolic contraction; 80 = Diastolic relaxation)

(C) 140/90 mmHg

(D) 100/60 mmHg

Answer: (B) 120/80 mmHg (Systolic / Diastolic) — Measured in millimeters of mercury (mmHg) using a Sphygmomanometer on the brachial artery.
NaukriPhod. Trick: Upper Number (120) = Systolic (Heart Squeeze); Lower Number (80) = Diastolic (Heart Relax)!

Q98. An Electric Generator (Dynamo) converts Mechanical Energy into Electrical Energy based on which law? [RRB NTPC 2021–24 • SSC CHSL 2023–25 PYQ]

(A) Coulomb's Law

(B) Michael Faraday's Law of Electromagnetic Induction (Fleming's Right-Hand Rule)

(C) Joule's Heating Law

(D) Kirchhoff's Law

Answer: (B) Faraday's Law of Electromagnetic Induction — Direction of induced current is found by Fleming's Right-Hand Rule.
NaukriPhod. Trick: Generator (Induction) = Fleming's RIGHT-Hand Rule; Electric Motor (Force) = Fleming's LEFT-Hand Rule!

Q99. Which semiconductor element is universally used to manufacture Computer Microchips (ICs) and Solar Photovoltaic Cells? [RRB NTPC 2021–24 • SSC CHSL 2023–25 PYQ]

(A) Copper

(B) Silicon (Si) & Germanium (Ge)

(C) Tungsten

(D) Silver

Answer: (B) Silicon (Si) and Germanium (Ge) — Integrated Circuits (IC chips) were invented by Jack Kilby; electrical conductivity of semiconductors INCREASES with temperature.
NaukriPhod. Trick: Heating a Metal increases resistance, but heating a Semiconductor (Silicon/Germanium) DECREASES resistance!

Q100. What is the scientific branch of study of 'Fungi', 'Algae', and 'Cells' called respectively? [RRB NTPC 2021–24 • SSC CHSL 2023–25 PYQ]

(A) Phycology, Mycology, Histology

(B) Fungi: Mycology; Algae: Phycology; Cells: Cytology

(C) Pomology, Oncology, Anthology

(D) Entomology, Ornithology, Ecology

Answer: (B) Fungi: Mycology; Algae: Phycology; Cells: Cytology — Lichen is a symbiotic partnership between Algae and Fungi (air pollution indicator for SO_2).
NaukriPhod. Trick: Fungi = Mycology; Algae = Phycology; Birds = Ornithology; Insects = Entomology; Cancer = Oncology; Fruits = Pomology!