



**THE CSS POINT**  
Yes We Can Do It!

*EDS*

*To The Point*



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# 1. Abbreviations

1. LPG: Liquefied Petroleum Gas
2. TNT: Tri Nitro Toluen
3. RNA: Ribonucleic Acid
4. CNG: Compressed Natural Gas
5. ATP: Adenosine Tri Phosphate
6. RBC: Red Blood Cells/Corpuscles
7. ECG: Electro Cardio Gram
8. PVC: Poly vinyl Chloride
9. RAM: Random Access Memory
10. CFC: Chloro Fluoro Carbon
11. LASER: Light Amplification by Stimulated emission of Radiation
12. RADAR: Radio Detection And Ranging
13. AIDS: Acquired Immune Deficiency Syndrome
14. ROM: Read Only Memory
15. LAN: Local Area Network
16. WWW: World Wide Web
17. DNA: Deoxyribonucleic Acid
18. SONAR: Sound Navigation And Ranging
19. SARS: Severe Acute Respiratory Syndrome
20. NTP: Network Time Protocol/ Normal Temperature and Pressure
21. RQ: Respiratory Quotient
22. NPN: Negative Positive Negative
23. PNP: Purine Nucleoside Phosphorylase
24. WAN: Wide Area Network
25. CPU: Central Processing Unit
26. BCG: Bacillus Calmette Guerin
27. STP: Standard Temperature And Pressure/Shielded Twisted Pair/Sodium Tripolyphosphate/Spanning Tree Protocol
28. ATP: Adenosine Triphosphate
29. KWh: Kilo Watt Hour
30. BTU: British thermal Unit
31. LDL: Low Density Lipoprotein
32. MAF: Million Acre Feet
33. HDL: Hardware Description Language
34. MCV: Mean Corpuscular Volume
35. UHF: Ultra High Frequency
36. LED: Light emitting Diode
37. LCD: Liquid Crystal Display
38. BASIC: Beginner's All-Purpose Symbolic Instruction Code
39. MASER: Microwave Amplification by Stimulated Emission of Radiation
40. ETT: Educational Telecommunications and Technology/ European Transaction on Telecommunication
41. HST: High Speed Technology/ High Speed Train (in UK)/Hubble Space Telescope
42. DBS: Data Base Server/ Direct Broadcast Satellite
43. CRO: Cathode Ray Oscilloscope
44. BOT: Build, Operate and Transfer/Botulinum Toxin
45. AMU: Atomic Mass Unit

46. EMF: Electro Motive force
47. ADH: Anti-diuretic Hormone
48. GeV: Giga Electro Volt
49. CRT: Cathode Ray Tube
50. CNS: Central Nervous System
51. PTFE: Poly Tetra Fluoro Ethylene
52. GUT: Grand Unified Theory
53. LONAR: Long Range Navigation
54. MeV: Mega Electron Volt/ Million Electron Volt/ Multi-experiment Viewer
55. AWACS: Airborne Warning and Control System
56. CCTV: Closed-Circuit Television

1. ABM: Anti-Ballistic Missile
2. AC: Alternating Current/Air Conditioning
3. AEC: Atomic Energy Commission
4. Alt: Altitude
5. am: Ante Maridiem (Before Noon/Midday)
6. Amp: Ampere
7. APTEC: All Pakistan Technology Engineers Council
8. ATM: Automated Teller Machine (Banking)
9. AW: Atomic Weight/ Asia Watch
10. BIOS: Basic Input Output System
11. BDS: Bachelor Of Dental Surgery/ Bomb Disposal Squad
12. BP: Blood Pressure/ Boiling Point/ Blue Print
13. C/A: Current Account
14. CAA: Civil Aviation Authority
15. CABB: Centre Of Agricultural Biochemistry And Biotechnology
16. CAD: Computer-Aided Design
17. Cal: Calorie
18. CD: Compact Disc/ Civil Defence/ Community Development
19. CD-ROM: Compact Disc Read-Only Memory
20. CECP: Cotton Export Corporation Of Pakistan
21. CHASNUPP: Chashma Nuclear Power Plant
22. CMCC: China Mobile Communications Corporation
23. COM: Computer Aided Manufacturing
24. COMSAT: Communications Satellite Corporation
25. COMSTECH: Council Of Scientific And Technology Cooperation Of Islamic Conference
26. CSIRO: Commonwealth Scientific And Industrial Research Organisation
27. CTBT: Comprehensive Test Ban Treaty
28. CT-Scan: Computerised Axial Tomography Scanning
29. DVD: Dynamic Versatile Disc
30. ECAT: Engineering Colleges Admission Test
31. EDB: Engineering Development Board
32. EEG: Electroencephalogram
33. ENERCON: Energy Conservation Centre
34. EPA: Energy Protection Agency
35. EPD: Energy Protection Department
36. ESA: European Space Agency
37. ESRO: European Space Research Organisation

38. FAT: File Allocation Table
39. FCPS: Fellow Of The Royal College Of Physicians And Surgeons
40. FM: Frequency Modulation
41. FMCT: Fissile Material Cut-Off Treaty
42. FRCS: Fellow Of The Royal College Of Surgeons
43. GHz: Gigahertz
44. GMT: Greenwich Mean Time
45. HIV: Human Immune Deficiency Virus
46. HTML: Hypertext Mark-Up Language
47. HTTP: Hypertext Transfer Protocol
48. IAEA: International Atomic Energy Agency (UN)
49. IBM: International Business Machine
50. IC: Integrated Circuit/ Intelligence Corps
51. ICBM: Inter-Continental Ballistic Missile
52. ICU: Intensive Care Unit
53. IEA: International Energy Agency
54. INSTRAW: International Research And Training Institute For The Advancement Of Women
55. INTELSAC: International Telecommunications Satellite Consortium
56. Intelsat: International Telecommunications Satellite Organisation
57. IRBM: Intermediate Range ballistic Missile
58. ISP: Internet Service Provider
59. IT: Information Technology
60. ITB: Information Technology Board
61. JAXA: Japan Aerospace Exploration Agency
62. KANUPP: Karachi Nuclear Power Plant
63. KAPCO: Kot Adu Power Company
64. kHz: Kilohertz
65. KV: Kilo Volt
66. kW: Kilowatt
67. MCAT: Medical Colleges Admission Test
68. MDS: Master In Dental Surgery
69. MNP: Mobile Number Probability
70. MRBM: Medium Range Ballistic Missile
71. MRCP: Member Of Royal College Of Physicians
72. MRCS: Member Of Royal College Of Surgeons
73. MRI: Magnetic Resonance Imaging
74. MS: Medical Superintendent
75. MSN: Microsoft Network
76. MW: Megawatt
77. NADRA: National Database And Registration Authority
78. NEPRA: National Electric Power Regulatory Authority
79. NM: Nautical Mile
80. NMD: National Missile Defence
81. NPT: Non-Nuclear Proliferation Treaty
82. NRA: Nuclear Regulatory Authority
83. OGRA: Oil And Gas Regulatory Authority
84. NWD: Nation Wide Dialling
85. OGDC: Oil And Gas Development Corporation
86. pm: Post Meridiem

87. PEMRA: Pakistan Electronic Media Regulatory Authority
88. PTA: Pakistan Telecommunication Authority
89. RADAR: Radio Detection and Ranging
90. SALT: Strategic Arms Limitation Talks
91. SLV: Satellite Launch Vehicle
92. SMS: Short Message Service
93. SNGPL: Sui Northern Gas Pipelines Limited
94. SONAR: Sound Navigation And Ranging
95. SSGPL: Sui Southern Gas Pipeline Limited
96. STD: Subscriber's Trunk Dialling
97. STM: Subscriber Identification
98. SUPARCO: Space And Upper Atmosphere Research Committee (Pakistan)
99. TB: Tubercle Bacillus/ Tuberculosis
100. UHF: Ultra High Frequency
101. UNAEC: United Nations Atomic Energy Commission
102. UNESCO: United Nations Education, Scientific And Cultural Organisation
103. VCD: Video Compact Disc
104. VHF: Very High Frequency
105. WAN: Wide Area Network
106. WAP: Wireless Application Protocol
107. WAPDA: Water And Power Development Authority
108. WHO: World Health Organisation
109. WMD: Weapons Of Mass Destruction
110. WWF: World Wildlife Fund
111. ZPG: Zero Population Growth

## 2. Units

1. Force: Newton/ Dyne
2. Temperature: Kelvin/ Celsius/ Degree
3. Current: Ampere
4. Heat: Joule/ Calorie/ BTU
5. Pressure: Pascal/Torr
6. Radioactivity: Becquerel/Curie/Rutherford
7. Atomic energy: Rydberg/Joule
8. Voltage: Volt
9. Electric Potential Difference: Volt
10. Electric Charge: Coulomb
11. Power: Watt
12. Resistance: Ohm
13. Conductivity: Mho
14. Energy: Joule/ Erg
15. Distance Between Stars And Planets: Light Year
16. Wavelength: Angstrom
17. Volume: Acre-Foot/Litre
18. Frequency: Hertz
19. Rate of flow of water: Cusec
20. Length: Meter/Fermi/Parsec
21. Optical Power Of A Lens or A Curved Mirror: Dioptre
22. Plane Angle: Radian

23. Luminous Intensity: **Candela**
24. Amount of Substance: **Mole**
25. Rate Of Decay Of Radioactive Material: **Rutherford**
26. Sedimentation Rate: **SVEDBERG Unit**
27. Induction: **Henry**
28. Magnetic flux: **Maxwell/ Weber**
29. Magnetic Flux Density/Magnetic Inductivity: **Telsa/Gauss**
30. Electric Conductance: **Siemens**
31. Angle: **Degree**
32. Solid Angle: **Steradian**
33. Torque: **Foot-Pound**
34. Mass: **Slug**
35. Volume of Water Reservoirs: **Acre-foot**
36. Mechanical work/Energy: **Erg**
37. Magneto Motive Force: **Gilbert**
38. Newton: **Force**
39. Dyne: **Force**
40. Kelvin: **Temperature**
41. Celsius: **Temperature**
42. Degree: **Temperature**
43. Ampere: **Current**
44. Joule: **Heat/Atomic Energy/Energy**
45. Calorie: **Heat**
46. BTU: **Heat**
47. Pascal: **Pressure**
48. Torr: **Pressure**
49. Becquerel: **Radioactivity**
50. Curie: **Radioactivity**
51. Rutherford: **Rate Of Decay Of Radioactive Material/Radioactivity**
52. Rydberg: **Atomic Energy**
53. Volt: **Voltage/Electron Potential Difference**    Coulomb: **Electric Charge**
55. Watt: **Power**
56. Ohm: **Resistance**
57. Mho: **Conductivity**
58. Erg: **Energy**
59. Light Year: **Distance Between Star**
60. Angstrom: **Wavelength**
61. Litre: **Volume**
62. Acre Foot: **Volume**
63. Hertz: **Frequency**
64. Cusec: **Rate Of Flow Of Water**
65. Meter: **Length**
66. Fermi: **Length**
67. Parsec: **Length**
68. Dioptre: **Optical Power Of Lens**
69. Radian: **Plane Angle**
70. Candela: **Luminous Intensity**
71. SVEDBERG: **Sedimentation Rate**
72. Henry: **inductance**

73. Maxwell: **Magnetic Flux**
74. Weber: **Magnetic Flux**
75. Tesla: **Magnetic Flux Density/Magnetic Inductivity**
76. Gauss: **Magnetic Flux Density/Magnetic Inductivity**
77. Siemens: **Electric Conductance**
78. Degree: **Angle**
79. Steradian: **Solid Angle**
80. Foot Pound: **torque**
81. Slug: **Mass**

### **3. Discoveries/Inventions-Scientists Past Papers**

1. Structure Of DNA: **Watson & Crick**
2. Rabies Vaccination: **Louis Pasteur**
3. Penicillin: **Alexander Fleming**
4. Genetic Laws of Heredity: **Mendel**
5. Vaccination Against Small Pox: **Edward Jenner**
6. Solar System: **Copernicus**
7. Current Electricity: **Volta**
8. Telephone: **Graham Bell**
9. Gramophone: **Thomas Edison**
10. Atomic Number: **Mosley**
11. Mercury Thermometer: **Fahrenheit**
12. Dynamite: **Alfred Noble**
13. Cell: **Robert Hooke**
14. Television: **John Baird**
15. X-rays: **Roentgen**
16. Circulation Of Blood: **William Harvey**
17. Bicycle: **Macmillan**
18. Wireless Telegraphy: **Signor Marconi**
19. Microorganisms: **Antoni Van Leeuwenhoek**
20. Laser: **Dr. C. Gilbert**
21. Periodic Table: **Mendeleev**
22. Radium: **Madam Marie Curie**
23. Mass/Energy Conversion Equation: **Einstein**
24. Cement: **Joseph Aspdin**
25. Simple Microscope: **Hans Janssen and Zacharias Janssen**
26. Sulphuric, Nitric and Hydrochloric Acid: **Jabir Bin Hayan**
27. Jet Engine: **Frank Whittle**
28. Electricity: **Thomas Edison**
29. Computer: **Charles Babbage**
30. Lightning Conductor: **Benjamin Franklin**
31. Semiconductor: **Bardeen and Brattain**
32. Uncertainty Principle: **Heisenberg**
33. Cyclotron: **Ernest Lawrence**
34. Electro Magnetic Engine: **James Maxwell**
35. Internal Combustion Engine: **Nikolas August Otto**
36. Earth As A Huge Magnet: **William Gilbert**



37. First Person To Orbit Earth: **Yuri Gagarin**
38. Water: **Henry Cavendish**
39. Gravitation: **Newton**
40. Magnet: **Dr. Gilbert**
41. E.M Induction: **Faraday**
42. Energy Quanta: **Max Planck**
43. Vitamin. C Therapy: **Linus Pauling**
44. First Clone Of A Sheep: **Ian Wilmit**
45. Streptomycin: **S.A. Waksman**
46. Helical Structure Of Protein: **Linus Pauling**
47. Polio Vaccine: **Jonas Salk**
48. Nylon: **Wallace. H Carothers**
49. Radioactivity: **Becquerel**
50. Safety Match: **John Walker**
51. Gun Powder: **Roger Bacon**
52. Jupiter: **Galileo**
53. Neutron: **James Chadwick**
54. Earth's Radius: **Eratosthenes**
55. Oxygen: **Joseph Priestley**
56. Noble Gases: **Cavendish**
57. Synthesis Of Gene In Laboratory: **Hargobind Khorana**
58. Earth Revolves Round The Sun: **Copernicus**
59. Binomial Nomenclature: **Carl Von Linnaeus**
60. North America: **Christopher Columbus**
61. Green Land: **Robert Peary**
62. Transistor: **William Bradford Shockley**
63. Typewriter: **Sholes**
64. Bacteriology: **Pasteur**
65. Laser: **Theodore Maiman**
66. Father Of Botany: **Theophrastus**
67. Father Of Zoology: **Aristotle**
68. Father Of Taxonomy: **Carolus Linnaeus**
69. Father Of Genetics: **Gregor Mendel**
70. Cell Theory: **Scheilden And Schwann**
71. Cholera Bacillus: **Robert Koch**
72. Theory Of Relativity And Photoelectric Effect: **Einstein**
73. Insulin: **Dr. F.G Banting**
74. Nucleus: **Robert Brown**
75. Chromosome: **Waldeyer**
76. Ultra Violet Rays: **Johann Wilhelm Ritter**
77. Law Of Attraction And Repulsion Between Electric Charges: **Coulomb**
78. Battery: **Alessandro Volta**
79. Electromagnetic theory: **James Clerk Maxwell**
80. First Person To Televisive Pictures Of Moving Objects: **John Logie Baird**
81. Antiseptic Medicine: **Joseph Lister**
82. Cotton Gin: **Eli Whitney**
83. Big Bang Theory: **Georges Lemaitre**
84. Electron: **J.J Thomson**

85. Aeroplane: Wilbur and Orville Wright
86. Steam Railway Locomotive: Richard Trevithick
87. Radio: Marconi
88. Household Vacuum Cleaner: Herbert Cecil Booth
89. Bakelite: Baekeland
90. Windscreen Wipers: Marry Anderson
91. Ballpoint pen: Laszlo And Georg Biro
92. Helicopter: Igor Sikorsky
93. DDT: Paul Muller
94. Blood Banking: Charles Drew
95. AK-47: Mikhail Kalashnikov
96. Integrated Circuit: Robert Noyce
97. Cellular Phone: Dr. Martin Cooper
98. Vitamins: Funk
99. Uranus: Herschel
100. Calculating Machine: Blaise Pascal
101. Tuberculosis: Robert Koch
102. Logarithm Table: John Napier
103. Malaria Parasite: Ronald Ross
104. Zero: Al Khwarizmi
105. Velocity Of Light: Roomer

## 4. Measuring Tools

1. Pressure: Barometer
2. Voltage: Voltmeter
3. Purity Of Milk: Lactometer
4. Temperature: Thermometer
5. Velocity Of Wind: Anemometer
6. Earthquake: Richter Scale
7. Degree Of Humidity: Hygrometer
8. Blood Pressure: Sphygmomanometer
9. Radioactivity: Geiger Counter
10. High Temperature: Pyrometer
11. Rainfall: Rain Guage
12. Earthquake Recording: Seismograph
13. Electric current: Ammeter
14. Altitude: Altimeter
15. Velocity And Direction Of Wind: Anemometer
16. Sensitivity Of Skin: Algeismeter
17. Atmospheric Pressure: Aneriodograph/Barometer
18. Improvement Of Hearing Power: Audiometer
19. Quantity Of Heat: Calorimeter
20. Intensities Of Colours: Colorimeter
21. Longitude Of Vessel Over Sea: Chronometer
22. Detection Of Electric Charge: Electroscope
23. Voltage Difference: Electrometer
24. Depth Of The Ocean: Fathometer
25. Small Electric Current: Galvanometer
26. Relative Density of Liquids: Hydrometer

27. Change In Atmospheric Humidity: **Hygroscope**
28. Detection And Measurement Of Light: **Photoelectric Cell**
29. Salinity Of Water: **Salinometer**
30. Spectrum Analysis: **Spectroscope**
31. Hearing Of Heartbeat And Lung Sound: **Stethoscope**
32. Maintenance Of A Constant Temperature: **Thermostat**
33. Amplification Of Current: **Transistor**
34. Measurement OF Potential Difference Between Two Points: **Voltammeter**
35. Flow Of Air: **Aerometer**
36. Radiant Energy: **Radiometer**
37. Conversion Of Rays Into Mechanical energy: **Radiograph**
38. Measurement Of Intensity Of Light: **Lucimeter**

1. The energy of food is measured in **Calories**
2. The **microscope** is used to study Small and near objects
3. The S.I unit of temperature is **Kelvin**
4. The **telescope** is used for viewing Distant Objects
5. **Decibel** is a unit of Sound
6. The instrument used to measure Electric Current is **Ammeter**
7. The apparatus used in submarines to give a clear view of the object, on the surface of the ocean or ground is known as **Periscope**
8. **Richter Scale** is used for measuring Intensity Of Earthquake
9. **Fathometer** is used to measure Ocean Depth
10. **Hygrometer** is used to measure Relative Humidity
11. **Venturi Tube** is used for Measuring Flow Of A Fluid
12. **Coronagraph** is used for Observing and often photographing the sun's corona
13. **Microphone** is used to convert sound waves into electric energy
14. Velocity of wind is measured by **Anemometer**
15. **Altimeter** is used to measure the approximate height above the ground
16. **Light year** is related to Distance
17. Pressure of gases is measured by **Barometer**
18. Altitude of the Sun is measured by **Sextant**
19. There are **981 Dynes** in one gram weight
20. When listening to heart beat with **stethoscope**, one hears closing of valves
21. The unit of Current is **Ampere**
22. The unit of energy in MKS system is **Joule**
23. The intensity of an earthquake is measured by **Seismograph**
24. Centigrade and Fahrenheit scales give the same reading at **-40 Degree**
25. The instrument, which is used to measure temperature by radiation, is called **Pyrometer**
26. **Centrifuge** is used to separate mixtures of chemicals
27. **Radio Telescope** is used to receive radio waves from objects in space
28. **Audiometer** is used to measure intensity of sound
29. A **chronometer** is used to measure time
30. **Electroscope** detects the presence of electric current
31. **Stroboscope** is used to view rapidly moving objects
32. **Taceometer** is used to measure distance, elevations and bearings during survey
33. **Retinoscope** is an instrument used to determine Refractive power of lens
34. The final image produced by a simple microscope is **Virtual and Erect**
35. **Photodiode** is used for the detection of Light
36. A **Polaroid** is a device used for analysing polarized light

37. The spectrum of luminous bodies is studied by **Spectrometer**
38. **Transformer** is used for conversion of low voltage into high voltage and vice-versa
39. **Ophthalmoscope** is used to observe Retina
40. **Sonar** works on the principle of Absorption of sound

## **5. Everyday Science MCQS Material**

1. When the resultant of all the forces acting on a body is zero the body is said to be in a state of **Equilibrium**.
2. Gamma Rays are similar to **X-Rays**.
3. The Separation of ordinary light into its constituent colours is known as **Dispersion**.
4. If a body weighs 600 kg on the surface of the earth then the weight of the same body on the surface of moon will be **1/6th i.e. 100kg**.
5. When a bullet penetrates into a target, the kinetic energy of a bullet is converted into **Mechanical Energy**.
6. The process of digestion begins in **Mouth**.
7. Sometimes when white blood corpuscles greatly increase in number, they cause a disease called **Leukaemia**.
8. The principle of wireless telegraphy was discovered by **Signor Marconi**.
9. The planet nearest to sun is **Mercury**.
10. Pressure cooker works on the principle that the boiling point of a liquid **increases** with the increase of pressure.
11. **Copper** is the best conductor of electricity.
12. Blood cells are manufactured by **bone marrow** of the body.
13. The smallest organism which causes disease is virus and even smaller is called **viroids**.
14. Neutron, electron and Proton have **neutral, negative and positive** charges respectively.
15. Of all the flying machines that man has made only **Rockets** are suitable for space flight.
16. Transistors do not need a warm up period because they have no **Filaments**.
17. If an object gives off its own light, it is said to be **Luminous**.
18. An electric heater would be most likely to produce **I.R Radiations**.
19. The Kelvin scale of temperature is called the **absolute scale**.
20. The type of radiation that is unaffected by magnetic field is called **Gamma Rays**.
21. If we know the mass of an object and the force applied on it, it is possible to calculate **acceleration of the object**.
22. Active transport in animals and plants required metabolic **energy and Concentration Gradient** to carry the substances across cell membrane electrical gradient.
23. Diseases that spread through air are called **Air Borne** diseases.
24. When iron is less in body, the quantity of **Haemoglobin** in cell decreases.
25. Arteries become hard due to deposition of **Fats and Cholesterol** in them.
26. The science of study of old age is called **Gerontology**.
27. The instrument used for measuring the velocity is called **Anemometer**.
28. The science which deals with the bird is called **Ornithology**.
29. The function of the **thermostat** in a refrigerator is **to maintain temperature**.
30. **Blotting paper** absorbs ink because **the action of capillary**.
31. **Mirage** is an example of **Reflection of Light**.
32. The age of a tree can be determined by counting **Rings of stem**.
33. In a normal resting man, the rate of heart beat is **72 per minute**.

34. In Pakistan copper is found in **Saindak**.
35. **American space shuttle Mercury Atlas-6** is the first winged space ship to orbit and return to airport landing.
36. **Myopia** is a defect of vision which does not permit to see clearly the distant objects.
37. The brightest planet is **Venus**.
38. **Urea** is not a phosphorous fertilizer.
39. **Ibn Baitar** was a renowned Muslim Botanist.
40. **Cellulose** is natural polymer.
41. **Vitamin A & D** are not water soluble.
42. **Amoeba** is a unicellular animal.
43. **Solar eclipse** occurs in full moon.
44. **Leprosy** is a disorder of the Nervous System.
45. **Chlorofluorocarbons (CFCs)** cause decomposition of ozone.
46. **Quartz** is chemically a Silicate or Silicon dioxide.
47. **Chicken egg** is composed of **One Cell**.
48. **Visible light energy** has the wave length range of **400-700 nm**.
49. The particle with positive charge but having mass equal to that of electron is called **Positron**.
50. Gas in children's play-balloons going upward is **hydrogen**.
51. Standard pressure is **760 mm-Hg**.
52. Iron corrodes due to the formation of **Iron Oxide**.
53. **Starch** is a polymer of Glucose.
54. Adrenalin is secreted by the **Adrenal Gland**.
55. **Mars** planet is nearest to the earth.
56. The process of conversion of a material from solid state directly to gaseous state is called **Sublimation**.
57. Bacteria are **parasite**.
58. **Ruby** is an oxide of Aluminium.
59. In the **Australian continent** nights are larger than days in June.
60. **Gypsum** is not hydrated calcium carbonate.
61. **Uranus** is the coldest planet.
62. **Chromite** ore contains chromium oxide.
63. **Mica** is a non-conductor of electricity.
64. **Sun** is not the biggest star in the universe.
65. The capacity to do work is called **energy**.
66. The energy possessed by body due to its position is called **potential energy**.
67. **Kitab-al-Manazar** is publication by a famous Muslim Scientist about **Optics**.
68. **Nucleus** usually lies in the centre of animal cells.
69. **Calcium and phosphorous** are the essential elements of bones.
70. **Proteins** are formed by combination of amino acids.
71. Rain water dissolves Sulphur dioxide to form **Sulphuric Acid**.
72. The set of instruction given to a computer is called **command**.
73. Chemicals such as **penicillin** which act on bacteria are called **antibiotics**.
74. **Comet shoemaker-levy 9** hit the planet Jupiter in July this year.
75. A branch of medicine studying blood and its disorders is called **Haematology**.
76. **Cytology** is the branch of biology which deals with the study of structure and function of cells.
77. A biological study of external form and structure of living organisms or their parts is **Morphology**.
78. An academic and applied discipline which involves the scientific study of human or animal mental functions and behaviours is called **Psychology**.
79. A study of the chemical composition of the earth's crust is called **Geology**.

80. In a heat engine heat energy is changed into **Mechanical Energy**.
81. Frequency of audible sound is **20-20,000 Hz**.
82. Deficiency of vitamin B causes **Beriberi**.
83. Cheapest source of producing electricity is **Water**.
84. The smallest unit of measurement of wave-length is **Angstrom**.
85. The chemical generally used in refrigerator is **Freon**.
86. The unit "TON" to specify air conditioners is equivalent to **12,000 BTU/hour**.
87. Unit of electricity "Kilowatt Hour" is the unit of **Power**.
88. Period of famous Muslim scientists is **7th to 13th century A.D.**
89. **Heat radiation** travels at a speed equal to Speed of light.
90. **Cryptograms** are non-flowering plants.
91. Reserve food material is usually stored as **Starch** in plants and **Glycogen** in animals.
92. **Streptococcus** is a gram positive bacterium.
93. Spinach is a good source of **vitamin K**.
94. **Insulin** is a hormone secreted by the pancreas.
95. **Femur** is a bone of the leg. 96. The moon has **no atmosphere**.
97. Excessive burning of the fossil fuels causes **acid rains**.
98. Twenty first of June is the longest day of the year in the **northern hemisphere**.
99. Electricity is a **secondary source of energy**.
100. The outer most layer of the earth is called **Crust**.
101. Newton is the unit of **Force**.
102. Radium was discovered by **Madam Marie Curie**.
103. The memory of the computer is expressed in **bytes**
104. AIDS is caused by **Human Immunodeficiency Virus (HIV)**.
105. Chemical name of gypsum is **Calcium Sulphate**.
106. Molten super-hot material present inside a volcano is called **Magma/Lava**.
107. Richter scale measures the severity of **Earthquake**.
108. pH of blood is **7.3-7.4**.
109. one of the countries through which equator passes is **Kenya**.
110. Purest form of iron is **Wrought Iron**.
111. Hypo is a solution of **sodium thiosulphate**.
112. Cod liver oil contains **Vitamin D**.
113. Aorta is a n organ of the **Circulatory System**.
114. Planet Mars has **two moons**.
115. Bauxite is an ore of **Aluminium**.
116. Circular aperture which appears as a dark spot in the eyes is called **pupil**.
117. The speed of light is nearly **300, 0000 km/sec**.
118. Ideally water can be used as a car fuel after **electrolysis**.
119. Our eye is very sensitive to **blue light**.
120. Al Beruni died in **1048 A.D.**
121. Abu ail Sina born in **Iraq**.
122. Blue colour has **shortest wavelength**.
123. Light travels fattest in **Vacuum**.
124. The universe is **Expanding**.
125. The disease, Haemophilia is caused by the deficiency of **Vitamin K**.
126. Protein is a **nautral polymer**.
127. Astronomers cannot be nominated for the **Noble Prize**.
128. A sheet of muscles called **Diaphragm** separates the chest from the abdomen.
129. In human body, blood clotting factor is produced by the **platelets**.

Human blood is able to carry large amounts of oxygen because of the **Haemoglobin**.

130. The living part of a plant cell is composed of a **nucleus and cytoplasm**.
131. The pattern for building protein molecule is stored in the **messenger RNA**.
132. **Anvil and stirrup** are names of bones present in the ear.
133. The front of the eye is covered with a tough transparent material called **Cornea**.
134. The young plant inside a grain of wheat is called the **Embryo**.
135. Inborn behaviour that involves only one part of the body is called **Reflex Action**.
136. The smallest branches of an artery lead into tiny blood vessels called **capillaries**.
137. **Eustachian tube** belongs to ear.
138. **Cartilage** is a connective tissue.
139. **Auricle** is present in heart.
140. **Tendon** is a muscle.
141. **Dendrites** are the part of Neuron.
142. In an animal cell protein is synthesized in the **Ribosome**.
143. Chemically finger nails are made up of **protein**.
144. Muscle stiffness is symptom caused by the disease **Tetanus**.
145. **Riboflavin (vitamin B2)** is not affected by cooking.
146. **Thiamine** is vitamin B1.
147. **Ascorbic acid** is vitamin C.
148. Rickets is caused by the deficiency of **vitamin D**.
149. The number of chromosomes in the **spermatozoon is 23**.
150. The fat in our food is digested by the **Enzyme Lipase**.
151. The most abundant element in the human body is **Oxygen**.
152. **Sound** is a form of energy.
153. A fraction of sunlight is refracted as it enters the **earth's atmosphere**.
154. Rainbows are produced by the **reflection of light** through rain drops.
155. **Light switches** in our homes are connected in parallel series.
156. Generators convert mechanical energy into **electricity**.
157. **Modern incandescent bulbs** do not contain filaments made of copper.
158. Trout is not a sea fish.
159. **Epiphytes** are a plant that grows upon another plant.
160. Hepatitis is the **inflammation of liver**.
161. **Meningitis** is inflammation of membrane surrounding the brain.
162. **Equinox** is the time when the sun appears vertically overhead at noon at the equator.
163. **Joseph Aspdin** is the inventor of cement.
164. **Neurology** is the science of Nervous system.
165. **Biometry** is the application of statistics in the study of Biology.
166. **Aviculture** is the rearing and breeding of birds.
167. Malaria is caused by **Plasmodium**.
168. Goitre is caused due to deficiency of Iodine in diet.
169. Typhoid is caused by **Salmonella Typhosa**.
170. **Black hole** is a hypothetical region of space having a gravitational pull so great that no matter or radiation can escape from it.
171. **Fungicide** is used against moulds and fungi.
172. The science which deals with heredity is known as **Genetics**.
173. Insulin is used for the treatment of **Diabetes**.
174. **Yuri Gagarin** is the first space man.

175. The distance between the earth and the sun is called **Astronomical unit**.
176. The study of chemical processes in living organisms is called **Biochemistry**.
177. The first computer virus invented by two Pakistani brothers is called the **brain virus**.
178. Severe deficiency of vitamin C results in **Scurvy**.
179. Plant cells manufacture their food due to the presence of **chlorophyll**.
180. **Mitosis** is a type of cell division where in the number of chromosomes in the daughter cell are the same.
181. **Blood cells** are of three types.
182. The **ultraviolet rays** cause sunburn.
183. **Xylem and Phloem** are conducting tissues.
184. **Carbohydrates** are cheapest and most ready source of energy.
185. **Enzymes** are responsible for chemical digestion of food.
186. **Plasma** is the fluid part of the blood in which the cells are suspended.
187. **Haemoglobin** combines with oxygen and transport to different cells of the body.
188. **Neutron** is the negative charged particle in an atom.
189. **Hydrogen** is the lightest gas.
190. **Mercury** is the smallest planet of the solar system.
191. Image of the object is formed on the **retina of the eye**.
192. **Barometer** is used for measuring the pressure.
193. Monomer of proteins is **Amino Acids**.
194. Water transport in plants occurs within **Xylem**.
195. Underground horizontal stems are allied **Rhizomes**.
196. In the eye only **Retina** contains receptors for light energy.
197. **Plant Hormones** control plant response to environment stimuli.
198. **Mitochondria** are often called the powerhouse of the cell.
199. The rate at which a current changes direction is called its **Line Frequency/Main frequency**.
200. **Diamond** is an allotropic form of the element **Carbon**.
201. Speed of the wind is measured by **Anemometer**.
202. **Ligament** connects the muscle with the bone.
203. **Polio** is caused by virus.
204. **Neptune** is the **coldest planet** of the solar system.
205. Eggshell is composed of **calcium carbonate**.
206. The most abundant element in the earth's crust is **oxygen**.
207. The main constituent of **Biogas** is **Methane**.
208. **Stalagmites** are deposits of **Calcium Carbonate**.
209. **Gigantism** is the result of **Hyper Pituitarism**.
210. The purpose of computer is **Manipulation of data**.
211. The chemical name of washing soda is **Sodium Bicarbonate**.
212. The main constituent of **Sui gas** is **Methane**.
213. **Blue colour** has the shortest wave length.
214. Glass is called **Silica**.
215. **Ascorbic Acid** is Vitamin C.
216. The solar system has **8 planets**.
217. The second most abundant element in the earth's crust is **silicon**.
218. The fastest revolving planet is **Mercury**.
219. **Geysers** are hot springs that erupt hot waters and steam from time to time.
220. The first simple microscope was invented by **Hans Janssen and Zachariah Janssen**.
221. Hot liquid rock beneath the earth's surface is called **Lava/Magma**.
222. **Mitochondria** are the power house of the cell.
223. Ability of the air to absorb long heat waves from the earth after allowing the short waves from



- sun to pass through it is known as **Green House Effect**.
224. Computer works on the principle introduced by the Muslim scientist **Musa al-Khwarizmi**.
225. Coldest planet of the solar system is Neptune.
226. The rupture of red blood cells is called **Eryptosis**.
227. Muslim Scientist Ail bin Tabari is famous for his work on **Firdous al-Hikmah**.
228. **Haploid cells** result from the process of meiosis.
229. All stars are not of the **same colour**.
230. The **left lung** has two lobes while **the right lung** has three lobes.
231. The **pulmonary veins** return oxygenated blood to the right atrium.
232. Our galaxy milky way is shaped like a large **thick concave lens** with a large **central bulge**
233. **DNA** has a double helix structure while the **RNA** does not have a double helix structure.
234. The normal temperature of Human Blood is 37C (98.60 F)
235. The liver is a part of **gastrointestinal tract**.
236. The major fossil fuel impurity is **Sulphur**.
237. **Sphalerite** is an ore of Zinc.
238. The most abundant element present in the sun is **Hydrogen**.
239. The metal atom present in chlorophyll is **Magnesium**.
240. The gland responsible for the secretion of the hormone estrogen is **Ovary**.
241. An element used in the doping of silicon for the preparation of a p-type semiconductor is Boron.
242. A synthetic fibre which is a polyamide is **Nylon**.
243. **Glycogen** is a carbohydrate.
244. The cell structure that controls movements of material into and out of the cell is **Cell Membrane**.
245. The unit that co-ordinates different devices of the computer system are **Control Unit**.
246. Mastication is an example of **Mechanical Digestion**.
247. Botanically a fruit is a **Ripened Ovary**.
248. The vocal folds are part of the **Larynx**.
249. The famous book Al-Qanoon was written by the Muslim scientist Abu Ail Sina.
250. The instrument used for the measurement of blood pressure is **Sphygmomanometer**.
251. A mammal, which can fly is Bat.
252. A disease which is more common in men than in women and is hereditary in character is **Colour Blindness**.
253. **Snow Leopard** is an endangered animal species of Pakistan.
254. **Cinnabar** is an ore of Mercury.
255. **Anabaena azolla** is cyanobacterium.
256. The nuclear reaction taking place on the surface of sun is **Nuclear Fusion reaction**.
257. Jabir bin Hayan prepared **Sulphuric Acid**.
258. The constituent elements of **Brass** are Copper and Zinc.
259. The conversion of non-diffusible substances into diffusible ones by the action of enzymes is called **digestion**.
260. **Diamond** is the purest naturally occurring crystalline form of Carbon.
261. **Caustic soda** is extensively used for making Soap.
262. When a person can see nearer objects but not the distant ones he is said to be suffering from **Myopia/Near-sightedness/Short sightedness**.
263. **Marble** is a metamorphic rock.
264. Curie is a unit of **Radioactivity**
265. The brown colour of rust is because of **Oxidation of iron/formation of iron oxide**.
266. The movement of food through oesophagus is by the muscular action is known as **Peristalsis**.
267. **Granite** is a form of igneous rock.
268. **Cellulose** is the min chemical substance in the plant cell wall.
269. Cell Nucleus was first discovered by **Robert Brown**.

270. **Enzymes** are organic catalysts made up of proteins.
271. Animals obtain carbohydrate mainly from **Starch**.
272. The minimum speed of a **Pentium II** computer is **233 MHz**
273. According to recent classifications the living organisms are divided into **5 kingdoms**.
274. **Glycolysis** is a process of Respiration.
275. The unit that coordinates different devices of **Computer system** is **control Unit**.
276. Seed is technically **Ripened Ovule**.
277. **ADH** is a hormone secreted by Posterior pituitary gland.
278. Permian Period belongs to **Palaeozoic era**.
279. **Right kidney** in man is slightly lower in position than the left kidney.
280. Light is **visible**.
281. **Steel** is more **elastic** than rubber.
282. **Pitch of man's voice** is lesser than that of woman.
283. **Diastolic blood pressure** is lesser than systolic blood pressure.
284. **Guava** contains more vitamin C than orange.
285. **A light year** is a unit of distance.
286. **Mercury** is heavier than lead.
287. **Kangaroo Rat** is a desert mammal which does not drink water.
288. **Aqua Regia** is a mixture which can dissolve platinum.
289. The constituent elements of **Bronze** are **tin and copper**.
290. The deficiency of **Thiamine (B1)** causes **Beriberi**.
291. A nuclear reaction in which two or more than two lighter nucleus are fused together to form a relatively heavier one is called **Nuclear Fusion**.
292. **Diamond** is the purest naturally occurring crystalline form of carbon.
293. The hormone secreted by adrenal cortex is **Corticosteroids (Cortisol & aldosterone)**
294. The three colours combination which produces the sensation of white light is **Red, Green and Blue**.
295. A six feet tall lady can see her full image in a **three feet plane Mirror**.
296. **Vanadium**, a steel gray corrosion resistant metal occur naturally in oxide state.
297. **Fibre optics cable** carries data in the form of light.
298. **Blue flame** is hotter than red flame.
299. **The falling of yellow leaves** during autumn is the seasonal time for plants to get rid of accumulated wastes.
300. **Friction** is necessary evil.
301. Cancer can be treated by **Chemotherapy and Radiotherapy**.
302. The **velocity of a moving object** is least where the pressure is greater.
303. The largest planet of solar system is **Jupiter**.
304. The temperature of the dead human body on Celsius scale is **25C (Normally room Temperature)**
305. The number of the spinal nerves in the man is **31 pairs**.
306. A **primary cell** cannot be charged again.
307. **Halos** around the moon are formed because of the phenomenon of dispersion.
308. **Muscle stiffness** is called by a disease called **Tetanus**.
309. Oil rises in a wick of oil lamp on account of a property of matter called **Capillary action**.
310. Muslim scientist Ail al Tabari is famous for his work on **Firdous al-Hikmah**.
311. The three elements needed for healthy growth of plants are **N (nitrogen), P (phosphorus) and K (potassium)**.
312. **Ammonium nitrate** is not used for rice crop.
313. Sea divers use a mixture of gases for breathing during diving. The mixture is **80% He & 20% O<sub>2</sub>**.
314. **Ascorbic acid** is a water soluble vitamin.

315. **Lipase** enzyme brings about **hydrolysis of fats**.
316. The solution of **benzoic acid** is used for seasoning of food.
317. **Influenza** is caused by virus.
318. The energy possessed by water in a dam is **potential energy**.
319. The organ in the human body which is responsible for the **digestion of protein only is stomach**.
320. **Nicolas Leonard Sadi Carnot** designed the first internal combustion engine used to burn low grade fuel.
321. **William Gilbert** was the scientist who asserted the earth to be a huge magnet.
322. The metal known as **quick silver** is called Mercury.
323. **Electrochemical cell** converts the chemical energy into electrical energy.
324. **Yuri Gagarin** was the first person to orbit the earth.
325. Water was discovered by **Henry Cavendish**.
326. To stay in the sunlight while circling the globe at the equator, one has to move with a speed of **1670 km/hour**.
327. **Infrared waves** have more wavelengths than the red colour.
328. **Liver produces bile** which is involved in the breakdown of fats.
329. A **secondary cell** can be charged again.
330. The study of human population is called **Demography**.
331. Human being belongs to species called **Sapiens**.
332. Defect of eye due to which nearby located objects are not clearly visible is called **Hyperopia/Hypermertropia**.
333. About **60-70%** of the human body consists of water.
334. All of the oxygen that we breathe has been produced by the splitting of water during **Photosynthesis**.
335. The important ore of Chromium is **Chromite**.
336. The measurement of rainfall is made by an instrument known as **Rain gauge**.
337. **Oxidation** means loss of electron.
338. **Poplar** is woody raw material which is used for the manufacture of paper pulp.
339. **Rectified spirit** contains alcohol about 95%.
340. The famous book; Al-Qanoon was written by the Muslim scientist **Abu Ail Sina**
341. Basic metals can be converted into gold by **artificial nuclear radioactivity**.
342. One of the main functions of the earth's ozone layer is to filter out **ultraviolet rays**.
343. The alloy consisting of metals copper, zinc and nickel is called **Paktong/Alpaca/Nickel Silver/German Silver**
344. The instrument specially designed for recording earthquake waves is called **Seismograph**.
345. The electrical device which converts sound energy into electrical energy is **Microphone**.
346. The ore of mercury metal is **Cinnabar**.
347. The variation of blood flow can be heard through **Sphygmomanometer**.
348. **Alexander Fleming** discovered penicillin.
349. **Neil Armstrong** was the first astronaut who first landed on the surface of the moon.
350. **Kangaroo rat** is the desert mammal which does not drink water.
351. Heat transfers from the sun to the earth through **Radiation**.
352. **Pitch of the cat** sound is greater than the dog sound.
353. **Ultraviolet light** is not visible.
354. A guava contains more **vitamin C** than an orange.
355. **Sound travels** faster in iron than air.
356. **Wheat Bridge** is the name of an electrical circuit.
357. **Morphine** can cause constipation and lowering of blood pressure.
358. A convex lens is used for the correction of the **Hyper-phobia**.
359. The **nucleic acids** are responsible for proteins synthesis in the human body.

360. **Entomology** is the branch of zoology which deals with the study of insects.
361. Beri Beri is the disease which is caused by the deficiency of **vitamin B1**.
362. Oil rises in a wick of oil lamp because of a property of matter, called **Capillary action**.
363. The production of genetically identical offspring is called as **Cloning**.
364. **Mercury** is the fastest planet of the solar system.
365. Mercury metal is **13.5 times heavier** than water.
366. Relative density of milk is measured by an instrument known as **Lactometer**.
367. The temperature of a human body is measured by an instrument known as **Mercury thermometer**.
368. Gold and silver are known as **coinage metals**.
369. The amount of ozone in the atmosphere is expressed in **ppm (parts per million)**.
370. One of the country through which equator passes is **Kenya**
371. **Max Planck** received the Noble prize in Physics in 1918 for his discovery of energy quanta.
372. **Bronze** is made up of copper and tin
373. **Addison's disease** is caused by the excessive secretion of **Adrenocorticotrophic Hormone**.
374. **Margalla Hill** is a branch of **Himalaya Range**
375. Humming bird belongs to a category called **Endotherm**
376. Insulin is secreted by Pancreas, thyroxin by Thyroid gland, Adrenalin by Adrenal gland, Oestrogen by Ovary, cortisol by Adrenal gland, Testosterone by Testes of male and ovaries of female
377. Japan is called **Land of rising sun**.
378. **Rodenticides** are used to kill rats.
379. Venus planet of our solar system is called as **Morning Star**.
380. The diameter of the earth is **12742 km**.
381. Insects are **invertebrates**
382. Opium is found in **poppy**.
383. Opium is used to make **Heroine**.
384. Kitab-al-Manadhir was written by **Ibn-al-Haisham**.
385. Speed of light is **300000 km/sec**
386. Generators convert **mechanical energy into electric energy**.
387. **Dry ice** is CO<sub>2</sub>.
388. **Telephone** was invented by **Dr. Graham Bell**.
389. **Ammeter** is the instrument which is used to measure electric current.
390. Ascorbic acid is **vitamin C**.
391. Total number of bones in human face is **14**.
392. The sky appears blue due to **Tyndall Effect**.
393. A, D, E, K are **fat soluble vitamins**
394. The composition of the mixture used for welding is **Copper Oxide and Aluminium**.
395. Abu ail Sina, Al Beruni, Ibn Al Haisham belonged to which **10th century**.
396. **Bakelite** is not a Thermoplastic.
397. **Haematite (a mineral)** is the important source of iron.
398. **Bauxite** is the mineral of Aluminium.
399. Bronze is an alloy of **copper and tin**.
400. **Skin** is the largest organ of the body.
401. Vaccine for T.B is **Bacillus Calmette Guerin (BCG)**
402. **Mitochondria** is called the power house of the cell.
403. Persons with **AB+** blood group are considered to be **universal recipient**.
404. Study of life in outer space is known as **Exobiology**.
405. The name of the common mineral salt present in sweat is **Sodium Chloride**.
406. Sensitive layer of the eye is **Retina**.
407. **Laughing gas** as the composition of Nitrogen and Oxygen.

408. Dr. Abdus Salam of Pakistan was one of the contributors of the **unification of Electromagnetic force and weak nuclear force**.
409. **CAT** triplet in DNA codes for **valine**.
410. The chance of **diabetic baby** born to parents both heterozygous normal is  $\frac{1}{4}$ .
411. **Inheritance of acquired characters** is not an art of **Darwinism**.
412. Role of biotechnology in the production of food is based on **Fermentation**.
413. Founder of modern astronomy was **Nicolas Copernicus**.
414. The instrument which measures very high temperature is **Pyrometer**.
415. The science which deals with study of manners and customs of people is **Ethics**.
416. Dry ice is **Solid Carbon Dioxide**.
417. Chemical name of vinegar is **Dilute Acetic Acid**.
418. **Deficiency of Pyridoxine** decreases haemoglobin production.
419. Orbital period of the planet Mercury around the sun is **88 days**.
420. The most splendid and the most magnificent constellation on the sky is **Orion**.
421. **"Black holes"** refer to Collapsing objects of high density.
422. **Eugenics** is the study of altering human beings by changing their genetic components.
423. The position of earth in its orbit when it is at its greatest distance from the sun causing northern summer is called **Aphelion**.
424. **Ionosphere** layer make the radio transmission possible.
425. Television signals are converted into light signals by **Transistor**.
426. Most of Asteroids lie in asteroid belt between the orbit of **Mars** and **Jupiter**.
427. The number of **spark plugs** needed in a diesel engine is **0**.
428. The half-life of a radioactive element is 8 days. It takes **8 days** to reduce it from 10mg to 5 mg.
429. The term "Blue Shift" is used to indicate **Doppler Effect** in which an object appears bluer when it is moving towards the observer or observer is moving toward the object.
430. **Kilowatt-hour** is a unit of Power.
431. Fuel used in a Fast Breeder Reactor is **Uranium Plutonium Oxide**.
432. Monsoon is caused by **Revolution of earth**.
433. Atmospheric layer ionosphere helps in **radio communication**.
434. A moderator is used in nuclear reactor in order to **slow down the speed of the neutrons**.
435. Sedimentary rocks are **Porous**.
436. Gypsum is a **non-metallic mineral**.
437. **Ozone layer** prevents the ultraviolet radiation from entering the atmosphere.
438. The phenomenon of **Aurora Borealis**, the display of red and green lights in northern hemisphere is due to radiations from Ionosphere.
439. **Oasis** is associated with Desert.
440. **Quartz crystal** in quartz watches work on the principle called Piezo-electric effect.
441. The fruits with seed, like banana, are called **Parthenocarpic fruits**.
442. Animal which captures and readily kills living animals for tis food is called **Predator**.
443. In a railway track, two rails are joined end in end with a gap in between them **to avoid accidents due to expansion**.
444. Al-Qanoon is the famous book of Ibn-e-Sina in which human **physiology and medicine are discussed**.
445. Copper can be converted into gold by **Artificial Radioactivity**.
446. In winter an iron pipe feel colder than a wooden window. This is because wood is **non-conductor**.
447. The echo (reflected sound) will be distinctly heard only at ordinary temperatures if the distance of the reflecting surfaces from the source of sound is at least **56 ft**.
448. It is possible to recognize a person in the dark by simply hearing hiss unique voice. It is because of the **Pitch**.

449. When a ray of sunlight enters a dark room, its straight path becomes visible because of dust particles hanging in the air. It is because light is **Transparent**.
450. The principle used in radar is the same as that of sonar. In radar we use radio waves; whereas in sonar we use **Ultrasonic**.
451. **Parsec** is a unit of distance.
452. The German or nickel silver is composed of approximately **60% copper, 20% nickel and 20% zinc**.
453. The temperature of the dead body is the **temperature of the place where it is kept**.
454. **Cusec** is the unit for measuring the flow of liquids/flow rate, equal to one cubic foot per second.
455. The deepest place on earth is **Mariana trench**.
456. Twinkling of stars is caused by **Refraction of light**.
457. Magnifying power of a simple microscope can be increased by **decreasing focal length of the lens**.
458. A very important practical application of properties of matter is hoeing or “godhi” practiced by the farmers. This property of matter is called **Capillarity**.
459. It is observed that the total pressure exerted by air on the man of average size is around **14.7 lb. wt. per square inch**. But the man feels quite comfortable. It is because of **an equal and opposite pressure acts from inside**.
460. A nuclear reactor is a device used to carry out controlled nuclear reaction whereas GM counter is a device used **to detect nuclear radiation**.
461. A body can escape the gravitational pull of the earth if it is thrown up with a velocity of **7 miles per sec**.
462. Night vision is possible with the help of **Infrared Rays**.
463. Myopia is a defect of human eye. It can be corrected by using a lens called **concave lens**.
464. Walnuts can be broken in the hand by squeezing two together but not one. It is because of **work done**.
465. The instrument which is specially designed for recording earth quake wave is called seismograph which measure earth quake waves on a **Richter scale**.
466. Fossils found in the **lowest geological strata** are generally most primitive.
467. **Evolution** can be described as a continuing process.
468. **Mutation** is the only source new alleles.
469. Polygenic characteristic are controlled by **Multiple Genes**.
470. Digestion involves **ingestion, digestion, absorption and elimination**.
471. In humans, most nutrient molecules are absorbed by the **small intestine**.
472. The energy needed to fuel essential body processes is called **Basal metabolism**.
473. Inhaled air passes through **Bronchiole in the last**.
474. **Hermaphroditism** is a form of sexual reproduction.
475. **Cobalt** is a metal which is strongly attracted by a magnet.
476. **Hepatitis A** is transmitted to different individuals by Faeces.
477. The unit that coordinates different devices of the computer system is **Control unit**.
478. The approximate intensity level of the sound which can cause damage is **100 decibel (dB)**.
479. Fuse wire is made of **63% tin and 37% lead**.
480. The unit of photosynthesis in green plants is called **Quantosome**.
481. The property by virtue of which metals can be beaten into thin sheets is known as **Malleability**.
482. The sky appears blue because the earth’s atmosphere **Reflects blue light**.
483. **Gamma rays** are Higher energy rays emitted by radioactive elements.
484. The radiation that is used in **magnetic resonance imaging (MRI)** is in the **infra-red range**.
485. Lead is used in **storage batteries**.
486. The gas produced during the fermentation of **Biomass is Methane**.
487. Biogas is the common name of **Natural Gas**.

488. Bacteria help in the process of **fermentation of biomass**.
489. One thousand watt power is called as **1 kilowatt**.
490. The meter installed in our homes measure electricity in **KWh**.
491. Units of electricity consumed by 2500 watt air-conditioner in one hour are **2.5 units**.
492. Gas bills are charged in **CGS and BTU**.
493. In BTU system, one BTU is equal to **1055 joule**.
494. Air is present in the atmosphere of earth up to the height of **200 kilometres**.
495. All forms of energy that we use are ultimately transformed into **Heat energy**.
496. The gas which acts as a glass of greenhouse is **Carbon dioxide**.
497. **Google** is the largest search engine of internet.
498. Carbon dioxide is used in the preparation of **soft drinks**.
499. World's largest flower auction is held in **Aalsmeer**.
500. All the plant life is based upon the compounds, which are made up of **Oxygen, Carbon and Nitrogen**.
501. Huge white ball in the sun almost consists of **Hydrogen**.
502. **Charcoal** is made by heating wood.
503. In blood, the percentage of **water is 90%**.
504. As the temperature of ice rises, **the ice melts and its density increases**.
505. Water is a universal solvent for **Biochemical Reactions**.
506. The temperature of the water below the solid ice layer is **4 degree centigrade**.
507. The volume percentage of nitrogen in air is **78%**.
508. The composition of oxygen in air is kept constant by the process of **Photosynthesis**.
509. Nitrogen occurs in plants and animals in the form of **Protein**.
510. Air contains volume of carbon dioxide approximately **0.03%**.
511. The gases which are used by divers as an artificial atmosphere are **helium and oxygen**.
512. Noble gases are extremely **unreactive**.
513. The second most abundant metal found in the earth's crust is **Iron**.
514. The iron content in plant tissue is normally between **50-250ppm**.
515. **Chernobyl nuclear reactor** lies in Russia.
516. Chernobyl nuclear plant was destroyed in **1986 due to Failure of cooling system**.
517. Radioactive source must be kept in **Lead Container**.
518. In Brazil **alcohol is used as fuel** for vehicles.
519. **Voltmeter** can be made by modification in **Galvanometer**.
520. The device used for the measurement of current, voltage and resistance is **AVO meter**.
521. In the name of multimeter "AVO", **V stands for Voltage**.
522. Silicon is a **Semiconductor**.
523. Paper is an **insulator**.
524. For sending sound waves at large distance, **Radio Waves** are used.
525. The carrier waves used for the radio transmission have the frequency up to **30 KHz**.
526. Video camera is used to convert Picture into **electrical signals**.
527. In a colour television, the colours are **green, red and blue**.
528. The waves used for sending signals to the satellite from ground station are **Micro Waves**.
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530. In a telephone receiver, **Magnet** is placed under the diaphragm.
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532. Modern Bicycle was invented by **Staley**.
533. Coulomb is the unit of **Electric Charge**.
534. For certain reasons, some people develop cloudy areas in one or both lenses. This defect is called **Cataract**.

535. In order to prevent the corrosion of iron pipes they are often coated with a layer of zinc. This process is termed as **Galvanization**.
536. In a reactor, cadmium rods are used for **Absorbing Neutrons**.
537. **Detergents** dissolved in water help in cleaning clothes by reducing the surface tension of water.
538. The swing of a spinning cricket ball in the air can be explained on the basis of **Bernoulli's Theorem**.
539. The absorption of ink by blotting paper involves **Capillary Action** phenomenon.
540. Materials for rain proof coats and tents owe their water proof properties to **Surface Tension**.
541. For being able to see three-dimensional pictures we have to use An **Endoscope**.
542. Water has maximum density at **4 degree centigrade**.
543. The highest recorded air temperature in the world in degree **Celsius is 57**.
544. The instrument that measures wind speed is the **anemometer**.
545. The theory of expanding Universe was first propounded by **Hubble**.
546. Used tea leaves contain **Quinine**.
547. A lake starts freezing because of the cold atmosphere. It will first **freeze at the top surface**.
548. The Sun remains visible for some time after it actually sets below the horizon. This happens due to **Atmospheric Refraction**.
549. An iceberg is floating in sea. **One tenth** of its mass will remain above the surface of water.
550. Bat has the highest upper limit of **audible range**.
551. "**Hotline**" is A telecommunication link between the rulers of countries.
552. Most of the ozone is concentrated in the **Stratosphere**.
553. The cow's milk contains **80% of water** in terms of percentage.
554. **Numismatics** is the study of Coins.
555. **Measles** is a viral disease.
556. **Vitamin C** is present in Citrus Fruits.
557. **Leukaemia** is a Blood Cancer.
558. **Haemophilia** is a hereditary disease.
559. **Diamond** is the hardest material.
560. Lead ball falls through water more slowly than through air because of **the viscous force in water**.
561. Polaroid's are used for **Photoelasticity**.
562. **Scalding** with steam is more severe than scalding by boiling water because Steam contains more energy than boiling water.
563. Cooking oil can be converted into vegetable ghee by the process of **Hydrogenation**.
564. Stainless steel is an alloy of **Iron, Chromium and Nickel**.
565. **Optical fibres** work on the principle of Total internal reflection.
566. Water vapour beyond the dew point results in **Condensation**.
567. The main chemical substance present in the bones and teeth of animals is **Calcium Phosphate**.
568. The **Green House Effect** is caused by an excess of Carbon dioxide.
569. Bats can also fly in dark because they are capable of taking the help of **Ultrasonic Waves**.
570. **Gold** is found in its original form.
571. **Green vegetables** have high iron content.
572. The fat content in buffalo milk is **10%**.
573. **Whale** has the largest egg.
574. The rear view mirror of a motor vehicle is **Convex**.
575. A **post mortem** study usually involves an analysis of liver.
576. **Bio fertilisers** are nitrogen-fixing micro-organisms which can enrich soil.
577. **Tincture** of iodine consists of **A solution of iodine in alcohol**.
578. The only planet of solar system which has **water vapours** is **Neptune**.
579. The major part of natural gas, petroleum and coal consist of **Methane**.
580. **Gypsum** is used for **cement**.



581. Chromium is obtained from **Chromite**.
582. Silica is used in **glass-making**.
583. Human population has become double during the last **45 years**.
584. At present population growth rate in Pakistan is **1.573%**.
585. In Pakistan, the nuclear power stations are built at **Karachi and Chashma**.
586. **Plutonium** is used as **Fuel for nuclear fission**.
587. **Uranium-235** is used in the fission process.
588. The solar energy falling on the atmosphere of earth is almost **1.4 kilowatt per square meter**.
589. The large plates of solar panels are painted **Black**.
590. The temperature of the semi-molten rocks about 10 km below the surface is **200 degree Centigrade**.
591. **Cataract** is a disease of eye.
592. **Rayon** is made of Cellulose.
593. **Meter per second** is a unit of Velocity.
594. The greatest number of compounds is formed by the element of **Carbon**.
595. The major component of honey is **Glucose**.
596. The working principle of a washing machine is **Centrifugation**.
597. **Oxygen** is present in the largest amount in terms of per cent by mass in the **earth's crust**.
598. **Radioactivity** was first discovered by **Henry Becquerel**.
599. **Helium gas** is commonly used in balloons and airships.
600. The process of elimination of water from any system is called **Dehydration**.
501. Huge white ball in the sun almost consists of **Hydrogen**.
502. **Charcoal** is made by heating wood.
503. In blood, the percentage of **water is 90%**.
504. As the temperature of ice rises, **the ice melts and its density increases**.
505. Water is a universal solvent for **Biochemical Reactions**.
506. The temperature of the water below the solid ice layer is **4 degree centigrade**.
507. The volume percentage of nitrogen in air is **78%**.
508. The composition of oxygen in air is kept constant by the process of **Photosynthesis**.
509. Nitrogen occurs in plants and animals in the form of **Protein**.
510. Air contains volume of carbon dioxide approximately **0.03%**.
511. The gases which are used by divers as an artificial atmosphere are **helium and oxygen**.
512. Noble gases are extremely **unreactive**.
513. The second most abundant metal found in the earth's crust is **Iron**.
514. The iron content in plant tissue is normally between **50-250ppm**.
515. **Chernobyl nuclear reactor** lies in Russia.
516. Chernobyl nuclear plant was destroyed in **1986 due to Failure of cooling system**.
517. Radioactive source must be kept in **Lead Container**.
518. In Brazil **alcohol is used as fuel** for vehicles.
519. **Voltmeter** can be made by modification in **Galvanometer**.
520. The device used for the measurement of current, voltage and resistance is **AVO meter**.
521. In the name of multimeter "AVO", **V stands for Voltage**.
522. Silicon is a **Semiconductor**.
523. Paper is an **insulator**.
524. For sending sound waves at large distance, **Radio Waves** are used.
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599. **Helium gas** is commonly used in balloons and airships.
600. The process of elimination of water from any system is called **Dehydration**.
601. Sparkling red colour after the blast of fire cracker is due to the presence of **Sulphur**.
602. The chemical name of aspirin is **Acetylsalicylic acid**.
603. Animal fat has the **highest calories per gram**.
604. The commonly present element in the artificial fertilizer is **Potassium, Nitrogen and Phosphorus**.
605. **Potassium nitrate** is used in fertilizers.
606. The inherited traits of a person can be investigated by the study of **Deoxyribonucleic acid**.
607. Silicon is extensively used in **electronics**.
608. When a bullet is fired upwards vertically, it gains in **Potential energy**.
609. The mixture of **Acetylene and oxygen gases** is required in gas welding.
610. **Isobars** are the lines connecting the places having same Atmospheric pressure.
611. The velocity of wind is related to **Pressure gradient**.
612. The acid present in the sour milk is **Formic acid**.
613. The most important stimulant in tea leaves is **Caffeine**.
614. Dolly was the name of **first cloned sheep**.
615. The smallest living cell is that of a **Mycoplasma (bacterium)**
616. We lose consciousness if blood flow to the brain is cut off **more than 5 sec**.
617. Menopause usually occurs between **40 to 45 years**.
618. **Platypus and Echidnas** are the only monotremes, or mammals that lay eggs.
619. **Film** is that part of camera which is analogue to the retina in the human eye.
620. **72-80** is the average adult pulse rate.
621. **Magnetic resonance** is the modern tool for imaging brain tumours.
622. The acid used in a car battery is **sulphuric acid**.

623. After drinking contaminated water, you would be most apt to develop symptoms of **Typhoid fever**.
624. In eye donation, **Cornea of donor's eye** is utilized.
625. **Alzheimer** is a disease of Brain.
626. Cell was discovered by **Robert Hooke**.
627. A body is taken from Earth to Moon. Its weight will **Decreases**.
628. Brass is an alloy of **Copper and Zinc**.
629. Mineral essential for the coagulation of blood is **Magnesium**.
630. Milk is an example of **Emulsion**.
631. Iron is the **most abundant transition metal**.
632. **Hydrometer** is used to determine **specific gravity of liquids**.
633. Convex lenses are used for the correction of **Long-sightedness (Hyperopia)**
634. A transformer is used to Increase or decrease **AC voltage**.
635. The stones formed in human kidney consist mostly of **Calcium oxalate**.
636. Most of the explosions in mines occur due to the mixing of **Methane with air**.
637. A mobile phone sends and receives messages through **Radio waves**.
638. **Fax machine** receives the signal and give its output through the Printer.
639. The procedure of crushing the gallstone and kidney stone by laser is called **Lithotripsy**.
640. Laser is used to produce an image of **One dimension**.
641. Three dimensional image formed by laser is called **Photograph**.
642. The first laser ever used is **Semiconductor laser**.
643. Ordinary light spreads in **all directions**.
644. **Optical fibres** are the fine strands of Glass.
645. The satellites which revolve in such an orbit, so that they move with earth rotation are called **Geo-stationary satellites**.
646. The elements which emit radiations have atomic number greater than **82**.
647. In a normal healthy body, the number of red cells or erythrocytes in **each cubic millimetre of blood is 5.0 m**.
648. The average life of a red blood cell in the body is about **120 days**.
649. DNA is a class of **nucleic acids**.
650. Cellulose is a **Carbohydrate**.
651. After long periods of use, a gray spot develops on the inside of a bulb. This is because the **tungsten filament evaporates and collects there**.
652. Ice cubes are added to a glass of pure water and a glass of a pure alcohol. The ice would be **Floating in alcohol and sinking in water**.
653. Protein which renders a cell less susceptible to attack by viruses is called **Chloromycetin**.
654. The pigment involved in photosynthesis activity is called **Chlorophyll**.
655. The chemical part of the dye that absorbs light and produces colour is called **photo chrome**.
656. A nuclear reactor harnesses nuclear energy by **Controlled chain reaction**.
657. Eyes are tested by dilating the pupils with a very dilute solution of **Atropine**.
658. **Phenol** is used as a raw material in the manufacture of foam used in mattresses, cushions, etc.
659. ECG is an instrument used for the **disorder of Heart**.
660. **Carbon-14** is used for dating very old objects of archaeological importance.
661. **Lead** is used in storage batteries.
662. Enzymes are **Biological catalysts**.
663. DNA finger-printing is the latest technology used in **Forensic science**.
664. Potassium is used in the preparation of glass and soap in the form of **Carbonates**.
665. **Potassium phosphate** is used in the preparation of detergent.
666. In Chlorophyll, **magnesium** is present.
667. Calcium plays a vital role in **blood clotting**.

668. For water purification, **Chlorine** is used
669. Deficiency of calcium causes the **impaired growth in infants.**
670. Wheat, rice, corn and maize are the **best sources of carbohydrates.**
671. The human blood is divided into **four groups.**
672. The muscles, tissues and blood all are made up of **Proteins.**
673. Iron is a part of haemoglobin which **transports oxygen.**
674. In thyroid glands iodine is required for the synthesis of **Thyroxin.**
675. The amount of calories provided by egg is **150 K calories/100gm.**
676. Jupiter is the **largest planet** of solar system.
677. The mirror placed near the driver of a bus is **Concave mirror.**
678. X-rays are used to **disintegrate bladder stones.**
679. The percentage of carbohydrates in the normal daily food calorie requirement of an adult is about **59%.**
680. Impure blood is received in the heart in the **right auricle.**
681. Plants take nitrogen in the form of **Nitrate.**
682. Washing soda in water behaves **acidic.**
683. The gland which maintains body temperature is the **Pituitary gland.**
684. Peeled banana under normal condition is **brittle.**
685. **Phrenology** deals with sensory perception of animals.
686. **Vinegar** is produced by two steps, first fermentation of sugar by yeast, second fermentation of ethyl alcohol by bacteria.
687. The longest and the strongest bone in the human body is **Femur.**
688. Red color has the **longest wavelength** and violet has the **shortest wavelength.**
689. **Chronometer** is used to measure Time.
690. Carbon dioxide is used in **fire extinguishers.**
691. Hereditary disorders are the result of **Defective DNA nucleus.**
692. Pure gold is **24 carat.**
693. One horse power is equal to **746 watts.**
694. **Dynamo** is a device that converts Mechanical energy into electrical energy.
695. The minimum velocity required to escape from the gravitational pull is **11.2 km/s.**
696. Heavy water consists of **Oxygen and heavy hydrogen.**
697. Polio is a **viral disease.**
698. **Ag** is the symbol for silver.
699. **Babbage** is called the father of computer.
700. Dead red blood cells are **stored in liver.**

Oxygen

46.1% , 461,000

Silicon

28.2% , 282,000

Aluminum

8.23% , 82,300

Iron

5.63% , 56,300

Calcium

4.15% , 41,500

Sodium

2.36% , 23,600

Magnesium

2.33% , 23,300

Potassium  
2.09% , 20,900  
Titanium  
0.565% , 5,650  
Hydrogen  
0.14% , 1,400

701. **Spring tides** occur on new moon and full moon days because on these days Sun, moon and earth are in a straight line.
702. **Clayey soil** is best suited for cotton.
703. The time interval between two beats of a normal human heart is **1 second**.
704. The material used for bleaching paper pulp is **Sodium hypochlorite**.
705. **Mercury** has the smallest diameter.
706. The instrument, used for recording tremors of earth, is known as **Seismograph**.
707. **Ionosphere** makes the radio transmission possible.
708. Colour of the skin is due to the presence of **Melanin**.
709. **Natural rubber** is a protein.
710. **Concave mirror** can be used to focus sunlight.
711. Liver secretes **bile**.
712. When an object is transferred from the earth to the moon **its mass remains unchanged**.
713. The unit of sound is **Decibel**.
714. It is economical to transmit **electric power at high voltage**.
715. **Diamond** does not have a tetrahedral structure.
716. The unit to measure the supersonic speed is **Mach**.
717. The application of the principles of genetics to the improvement of human race is known as **Eugenics**.
718. The penetration of x-rays through an object depends upon **the object's Density**.
719. **Using Ultrasound**, we can determine the **Structure of the body**.
720. To find the hidden secrets under the water, the ships and submarines use the **Sonar system**.
721. The dirt in the dirty water can be separated by using the **Ultrasound**.
722. Recording of brain waves from outer surface of head is called **E.E.G (Electroencephalograph)**.
723. The first rocket launched by Pakistan was **Rahber**.
724. The **first Nuclear power plant** in Pakistan was established at Karachi.
725. Sodium benzoate is used **for preservation of food grains**.
726. Steel is more elastic than rubber because **ratio of stress to strain is more**.
727. **Haemoglobin** makes the blood look red.
728. Mercury is extracted from **Cinnabar**.
729. Cattle-bone powder is used as fertilizer as it is rich in **Phosphorous**.
730. Heating element of an electric heater **Nichrome**.
731. Dry sand appears bright while wet sand appears dark because of **Reflection**.
732. Acid rain contains high levels of **Sulphuric acid**.
733. A woman's voice is shriller than a man's **due to smaller vocal chords**.
734. The blood glucose level is commonly expressed as **Milligram per decilitre**.
735. Soft drinks such as colas contain significant quantities of **Caffeine**.
736. A small pouch containing silica gel is often found in bottles of medicine in tablet or powder form because **silica gel absorbs moisture**.
737. Fluorescent tubes are fitted with a choke. **The choke coil reduces current in the circuit**.
738. For reproduction of sound, a CD (Compact Disc) audio player uses a **Laser beam**.
739. When a CD (Compact Disc used in audio and video systems) is seen in sunlight, rainbow like

- colours are seen. This can be explained on the basis of the phenomenon of Reflection and diffraction.
740. If a U-238 nucleus splits into two identical parts, the two nuclei so produced will be **Radioactive**.
741. The total genetic material within an individual is known as the **Genome**.
742. The part of the body directly affected by Pneumonia is **Respiratory system**.
743. As the amount of clay in a soil increases, its **water retaining capacity increases**.
744. "O" blood group of human beings is a **universal donor**.
745. Amino acids are a product of the digestion of **Protein**.
746. **Ptyalin** is a starch digesting enzyme.
747. Pepsin, a digestive enzyme, is produced in the **Stomach**.
748. Milk is nearly a **complete food** by itself.
749. The **acids turn the blue litmus paper Red**.
750. Permanent magnets can be made from **Cobalt**.
751. Nights are cooler in the deserts than in the plains because **Sand absorbs heat more quickly than the earth**.
752. Atmospheric pressure exerted on the earth is due to the **Gravitational pull**.
753. Fertilizer having high nitrogen content is **Urea**.
754. **Potassium Carbonate** is used for removing air bubbles from the glass during its manufacture.
755. The chemical name for "baking soda" is **Sodium Bicarbonate**.
756. The snow on the mountains does not melt all at once when it is heated by the sun because **it reflects most of the heat from the sun**.
757. First time AIDS was identified in **1983**.
758. **Anthrax** is a **bacterial disease**.
759. Blood is formed in **bone marrow** in human body.
760. **Quark** is the smallest part of the matter discovered by the scientists.
761. **Trachoma** is a disease of the eye.
762. The heart of a normal adult human being weighs about **300 grams** and that of woman **200 grams**.
763. Heart pumps **5 litre blood per minute** in a normal human adult (at resting position).
764. The part of the body directly affected by **Rickets** is bone tissue.
765. **Histology** is the study of tissues.

## 6. SCIENTIFIC REASONS FROM PAST PAPERS (95 To 2011):

1) The Earth bulges out at equator. Why?

Ans: This is due to the shape of the earth. The earth is not a true sphere but it is an ellipsoid. The equatorial diameter of the earth is 12756.27 kms. While its polar diameter is 12713.505 km. the difference between its equatorial and polar diameter is about 43 kilometres. The rotation of the earth on its axis produces a centrifugal force which increases its equatorial diameter. That is why earth bulges at the equator.

2) The Sun appears red at sunset and sunrise. Why?

Ans: The sun appears red at the time of sunset and sunrise due to the scattering of light by small particles of dust or smoke near the surface of the earth. The light travels relatively without hindrance that is why the sun appears red at the time of sunset and sunrise.

3) The ozone layer in the atmosphere is necessary for our survival. Why?

Ans: ozone layer in the atmosphere is very necessary for plant and animal survival because it is the absorber of ultraviolet rays which are very dangerous for animal health. Ultraviolet rays cause cancer of skin, spotting of plants etc. that is why the ozone layer is necessary and essential for animal as well as plant survival.

4) The sky from moon appears black. Why?

Ans: as the moon has no atmosphere, so the sky looks completely black when viewed from the moon.

5) Roads are bent inwards on curves. Why?

Ans: The roads are bent inwards on the curves and at the turns because the bents avoid falling outside and prevent the accidents.

OR

When an object turns in a circle it is influenced by a centrifugal force which pushes it away from the centre of the circle. When vehicles turn on a road they fall outside under the influence of centrifugal force. In this way there is danger of falling or slipping out of road at a turn. Roads are made in a way that these bent inward at the turns to avoid falling outside and to prevent accidents.

6) Australian continent has winter season when we have summer season in Pakistan.

Ans: the earth on its axis is not at a vertical angle to its orbit. It is inclined at an angle of about. In this way when the northern hemisphere of the earth is inclined to the sun and getting direct sun rays, southern hemisphere is inclined away from the sun and getting less direct rays. Thus the northern hemisphere has summer season and southern hemisphere has winter season. Pakistan is in the northern hemisphere while Australia is in the southern hemisphere. So when there is winter in Australia there is summer season in Pakistan.



### 7) Meat takes longer to cook on mountains.

Ans: The meat takes longer time to cook on the mountains because the atmospheric pressure decreases with altitude and the boiling point of a liquid is directly proportional to the atmospheric pressure.

### 8) Water remains cool in earthen pitcher.

Ans: This occurs due to the process of evaporation. Water gets cooled on evaporation. As the earthenware pitcher is concerned, they have small pores. Water tends to come out of pores and evaporates which results in cooling effect on the earthenware and water.

While in the metal pots there are no pores and evaporation does not take place. Besides metal has tendency to absorb heat that's why water does not get cooled in a metal pot.

### 9) Ice and salt mixture is used as a freezing agent by manual ice-cream makers.

Ans: In manual ice-cream making a mixture of salt and ice is always used because salt has capacity to reduce the temperature of ice by decreasing its freezing point. That's why ice and salt mixture is used as freezing agent in manual ice cream making.

### 10) It is not advisable to sleep under trees during the night.

Ans: During night the plants release carbon dioxide (CO<sub>2</sub>) which is a poisonous gas and injurious to health. That is why it is not advisable to sleep under trees during night.

### 11) Why the green house operators paint their glass roofs white in summer?

Ans: White colour is the reflector of light and it absorbs less heat as compared to other colours. As in summer there is already very hot season and heat is not required to that level. That is why the green-house operators paint glass roofs white in summer season.

### 12) Water boils quicker on mountains.

Ans: On Mountains the pressure of the air is low due to height, as the air pressure decreases with altitude. In this way, water boils quicker on mountains at temperature less than 100 degree centigrade, which is the boiling point of water at ground level.

### 13) Rainbow is produced in the sky after rainfall and sunlight.

Ans: After rain, many droplet of water travel in the atmosphere. When sun rays fall on these droplets, dispersion of water occurs and droplets act as prism and produce a spectrum of seven colours. That's why a rainbow is seen in the sky after rain.

### 14) Milk is considered as an ideal food.

Ans: Milk is considered as an ideal food due to following reasons:

a) It contains all constitute of balanced diet.

b) Milk contains fat.

c) Milk has high nutritional value because it contains proteins as well as minerals.

15) Lunar eclipse last much longer than solar eclipse.

Ans: Lunar eclipse last longer than the solar eclipse because the length of the earth's umbral shadow cone is more than three times the average distance between the moon and the earth, so the shadow is relatively wide at the point where the moon crosses it.

16) Goitre is common in hilly areas.

Ans: Goitre is common in hilly areas because there is deficiency of Iodine in the water.

17) Detergents are better cleaning agents.

Ans: A detergent consists of hydrophilic and hydrophobic ends. In case of dirt the detergent pushes the dirt off the wet surface of the fabric. The washing machine provides the agitation.

18) Decomposers are important for life.

Ans: Decomposers break down animal waste and dead organisms in order to get energy and release free nutrients back into the ecosystem.

OR

Decomposers break down organics into nutrients, which can be used by living organisms to create new life.

19) Places near sea are cooler in summer.

Ans: Sea water keeps the temperature moderate. In the summer season the places located near sea are cooler due to the lower temperature of water.

20) Colour blindness is more common in men than women.

Ans: Women have the sex chromosomes XX, while men have the chromosomes XY. The gene for normal colour vision is found on the X-chromosome. If a woman has one X-chromosome with the gene and one without it, she will not be colour blind. On the other hand, a man with an X-chromosome that is missing the gene has no 'backup'. He will definitely be colour blind. Colour blind women have both X-chromosomes missing the colour vision gene. This is less probable mathematically than having just one X-chromosome missing the gene.

21) Light colours absorb less heat therefore these are not heated as much as the black colour.

Ans: Dark colours do not exactly absorb more heat, but they do convert a higher percentage of light into heat. In the sun with a dark coloured shirt it gets hot, where a lighter coloured shirt would not get nearly as hot. This is due to the amount of light being absorbed by the colour. The lighter the colour the smaller is the range of visible light being absorbed and converted into heat. White objects reflect all visible light, where black objects absorb all visible light.

22) Rain water is more fertile than water from tube well.

Ans: Rain water is more fertile because it contains many salts and nitrogen dissolved from the atmosphere.

23) The manhole covers are generally round.

Ans: Manholes, which interconnect underground sewerage pipes, and serve as a point of entry for cleaning the pipes, are located at every major sewer pipe junction, and are capped with round manhole covers. The reason for the circular construction of these covers is, quite simply, that covers of any other shape would fall through the manholes by virtue of their varying diameters. Circular manhole covers do not vary in width, or in diameter, as is the case with these other shapes, thus remaining in place despite the street traffic running roughshod over them.

24) Clothes of a moving dancer bulge.

Ans: The clothes of a moving dancer bulge outside due to the centrifugal force which tends to move away from the centre.

25) People are advised not to stand near fast moving train.

Ans: One should not stand beside a fast moving train because of the strong pressure of air which carries along. A man can fall in this pressure.

26) The image of a tree is inverted on the bank of a lake.

Ans: The water of lake acts as a mirror. According to the laws of light, mirror forms inverted images.

27) Polar star is always seen in the north.

Ans: It is because the Polar Star (North Star) is closest to the location of the celestial North Pole.

28) We never see birds urinating.

Ans: The birds do not have a urinary system like other living beings which possess urinary excretory organs. In the birds the urine is excreted from body without special organs.

29) Pasteurized milk has more nourishment than the ordinary boiled milk.

Ans: Pasteurized milk is obtained by heating milk at a temperature of 60 degree Celsius for 30 minutes. In this way the TB bacteria are killed without damaging the milk protein. Thus pasteurized milk has more nourishment than ordinary boiled milk.

30) Bees die when they sting human being.

Ans: Their stingers are actually ovipositors, tubular structures extending from the abdomen that sometimes contain eggs. When the barbed stinger is left inside the victim, the honeybee mortally tears her abdomen in the process. They leave their stingers in the wound with a tiny venom sac attached. Fortunately, only about one out of a hundred people are allergic to bee sting, but allergic reactions can be very serious.

31) Cloudy nights are usually warmer than the clear ones.

Ans: The clouds serve as a barrier and prevent the loss of heat. Thus the warm temperature is maintained.

### 32) Why do some people snore?

Ans: Some people snore during their sleep because the breathing action produces sound. This is so because the pharynx or the windpipe offers resistance to the air taken in or expelled.

### 33) Why do we sometimes sleep walk?

Ans: Sleep walk is a sort of disorder of sleep in which a person starts walking during his sleep. The sleeper walks and performs complex activities automatically without regaining consciousness.

### 34) Climbers bend forward while climbing mountain.

Ans: While climbing a mountain, a climber bends his body forward in order to keep the centre of gravity of his body within two thirds portion. According to this principle the Pisa Tower is not falling.

### 35) Why climbers get their food by climbing on other trees?

Ans: The climbers are mostly parasites and they cannot manufacture their food. Therefore, they climb on other trees and get food from them.

### 36) Mars is called red planet.

Ans: Mars is called the red planet because its colour is red due to the desert like surface.

### 37) Vitamin D is the essential component of the body.

Ans: Vitamin D is necessary for body because it is essential for bone formation and retention of calcium in the human body. Vitamin D also protects the teeth.

### 38) The weight of the object is less at the equator than at the poles.

Ans: The weight of an object is the product of mass and force of gravity. The equatorial diameter is more than the polar diameter. Thus, the force of gravity is more at the poles and the weight is more there.

### 39) The dogs pant, the birds open their mouth and the elephants move rapidly their ears.

Ans: All of them do not sweat; they use the above mentioned mechanisms to cool themselves.

### 40) A geostationary satellite appears standstill to a viewer on the equator of earth.

### 41) Why do the stars twinkle?

Ans: The light from the stars travels through different layers of space of varying densities. Therefore, the light rays deviate from their original path. Further, these layers are not stationary but keep on moving. This leads to the twinkling of stars.

### 42) On what days do we have equal days and nights all over the world? And why?

Ans: On 23 September and 21 March we have equal days and nights all over the world. This is so because on these days, the rays of the sun fall vertically on the equator at noon. Both the poles receive equal rays of the sun. As a result, exactly one-half of each hemisphere receives the sun's rays.

This makes day and night equal.

43) Every fourth year has 366 days. Explain.

Ans: One revolution of the earth around the sun takes 366 days and 6 hours. But we consider a year as consisting of only 365 days and ignore 6 hours. In four years the difference becomes as much as 24 hours or one day. Hence, to every fourth year we add one day. That year of 366 days is known as leap year.

44) Why are igneous rocks called primary or parent rocks?

Ans: Igneous rocks are formed when the molten material from volcanoes gets solidified. This material is liquid, hot and sticky which moves towards the surface through cracks and joints. All other rocks derived from these rocks. Hence, they are called primary or parent rocks.

45) Why are the areas lying between the Arctic Circle and the North Pole in the Northern Hemisphere and the Antarctic Circle and the South Pole in the Southern Hemisphere very cold?

Ans: These areas are very cold because the sun does not rise much above the horizon. Therefore, its rays are always very slanting which emit minimum heat. These areas being very cold are called Frigid Zones.

46) Why are the three hot regions of the world-equatorial forests, savannah lands and hot deserts-not found in Europe?

Ans: The three hot regions of the world-equatorial forests, savannah lands and hot deserts-are not found in Europe because Europe is the only inhabited continent situated entirely outside the tropics.

47) Why is the lowest layer of the atmosphere in contact with the earth's surface, the warmest?

Ans: The lowest layer of the atmosphere in contact with the earth's surface is the warmest because the atmosphere is heated mainly from the below.

48) Why does the temperature above the ocean and land masses vary even on the same latitude?

Ans: Temperature above the oceans and land masses varies even on the same latitude because of the differential heating of land and water, i.e., land mass is heated and cooled more rapidly and to a greater degree than water.

49) Why are marine animals able to live at great depths than marine plants?

Ans: As marine animals do not depend upon sunlight for their survival, they are able to live at great depths where there is permanent darkness.

50) Why do trees of coniferous forests possess needle-like leaves?

Ans: The needle-like leaves limit transpiration and thus enable conifers to grow in the drier areas.

51) Why do equatorial forests appear evergreen?

Ans: In equatorial forests trees often shed a few leaves or shed their leaves seasonally, but most of the trees retain their leaves for most of the time so that the forests appear evergreen.

52) Why is petroleum often called black gold?

Ans: Petroleum is often called black gold because of its great demand in the modern industry and for domestic use. It provides fuel for heat and lighting, lubricant for machinery and raw material for a number of industries.

53) Why are the kangaroos called marsupials?

Ans: Marsupial means broad-pouch. Since kangaroos have a pouch-like fold of skin near the stomach in which they carry their young ones, they are called marsupials.

54) Why is platypus considered a strange animal?

Ans: Platypus is a strange animal because it is an animal-bird that survives under water, walks on the ground and digs tunnel under the ground. It is a four-legged animal that lays eggs like a bird. It is found in Australia.

55) Why is a person in moving vehicle thrown forward when the vehicle stops suddenly?

Ans: A person in a moving vehicle is in a state of motion. When the vehicle suddenly stops his body tends to remain in a state of motion due to inertia and he is thrown forward.

56) Earth is continuously pulling moon towards its centre. Why does not the moon fall on to the earth?

Ans: it is so because the gravitational attraction of the earth provides the necessary centripetal force to the moon for its orbital motion around the earth due to which the moon is revolving around the earth.

57) Which of the two-glass or rubber is more elastic and why?

Ans: Glass is more elastic than rubber because for a given applied force per unit area, the strain produced in glass is much more than that produced in rubber.

58) Animal like camel can easily walk in the desert sand while other animals like donkeys, dogs and horses cannot. Explain.

Ans: The camel has very broad and large feet. As a result of the large surface area in contact with the ground, it exerts less pressure on the sand and sinks only slightly in it. Other animals have smaller feet which exert more pressure on the sand. As a result, they sink more in the sand and cannot walk easily in desert.

59) Why does a small quantity of liquid assume spherical form?

Ans: A small quantity of liquid assumes a spherical form due to surface tension which tends to reduce the surface area. A given mass will acquire minimum surface area if it assumes a spherical shape.

60) Why does an iron needle float on clean water but sink when some detergent is added to this water?

Ans: Due to surface tension, the free surface of liquid at rest behaves like a stretched membrane. When an iron needle floats on the surface of clean water, its weight is supported by the stretched membrane. When some detergent is added to this water, its surface tension decreases. As a result of it, the stretched membrane on the surface of water is weakened and is not able to support the weight of needle. Hence the needle sinks in such water.

61) Why is cooking quicker in a pressure cooker?

Ans: The boiling point of water depends upon the pressure on its surface. Steam produced inside the cooker builds up pressure thereby raising the boiling point of water, which results in quick cooking.

62) Why does steam cause more severe burns than boiling water?

Ans: The amount of heat (latent heat) possessed by steam is much greater than the amount of heat possessed by water at the same temperature. Therefore, steam causes more severe burns than boiling

water.

63) Why does ice not melt readily when salt is sprinkled over it?

Ans: When salt is sprinkled over ice, some of it dissolves. As dissolution of the salt is accompanied by absorption of heat. The temperature of the system falls below 0 degree Celsius. Hence, ice does not melt readily.

64) It is difficult for firemen to hold a hose, which ejects large amount of water at a high velocity. Why?

Ans: the water which comes out of the fireman's hose carries large momentum as its velocity is very high. The equal and opposite reaction force pushes the fireman backwards with a great speed satisfying the law of conservation of momentum. As a result, it is difficult for the fireman to hold the hose.

65) In the outer space astronauts talk to each other through radios. Why?

Ans: sound waves need a material medium for its propagation. There is no air in space and hence, sound waves cannot travel. However, radio waves can travel through space. The astronauts can see each other because light, like radio waves, can travel through vacuum.

66) Sonar scanners are used by doctors. Explain.

Ans: sonar scanners send out ultrasonic waves, which are reflected by body tissue and organs. From the pattern of reflections, a computer can build up an image of the internal structure which is vital for diagnosis.

67) Why the flash of lightning is seen before the sound of thunder is heard?

Ans: the velocity of light is much greater than that of the sound. Therefore, flash of lightning is seen before the sound of thunder is heard.

68) Bats have poor eyesight but are able to home their prey with great accuracy. Also, dolphins can avoid fishing nets and can detect fish at night. Explain

Ans: Bats emit high frequency (1, 20,000 Hz) sound waves and listen with their sensitive ears for any echoes. From the time taken to hear the echo and from the nature of sound received. Bats are able to estimate the distance and the type of surroundings. This process is known as echolocation. Same process is used by the dolphins.

69) When low flying aircraft passes overhead, we sometimes notice a slight disturbance on our TV screen. Why is it so?

Ans: a low flying aircraft reflects TV signal. Due to the interference between the direct signal and the reflected signal, there is disturbance on the TV screen.

70) In automobiles, why are convex mirrors used to see the traffic from behind?

Ans: Convex mirrors are used in automobiles because they form erect and diminished images of the object. Thus, it helps the drivers to get a wider field of view of the traffic coming from behind.

71) Why is mirage formed in the deserts?

Ans: A mirage is formed owing to total internal reflection. To the observer at a distance, the reflected image of the object appears behind the reflecting surface, as if the object were in front of it, but actually it is just an illusion.

72) What will be the colour of grass in blue light?

Ans: Grass will appear blackish in colour in blue light because it has the property of absorbing all other colours except its own colour. The blue rays falling on grass will be absorbed by it, and it will appear dark coloured.

73) A bird perches on a bare high power line and nothing happens to it. A man standing on the ground touches the same line and gets a fatal shock. Why?

Ans: When bird perches on a live high power line, no current passes through the body of bird because there is no potential difference between live wire and the body of bird as the potential of bird's body is the same as that of wire.

When a man standing on the ground touches the same wire then due to a large potential difference between his hands and feet, a large current flows through his body to the earth.

74) During lightning it is safest to be inside a car rather than under a tree or in the open. Give reason.

Ans: When a person is in the open or under the tree, the lightning passes through his body to the earth. On the other hand, for a person inside a car, the car provides shielding and the electric field inside the car is zero, thus lightning does not affect the person inside it. The lightning actually passes through the metallic body of the car to the earth without affecting the person sitting inside it.

75) Why is earthing desirable for electric appliances?

Ans: Earthing helps the current move into the earth in the event of short-circuit, without giving a shock to the user.

76) Why does a perspiring man feel relief when air flows by his side?

Ans: The air flowing by the side of a perspiring man quickens the pace of evaporation of perspiration from the body of that person, and the resultant loss of heat from his body causes the cooling sensation which provides relief to him.

77) Why is magnet always made of soft iron?

Ans: Magnet is always made of soft iron because 'magnetisation' and 'demagnetisation' both are possible in soft iron.

78) Why are telephone wires between two poles kept loose?

Ans: Telephone wires are kept loose between two poles so that they are protected from being broken due to expansion and contraction caused by the change of temperature in summers and winters.

79) X-rays penetrate through the flesh but not through bones. Why?

Ans: The penetrating power of X-rays depends upon the potential difference between the cathode and the anode of X-ray tube. The X-rays produced can penetrate through light element like flesh of human body but they are unable to penetrate through heavier elements like bones.

80) What is a black hole? Why is it called so?

Ans: A black hole is a super dense planetary material formed due to the death of a star of mass more than five solar masses.

It is called black hole because any particle or photon approaching its surface is just swallowed by it. It appears black, as radiation is neither emitted nor reflected by it.



81) Why do water pipes burst in severe cold winters?

Ans: Water freezes in pipes during winters, when the temperature goes below 0 degree Celsius (i.e., freezing point of water). It expands and in the process exerts pressure on the water pipes, thereby sometimes bursting them.

82) Most aircrafts and ships have their front shape pointed. Why?

Ans: The shape of many objects, viz. aeroplanes, rockets, ships, etc. moving through air or water, are designed in such a way that friction can be reduced between the objects and air/water. Such type of body is known as streamlined and the process is known as streamlining.

83) An athlete runs some distance before taking jump, why?

Ans: An athlete runs a certain distance before actually jumping in order to increase his speed, and thereby, his inertia of motion. This increased inertia of motion enables him to jump a longer distance.

84) It is difficult to drown in the Dead Sea. Why?

Ans: The water of Dead Sea has a salt content of 27%. Therefore, its density is much greater than that of ordinary sea water and it also offers a greater upthrust. Hence, the body weighs less than an equal volume of Dead Sea water and is thus, able to float.

85) Why aquatic animals have soft skeleton unlike those of the terrestrial animals?

Ans: The density of animals and fish living in water is almost the same as the density of water. Therefore, their weight is almost completely balanced by buoyancy. That is why they do not need massive skeleton like those of terrestrial animals.

86) Why does a swimming pool appear less deep than it really is?

Ans: When rays of light start from the bottom of a pool and travel from water to air, they are refracted away from the normal because they travel from a denser medium to a rarer medium. As a result, a virtual image of bottom is formed above the bottom. Hence, a swimming pool appears less deep than it really is.

87) Why is electrical wiring in parallel better?

Ans: electrical wiring in parallel is better because all the lines will have the same potential difference and if one line gets fused the other lines remain unaffected.

88) It is easier to swim in sea water than in river water. Explain.

Ans: The density of sea water is more than that of the river water. Therefore, the weight of sea water displaced by the swimmer is more. Thus, buoyant force of upthrust on the swimmer increases, making it easier to swim in sea water.

89) A cold compress is applied on the forehead of a person suffering from high fever. Why?

Ans: Evaporation causes cooling. As the water evaporates, it absorbs heat from the forehead and helps in reducing the temperature.

90) A man with a load his head jumps from a high building. What will be the load experienced by him.

Ans: Zero, because the acceleration of his fall is equal to the acceleration due to gravity of the earth.

91) Why is spring made of steel and not copper?

Ans: The elasticity of steel is greater than that of copper.

92) Why is it easier to spray water to which soap is added?

Ans: Addition of soap decreases the surface tension of water. The energy for spray is directly proportional to surface tension.

93) A piece of chalk when immersed in water, emits bubbles. Why?

Ans: Chalk consists of pores forming capillaries. When it is immersed in water, the water begins to rise in the capillaries and air present there is expelled in the form of bubbles.

94) Why does a liquid remain hot or cold for a long time inside a thermo flask?

Ans: Because of the presence of air, which is poor conductor of heat, in between the double glass walls of a thermos flask.

95) Why is the boiling point of sea water more than that of pure water?

Ans: Sea water contains salts and other impurities with different points which jointly rise its boiling point.

96) Why is it recommended to add salt in water while boiling grams?

Ans: By addition of salt the boiling point of water gets which helps in cooking.

97) Why is soft iron used as an electromagnet?

Ans: Because it remains magnetic only till the current passes through the coil and loses its magnetism when the current is switched off (principle of electric bells)

98) Why does ink leak out of a partially filled pen when taken to a high altitude?

Ans: As we go up the pressure and the density of air go on decreasing. Partially filled pen leaks when taken to a higher altitude because the pressure of air acting on the ink inside the tube of the pen is greater than the pressure of air outside.

99) Why does some liquids burn while others do not?

Ans: A liquid burns if its molecules can combine with oxygen of the air with the production of heat. Hence, oil burns but water does not.

100) Oil and water do not mix. Why?

Ans: i) Molecules of oil are not bigger than that of water and therefore do not mix easily.

ii) Molecules of water are polar, i.e. they have opposite charges at two ends whereas oil molecules do not; as a consequence they tend to stay away from water molecule.

# 7. Differences

## 1. Artery & Vein

### Artery

- i) Arteries are blood vessels which transport blood away from the heart.
- ii) Arteries have thick vascular walls.
- iii) The inside bore or lumen of arteries is narrow.
- iv) Arteries carry oxygenated blood with the exception of pulmonary artery.
- v) The walls of arteries are more elastic.
- vi) The blood is under great pressure in the arteries.
- vii) Arteries are generally deeply placed.
- viii) Arteries end in the capillaries.

### Vein:

- i) Veins are the blood vessels which always carry blood towards heart.
- ii) Veins have thin muscular walls.
- iii) The inside bore or lumen of veins is wide.
- iv) Veins carry deoxygenated blood with the exception of pulmonary veins.
- v) The walls of veins are less elastic.
- vi) The blood is under less pressure in the veins.
- vii) Veins are generally superficially placed.
- viii) Veins start from the capillaries.

## 2. PNP and NPN Transistor

1. NPN has higher electron mobility than PNP. Therefore, NPN bipolar transistors are often more favoured than PNP transistors.
2. NPN is easier to create from silicon than PNP.
3. The main difference of NPN and PNP is the base. One is just the opposite of the other.
4. With the NPN, a P-dope semiconductor is the base, while with the PNP, the 'base' is a N-dope semiconductor.

## 3. Electronic & Static Electricity

### Electronic Electricity

- i) This is electricity in motion.
- ii) It involves flow of electrons.
- iii) It has high voltage.

### Static Electricity:

- i) This is electricity at rest.
- ii) It does not involve flow of electrons.
- iii) It has low voltage.

## 4. Concave & Convex Lens

### Concave Lens

- i) It is the lens which is narrower in the centre and broader towards the corners.
- ii) When a beam of light strikes a concave lens all the rays after passing through it diverge.
- iii) It gives mostly virtual image.
- iv) They are also called diverging lenses.

### Convex Lens:

- i) It is the lens which is narrower towards the corners and broader towards the centre.
- ii) When a beam of light strikes a convex lens all the rays after passing through it converge at a single point.
- iii) Mostly real images are formed except when the ray of light passes through it when object is placed between optical centre and focus.
- iv) They are also called converging lenses.

## 5. Absorption & Adsorption

### Absorption

- i) Absorption is a process in which a substance takes up another substance, such as blotting paper (solid) absorbing water (a liquid). OR Adsorption and absorption are two different things. Absorption is the chemical integration of one chemical into another. When you drink a glass of water, you are absorbing it, as the water becomes part of you.

### Adsorption:

- i) Adsorption is a process in which a substance adheres to the surface of another substance. Adsorption is important in some types of catalysis, notably where gases adsorb on metal surfaces. The reaction is then made easier by a consequent lowering of activation energy. OR Adsorption occurs when one substance holds another via physical bonds. If you spill a glass of water on your shirt, it is adsorbed as the fibres will hold the water until heat dries out the shirt.

## 6. Fats & Oils

### Fats

- i) are solid at room temperature
- ii) made by animals, mostly
- iii) are more saturated

### Oils:

- i) are liquid at room temperature
- ii) are made by plants, mostly
- iii) are less saturated

### Hypoglycaemia:

- i) The fall in sugar level in the blood below the normal physiologic level known as Hypoglycaemia. Normal physiologic range of sugar in blood is 60-90mg% at fasting and 120-140 mg% at random.
- ii) It is treated by giving intravenous glucose.
- iii) It causes mental confusion, visual problem and often coma etc.
- iv) It causes weakness and increases in food desire.

### Hyperglycaemia:

- i) Hyperglycaemia is a condition in which blood sugar level rise above its normal range.
- ii) It is treated by exercise, medicine or by intravenous insulin therapy.
- iii) It causes weakness, calf pain, unhealed wounds and kidney problem.
- iv) It causes excessive urination, dryness of lips and increased thirst etc.

## **2. Epidemic & Endemic**

### Epidemic:

- i) If at one place and times a great number of people suffer from a disease is known as epidemic.
- ii) It can travel from one place to another.
- iii) Examples: Influenza, Smallpox, Cholera etc.

### Endemic:

- i) If a disease persists in a particular locality, certain area or one region, it is known as endemic disease.
- ii) It cannot travel from one place to another place.
- iii) Example: Goitre in iodine deficient areas.

## **3. Herbivores & Carnivores**

### Herbivores

- i) The animals eating green plants, grass and fodder are known as Herbivores.
- ii) Animals have specific digestive system to digest leaves, plants and fodder.
- iii) The teeth are specifically designed to cut and chew leaves, plants and fodder.
- iv) Jaw movement is specific for side motion.
- v) Examples: goats, cattle, sheep, buffalo, cow etc.

### Carnivores:

- i) The animals eating flesh and meat are known as carnivores.
- ii) Digestive enzymes are specific.
- iii) Their teeth are short and to cut and chew leaves, plants pointed especially for flesh eating.
- iv) Jaw movement is specific for up and down movement.
- v) Examples: Tiger, dog, cat, lion etc.

## 4. Respiration & Photosynthesis

### Respiration

- i) Respiration is a catabolic process in which compounds are broken down.
- ii) In this process carbohydrates are broken down into simpler compounds.
- iii) The end-products for this process are CO<sub>2</sub> and H<sub>2</sub>O.
- iv) In respiration Oxygen enters the plant body and CO<sub>2</sub> is released.
- v) It occurs during both day and night. Light is not necessary for this process.
- vi) In respiration energy is released from food material.

### Photosynthesis

- i) It is an anabolic process in which compounds are formed.
- ii) In this process carbohydrates are manufactured.
- iii) The end-product of this process is simple carbohydrates.
- iv) In photosynthesis CO<sub>2</sub> enters the plant and O<sub>2</sub> is released.
- v) It occurs during day time only. Light is essential for this process.
- vi) It is energy consuming process.

## 5. Pollination & Fertilization

### Pollination

- i) It is a process involving transfer of pollens from male reproductive organ to female reproductive organ of plants.
- ii) It occurs in flowering plants.
- iii) The products of pollination are seed.
- iv) It takes place through animals, birds, insects, wind and water.

### Fertilization:

- i) In fertilization fusion of egg and sperm occurs.
- ii) It occurs markedly in animals.
- iii) The product of fertilization is zygote.
- iv) It takes place by physical contact and mating of male and female.

### Thermoplastics

- i) Plastics that can be melted again and again are known as thermoplastics.
- ii) They behave just like wax.
- iii) These plastics can be shaped again and again.
- iv) Examples: Nylon, PVC, Teflon etc.

### Thermosetting Plastics:

- i) Plastics that can be melted only once are known as thermosetting plastics.
- ii) They become hard after melting.
- iii) These plastics cannot be shaped again and again.
- iv) Examples: Polyesters and Bakelite.

## **Lunar & Solar Eclipse**

### **Lunar Eclipse**

- i) It occurs when the earth comes between moon and sun.
- ii) Moon goes through series of partial eclipses when moon comes out of umbral region of earth's shadow.
- iii) Earth lies in umbral region at total eclipse when earth lies exactly between moon and sun and its shadow covers the whole moon.

### **Solar Eclipse**

- i) It occurs when moon comes between earth and sun.
- ii) Partial eclipse of sun occurs as in Penumbra can see a part of the sun.
- iii) At the total eclipse of the sun, the shadow of moon which it throws on earth consists of an umbra and penumbra people on earth who are in umbral region cannot see the sun.

## **Asteroid & Meteorite**

### **Asteroid:**

- i) The small rocky objects which are orbiting the sun between orbits of Mars and Jupiter are known as asteroids.
- ii) Its origin is concentrated to the remains of planets that fell apart.
- iii) Asteroid means star like but these are known as minor planets.

### **Meteorite:**

- i) Tiny chunk of material floating in space, which can also enter the earth's atmosphere and become meteor are known as meteorites.
- ii) It may originate by the disintegration of comet.
- iii) A falling star (Meteor) is seen as a streak of light in sky.

## **Renewable & Non-renewable resources**

### **Renewable Resources**

- i) Renewable resources are used continuously and can be used again and again.
- ii) Major examples are: air, water, soil, wildlife, forests, fish etc.
- iii) These resources support millions of people all over the world.
- iv) Renewable resources are constantly renewed by bio-geochemical cycles of nature.

### **Non-renewable Resources**

- i) Non-renewable resources cannot be used again and again after their consumption.
- ii) Major examples include: Coal, oil, natural gas etc.
- iii) These resources cannot support millions of people all over the world.
- iv) Non-renewable resources are being exhausted day by day because their demand rises. Due to worldwide demand of fossil fuels, its supplies are declining.

### **OR**

### **Renewable resources-**

- 1) the resources that can be renewed by reproduction are called renewable resources.
- 2) Renewable resources are inexhaustible.
- 3) Renewable resources are not affected by the human activities.
- 4) All biotic resources are renewable.
- 5) For example: air and water.

### Non-renewable resources-

- 1) the resources that are present in fixed quantities are called non-renewable resources.
- 2) Non-renewable resources are inexhaustible.
- 3) Non-renewable resources are affected by human activities.
- 4) Some abiotic resources are non-renewable.
- 5) For example- fossil fuels and minerals.

### **Endothermic & Exothermic Reaction**

#### Exothermic Reaction

- i) Energy is drawn in from the external environment, causing its surroundings to lose heat, or "cool down."
- ii) The endothermic chemical reaction creates a product that has a higher energy level than the original materials, causing the reactant's stored energy to decrease. (In scientific terms, the reactants have "less total enthalpy" than the product.)
- iii) The resulting product of the reaction is less stable because, the higher the energy bond, the less strength its molecules possess.
- iv) Most endothermic reactions are not spontaneous.
- v) Example: Melting ice. In order for ice to melt, it needs to draw in the heat (energy) from its surroundings. The ice becomes less stable as it responds to the increased heat. The ice stored energy decreases. The end product is water, which has a higher energy level than the ice.

#### Exothermic Reactions

- i) Exothermic chemical reactions cause their surroundings to warm up by giving off heat.
- ii) The reactants contain more stored energy than the product because energy from external sources is not required, but given off. This gives the product more stability due to the lower amount of energy needed. (In this case, the reactants have a "greater total enthalpy" than the product.)
- iii) Exothermic reactions are usually spontaneous.
- iv) Example lighting a match. When the head of the match is struck, it results in the spontaneous release of stored energy (heat) from the reactants into the surroundings. The flame that is produced has a lower level of energy than the match and the striking surface because the reaction is giving off stored energy and not required to draw energy in from its surroundings

### **Star & Planet**

#### Star

- i) Stars are self-luminous heavenly bodies.
- ii) They do not revolve around the sun.
- iii) They are usually stationary.
- iv) Examples: fixed stars, binary stars.

#### Planet:

- i) Planets are rocky non-luminous bodies.
- ii) They revolve round the sun.
- iii) They usually move.
- iv) Examples: Mercury, Venus, Jupiter etc.



## **Nuclear Fission & Fusion**

### **Fission:**

- i) Lighter atoms are fused together at a very high temperature to form heavier elements.
- ii) It is difficult to carry out on the earth.
- iii) It has no nuclear waste problem.
- iv) It requires cheaper and abundant elements.
- v) Not possible at concerning scale as high temperature is needed to start it.

### **Fusion:**

- i) Heavier unstable atoms are broken down to produce energy.
- ii) It is easy to carry out on the earth.
- iii) It has nuclear waste radioactivity disposal problem.
- iv) It requires expensive and rare elements.
- v) Possible to commercialize under controlled measure.

### **RAM**

- i) It stands for random access memory.
- ii) It is an optical disc, where data and information is stored permanently.
- iii) RAM is the primary storage media.
- iv) RAM is the primary storage device from which the system boots.
- v) RAM is stored on RAM chip.
- vi) The data or information stored on it can be written on or it can be erased.

### **ROM**

- i) It stands for read only memory.
- ii) It is that part of CPU, where temporary information is stored.
- iii) RIOM is the secondary storage media.
- iv) System does not boot from ROM.
- v) ROM is stored on a compact disc.
- vi) The data or information stored on it neither be written on, nor it can be erased.

## **BIT & BYTE**

A bit is defined as: a single basic unit of information, used in connection with computers and electronic communication. All modern computers store and use data in digital form. The smallest unit of storage and measurement is one binary digit, therefore its name.

A byte, pronounced 'bite', is the next size up basic unit of measurement for information storage, usually consisting of eight bits. These 8 bits are grouped together to form a byte that is, a total or 8 grouped bits representing one character of data.

Therefore, so far we have two basic units of measuring digital information storage that have different capacities, they are:

- 1 Bit
- 8 Bits equal 1 Byte

## **CU & ALU**

### **CU**

- i) It stands for Control Unit.
- ii) Control unit controls overall activates of computer.
- iii) CU does not perform the functions of calculations.

### **ALU**

- i) It stands for arithmetic logic unit.
- ii) It performs arithmetic and logical operations.
- iii) ALU performs functions of addition, subtraction, multiplication and division.

## **Hardware & Software**

### **Hardware:**

- i) All the physical components of computer which can be touched, measured have weight and occupy space are collectively called computer hardware etc.
- ii) Examples of hardware are: keyboard, mouse, joy stick, scanner, printer, CPU etc.

### **Software:**

- i) Software can be defined as a set of instructions and codes written in a defined manner. In other words software are pre-written programs, which control the operation of computer.
- ii) Examples of software are; DOS, windows, UNIX, XENIX, Linus, JAVA, Oracle, Antivirus etc.

## **PC/Minicomputers & Mainframe computers**

### **PC:**

- i) It is a small computer based on microprocessor.
- ii) One user can use it at a time.
- iii) These are very low priced computers. An individual can afford it.
- iv) User friendly software are used to operate this computer.
- v) Minicomputers were launched in 1959 by Digital Equipment Corporation (DEC)
- vi) Minicomputers are also made by Data General, Hewlett-Packard & IBM

### **Mainframe Computers:**

- i) The largest computers called mainframe computers are the oldest category of computer system.
- ii) They are capable of great processing speed and data storage.
- iii) These are always kept in air-cooled rooms.
- iv) They are mainly used in banks, airlines and industrial companies.

## **Email & Snail Mail**

### **Snail mail:**

- i) "Snail mail" is a term used to refer to mail that is sent in the traditional way — through the postal service — rather than by email, fax, or other electronic means of communication.
- ii) It is called "snail mail" because it can be very slow, as is a snail. Snail mail generally takes 2 or 3 days to go from origin to destination, if not many more,
- iii) Snail mail has gone out of fashion for simple letters, though it is still necessary for sending packages, or legal documents that require signatures.

### **Email:**

- i) Email is electronic mail which is very quick means of communication through computers and telephone line.
- ii) Email can be sent instantly.
- iii) With email, a message is sent directly from a user's mail program to another person's email address. Though many email messages simply contain words, they may also include photos or other digital files, such as songs, or links to websites.

## **Apes & Monkeys**

### **Apes:**

- i) Apes do not have tail.
- ii) Apes have rounded nasal openings.
- iii) Apes generally have bigger brains and larger bodies than monkeys.
- iv) Apes do not have web foot.
- v) Apes are bigger in size.
- vi) Apes are: Humans, Chimps, Gorillas, Orangutans and Gibbons.

### **Monkeys**

- i) Monkeys have tails.
- ii) Monkeys have slanted nasal openings.
- iii) Monkeys have web foot.
- iv) Monkeys are smaller in terms of size
- v) Monkeys are all primates non-apes and non-prosimians (lemurs)

## **Hydrostatics & Hydrodynamics**

### **Hydrostatics:**

- i) Hydrostatics is a branch of science which deals with physical behaviour of liquids at rest.
- ii) The consideration of liquids at rest, involves problems of buoyancy and flotation, pressure on dams and submerged devices, and hydraulic presses.

### **Hydrodynamics:**

- i) Hydrodynamics is the branch of science which deals with behaviour of liquids in motion.
- ii) The study of liquids in motion is concerned with such matters as friction and turbulence generated in pipes by flowing liquids, the flow of water over weirs and through nozzles, and the use of hydraulic pressure in machinery.

## **Comet & Meteor**

### **Comet:**

- i) Comet is a collection of gas, dust, and volatile ice that travel around the sun, generally in very eccentric orbit.

### **Meteor:**

- i) Meteor is a streak of light seen in the night sky signify the burning up in earth's atmosphere of inter-planetary material.

## **Barrage & Dam**

### **Barrage:**

- i) Barrages are constructed not at a much height but at a low height.
- ii) Barrages are single purpose constructions i.e. for irrigation.
- iii) Electricity cannot be produced in barrages.
- iv) It is constructed on plains.
- v) Sukkur barrage is an example.

### **Dam:**

- i) Dams are constructed at higher elevation or at a height.
- ii) Dam is multipurpose. It acts as reservoir, control flood, and for irrigation.
- iii) Dam is constructed to generate electricity.
- iv) It is impossible at ground level.
- v) Tarbella dam is an example.

### **Isotopes:**

These are the elements having same atomic number but different mass number. They have the same atomic number because the number of protons inside their nuclei remains the same. The difference in their mass number is due to the difference in their number of neutrons.

### **Isobars**

Where Isotopes are chemically the same and physically different, the converse is true in Isobars. That is isobars are elements, which are chemically different but physically the same. So, isobars are atoms of different elements having the same atomic mass but different atomic number. Since their number of electrons is different, their chemical properties are different. The light nuclei have unstable isobars. Heavy nuclei have stable isobars and these occur in pairs. Suppose the number of protons of one isobar matches with that of another they are called as mirror-nuclides of each other.

## **Autopsy & Biopsy**

### **Autopsy:**

- i) An autopsy is the dissection and analysis of a dead subject.
- ii) , autopsies are limited to the deceased and there are two kinds of autopsy; External examination and internal examination.
- iii) Autopsy is performed for medico-legal purpose.

### **Biopsy:**

- i) A biopsy is a medical test in which cells, tissue, or fluid is removed for examination.
- ii) Biopsy is not limited to only living people because they are routinely taken from organs that are going to be used for transplantation.
- iii) Autopsy is performed for diagnosis purpose.

## Mitosis & Meiosis

### Mitosis:

- i) Mitosis takes place within somatic cells (cells that make up the body).
- ii) One single division of the mother cell results in two daughter cells.
- iii) A mitotic mother cell can either be haploid or diploid.
- iv) The number of chromosomes per nucleus remains the same after division.
- v) It is preceded by a S-phase in which the amount of DNA is duplicated.
- vi) In mitosis, there is no pairing of homologous chromosomes.
- vii) There is no exchange of DNA (crossing-over) between chromosomes.
- viii) The centromeres split during anaphase.
- ix) The genotype of the daughter cells is identical to that of the mother cells.
- x) After mitosis, each daughter cell has exactly same DNA strands.

### Meiosis:

- i) Meiosis takes place within gamete cells (sex cells).
- ii) Two divisions of the mother cell result in four meiotic products or haploid gametes.
- iii) A meiotic mother cell is always diploid.
- iv) The meiotic products contain a haploid (n) number of chromosomes in contrast to the (2n) number of chromosomes in mother cell.
- v) In meiosis, only meiosis I is preceded by a S-phase.
- vi) During prophase I, complete pairing of all homologous chromosomes takes place.
- vii) There is at least one crossing-over or DNA exchange per homologous pair of chromosomes.
- viii) The centromeres do separate during anaphase II, but not during anaphase I.
- ix) Meiotic products differ in their genotype from the mother cell.
- x) After meiosis, each daughter cell has only half of the DNA strands.

## Hard water & Heavy Water

### Hard Water:

- i) Hard water is that type of water which does not form lather easily.
- ii) Its formula is  $H_2O$ .
- iii) Hard water is not used in nuclear power plants.

### Heavy Water:

- i) Heavy water is deuterium oxide in which hydrogen of water is replaced by its heavier isotope, Deuterium.
- ii) The formula of heavy water is  $D_2O$ .
- iii) Heavy water is used in nuclear power plants.

## Climate & Weather

### Climate:

- i) Climate is the normal weather conditions for an area during a season or a year.
- ii) Climate of an area is described by means of an average means of an average of the statistics of the various weather factors over a period of time, normally 30-years.

### Weather:

- i) Weather is the condition of the atmosphere at any one place and time.

ii) Weather is described by air, temperature and humidity, wind speed and direction, cloud amount and precipitation, sunshine and visibility.

## **Cardiac & Skeletal Muscles:**

### **Cardiac Muscles:**

- i) Cardiac muscles are present in the heart only.
- ii) They have centrally placed nuclei.
- iii) They never fatigue.
- iv) They are composed of long fibres.
- v) They are under involuntary control.

### **Skeletal Muscles:**

- i) Skeletal muscles are present in the skeleton of the body.
- ii) Nuclei are not centrally placed in skeletal muscle.
- iii) They can fatigue.
- iv) They are not composed of long fibres.
- v) They are under voluntary control.

## **Haze & Smog**

### **Haze:**

- i) The dust particle smoke etc. that may be visible in atmosphere close to the earth's surface is known as Haze.
- ii) It does not affect natural visibility.
- iii) It does not occur particularly near coastal areas.

### **Smog:**

- i) It is a mixture of solid and liquid fog as well as particles of smoke. It is formed when humidity is high.
- ii) Smog reduces visibility.
- iii) It occurs near coastal areas.

## **Enzyme & Hormone**

### **Enzyme:**

- i) These are organic catalysts produced in the protoplasm of all living cells.
- ii) These are mostly protein in nature.
- iii) They control all biochemical reactions of the cell.
- iv) These are present in all cells and show their activity there.

### **Hormone:**

- i) These are organic substances produced in places away from their functional sites.
- ii) These are mostly acids.
- iii) They promote and inhibit growth, flowering, sex expression, etc.
- v) These are mobile. They are produced at one site and show their activities at other sites.

## **Igneous & Sedimentary Rocks**

### **Igneous Rocks:**

- i) Igneous rocks are formed when magma (or molten rocks) has cooled down and solidified.
- ii) Igneous rocks are commonly found inside the Earth's crust or mantle,
- iii) Igneous rocks can be an important source of minerals,
- iv) Examples of Igneous rocks include granite and basalt.

### **Sedimentary Rocks:**

- i) Sedimentary rocks are formed by the accumulation of other eroded substances,
- ii) Sedimentary rocks are usually found in water bodies (sea, oceans etc.).
- iii) Sedimentary rocks, or their bedding structure, are mostly used in civil engineering; for the construction of housing, roads, tunnels, canals etc.
- iv) Examples of Sedimentary rocks include shale, limestone and sandstone.

### **OR**

#### **What is the difference between Igneous Rocks and Sedimentary Rocks?**

- Igneous rocks are formed from molten liquid minerals called magma, while sedimentary rocks are formed from lithification (cementing, compacting and hardening) of existing rocks.
- Igneous rocks are non-porous for water, while sedimentary rocks are porous to the water. That is water cannot penetrate through igneous rocks but can through sedimentary rocks.
- Igneous rocks are having fossils very rarely, while sedimentary rocks are rich in fossils.
- Igneous rocks are harder than sedimentary rocks.
- Tendency to react with acids is higher to sedimentary rocks when compared to igneous rocks.
- Igneous rocks may be light or dark coloured, while sedimentary rocks have great colour variety.

## **Producers & Consumers**

### **Producers:**

Producers are organisms that make their own food through photosynthesis or other reactions and are a food source for other organisms (ex. plants, extremophile benthos communities).

### **Consumers:**

Consumers are organisms that ingest other organisms, like plants, in order to gain energy (ex. herbivores, carnivores, omnivores, and detritivores).

## **Microcomputer & Minicomputer**

### **Microcomputer:**

- i) A microcomputer is a standard desktop computer used at a home and in business.

- ii) A microcomputer is a computer with a microprocessor as its CPU.
- iii) They are cheap, compact and can be easily accommodated on a study table.
- iv) Microcomputer is a single-user computer.
- v) The two most common types of storage devices used with microcomputers are tapes and disks.
- vi) Microcomputer is not powerful or as fast as minicomputer.
- vii) Examples are- Modern computers like desktop, laptop etc.

### **Minicomputer:**

- i) Minicomputers are mid-sized computer used in universities, research labs and small corporations.
- ii) Minicomputers are faster than microcomputers.
- iii) They are expensive and larger than microcomputer.
- iv) Minicomputer is a multi-user computer.
- v) For secondary storage, most minicomputers use magnetic disks or tapes.
- vi) Minicomputer is powerful than microcomputer but not as super computer and mainframe computer.
- vii) Examples are- IBM 9375, Motorola 68040 etc.

### **Mainframe & Super Computers**

#### **Mainframe Computers:**

- i) The largest computers called mainframe computers are the oldest category of computer system.
- ii) They are capable of great processing speed and data storage.
- iii) These are always kept in air-cooled rooms.
- iv) They are mainly used in banks, airlines and industrial companies.

#### **Super Computers:**

- i) The super computers are fastest of all computers.
- ii) It was invented by two brothers Gregory and David in New York.
- iii) These computers have high capacity to work.
- iv) These also require air-conditioned rooms.
- v) The super computers are mainly used in a) Automotive engineering b) Modelling nuclear explosion c) Aeroplane designing d) Oil exploration e) Weather forecasting etc.

### **RAM & Cache Memory**

#### **RAM**

- i) It stands for random access memory.
- ii) It is an optical disc, where data and information is stored permanently.
- iii) RAM is the primary storage media.
- iv) RAM is the primary storage device from which the system boots.
- v) RAM is stored on RAM chip.
- vi) The data or information stored on it can be written on or it can be erased.



### Cache Memory:

- i) Cache memory is a special high speed memory that the CPU can access quickly.
- ii) It is used in computers with very fast CPUs, so that these CPUs don't have to wait for Data to be delivered from RAM.
- iii) The most frequently used instructions are kept in the cache memory.
- iv) This allows the CPU to run faster because it does not have to take time to swap instructions in and out of RAM.

### **Rotation & Revolution Of Earth:**

#### Rotation Of Earth:

- i) it is the movement of the earth in which the earth makes rotation around its axis.
- ii) Rotation of the earth occurs from West to East.
- iii) The main effect of the rotation of the earth is the formation of days and nights.

#### Revolution Of Earth

- i) it is the movement of the earth, in which the earth makes revolution around the sun.
- ii) Revolution of the earth occurs in counter clockwise direction or from right to left.
- iii) The main effect of the revolution of the earth is the change of seasons.

### **Dicot & Monocot Stem**

#### Dicot Stem:

- i) In dicot stem pericycle is broken.
- ii) There are few vascular bundles.
- iii) The vascular bundles are open.

#### Monocot Stem:

- i) In monocot stem pericycle is not broken.
- ii) there are many vascular bundles.
- iii) The vascular bundles are closed.

### **Penumbra & Umbra**

#### Penumbra:

The term relates to the solar and lunar eclipse. When during its revolution, the moon comes between the sun and the earth then solar eclipse takes place. A shadow is created. The outer shadow region in the eclipse is called penumbra.

#### Umbra:

Similarly, when the solar eclipse takes place, two regions of shadow are created. Out of these the dark inner shadow region is called Umbra.

### **Nucleus & Nucleolus**

#### Nucleus:

- i) The nucleus is the main organelle.
- ii) It is mostly present in the centre of the cell.
- iii) It is membrane bound.
- iv) The nucleus contains DNA.

v) It contains hereditary material in the form of chromosome and genes and controls all the activities of the cell.

### Nucleolus:

- i) The nucleolus is a sub-organelle.
- ii) It is present in nucleus.
- iii) It is non-membrane bound.
- iv) It contains RNA.
- v) It takes part in protein formation.

### **Lava & Magma**

- Magma is the molten rock material deep inside earth's crust, while the same magma, when it finds its way to a volcano through fissures and cracks, and comes out of the mouth of the volcano, is referred to as lava.
- So magma is deep underground, while lava is the hot mixture of gases and molten rocks that comes out of the volcano.
- The most notable difference between magma and lava pertains to their location.

### **Fold & Fault**

#### Fold:

A fold is a bend in a rock layer caused by forces within the crust of the earth. Folds usually occur in a series and look like waves in the rock.

#### Fault:

Rock layers can also break, in which case a fault occurs. A fault zone is where the sides of broken rock have moved relative to each other.

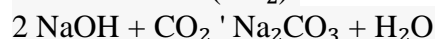
### **Caustic Soda and Caustic Potash**

Sodium hydroxide (NaOH) and potassium hydroxide (KOH) are both strongly alkaline, corrosive solids. As chemical re-agents, they are mostly interchangeable, although some differences exist in specific applications.

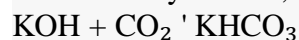
### 1. Chemistry in Air

o Sodium hydroxide, also known as lye or caustic soda, and potassium hydroxide, also known as caustic potash, are both white solids. They are hygroscopic, meaning they will absorb water from the air.

Sodium hydroxide will form sodium carbonate ( $\text{Na}_2\text{CO}_3$ , washing soda) by absorption of carbon dioxide ( $\text{CO}_2$ ):



Potassium hydroxide, however, will form potassium bicarbonate ( $\text{KHCO}_3$ ):



## 2. Solubility

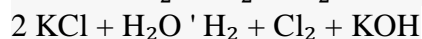
o Sodium and potassium hydroxide are strong bases. At room temperature, they exhibit almost identical solubilities in water - 111 grams of sodium hydroxide will dissolve in 100 millilitres of water vs. 110 grams of potassium hydroxide.

## Applications

o Both hydroxides can be used in the saponification of fats to form soap. Soaps prepared from potassium hydroxide tend to exhibit greater solubility and are commonly referred to as "soft" soaps.

## Manufacture

o Sodium and potassium hydroxides are prepared commercially by electrolysis of sodium chloride (NaCl, table salt) or potassium chloride (KCl):



## Differences

o In many applications, potassium and sodium hydroxide can be freely interchanged. The primary difference between them is cost. In ton quantities, potassium hydroxide is about three times more expensive than sodium hydroxide.

## **SEM & TEM**

### SEM:

SEM involves shooting an electron beam at a specimen and observing the reactions on the specimen surface. When the electron hits a molecule on the surface, its energy is absorbed by the molecule, which in turn emits a lower amount of energy. This energy can be in the form of a secondary, less energetic electron, a photon of light, or x-rays. Differentiation between these emissions is used to produce image contrast. However, in order to produce a coherent image, the sample must often be prepared with a conductive coating or by embedding a resin for many biological samples.

### TEM:

TEM acts much like a typical bright field microscope in the sense that it sends electrons through a specimen. As it propagates through the specimen, some of the electrons are scattered and some are transmitted. The transmitted electrons are passed through an objective lens and then projected onto a scintillating material which can then be recorded photographically. This requires samples to be prepared in very thin slices in order to allow transmission of the electrons through transparent sections.

## OR

A SEM (scanning electron microscope) images using the electrons reflected from a specimen. A TEM (transmission electron microscope) images using the electrons that pass through it.

The image from an SEM thus looks somewhat like a normal photo (we're used to imaging using the light reflected from objects). However, a TEM image takes a bit more interpretation

as we're not used to seeing images of light that's passed through things - think of silhouettes or slide projectors.

## **Periscope & Pyrometer:**

### **Periscope:**

Instrument used by submarines to see above the surface of the sea.

### **Pyrometer:**

Instrument used for measuring high temperatures.

## **Cell & Battery**

### **Cell:**

A cell is a DC voltage source in which chemical energy is converted into electricity.

### **Battery:**

It is a device which produces electricity through the use of acid and other chemicals. It is assembly of many cells.

## **Perimeter & Altimeter**

### **Perimeter:**

A perimeter is a path that surrounds an area. The word comes from the Greek peri (around) and meter (measure). The term may be used either for the path or its length - it can be thought of as the length of the outline of a shape. The perimeter of a circular area is called circumference.

### **Altimeter:**

An altimeter is an instrument used to measure the altitude of an object above a fixed level. The measurement of altitude is called altimetry, which is related to the term bathymetry, the measurement of depth underwater.

## **Pelage & Plumage**

### **Pelage:**

It is a growth of hair/fur/wool covering the skin of animals.

### **Plumage:**

Plumages are feathers covering the body of birds.

## **Smog & Smoke**

### **Smog**

Smog is formed by the interaction of pollutants present in the air in presence of sun light (photochemical smog), it usually restricts visibility and is hazardous to health.

### **Smoke:**

Smoke is the thin fine particles usually result from the combustion.

## **Radiotherapy & Chemotherapy**

1. Radiation targets only the cancer cells. However, chemotherapy is administered through the blood and therefore, affects both cancerous and non-cancerous cells
2. Though they can be used for any sort of cancer, radiation mainly targets solid tumours like those of the cervix, spine and skin.
3. Chemotherapy treats cancers through medicines, while radiation deals with cancer cells through rays
4. Radiation results in additional side effects like internal inflammation, especially in the stomach and the intestine.

## **Springtides & Neap tides**

### **Springtide:**

- i) Spring Tides When the moon is full or new, the gravitational pull of the moon and sun are combined.
- ii) At these times, the high tides are very high and the low tides are very low. This is known as a spring high tide.
- iii) Spring tides are especially strong tides (they do not have anything to do with the season spring).
- iv) They occur when the Earth, the Sun, and the Moon are in a line. The gravitational forces of the Moon and the Sun both contribute to the tides.
- v) Spring tides occur during the full moon and the new moon.

### **Neap tides:**

- i) Neap Tides During the moon's quarter phases the sun and moon work at right angles, causing the bulges to cancel each other.
- ii) The result is a smaller difference between high and low tides and is known as a neap tide.
- iii) Neap tides are especially weak tides.
- iv) They occur when the gravitational forces of the Moon and the Sun are perpendicular to one another (with respect to the Earth).
- v) Neap tides occur during quarter moon.

## **Vertebrates & Invertebrates**

- Vertebrates have a backbone with a spinal cord, whereas invertebrates do not.
- The diversity is exceptionally high among the invertebrates compared to vertebrates.

- Vertebrates are always bilaterally symmetrical, while invertebrates could show either bilateral or radial symmetry.
- Vertebrates are usually large-bodied and move fast compared to invertebrates.
- Vertebrates have a closed blood system, a well-developed brain, either gills or lungs for respiration, and a complex and sophisticated nervous system, whereas those are primitive in invertebrates. Therefore, it concerns that vertebrates have many specializations to extract the best out of the environment compared to invertebrates.

## **Fluorescent & Neon Light**

A neon light is the sort of light you see used in advertising signs. These signs are made of long, narrow glass tubes, and these tubes are often bent into all sorts of shapes. The tube of a neon light can spell out a word, for example. These tubes emit light in different colours.

A fluorescent light, on the other hand, is most often a long, straight tube that produces white light. You see fluorescent lights in offices, stores and some home fixtures.

The idea behind a neon light is simple. Inside the glass tube there is a gas like neon, argon or krypton at low pressure. At both ends of the tube there are metal electrodes. When you apply a high voltage to the electrodes, the neon gas ionizes, and electrons flow through the gas. These electrons excite the neon atoms and cause them to emit light that we can see. Neon emits red light when energized in this way. Other gases emit other colours.

A fluorescent light works on a similar idea but it has an extra step. Inside a fluorescent light is low-pressure mercury vapour. When ionized, mercury vapour emits ultraviolet light. Human eyes are not sensitive to ultraviolet light (although human skin is -- see How Sunburns and Sun Tans Work!). Therefore, the inside of a fluorescent light is coated with a phosphor. A phosphor is a substance that can accept energy in one form (for example, energy from a high-speed electron as in a TV tube -- see How Television Works) and emit the energy in the form of visible light. In a fluorescent lamp, the phosphor accepts the energy of ultraviolet photons and emits visible photons.

The light we see from a fluorescent tube is the light given off by the phosphor that coats the inside of the tube (the phosphor fluoresces when energized, hence the name). The light of a neon tube is the colored light that the neon atoms give off directly.

### **Telemeter:**

A telemeter is a device used to remotely measure a quantity. Telemeters are generally the physical devices used in telemetry. Electronic devices are widely used in telemetry and can be wireless or hard-wired, analogue or digital. Other technologies are possible, however, such as mechanical, hydraulic and optical.

### **Multimeter:**

A multimeter or a multi-tester, also known as a VOM (Volt-Ohm meter), is an electronic measuring instrument that combines several measurement functions in one unit. A typical multimeter may include features such as the ability to measure voltage, current and resistance. Multimeters may use analogue or digital circuits—analogue multimeters (AMM) and digital multimeters (often abbreviated DMM or DVOM.) Analog instruments are usually

based on a micro-ammeter whose pointer moves over a scale calibrated for all the different measurements that can be made; digital instruments usually display digits, but may display a bar of a length proportional to the quantity being measured.

A multimeter can be a hand-held device useful for basic fault finding and field service work or a bench instrument which can measure to a very high degree of accuracy. They can be used to troubleshoot electrical problems in a wide array of industrial and household devices such as electronic equipment, motor controls, domestic appliances, power supplies, and wiring systems.

## **Periscope and Microscope**

### **Periscope:**

A periscope is an instrument for observation from a concealed position. In its simplest form it consists of a tube with mirrors at each end set parallel to each other at a 45-degree angle. This form of periscope, with the addition of two simple lenses, served for observation purposes in the trenches during World War I. Military personnel also use periscopes in some gun turrets and in armoured vehicles.

More complex periscopes, using prisms instead of mirrors, and providing magnification, operate on submarines. The overall design of the classical submarine periscope is very simple: two telescopes pointed into each other. If the two telescopes have different individual magnification, the difference between them causes an overall magnification or reduction.

### **Microscope:**

A microscope (from the Greek: μικρός, mikrós, "small" and σκοπεῖν, skopeîn, "to look" or "see") is an instrument used to see objects that are too small for the naked eye. The science of investigating small objects using such an instrument is called microscopy. Microscopic means invisible to the eye unless aided by a microscope.

There are many types of microscopes, the most common and first to be invented is the optical microscope which uses light to image the sample. Other major types of microscopes are the electron microscope (both the transmission electron microscope and the scanning electron microscope) and the various types of scanning probe microscope.

## **Nucleon and Photon**

### **Nucleon:**

A nucleon is a collective name for two particles: the neutron and the proton. These are the two constituents of the atomic nucleus. Until the 1960s, the nucleons were thought to be elementary particles. Now they are known to be composite particles, each made of three quarks bound together by the so-called strong interaction.

The interaction between two or more nucleons is called inter-nucleon interactions or nuclear force, which is also ultimately caused by the strong interaction. (Before the discovery of quarks, the term "strong interaction" referred to just inter-nucleon interactions.)

### **Photon:**

A photon is an elementary particle, the quantum of the electromagnetic interaction and the basic unit of light and all other forms of electromagnetic. It is also the force carrier for the electromagnetic force. The effects of this force are easily observable at both the microscopic

and macroscopic level, because the photon has no rest mass; this allows for interactions at long distances. Like all elementary particles, photons are currently best explained by quantum mechanics and will exhibit wave–particle duality, exhibiting properties of both waves and particles. For example, a single photon may be refracted by a lens or exhibit wave interference with itself, but also act as a particle giving a definite result when quantitative momentum (quantized angular momentum) is measured.

## **Cusec and Comet**

### **Cusec:**

Cusec is a measure of flow rate and is informal shorthand for cubic feet per second (28.317 litres per second).

### **Comet:**

A comet is an icy small Solar System body that, when close enough to the Sun, displays a visible coma (a thin, fuzzy, temporary atmosphere) and sometimes also a tail. These phenomena are both due to the effects of solar radiation and the solar wind upon the nucleus of the comet. Comet nuclei range from a few hundred meters to tens of kilometres across and are composed of loose collections of ice, dust, and small rocky particles. Comets have been observed since ancient times and have traditionally been considered bad omens.

Telescope and Microscope are two scientific instruments that serve their purposes differently. One of the main differences between a telescope and a microscope is that a telescope is used to view things that are far whereas a microscope is used to view things that are very near.

It is indeed true both the instruments are used to watch the minute details of the objects or things more clearly. Another important difference between telescope and microscope is that the focal length or the distance from the focal point to the lens is different in these two scientific instruments.

As a result of this the focal point in the case of a telescope may be at a far off place. On the other hand the focal point in the case of a microscope is just a fraction of an inch off.

The difference in the diameter of the lens used in the two instruments also matter a lot when it comes to the difference between them. The lens diameter or the aperture is much larger in a telescope. This is to ensure that the aperture allows tiny amount of natural light at the focal point.

On the other hand only artificial illumination is used in a microscope. The artificial illumination is made to fall at the focal point in a microscope. It is interesting to note that a telescope and a microscope differ from each other in terms of the curvature of the lens.

A microscope is used to look into smaller details like the structure of the cells and the unicellular organism. On the other hand larger objects that are very far off are the targets of a telescope. In short it can be said that a telescope is used to look into space. Magnification is the keyword in both the scientific instruments.



## **Antibiotics and Vaccines**

- 1) Vaccine kills virus while antibiotics kill bacteria.
- 2) Vaccine is taken once and has permanent effect whereas antibiotics work during the time of disease.
- 3) Antibiotics are available in different forms like tablets, capsules, drops or ointments. Vaccines can be given orally or through injection.
- 4) Vaccines are preventive method that is taken before getting infected. Antibiotics are taken after getting infected.

## **OR**

- Vaccines act against most microorganism, whereas antibiotics act against bacteria.
- Vaccines are provided before the manifestation of the infection, but antibiotics are given mostly after.
- Vaccines usually have a specific single type of microbe, whereas antibiotics would act against a multitude of species.
- Vaccines enhance the natural immunity, and antibiotics cause destruction of the biochemistry of the organism.
- Vaccines are highly effective against organism, but there may be resistance to antibiotics needing the development of newer antibiotics.
- Both have equally lethal complications, but vaccines carry a lesser range of complications related to antibiotics.

## **Myopia:**

Myopia (short sightedness) is an eye disease in which the patient cannot see the distant objects clearly. This disease can be corrected by using convex lenses in glasses.

## **Hyperopia:**

Hyperopia (long sightedness) is defect of vision in which a person cannot see the clearly objects lying close to him. The disease can be corrected by using convex lenses in glasses.

## **Periscope & Perimeter**

### **Periscope:**

Instrument used by submarines to see above the surface of the sea.

### **Perimeter:**

A perimeter is a path that surrounds an area. The word comes from the Greek peri (around) and meter (measure). The term may be used either for the path or its length - it can be thought of as the length of the outline of a shape. The perimeter of a circular area is called

circumference.

## **X-rays & Gamma Rays**

1. Gamma rays cause more harm to human body than the X- rays.
2. Gamma rays have shorter wavelengths than the X-rays.
3. X rays are emitted by the electrons outside the nucleus, and gamma rays are emitted by the excited nucleus itself.
4. X rays are used in hospitals for taking X-rays but gamma rays are not.

## **Hydrometer & Hygrometer**

### **Hydrometer**

Hydrometer is an instrument used to measure the specific gravity of liquids. It should be noted that specific gravity is the ration of the density of the liquids to density of water.

### **Hygrometer:**

A hygrometer is an instrument used to measure relative humidity. A simple form of hygrometer consists of two thermometers, one of which has a dry bulb and the other, a wet bulb.

## **Perimeter & Telemeter**

### **Perimeter:**

A perimeter is a path that surrounds an area. The word comes from the Greek peri (around) and meter (measure). The term may be used either for the path or its length - it can be thought of as the length of the outline of a shape. The perimeter of a circular area is called circumference.

### **Telemeter:**

A telemeter is a device used to remotely measure a quantity. Telemeters are generally the physical devices used in telemetry. Electronic devices are widely used in telemetry and can be wireless or hard-wired, analogue or digital. Other technologies are possible, however, such as mechanical, hydraulic and optical.

## **Isotope & Isomer**

### **Isotope:**

Isotopes are different types of atoms of same element whose atoms of same element whose atomic number is same but atomic mass is different. Isotopes have similar chemical properties but different physical properties.

### **Isomers:**

Isomers are compounds with the same molecular formula but different structural formula. Isomers do not necessarily share similar properties unless they have same functional groups.

## OR

### Isotopes and Isomers

An isotope refers strictly to pure elements. Atoms of the same element that have different numbers of neutrons in their nuclei are called isotopes. For instance, hydrogen-1 (1H) and hydrogen-2 (2H or deuterium) are isotopes of each other.

An isomer refers strictly to molecules. Two molecules that have the same composition (i.e., the same molecular formula) but are different in the connectivity, shape or orientation, are called isomers. For instance, n-propanol (1-propanol) and isopropanol (2-propanol or rubbing alcohol) are isomers of each other. Ethanol is not an isomer of propanol, however, because they have different formulas.

### **Flying Mammal & Bird**

#### Flying Mammals:

- i. Mammals are the class of animals which give birth to live offspring and feed their young ones on milk from their breast.
- ii. Flying mammal is the type of animal which belongs to mammalian group with additional quality of flying.
- iii. Bats are representative animals of this group.
- iii. Bats have many unusual characteristics.
- v. They cannot walk very well because of skin that reaches over its front and back legs.
- vi. It flies at night and stays in caves and other dark places during the day.
- vii. Hanging upside down by the claws of its back legs, it looks like flying mice.

#### Birds:

- i. Birds are winged, bipedal, endothermic warm-blooded, egg laying vertebrate animals.
- ii. There are around 10,000 living species across the world.
- iii. All birds have fore-limbs modified as wings and most can fly with few exceptions like ratites, penguins and number of various island species.

### Difference between Bats and Birds

The variation between bats and birds is their structure and class. Bats came from the Chiroptera and Aves family. Bats are webbed structured flying animals while birds are feathered winged animals. Bats are mammals, so they don't lay eggs, compared to birds that are known as egg-laying animals. When flying, bats don't flap their forelimbs completely

compared to birds. Generally, bats have teeth which help them when eating while birds have beaks in picking up food and eating them. Bats are nocturnal animals; they hunt and go around their business at night and sleep during the day while birds work and hunt for food during daytime and sleep at night.

## **Typhoons & Tornado**

- Hurricane (also called typhoons) is a result of tropical disturbance on a water body, while a tornado is always formed on land.
- A tropical storm is labelled a hurricane if it takes place between Atlantic and Pacific Ocean, but the same storm is called a cyclone if it takes place in Indian Ocean.
- Though both have eyes or centre, the centre of a hurricane can be huge, extending up to 20 miles in diameter, whereas the eye of a tornado is very small being only a few feet in diameter
- Hurricanes occur in the months of June to November, whereas Tornadoes occur in the months of April to June
- Tornadoes last for a few minutes or hours, whereas hurricanes can have a very long duration lasting for 2-3 weeks.
- Thunderstorms are effects of hurricanes, whereas they are the cause of a tornado
- Hurricanes can cause floods and tsunamis, whereas tornadoes spread epidemics and also contaminate water sources.

## **OR**

A tornado is a violently rotating column of air extending from the base of a thunderstorm to the ground. In weather terms tornadoes are small, 50 yards wide on average and rarely exceeding a mile wide, though on rare occasions tornadoes up to 2.5 miles wide have occurred. Tornadoes are also short lived, lasting 10 minutes on average, though a few have lasted for over 3 hours. Tornadoes form from interactions of air currents in a thunderstorm.

Hurricanes and typhoons are essentially the same thing, only a hurricane is in the Atlantic ocean or north-eastern Pacific ocean while a typhoon is in the north western Pacific ocean. Both are tropical cyclones with winds of at least 74 mph. In addition to having strong winds these storms bring heavy rain and flooding. The average hurricane/ typhoon is about 300 miles wide and forms over the course of several days. Unlike tornadoes, which are generally as land-based event These systems develop from disorganized clusters of thunderstorms that feed of the moisture from warm ocean water, organize, and intensify.

## **Microscope & Telescope**

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### **Ultrasonics & Infrasonic:**

#### **Ultrasonics:**

The study of sound waves with high frequencies beyond the upper limit of human hearing or 20 thousand Hz. This technique is employed to locate a tumour, to scan a pregnant woman's abdomen in order to produce a picture of foetus or to treat certain neurotically disorders.

#### **Infrasonic:**

These are the sound waves which have the frequencies lowest than the lowest limits of human hearing or 20 Hz.

### **OR**

The sounds having frequency more than 20,000 hertz (Hz) are called ultrasonic or ultrasound and the sounds having frequency less than 20 Hz are called infrasonic or infrasound. Both of these sounds cannot be heard by human beings. The audible range for of hearing by human beings is 20 Hz to 20000 Hz.

#### **Antibodies:**

Protein synthesized in the blood in response to the entry of foreign substances or organisms into the body. When the body get infected through virus or bacteria, specific antibody is produced which fights the disease.

#### **Antibiotics:**

These are substances which can stop the growth or destroy the bacteria or other microorganisms. The antibiotics are used to eliminate fatal diseases such as typhoid, plague and cholera etc.

### **OR**

## Antibodies

l They are what your body produces in response to the presence of antigens (bacterial or viral surface structures)

l They merely assist your white blood cells in identifying

l They also destroy and invade the unidentified microorganisms.

## Antibiotics

l They are chemicals that work to destroy invading bacteria (usually by disrupting the outer cell wall and making it "leak" or by messing up the bacteria's metabolic processes. They are not produced by the body)

l Antibiotics can be antibacterial or antiviral. Antibacterial will only destroy bacteria and antiviral will only destroy viruses. There are not many antibiotics for viruses. Also a virus is not a eukaryote.

## **Antigen & Vaccine**

### Antigen:

A substance or organism that induces the production of an antibody. The antigen reacts with antibody. The antigen tissue proteins can cause problems in the transplant of organs by rejecting the introduction of new organ in the body.

An antigen is a foreign molecule that, when introduced into the body, triggers the production of an antibody by the immune system. The immune system will then kill or neutralize the antigen that is recognized as a foreign and potentially harmful invader. These invaders can be molecules such as pollen or cells such as bacteria. The term originally came from antibody generator[1][2] and was a molecule that binds specifically to an antibody, but the term now also refers to any molecule or molecular fragment that can be bound by a major histocompatibility complex (MHC) and presented to a T-cell receptor. "Self" antigens are usually tolerated by the immune system; whereas "Non-self" antigens are identified as invaders and attacked by the immune system. self-antigens.

### Vaccine:

The agent which is used to give immunity against various diseases. A vaccine consists of modified disease organisms such as live weakened viruses or dead that can induce the production of antibodies within the blood.

A vaccine is a biological preparation that improves immunity to a particular disease. A vaccine typically contains an agent that resembles a disease-causing microorganism, and is often made from weakened or killed forms of the microbe or its toxins. The agent stimulates the body's immune system to recognize the agent as foreign, destroy it, and "remember" it, so that the immune system can more easily recognize and destroy any of these microorganisms that it later encounters.

Vaccines can be prophylactic (example: to prevent or ameliorate the effects of a future infection by any natural or "wild" pathogen), or therapeutic (e.g. vaccines against cancer are also being investigated; see cancer vaccine).

# 8. Short/Long Notes

## Solar System

The solar system is the family of the sun, planets revolving around it, the satellites of the planets and the asteroids or meteoroids and comets etc.

- There are eight planets in the solar system.
- Starting from the sun there are Mercury, Venus, Earth, Mars, Jupiter, Saturn, Uranus and Neptune.
- All the planets revolve around the sun in their orbits.
- Meteorite analysis shows that the age of solar system is about 4530 million years.
- The sun is not the largest star of the Milky Way; rather it is an average sized star.
- It is not at the centre of the galaxy but shifted towards a side.
- The diameter of the sun is 1, 392, 140 km and its mass is  $2 * 10^{27}$  tonnes.
- The outermost layer of the sun is called photosphere, has an average temperature of 5570 0C.
- The photosphere rotates at a rate of 25.38 days per turn.
- At the centre of the sun hydrogen is undergoing nuclear fusion reaction which provides energy for the heat and light so sun.
- The planets of the solar system as well as the moons get light and sometimes heat from the sun.
- The four inner planets of the solar system are called terrestrial plants because of their rocky nature.
- The outer planets are called gaseous planets because they don't have solid surface and are composed of gases.

## Planets And Their Characteristics:

### 1. Mercury

- Its distance from Sun is 58 million kms.
- Its revolution period is 88 days.
- Its rotation period is 58 days, 15 hours and 30 minutes.
- It has no moon.
- It is the nearest planet to the sun.

- It is also the smallest planet of the solar system.
- It is the fastest planet.
- Its radius is 2,433 kms and diameter is 4,878 kms.
- It is covered with holes called Craters.
- It has no atmosphere.
- The temperature on mercury vary between 420 0C (7900F) in the day and -180 0C (-2900F) at nights.

## 2. Venus

Apart from the moon, Venus is the brightest object in the sky. Venus can be seen with naked eye in the morning or in the evening. Following are the main characteristics of the Venus.

- Its distance from the Sun is 108 million kms.
- Its revolution period is 224.7/225 days.
- Its rotation period is 243 days and 14 hours (longest day)
- It has no moon.
- It is the nearest neighbour of the earth in the solar system.
- It is the brightest planet.
- It is also the hottest planet.
- Its diameter is 12,102 kms.
- It is wrapped in thick clouds of CO<sub>2</sub> gas.
- It rotates from east to west as opposite to most other planets.

## 3. Earth

The earth is the largest and the densest of the four terrestrial planets. It is the most wonderful planet of the solar system. Following are the features of the Earth.

- Its distance from the Sun is 150 million kms.
- Its revolution period is 365  $\frac{1}{4}$  days.
- Its rotation period is 23 hours, 56 minutes, 40 seconds.
- It has one moon.
- It is the densest planet.
- It is also the watery and bios planet.
- Its diameter is 12756 km (7927 miles equatorial and 7900 miles polar diameter)
- It has atmosphere which contains 78% Nitrogen, and 21% Oxygen.
- Its two-thirds surface is covered with oceans.
- The earth's surface is rich in Oxygen, Silicon, Aluminium, Iron, Calcium, Sodium etc.

## 4. Mars

- Distance form sun 228 million kms.
- Revolution period 687 days.
- Rotation period 24 h, 37 min and 22 sec.
- It has two moons Phobos and Deimos.
- Its diameter is 6794 kms.
- Mars is covered with red dust.
- It has an atmosphere composed almost entirely of CO<sub>2</sub>.
- Its average temperature is -53 0C.



## 5. Jupiter

- Its distance from sun is 778 million kms.
- Revolution period 12 years.
- Rotation period 9h, 50min, and 30 sec. (smallest day)
- It has 63 moons.
- It is the largest planet of the solar system.
- It has the largest number of satellites.
- Its diameter is 1, 24,800 kms.
- Its diameter is eleven times greater than the earth's diameter.
- It has a dense, cloudy atmosphere of hydrogen and helium.
- It has a rock-iron-ice core about 15, 000 km (9,000 miles) thick.
- Jupiter radiates 67% more heat than it receives from the sun. this is mainly due to dissipation of the primordial heat of the planet.

## 6. Saturn

In 1610, Galileo became the first person to look at Saturn through telescope.

- Distance from Sun 1427 million kms.
- Revolution period 30 years.
- Rotation period 10h, 14 mins.
- It has 62 moons.
- The largest moon of Saturn is the Titan and it is the second-largest moon in the solar system. Titan is larger than the planet Mercury.
- It is the second largest planet.
- It has a magnificent system of rings.
- Its diameter is 1, 20, 000 km.

## 7. Uranus

When sky is very dark and very clear Uranus can be seen with the naked eyes. The planet was discovered by William Herschel in March 1787.

- Its distance from Sun is 2869.9 million kms.
- Revolution period is 84 years.
- Rotation period is 16h, and 10 mins.
- It has 27 moons.
- Titania is the largest moon of Uranus.
- It has an atmosphere which is dominated by hydrogen and helium.
- Its diameter is 52, 400 km.

## 8. Neptune

Neptune was discovered by the German astronomer Johann Galle.

- Distance from Sun 4496, 6 million kms.
- Revolution period 165 years (largest year)
- Rotation period 18 hours.

- Neptune has 13 moons that we know of. The largest moon is Triton.
- It is the coldest planet.
- It is the slowest to move around the sun.
- Its diameter is 49,100 kms.
- It is known as the twin of Uranus due to their similarity of size, mass and composition.

### Short Note (Solar System)

#### Lunar Eclipse:

The partial or complete obscuration of light of moon for an observer on the earth is called lunar eclipse.

Lunar eclipse takes place when the earth comes in position between the sun and the moon. In this way, the shadow of the earth is cast on the moon and the moon does not get sunlight in this position.

Lunar eclipse occurs only when there is full moon. But this does not happen on every full moon because of inclination of the axis of earth to its orbit.

#### Solar Eclipse:

Solar eclipse occurs when the moon comes in between the Sun and the earth and its shadow is cast across the face of the earth.

The solar eclipse occurs when the moon moves to a position between the Sun and the Earth. During this process it throws shadow on the earth. This shadow is categorized in umbral and penumbra. The people who are in the umbral region are unable to see the sun at all. This condition is known as the total eclipse of the sun. While the people in penumbra region can see the sun partly this is known as the partial eclipse of the sun.

This happens with the new moon when the moon is in conjunction with the sun. this does not happen at every new moon because of the inclination of the orbit of the moon to the orbit of earth around the sun.

#### Asteroids:

Asteroids are also known as planetoids. These are small, irregularly shaped rocky objects which orbit the Sun between the orbits of Mars and Jupiter. Asteroids are also known as the minor planets.

Basically the word Asteroid means “Starlike”. Ceres asteroid was the first to be discovered.

#### Meteorites:

Meteorites are small chunks of iron and rock thought to be resulted from collisions between asteroids. They also may be formed when comets disintegrate into fragments. Meteorites enter the earth’s atmosphere and become a meteor. A meteor is a “falling star” that is usually seen in the sky at night. A meteor will burn up from frictional heating as it enters the atmosphere. Most of the meteors burn up before they reach the earth. If they do not reach the ground they become meteorites. Meteorites can be seen at a distance of 70 miles from the earth. Meteorites are heavy objects which weigh about 60 tons.

#### Comets:

Comets are those bodies which revolve round the sun. they are mainly composed of ice and dust. Most comets have three parts which are as under.

- i) A solid centre.
- ii) A head or round coma, that surrounds the centre and consists of dust particles mixed with

frozen water, frozen methane and frozen water, frozen methane and frozen ammonia.

iii) A long tail of dust and gases that escape from the head. Most comets stay near the solar system.

Other characteristics of comets are as under:

- Comet is usually about 10 km or 6 miles across.
- Comets are usually made up of ice and dust.
- Millions of comets are present in the solar system.
- Halley's comet is the famous example.
- Comets usually move around the sun in the elliptical orbits.

### **Light Year:**

The distance travelled by light at speed of 186,000 miles per seconds in one year is known as a light year. One light year is approximately 9461,000 million kilometres or 5875000 miles. Light year is also used to measure the distance between the galaxies.

### **Astronomical Unit:**

The distance between the Sun and the Earth is called as Astronomical Unit. This unit is also used in the measurement of distances between the heavenly bodies within the solar system. The earth is one A.U away from the Sun and the Pluto is 39 A.U away from the Earth.

### **Black hole:**

Black Hole is a hypothetical region in space which has a big gravitational pull for which no matter or radiation can escape from it. Even it is believed that light cannot escape from it. Black Hole usually likes at the centre of galaxy.

### **Super Nova:**

A Super Nova is an exploding star. At the end of its phase as a Red Giant, a heavy star explodes as a Supernova shining briefly as brightly as a thousand million stars. Recent Supernova was observed on the night of Feb 23, 1987. This occurred in Large Magellanic Cloud.

### **Nebula:**

Nebula is derived from a Greek word which means "Cloud". In the sky there are clouds like objects, which are classified as Nebulae. There are both luminous diffuse nebulae and dark obscuring nebulae over the Milky Way. They are made up of dust and gases.

### **Aurora:**

Aurora or Kutub-i-Raushani is a luminous meteoric phenomenon of electrical character seen in Polar Regions with a tremulous motion and giving forth streams of eight Aurora. It is generally believed that the aurora is actually caused by radiation from the Sun-spots.

### **Solar Wind:**

Solar wind is the stream of electrically charged particles especially protons and electrons, which are emitted by the Sun, predominantly during solar flares and sunspots activity. Some of these particles become trapped in the Earth's magnetic field forming the outer Van Allen radiation belt, but some penetrate into the upper atmosphere where they congregate in narrow zones in the region of the Earth's magnetic poles producing aurora displays.

### **Cosmic Rays:**

Cosmic Rays are charged particles moving as fast as the speed of light. Most of the particles are protons, while some are alpha particles and electrons. They travel throughout our galaxy,

including the solar system and some strike the earth's atmosphere. They can be detected by instruments on the Earth. Nobody knows how cosmic rays are formed. Some of them are formed by exploding stars or supernova and some come from outside our Galaxy.

## **Some Important Definitions:**

### **Cosmology:**

Cosmology is the science of the cosmos or universe.

### **OR**

Cosmology is the branch of physical science which deals with the Universe.

### **Universe:**

The universe is the sum total of all that exists, or has existed, both in space and time.

### **Galaxy:**

A galaxy is a system of many thousands of millions of stars together with inter-stellar gas and dust.

### **OR**

Galaxy is a fundamental unit of the universe. It is composed of hundreds of thousands of stars together with intra-stellar gas and dust.

### **Star:**

Those heavenly bodies which are luminous and produce their own energy by nuclear reactions are called stars.

- Proximal Centauri second nearest after Sun to the Earth.
- Antares is one of the largest stars known.

### **Solar system:**

A tiny system of our galaxy which consists of the /sun, a planet and their satellites, thousands of miniature planets called asteroids, meteoroids, comets, interplanetary dust and plasma.

### **Satellite:**

Those heavenly bodies which revolve round the planets are called satellites.

### **Eclipse:**

In astronomy, the term eclipse simply means the obscuring of one heavenly body by another, particularly that of the sun or a planetary satellite.

### **Lunar Eclipse:**

A condition when the earth comes in between the sun and the moon and throws its shadow on the moon is called lunar eclipse.

### **Solar Eclipse:**

A condition when the moon comes in between the sun and the moon and throws its shadow on the moon is called Solar Eclipse.

### **Astrology:**

Astrology is the interpretation of the influence of planets and stars on human lives.

### Asteroids:

Small, irregular shaped rocky objects which orbit the sun between the orbits of Mars and Jupiter are called Asteroids.

### Meteorites:

Tiny chunk of material floating in space which can also enter the earth's atmosphere and become meteor are known as meteorites.

### Comets:

The bodies mainly composed of ice and dust which revolve round the sun are called comets.

## Balanced Diet:

• “The food which contains all essential food nutrients which are necessary and essential for healthy growth of the body and proper functioning of the whole parts of body.”

• Food is a complex mixture of chemical substances.

• It performs following useful functions when eaten and absorbed by the body.

**i) Produces energy**

**ii) Promote growth**

**iii) Repair the tissues**

**iv) Regulate various processes**

• Nutrients are the chemical components of food capable of performing above functions.

• Example: milk is a balanced diet although it does not contain iron.

• Following are the major components of Balanced Diet and their source and functions:

### i) Carbohydrates

• **Source:** Honey, Sugarcane, Wheat, Maize, Potatoes.

• **Functions:** Provide energy

### ii) Fats:

• **Source:** Butter, Cheese, Soya bean, Mustard etc.

• **Functions:** Provide Energy

### iii) Proteins:

• **Source:** Meat, Eggs, Fish, Milk, Pulses etc.

• **Functions:** Essential for growth

### iv) Vitamins:

• **Source:** Fruits and Vegetables.

- **Functions:** Important for proper physiologic and metabolic functions of the body.

### Types:

- a) Water Soluble Vitamins: B1, B2, B6, B12, C
- b) Fat Soluble vitamins: A, D, E, K

v) **Minerals:** Minerals are those inorganic substances which play a key role in the maintenance and building of the body tissues. The most important minerals of balanced diet are as under:

- **Phosphorus:** is necessary for bones and teeth.
- **Iron:** is an essential component of blood.
- **Iodine:** is necessary for thyroxin which is secreted from thyroid gland.
- **Calcium:** is necessary for bone development.

### vi) Water:

- **Source:** Fruits, Vegetables
- **Functions:** It is constituent of blood, lymph, hormones and other secretions of the body.

## Functions Of Vitamins:

### 1. Vitamin A

- i) **Role:** Vitamin A plays an important role in growth and body repair, keeps the skin smooth and essential for vision.
- ii) **Deficiency:** its deficiency causes "Night Blindness".
- iii) **Source:** Fortified milk, butter, eggs, cream, leafy vegetables, carrot.

### 2. Vitamin B1

- i) **Role:** it is an energy building vitamin, help in the digestion of carbohydrates, keep the heart and muscle stable and necessary for nerves.
- ii) **Deficiency:** its deficiency causes Beri Beri, muscular weakness, cramps and heart swelling.
- iii) **Source:** Pork, cereals, legumes, nuts and seeds.

### 3. Vitamin B2 (Riboflavin)

- i) **Role:** It is important in forming RBCs, protection of mouth and mucous membrane and skin.
- ii) **Deficiency:** its deficiency causes "Pellagra"
- iii) **Source:** Milk, leafy green vegetables, cereals etc.

### 4. Vitamin B3 (Niacin)

- i) **Role:** Helps in releasing energy from carbohydrates, fats and proteins, very essential for the DNA synthesis, used to lower elevated LDL cholesterol and triglyceride levels in the blood, boosts the level of HDL, the 'good' cholesterol, in the body, essential for the proper digestion of the food etc.
- ii) **Deficiency:** its deficiency causes Loss of appetite, Indigestion, Skin lesions, Mental imbalance etc.
- iii) **Source:** Meat, poultry, fish, cereals, vegetables, peanuts, butter etc.

### 5. Vitamin B6 (Pyridoxine)

- i) **Role:** it is essential for the production of antibodies, for the CNS and help in protein metabolism in the body.
- ii) **Deficiency:** Skin problems, Nervous system disorders, Muscle spasms, Sleeplessness.
- iii) **Source:** Meat, fish, poultry, vegetables, fruits etc.

### 6. Vitamin B12 (Cynocobalamin)

- i) **Role:** it is important for carbohydrate and fat metabolism, growth of child and formation of blood.
- ii) **Deficiency:** its deficiency causes “anaemia”
- iii) **Source:** Meat, poultry, fish, seafood, eggs, milk.

### 7. Vitamin C (Ascorbic Acid)

- i) **Role:** It is essential for protection of bones and for healthy teeth and gums.
- ii) **Deficiency:** its deficiency causes “Scurvy”
- iii) **Source:** Citrus fruit, guava, pineapple, tomatoes, spinach, turnips, strawberry.

### 8. Vitamin D:

- i) **Role:** It is very important for the growth of children.
- ii) **Deficiency:** Its deficiency causes “Rickets” in children and Osteoporosis in adults.
- iii) **Source:** Egg yolk, liver, fish, milk.

### 9. Vitamin E:

- i) **Role:** it plays an important role in wound healing, prevention of sterility, breaking blood clots and prevents damage of cells due to aging.
- ii) **Source:** Leafy green vegetables, soya bean, cotton seed, liver, egg yolk, nuts etc.
- iii) **Deficiency:** its deficiency slows down the formation of RBCs.

### 10. Vitamin K:

- i) **Role:** essential for blood clotting.
- ii) **Deficiency:** its deficiency causes “Blood clotting Disorder”
- iii) **Source:** Leafy green vegetables, milk, fish, liver, alfalfa.

## Minerals: Their Functions, Source and Signs Of Deficiency:

### 1. Calcium:

- i) **Role:**
  - a) It is essential constituent of bones and teeth.
  - b) It is vital for metabolic process such as nerve function, muscle contraction, and blood clotting.
- ii) **Source:** Dairy Products
- iii) **Deficiency:** Osteomalacia (softening of bones), Osteoporosis, Rickets, Tetany

### 2. Iron:

- i) **Role:** It is the key constituent of haemoglobin which helps in transfer of oxygen.
- ii) **Source:** Eggs, Green Vegetables, Fortified foods, Cereals, White flour, Liver, Meat, Nuts, Peas.
- iii) **Deficiency:** Anaemia, Increased susceptibility to infection.

### **3. Magnesium:**

**i) Role:** it is essential for healthy bones; muscles and nervous tissues. It is needed for functioning of approx. 90 enzymes.

**ii) Source:** Eggs, leafy vegetables, fish, milk and dairy products.

**iii) Deficiency:** Anxiety, fatigue, insomnia, muscle problem, nausea, premenstrual problem.

### **4. Phosphorus:**

**i) Role:** it is important for healthy bone tissues.

**ii) Source:** Dairy products, fruits, meat, pulses, leafy vegetables.

**iii) Deficiency:** Anaemia, demineralization of bones, nerve disorder, respirator problem, weakness, weight loss.

### **5. Potassium:**

**i) Role:** it is essential for intracellular fluid, maintenance of electrical potential of the nervous system and functioning of muscle and nerve tissues.

**ii) Source:** Cereals, coffee, fresh fruits, meat, vegetables, whole-grains, flour.

**iii) Deficiency:** General muscle paralysis and metabolic disorder.

### **6. Sodium:**

**i) Role:** it is necessary for the control of the volume of extra cellular fluid in the body maintenance of pH of the body, and electrical potentials of the nervous system.

**ii) Source:** Bakery products, Table salts

**iii) Deficiency:** Low blood pressure, general muscle weakness, respiratory problems.

## **Computer:**

**“The word Computer is derived from compute which means to calculate. In simple and technical term it is an automatic electronic calculating machine that processes or manipulates a given data according to a program or set of instructions and gives a desired output.”**

### **Parts Of A Computer:**

The computer is composed of two parts:

- 1) Hardware
- 2) Software

#### **1) Hardware:**

All physical components of computer, which can be touched, measured, have weight and occupy space, are collectively called computer hardware viz;

- i) Keyboard
- ii) Mouse
- iii) Joy stick
- iv) Scanners
- v) Monitor
- vi) Printer
- vii) Central Processing unit etc.



## 2) Software:

Software can be defined as a set of instructions or codes written in a defined manner. In other words softwares are prewritten programs, which control the operations of computer.

## OR

All programs and data stored on floppy disk, Hard disk, CD-ROM are collectively called softwares. Examples are;

- i) DOS
- ii) Window
- iii) UNIX
- iv) XENIX
- v) Linus
- vi) Java
- vii) MS Office

## Devices OR Components Of A Computer:

The computer is a combination of many parts, each of which performs specific task independently. The major devices of a computer are as under.

### 1) Input Devices

The input devices are those devices which send data or information to the Central Processing Unit. The main input devices are:

- i) **KEYBOARD:** It is used to enter text. It contains alphabetic, numeric and other keys for entering data.
- ii) **MOUSE:** It is a pointing device. It controls the pointer on the screen.
- iii) **MICROPHON:** It is used to enter voice into the computer.
- iv) **SCANNER:** It reads printed text and graphics and then translates the result into digital form.
- v) **DIGITAL CAMERA:** It is used to take photos.
- vi) **PC CAMERA:** It is used to create movie and to take photos on the computer.

### 2) OUT PUT DEVICES:

A hardware component used to display information to the user output device.

- i) **MONITER:** It is used to display text, graphics and video output.
- ii) **PRINTER:** It is used to display printed output on paper.
- iii) **SPEAKER:** It is used to hear sound to hear sound music and voice outputs.

### 3) STORAGE DEVICE:

The hardware components used to store data, instructions and information permanently are called storage devices. For example floppy disk drive, zip drive, hard disk drive, CD-ROM drives etc.

### 4) COMMUNICATION DEVICES:

It is used to communicate and exchange data, instructions and information with other computers. For example Modem.

## UNITS OF CPU:

### • ALU(ARTHMETIC AND LOGICAL UNIT)

ALU is a part of CPU. Actual execution of instructions takes place in this part. All arithmetic and logical operations are performed in ALU. It consists of two units:

#### 1. Arithmetic Unit

It performs basic arithmetic functions such as addition, subtraction, division.

#### 2. Logical Unit

It performs logical operations like comparing two data items to find which data item is greater than, equal to, or less than the other.

### • CONTROL UNIT

It acts like a supervisor of the computer. It does not execute program instruction by itself. It controls and coordinates all activities of computer system.

### • Memory Unit (MU)

It is responsible for storage of data and information. The memory unit consists of two types of memory which are RAM and ROM.

## Some Important Definitions And Short Notes:

### RAM:

RAM stands for random access memory. It is that part of CPU where temporary information is stored.

### Byte:

A group of 8 bits is called a byte.

### Icons:

Pictorial objects on the desktop or screen are called Icons.

### Mouse:

It is an input device, normally called a "Pointing device". This device is used for pointing anything on monitor through a blinking cursor.

### Software:

A set of instructions or codes written in a defined manner or prewritten programs which control the operations of computer.

### Control Unit:

A unit of CPU which is responsible for all automatic operations carried out by the digital computers is called CU. The CU directs and coordinates all activities of a computer.

### LAN:

LAN stands for local area network. It is privately owned communication network that serves users within a confirmed geographical area. The range is usually within a mile-perhaps one office, one building or a group of buildings.

### **WAN:**

It stands for wide area network. It is a communication network that covers a wide geographical area. The range is usually a state or a country. Examples are Telenet, Uninet etc.

### **Modem:**

Modem is abbreviation of Modulate-de-Modulate. Modulation is a process that converts digital signals into Analog form and Demodulation is a process that converts Analog signals into digital form. The device which performs modulation and demodulation is called a MODEM. In simple words it is a device that converts the digital signals into Analog and then back from Analog to digital form.

### **ALU:**

A unit of CPU that performs arithmetic and logical operations is called ALU.

### **Register:**

Registers are high-speed staging areas that temporarily store data during processing and provide working areas for computation.

Registers are contained in control unit and arithmetic Logic Unit. Following are the major types of registers:

- i) Address Register
- ii) Instructions Register
- iii) Storage Register
- iv) Accumulator Register

### **Soft Copy:**

It displays the data on screen of monitor. It can be carried in a floppy disk. A change can be made in a soft copy.

### **Hard Copy:**

The data is printed on paper card etc. with the help of printer. It cannot be carried in a floppy disk. No change can be made in hard copy.

# Energy:

## Definition Of Energy:

“Energy is an agent which is responsible to do work.”

## OR

“The capacity or ability of doing some work is known as energy.”

## Kinds OR Types Of Energy:

**i) Kinetic energy:** The energy due to motion of a body is called Kinetic Energy.

**Example:** i) Moving ball can break a glass window ii) A striking hammer can drive a nail.

**ii) Potential Energy:** the energy which is possessed by a body by means of its position is known as potential energy.

**iii) Mechanical Energy:** Energy of an object due to its motion or position

## OR

A combination of kinetic and potential energy resulting from the force of gravity or the movement or release of a machine component, such as a spring, clamp, or wheel.

**iv) Chemical energy:** energy in a substance that can be released by a chemical reaction. For example: coal, petroleum are the source of chemical energy.

**v) Electrical energy:** energy made available by the flow of electric charge through a conductor.

**vi) Heat energy:** a form of energy that is transferred by a difference in temperature.

**vii) Solar energy:** Radiant energy emitted by the sun.

**viii) Hydropower energy:** The energy in flowing water is called Hydropower Energy.

**ix) Nuclear energy:** The energy released by a nuclear reaction, especially by fission or fusion.

## Energy Resources:

Energy resources can be divided into two categories.

- 1) Renewable Resources Of energy
- 2) Non-Renewable Resources Of energy

## Renewable Resources Of Energy:

Renewable energy is energy which is generated from natural sources i.e. sun, wind, rain, tides and can be generated again and again as and when required. They are available in plenty and by far most the cleanest sources of energy available on this planet. For e.g.: Energy that we receive from the sun can be used to generate electricity. Similarly, energy from wind, geothermal, biomass from plants, tides can be used this form of energy to another form.

## OR

The resources of energy which can be used again and again are known as renewable resources. These are:

- i) Solar energy:** Solar energy is the energy derived from the sun through the form of solar radiation.
- ii) Wind energy:** Wind power is the conversion of wind energy into a useful form of energy, such as using wind turbines to make electricity, wind mills...
- iii) Hydropower energy:** Energy in water can be harnessed and used. Since water is about 800 times denser than air, even a slow flowing stream of water, or moderate sea swell, can yield considerable amounts of energy.
- iv) Tidal energy:** Tidal power, also called tidal energy, is a form of hydropower that converts the energy of tides into useful forms of power - mainly electricity.
- v) Geothermal energy:** Geothermal energy is power extracted from heat stored under the earth's crust. This power source is generally cost effective, usually reliable, mostly sustainable, and generally environmentally friendly.

## Non-Renewable Resources Of Energy:

Renewable energy is energy which is taken from the sources that are available on the earth in limited quantity and will vanish fifty-sixty years from now. Non-renewable sources are not environmental friendly and can have serious effect on our health. They are called non-renewable because they can be re-generated within a short span of time. Non-renewable sources exist in the form of fossil fuels, natural gas, oil and coal.

## OR

The resources of energy which can be used for a particular period of time, after that they may not be available for the use of man. These include:

- i) Coal:** Coal is a combustible black or brownish-black sedimentary rock formed from fossilized plants. Coal consists of amorphous carbon with various organic and some inorganic compounds and is normally occurring in rock strata in layers or veins called coal beds.
- ii) Gas:** Natural gas is a combustible mixture of hydrocarbon gases that occurs with petroleum deposits consisting primarily of methane. It is found with other fossil fuels and in coal beds and is created by the decay of methanogenic organisms in marshes, bogs, and landfills. Lower temperatures are likely to produce more petroleum, and higher temperatures are likely to produce more natural gas.
- iii) Oil:** Petroleum, also known as crude oil, is a naturally occurring toxic combustible liquid primarily made up of hydrocarbons. Petroleum is the result of partial decay of living organisms occurring in the rock strata of certain geological formations.
- iv) Nuclear fuels:** Nuclear power is produced by controlled nuclear fission (splitting atoms). In most cases nuclear power plants use nuclear fission reactions to heat water, using the steam to produce electricity. Uranium, specifically, uranium -235, is one of the few elements easily fissioned.

v) **Wood:** Wood and wood products used as fuel, including round wood (cord wood), limb wood, wood chips, bark, sawdust, forest residues, charcoal, pulp waste, and spent pulping liquor.

### Non-Conventional Sources Of Energy:

Non-conventional sources of energy are those sources of energy which are not in common use at this time but are being considered or explored to bring to routine use in the future. With the exhaustion of conventional sources of energy the search for non-conventional sources of energy have been intensified.

Conventional sources of energy are coal, gas, oil, wood and nuclear fuels. These sources are in routine use nowadays.

Non-conventional sources of energy are solar energy, geothermal energy. Wind energy, tidal energy and ocean thermal gradient.

### Solar Energy:

The energy of the sun is called solar energy. It has been estimated that on the average 180,000 kilowatts solar energy is falling per square kilometre of the earth. Solar energy is utilized in two ways.

A solar furnace contains thousands of mirrors to focus the sun rays. In this solar heater produces heat used in industry or houses. The heaters heat up water or air. Solar energy can also be used indirectly. Solar cells made up of panels of semi-conductors (usually silicon) are used which when illuminated by sun generate electricity. These kinds of cells have frequently been used in space probe. They have not become popular in domestic side due to high cost.

### Wind Energy:

Energy obtained from wind by using wind mills is called wind energy. The wind rotates generated which produce electricity.

Previously wind mills were used for grinding grains. The rotating wings of a wind mill can be attached to a magnet which gives an electric current with rotation. Low power, high cost and uncertainties of weather had not made power generation through wind power.

### Geothermal energy:

Heat energy obtained from the hot molten metals inside the earth crust serves as the source of thermal energy. This type of energy is present in the form of hot water and steam. Geothermal electricity plants change the geothermal energy into electricity. Hot water of springs is being used for power generation particularly in USA, Italy, and Japan etc. furthermore; hot springs are used as geysers for heating the houses.

### Nuclear Energy:

The most concentrated form of energy is in the atomic nuclei. This energy can be released by the processes of fission or fusion.

Fusion reactions have been producing electricity in commercial quantities for about 30 years. In Pakistan we have got only one fission nuclear reactor located at Karachi which generates 137 megawatt of power to meet ur future domestic and industrial needs, we will have to generate electricity from nuclear plants using (Uranium U-235) and plutonium s fuel.

### Tidal Energy:

Energy which is obtained through the tidal waves of the sea is called tidal energy. Tidal waves of sea strike the shore constantly. These waves are used to run electric generators which produce

electricity. The kinetic energy of the tides is also used to produce other forms of mechanical work. Tidal power station traps high tides behind a barrage. The water flows through turbines.

## Greenhouse Effect:

The heating that occurs when gases such as carbon dioxide trap heat escaping from the Earth and radiate it back to the surface; so-called because the gases are transparent to sunlight but not to heat and thus act like the glass in a greenhouse.

### OR

The overall warming of the earth's lower atmosphere primarily due to carbon dioxide and water vapour which permit the sun's rays to heat the earth, but then restrict some heat-energy from escaping back into space.

### Greenhouse Gases:

- i) Carbon dioxide CO<sub>2</sub>
- ii) Methane
- iii) Water Vapour
- iv) Chloro Fluoro-Carbon (CFC)
- v) Nitrous oxide

### Mechanism OF Greenhouse Effects:

- Our Earth receives most of its energy, called radiation, from the Sun.
- This energy is electromagnetic radiation in the form of Visible light, with small amounts of Infrared (IR) and Ultraviolet (UV).
- The incoming Visible solar energy has a very short wavelength and passes right through the atmosphere.
- The Earth's surface absorbs the solar energy and releases it back to the atmosphere as Infrared (IR) radiation, some of which goes right back into space.
- But some of the IR radiation emitted by the Earth is absorbed by greenhouse gases in the atmosphere and sent back towards the Earth's surface.
- That warms the Earth's surface. Three main gases in our atmosphere that contribute to the greenhouse effect are carbon dioxide, methane, and water.
- These gases absorb the infrared radiation emitted by the Earth and re-radiate the energy as heat back towards the Earth, causing a warming known as the greenhouse effect.
- The warming due to greenhouse gases is expected to increase as humans add more greenhouse gases to the atmosphere.

### Sources Of Greenhouse Gases:

**Carbon dioxide (CO<sub>2</sub>)** is a colourless gas that's a by-product of the combustion of organic matter. Today human activities are pumping huge amounts of CO<sub>2</sub> into the atmosphere, resulting in an overall increase in carbon dioxide concentrations.

**Methane** occurs naturally when organic material decomposes. Man-made processes produce methane in several ways:

- By extracting it from coal
- From large herds of livestock (i.e., digestive gases)
- From the bacteria in rice paddies

- Decomposition of garbage in landfills

### Importance Of Greenhouse Effect:

Following is the importance of greenhouse effect.

- i) Without greenhouse effect, the Earth would not be warm enough for humans to live.
- ii) Without greenhouse gases, heat would escape back into space and Earth's average temperature would be about 600 F colder.

## Global Warming:

A gradual increase in the overall temperature of the earth's atmosphere generally attributed to the greenhouse effect caused by increased levels of carbon dioxide, CFCs, and other pollutants

### Causes Of Global Warming:

The main causes of global warming, in order of the magnitude of their impact, are:

#### **1. Carbon Dioxide from:**

- A. Fossil Fuel
- B. Deforestation
- C. Failing Sinks

#### **2. Methane from:**

- A. Cattle and Rice Paddies
- B. the Arctic Tundra
- C. Clathrates

#### **3. Nitrogen Oxides from Farming**

#### **4. Other Gases**

### Effects OF Global Warming:

When it comes to global warming, harmful effects like melting polar ice caps, weather changes, and an increase in diseases are changing the world and will ultimately affect your life. Below is the list of effects that global warming is having on environment, climate and human kind.

**1. Melting of glaciers:** The melting of glaciers will create plethora of problems for human kind and the animals living in the earth. Due to increased global warming, the level of the sea will rise which will lead to flooding and this will in turn create havoc in human life. Apart from raising the sea levels, it will also endanger several species of animals and thus will hamper the balance of the ecosystem. Moreover these large glaciers reflect light back into the space and with meltdown of these glaciers, earth will be further warmed.

**2. Climate Change:** Irregular weather patterns have already started showing results. Increased precipitation in the form of rain has already been noticed in polar and sub Polar Regions. More global warming will lead to more evaporation which will cause more rains. Animals and plants cannot easily adapt to increase rainfall. Plants may die due to it and animals may migrate to other areas, which can cause entire ecosystem out of balance.



**3. Droughts:** Large scale evaporation will be the major cause of droughts in many places particularly Africa. Although, it is reeling under the huge pressure of water crisis, increased global warming would further make the situation worse and will cause malnutrition.

**4. Diseases:** As the temperature becomes warmer, it will have an effect on the health of humans and the diseases they are exposed to. With the increase in the rainfall, water borne diseases are likely to spread specially malaria. The earth will become warmer and as a result heat waves are likely to increase that will cause a major blow to the people particularly in Europe.

**5. Hurricanes frequency:** As the temperature of the oceans rises, hurricanes and other storms are likely to become stronger. With the increase in the global warming the water in the ocean warms up and it heats up the surrounding air, creating hurricanes. More water evaporation means more hurricanes.

**6. Agriculture:** Global warming will affect agriculture. Although the results are not visible yet, but it may show its colours in years to come. As the global temperature will increase plants will find it harder to survive and will die. Plants are the major source of food for human beings and as a result food shortage will occur. The shortage of the food may lead to war and conflicts in some countries.

### Steps To Control Global Warming:

- i) Use Public Transport:
- ii) Use Renewable Energy Like Wind Power:
- iii) Burn Methane:
- iv) Use Smart Cooler, Heater & Air Conditioner
- v) Tune up and maintain vehicles properly
- vi) Reduce electricity usage to the maximum
- vii) Prefer recycling.

## Ozone Depletion:

### Ozone:

Ozone is a highly reactive and unstable gas, which is formed by the recombination of oxygen (O<sub>2</sub>) atoms in the presence of intense radiation. Its symbol is O<sub>3</sub>.

### Ozone Layer:

The ozone layer is a naturally occurring zone found in the stratosphere, situated between 10-15 kms above the surface of the Earth. The main function of the ozone layer is to act as a shield against ultraviolet (UV) radiations from the Sun because these rays are harmful to life.

### Ozone Depletion:

Destruction of the stratospheric ozone layer which shields the earth from ultraviolet radiation harmful to life. ...

### Causes Of Ozone Layer Depletion:

#### **The Main Ozone-Depleting Substances (ODS)**

- Chlorofluorocarbons (CFCs)

- The most widely used ODS, accounting for over 80% of total stratospheric ozone depletion.
- Used as coolants in refrigerators, freezers and air conditioners in buildings and cars manufactured before 1995.
- Found in industrial solvents, dry-cleaning agents and hospital sterilants.
- Also used in foam products — such as soft-foam padding (e.g. cushions and mattresses) and rigid foam (e.g. home insulation).
- Halons
  - Used in some fire extinguishers, in cases where materials and equipment would be destroyed by water or other fire extinguisher chemicals. In B.C., halons cause greater damage to the ozone layer than do CFCs from automobile air conditioners.
- Methyl Chloroform
  - Used mainly in industry — for vapour degreasing, some aerosols, cold cleaning, adhesives and chemical processing.
- Carbon Tetrachloride
  - Used in solvents and some fire extinguishers.
- Hydro fluorocarbons (HCFCs)
  - HCFCs have become major, “transitional” substitutes for CFCs. They are much less harmful to stratospheric ozone than CFCs are. But HCFCs they still cause some ozone destruction and are potent greenhouse gases.

OR

The cause of ozone depletion is the increase in the level of free radicals such as hydroxyl radicals, nitric oxide radicals and atomic chlorine and bromine. The most important compound, which accounts for almost 80% of the total depletion of ozone in the stratosphere are chlorofluorocarbons (CFC). These compounds are very stable in the lower atmosphere of the Earth, but in the stratosphere, they break down to release a free chlorine atom due to ultraviolet radiation. A free chlorine atom reacts with an ozone molecule (O<sub>3</sub>) and forms chlorine monoxide (ClO) and a molecule of oxygen. Now chlorine monoxide reacts with an ozone molecule to form a chlorine atom and two molecules of oxygen. The free chlorine molecule again reacts with ozone to form chlorine monoxide. The process continues and the result is the reduction or depletion of ozone in the stratosphere.

### Effects Of Ozone Depletion

Following are the major effects of ozone layer depletion.

- i) It will increase the risk of skin cancer
- ii) It has resulted in melanomas, a kind of tumour.
- iii) It greatly affects eyes and produces disease of vision.
- iv) It suppresses immunity system of human beings.
- v) UV rays damage various crops.
- vi) It kills plankton and fish larvae.
- vii) It causes sunburn in human beings.
- viii) It causes spotting of leaves in plants and trees, thus decreases productivity of the plants.

## Acid Rain:

“The rainwater which contains a large amount of poisonous acids like sulphuric acid, sulphurous acid, nitrous acid and other pollutants is known as the Acid Rain.”

### Formation of Acid Rain

Acid rain is caused by a chemical reaction that begins when compounds like sulphur dioxide and nitrogen oxides are released into the air. These substances can rise very high into the atmosphere, where they mix and react with water, oxygen, and other chemicals to form more acidic pollutants, known as acid rain. Sulphur dioxide and nitrogen oxides dissolve very easily in water and can be carried very far by the wind. As a result, the two compounds can travel long distances where they become part of the rain, sleet, snow, and fog that we experience on certain days.

### Causes Of Acid Rain:

Human activities are the main cause of acid rain. Over the past few decades, humans have released so many different chemicals into the air that they have changed the mix of gases in the atmosphere. Power plants release the majority of sulphur dioxide and much of the nitrogen oxides when they burn fossil fuels, such as coal, to produce electricity. In addition, the exhaust from cars, trucks, and buses releases nitrogen oxides and sulphur dioxide into the air. These pollutants cause acid rain.

OR

The main causes of acid rain are...

#### Natural Sources:

- Lightning strikes (cause nitrogen molecules to be oxidized)
- Combustion of hydrogen sulphide (hydrogen sulphide is formed from the breakdown of sulphates in organic matter in the absence of oxygen- anaerobic conditions). This reaction forms sulphur dioxide.

#### Human Sources:

- Combustion engines (car, airplanes etc.)
- Burning of fossil fuels and coal
- Some mineral ores contain sulphur dioxide, and this is released when the minerals are processed.

#### Effect Of Acid Rain:

- i) Kills flora and fauna
- ii) Damages the buildings
- iii) Causes skin cancer
- iv) Increases the acidity of the soil
- v) Kills fish and other aquatic animals
- vi) Pollutes the water
- vii) Causes spotting of leaves
- viii) Causes corrosion of metal, painted surfaces and even stone buildings and monuments.

# Ecosystem:

## Definition:

A natural of habitat or system where living organisms and physical components of their environment interact with one another and exchange materials so as to achieve a functional stability is called an ecosystem.

## Characteristics Of Ecosystem:

- An ecosystem is a basic unit of ecology of living organisms.
- An ecosystem may be natural like a pond, lake, stream, river, ocean or a forest.
- It may also be artificial like an Aquarian, an artificial pond or an agricultural field.
- A pond is an excellent example of a small ecosystem to demonstrate interrelationship between abiotic and biotic component of the ecosystem.

## Components Of Ecosystem:

### **i) Abiotic Components Of Ecosystem.**

Following are the abiotic components of ecosystem.

- a. Light
- b. Temperature
- c. Water
- d. Atmosphere and wind
- e. Fire
- f. Soil
- g. Topography
- h. Gravity
- i. Inorganic nutrients

### **ii) Biotic Factors.**

Following are the biotic components of ecosystem.

- a. Producers: Green Plants
- b. Consumers: Animals and Man
- c. Decomposers and reducers: Bacteria, fungi

## Types Of Ecosystem:

There are two main types of ecosystem:

**i) Terrestrial Ecosystem:** it includes Forest and Desert Ecosystem

**ii) Aquatic Ecosystem:** it includes small pool, a pond, stream, river, lake and an oceanic ecosystem.

# Environmental Pollution:

“Destabilization of the balance of the atmospheric composition.

OR

“It is an unstable change in the composition of the environment due to its physical, chemical and biological changes, which is harmful for human life and other animals living on the earth.”

## Types Of Pollution:

- i) Air pollution
- ii) Water pollution
- iii) Land pollution
- iv) Noise pollution
- v) Industrial pollution
- vi) Commercial or domestic sector pollution
- vii) Chemical pollution
- viii) Radioactive pollution (contamination)

## Causes of Pollution

The ultimate cause of pollution is human activity itself. Pollution is a human contribution to nature. Science has evolved technologies and technologies have helped the human welfare. In the process, the pollution has been a part of technology and therefore a part of human miseries.

## **Human activities mainly include:**

- Industries for various human needs - directly and indirectly
- Agriculture for food production and industrial needs
- Health care for health of human beings and animals
- Transport for mobility of human beings
- Dwelling for settlement in city or villages
- Energy for various direct human needs and industrial needs.

## Pollutants:

Pollutants are those substances which alter the natural composition of the atmosphere or destroy it to harmful level.

## Types Of Pollutants:

### **1. Primary Pollutants**

Primary pollutants are those substances which are directly produced by a process. These are:

- ix) Sulphur oxides
- x) Nitrogen oxides
- xi) Carbon monoxide (CO)
- xii) Carbon dioxide
- xiii) Volatile organic compounds (VOC), such as hydrocarbon fuel vapours and solvents
- xiv) Particulate matter (PM), such as smoke and dust.
- xv) Metal oxides, especially those of lead.
- xvi) Chlorofluorocarbons (CFCs)
- xvii) Ammonia (NH<sub>3</sub>)

xviii) Garbage, sewage and industrial wastes.

## **2. Secondary Pollutants**

Secondary pollutants are those pollutants which are not emitted. Rather, they form in the air when primary pollutants react or interact.

**These are:**

- i) Ground level ozone (O<sub>3</sub>)
- ii) Nitrogen dioxide
- iii) Peroxyacetyl nitrate (PAN)

### **Effects Of Pollution:**

- 1) Air Pollution:** Irritation of eyes, nose, mouth and throat, Increased respiratory disease, Cancer, Reduced lung functioning, Premature death. Acid rain, Ozone,
- 2) Water Pollution:** Waterborne diseases such as; Typhoid, Hepatitis, diarrhoea, vomiting, and stomach aches, death of aquatic animals, May disrupt photosynthesis in aquatic plants
- 3) Soil Pollution:** Causes cancers including leukaemia, developmental damage to the brain, kidney damage; depression of the central nervous system, Also causes headaches, nausea, fatigue, eye irritation and skin rash, Contamination of crops, reduce crop yields.

## **Water Pollution:**

### **Definition:**

“The presence of undesirable substances into fresh and natural water which cause harmful diseases in human beings as well as aquatic life is called water pollution.”

### **Types Of Water Pollution:**

Following are the major types of water pollution.

- i) Sea-water Pollution
- ii) River water Pollution
- iii) Land Water Pollution

### **Causes Of Water Pollution:**

#### **1) Pollution Through Domestic Activities:**

Domestic activities pollute the water when following kinds of wastes are added.

- i) Soap and detergents
- ii) Chemicals used in the houses
- iii) Waste from slaughter house
- iv) Waste from hospitals
- v) Waste from bakeries
- vi) Human and animal faeces
- vii) Waste food

#### **2) Pollution Through Industrial Activities:**

Industrial sector is a great source of pollution of water and air. Many industrial units produce waste materials in the shape of solids, liquids and gases. The industrial wastes are.

- i) Poisonous gases

- ii) Acids, bases and harmful salts
- iii) Pesticides and plastics
- iv) Radioactive wastes
- v) Toxic wastes from fertilizer factories
- vi) Wastes from chemical factories

### **Water Pollution In Pakistan:**

In Pakistan people do not take pain to dispose the waste materials in a proper way. Instead of dumping wastes in the drums and places meant for them they freely throw these into the water drains.

Water pollution is very prominent and widespread as a result of urban and industrial activity. Sewage waste from cities and industrial waste are the main factors of water pollution. Many other kinds of wastes which pollute water are from agricultural lands which contain pesticides, waste foods, fertilizers and animal excreta. Wastes from power plants contain radioactive materials, hot water and minerals which also pollute the water. Soaps, detergents, human excreta, animal faeces, wastes from slaughter houses, disease causing micro-organisms from patients and chemicals etc. are drained into water which causes massive water pollution.

### **Two Important Industries Of Pakistan Causing Water Pollution:**

1) One of the biggest sources of water pollution is the tanning and leather industry. The industry uses toxic chromium metal and many other toxic substances/chemicals. These toxins are released in natural waters. Effluent of this industry has polluted ground water and water of nearby rivers. This industry is frequent in Kasur and Sialkot area.

2) Pesticide industry in Kala Shah Kaku near Lahore releases huge quantity of acids, pesticides and other dangerous wastes. These wastes are getting entry into a stream flowing nearby. The water of the stream is dangerously polluted. This water ultimately goes to the rivers.

### **Effects:**

- i) Bacteria, viruses, protozoa and worms are carried in polluted water. The diseases caused by them are as under:
  - a) Bacteria: Typhoid, cholera, Dysentery, enteritis.
  - b) Viruses: Hepatitis, Polio, Viral enteritis.
  - c) Protozoa: Amoebic dysentery, diarrhoea.
  - d) Parasitic worms: Schistostomiasis
- ii) It causes death of aquatic animals.
- iii) It decreases the fertility of the soil and results in low production.

### **Methods To Control Water Pollution:**

Different methods can be used to control water pollution.

- i) The whole sewage waste should be dumped after any treatment.
- ii) Sewage treatment plants should be installed in cities.
- iii) The sewage waste must not be drained in river to save water from pollution.
- iv) Industrial waste should be treated before reaching natural water.
- v) Industries should be established away from cities and rivers.
- vi) Nuclear dumping in oceans should be banned.
- vii) Modern scientific methods should be used in agriculture.

## Deforestation:

It is the process of destruction of the forests.

### Causes Of Deforestation:

A number of agents are responsible for removal of forests. These are fires. Droughts or animals. The principle agent of deforestation is man himself. Humans are cutting forests to colonize the forest areas or to prepare more agricultural lands or for getting food.

### Effects Of Deforestation:

- i) Deforestation has many bad effects on human life. With destruction of the forest the process of cleaning of air and production of oxygen is badly affected.
- ii) Forests are major agents of evaporation and rainfall. With deforestation rainfall is decreased.
- iii) With cutting of forests, pollution is increasing as the hazardous gases are not completely absorbed by plants.
- iv) With deforestation carbon dioxide is increasing which is causing global warming.
- v) With reduction in area of forest, soil erosion is taking place resulting in floods which destroy crops and human life.
- vi) Deforestation has badly damaged wild life and reduced recreation sites.

## Earth:

### Features Of Earth:

- i) The earth is the fifth largest planet of the solar system, where life exists.
- ii) Its equatorial diameter is 7,927 miles.
- iii) Its polar diameter is 7900 miles.
- iv) The earth has average density of  $5 \frac{1}{2}$  g/cc.
- v) the rotation period of the earth is 23 hours, 56 minutes and 4 seconds.
- vi) the revolution period of the earth is 365 days.
- vii) The total mass of the earth is  $6 \times 10^{21}$  tons.
- viii) The earth is composed of shells or layers, which are, the crust, mantle and core.
- ix) It is surrounded by a blanket of gases, which is known as the atmosphere, mainly composed of Nitrogen and Oxygen.
- x) The surface of the earth is rich in oxygen, silicon, iron, magnesium, sodium etc.

### Structure Of The Earth:

The earth comprises of the following layers:

- a) The crust
- b) Moho discontinuity
- c) The mantle
- d) The Core

#### a) The Crust:

- i) It is the outermost layer of the earth.
- ii) It extends to about 25 miles (40kms) and comprises of rocks.
- iii) The crust is divided into the oceanic and the continental crust.



- iv) Out of these the oceanic crust is 808 meter thick and consists of sedimentary mud.
- v) The continental crust is divided into upper continental and lower continental crust.

### **b) Moho discontinuity:**

- i) The sharp boundary between the crust and mantle is called Moho Discontinuity.

### **c) The Mantle:**

- i) The layer of the earth lying below the crust and above the core is known as the mantle.
- ii) It is almost 2900 kms (1800 miles) thick and comprises about 80% of the volume of the earth.
- iii) The chemical composition of the entire mantle is fairly homogenous.
- iv) However, temperature and pressure increases with depth.
- v) The behaviour of the earthquake waves as they travel through the mantle further tells us that it consists of several layers and they are:
  - a) Lithosphere
  - b) Asthenosphere
  - c) Mesosphere

### **d) The Core:**

- i) The innermost part of the earth is known as the core.
- ii) It extends from the base of the mantle to the centre of the earth.
- vi) This portion consists of melted iron and nickel that is why it is known as Nife.
- vii) The density of this molten mass of the core is 345 pounds per cubic feet.

### **Types Of Movements Of Earth:**

- There are two types of motions of the earth.
- One is around its own axis which is called Rotation. One rotation completes in 23 hours, 56 minutes and 4 seconds.
- The other motion of earth is round the sun, and is called revolution of the earth.
- One revolution completes in 365 days.
- Northern end of the earth's axis is called the North Pole and the Southern end is called South Pole.
- An imaginary line drawn round the earth midway between the poles is called equator.
- The path which the earth takes round the sun is called earth's orbit.

### **Effects Of These Movements:**

- Rotation of earth round its axis cause days and nights.
- That portion of earth, which is within the circle of illumination caused by the rays of sun, has its day.
- The other side earth, which is away from sun, remains dark and therefore has its night.

### **Longer And Shorter Days:**

- The circular areas near the North and South Pole of the Earth are called Arctic and Antarctic circles, respectively.
- These are situated at  $66\frac{1}{2}^{\circ}$  North and  $66\frac{1}{2}^{\circ}$  South of the equator, respectively and form limits of polar region.
- On June, the earth is in position A. north pole is inclined towards the sun and south pole is away from it.
- Obviously any place in Northern Hemisphere will have longer days because it remains in light for more than half the time of earth's rotation.
- Places on equator remains in light for half the time making days and nights equal in this region.

- The southern hemisphere remains in light for less time than half the rotation of earth so the days are shorter here.
- Positions of days and nights in the northern and southern hemisphere are reversed on 22nd December, when the earth completes its half revolution around the sun, so days are longer in southern hemisphere than those in the north.

### **Change Of Season:**

- The second type of motion of earth is round the sun and is called revolution of the earth.
- This is the cause of change of seasons.
- On June 21, the earth is in position A, when the north pole is inclined towards sun while the south pole is away from it.
- As the sun rays fall vertically and for a longer period in the northern hemisphere, it is summer here but in the southern hemisphere it is winter.
- On December 22, when the earth completes half revolution, the conditions become reversed; it is summer in the southern hemisphere and winter in the northern hemisphere.

## **Atmosphere:**

The layer of the gases which surrounds the earth is known as the atmosphere.

**OR**

The atmosphere is a thin layer of the gases held to the earth by the gravitational attraction.

**OR**

Atmosphere is the huge blanket of gas that circles the entire earth.

### **Composition Of The Atmosphere:**

The atmosphere consists of:

- i) Nitrogen: 78.03%
- ii) Oxygen: 20.99%
- iii) Argon: 0.94%
- iv) CO<sub>2</sub>: 0.03%
- v) Hydrogen: 0.01%
- vi) Neon: 0.0018%
- vii) Helium: 0.0005%
- viii) Krypton: 0.0001%
- ix) Ozone: 0.000001%

### **Layers Of The Atmosphere:**

The atmosphere of the earth is divided into following layers.

- i) Troposphere
- ii) Stratosphere
- iii) Ionosphere
- iv) Exosphere

Ionosphere is sub-divided into:

- i) Mesosphere
- ii) Thermosphere

### 1) Troposphere:

- i) Troposphere is the lowest layer of the atmosphere.
- ii) It extends roughly to a height of 8 kms near the poles and 16-18 kms at the equator.
- iii) It is troposphere where the people, plants, animals and insects live.
- iv) It is the layer where all weather occurs that's why it is also referred as "The weather Zone".
- v) In the Troposphere temperature gradually falls with increasing altitude.
- vi) There is a thin buffer zone between the troposphere and stratosphere is called tropopause.

### 2) Stratosphere And Ozone Layer:

- i) The second layer of the atmosphere is known as the stratosphere.
- ii) The stratosphere extends from the tropopause to about 30-31 mile above ground level.
- iii) The important ozone layer is found in this region where heat is generated by absorption of UV.
- iv) Here the temperature either remains constant or increases with altitude.

### Stratopause:

It is the upper boundary of the stratosphere which occurs beyond 52 kms. Here the temperature remains constant with increase in height.

### 3) Ionosphere:

- i) The third major layer of the atmosphere is the ionosphere.
- ii) It lies above the stratosphere.
- iii) It lies between about 30 and 90 miles above the surface of the earth.
- iv) It is divided into mesosphere and thermosphere.
- v) The ionosphere is bombarded by cosmic radiation and solar x-rays, which causes the gases in the ionosphere to ionize.
- vi) Brilliant displays of colored lights in the sky called Aurora Borealis in the northern hemisphere and the Aurora Auralis in the southern hemisphere occur when streams of electrically charged particles from the sun (solar wind) ionize the atmosphere gases.

### 4) Exosphere:

- i) The uppermost layer of the atmosphere extending beyond Ionosphere is called exosphere.
- ii) Beyond 300 miles is the very rare field exosphere which consists only of scattered atmosphere of O, H and He.

## Latitude:

### Definition:

It is the distance on the surface of the earth measured in degrees north and south of the equator.

The equator is at zero degree where the poles are at 90 degree. The latitude of the north pole is 90 North and that of south pole is 90 South.

### Characteristics OF Lines Of Latitudes:

- i) All lines of latitudes are parallel to the equator as well as parallel to one another.
- ii) Parallels in the north of the equator are north latitudes while those in the south of equator are known as south latitudes.
- iii) They are drawn on the globe as circles running in east to west direction.
- iv) The length of the equator is the maximum and it goes on reducing till the pole is only a

point.

## **Longitude**

### **Definition:**

The distance on the earth's surface measures in degrees east and west of a line joining the geographical north and south poles and passing through Greenwich in England. Greenwich is at zero degrees longitude.

The sun rays have highest altitude simultaneously on all the places at a particular line of longitude as a result of which these are also called as Meridians (Meridian is a Latin word which means Mid-way). Among the latitude, equator is the longest and is taken as reference line. But all the lines of longitude are of the same length and selecting a longitude as lines of reference is a serious problem.

## **Earthquake:**

Earthquakes are those movements of the earth crust which make the ground vibrated and shake backwards and forwards or in simple words an earthquake is trembling in the earth.

The shocks waves are generated at a point within the crust called the focus, and the point on the earth's surface vertically above the focus is called the epicentre of the earthquake. The shock waves travel in all directions from the focus. On the earth's surface, the shaking is the strongest near the epicentre. These waves are detected by seismograph.

### **Occurrence Of Earthquake:**

- i) Earthquakes occur when rocks subjected to great stress suddenly break, releasing the accumulated energy, which shakes the ground. Vibrations spread out from the epicentre like ripples in water.
- ii) It may also be caused by movements of the plates, resulting from convection currents in the hot mantle of the earth.
- iii) Earthquakes are also associated with volcanic activity-eruption of magma. Collapse of mines can also produce small earthquakes.

## **Volcanoes:**

An opening in the earth's crust through which molten lava, ash, and gases are ejected.

### **Occurrence Of Volcanoes:**

- i) Rocks below the Earth have a very high temperature.
- ii) The great pressure upon these keeps them in a semi-solid state.
- iii) If the pressure weakens, then some of rocks become liquid.
- iv) This liquid is called magma.
- v) The magma forces its way into cracks of the crust and may either reach the surface of the earth where it forms lava and flow out.

## Types Of Volcanoes On The Basis Of Activity:

There are three types of volcanoes on the basis of volcanic activity, which are as under.

### i) Active Volcanoes:

Volcanoes are said to be active when they frequently erupt or at least when they have erupted within recent time.

### ii) Dormant Volcanoes:

The volcanoes that have been known to erupt and show signs of possible eruption in the future are described as dormant volcanoes.

### iii) Extinct Volcanoes:

The volcanoes that have not erupted at all in historic times but retain the features of volcanoes are termed as extinct volcanoes.

## Causes of The volcanoes Eruptions:

- i) Seafloor spreading
- ii) Convergence of lithospheric plates
- iii) Percolation of cold water
- iv) Orogenic Movements
- v) High temperature in the interior of the Earth.

## Rocks:

### Igneous Rocks:

- The word igneous means the fires and the rocks formed by solidification of molten rock material known as magma are known as igneous rocks.
- The first minerals to crystallize out of the melt are high-temperature minerals-the olivines and pyroxenes, which are silicates of magnesium and iron.
- They tend to be denser than magma and so they sink, leaving the remaining fluid deficient in magnesium and iron.
- The next group of minerals to solidify are the feldspars (silicates minerals of potassium, sodium, calcium and aluminium); the magma thus loses its metallic constituents first.
- Finally, any remaining silica crystallizes out as quartz.
- The entire solidification process therefore results in dense iron-and magnesium-rich rocks and less dense silica rich rocks from the same original fluid.
- In this way, different types of rocks can be seen in the same rock mass.
- The most important igneous rocks are: a) Granite rocks b) Gabbro rocks c) Basalt rocks

### Sedimentary Rocks:

- Sedimentary rocks are formed from the deposition and compaction or lithification of rocks and mineral grains derived from other rocks.
- These grains broke away from existing rocks by the action of water, wind and ice.
- Many sedimentary rocks begin their existence as loose deposits of sand or gravel at the bottom of a sea or lake, on beach, or in a desert.
- 
- Later the sediment is lithified i.e. compressed into a rock.
- Following are the major classes of sedimentary rocks:

- i) Calcareous sedimentary rocks
- ii) Carbonaceous sedimentary rocks
- iii) Siliceous sedimentary rocks
- iv) Ferruginous sedimentary rocks
- v) Arenaceous sedimentary rocks
- vi) Argillaceous sedimentary rocks
- vii) Rudaceous sedimentary rocks

### Metamorphic Rocks:

- The word metamorphic has been derived from two Greek words Meta means change and Morpha means shape.
- Thus metamorphic rocks include those rocks that have been changed either in form or composition without disintegration.
- Metamorphic rocks are formed from igneous as well as sedimentary rocks but are different from them.
- **Example:**
  - i) Sandstone, made of quartz grains and silica cement, becomes quartzite, a very hard metaphoric rock that resist weathering.
  - ii) Limestone is converted into much denser and harder marble.
  - iii) Mica, an igneous rock, is converted into schist after metamorphosis.
  - iv) Sedimentary rock slate is converted into a slightly higher grade metamorphic rock phyllite.

### Branches Of Biology:

- i) Zoology:** Zoology is that branch of biology which deals with the study of animals.
- ii) Botany:** Botany is that branch of biology which deals with the study of plants.
- iii) Microbiology:** It is the branch of biology which deals with the study of microorganisms such as viruses, bacteria etc.
- iv) Morphology:** It deals with the shape and structure of living organisms.
- v) Histology:** It is the microscopic study of tissues of plants and animals.
- vi) Cytology:** It deals with the structure of cell and organelles present inside the cell.
- vii) Physiology:** It deals with the study of functions of different parts of plants and animals.
- viii) Ecology:** It is the science of ecosystem and explains the relationship between organisms and their environment.
- ix) Taxonomy:** It deals with the naming and classification of organisms.
- x) Genetics:** It deals with the study of heredity and variations.
- xi) Biotechnology:** It deals with the application of biological processes.
- xii) Haematology:** Study of blood and its constituent cells.
- xiii) Geology:** Study of features and properties of earth and its constituents rocks

## Characteristics Of Living Organisms:

Following are the main characteristics of living beings which are not present in non-living organisms.

- i) Metabolism
- ii) Growth
- iii) Irritability
- iv) Reproduction
- v) Movement
- vi) Nutrition
- vii) Respiration
- viii) Excretion

## Virus:

- Viruses are the micro-organisms which are strict or obligate parasites of animals or plant cells.
- Many of the viruses are also parasites on bacteria.
- A large number of viruses cause diseases in plants and animals.

## Characteristics Of Virus:

- A virus consists of two components, a protein coat and a core of nucleic acid which is either DNA or RNA.
- DNA viruses are called adenoviruses and RNA viruses are called retroviruses.
- The shape of a virus is due to its protein coat.
- Viruses are of many shapes i.e. rods, spherical, hexagonal or icosahedral.
- Sometimes their shape is complicated.
- Virus replicate inside a living cell and many viruses are synthesized along with their protein coats and nucleic acid.
- The nucleic acid contains instructions for the shape of the virus.

## Diseases Caused By viruses:

- i) Polio
- ii) AIDS
- iii) Smallpox
- iv) Measles
- v) Hepatitis

# Bacteria:

## Characteristics Of Bacteria:

- Bacteria are unicellular prokaryotic organisms which generally divide by transverse binary fission.
- They possess rigid cell walls and act as pathogens
- Nucleus is not well organised
- No definite chloroplast, chlorophyll is dissolved in chromoplasm.
- There are three forms of bacteria which are:
  - i) Round called Cocci
  - ii) Rod like called Bacilli
  - iii) Spiral called Spirilla

## Classification Of Bacteria According To Mode Of Nutrition:

According to mode of nutrition, there are three types of Bacteria:

### **a) Parasitic:**

- Devoid of chlorophyll
- Are heterotrophic and get food from living animals and plants

### **b) Saprophytic**

- Lack chlorophyll hence cannot prepare their own food.
- Get food from dead organic remains

### **c) Autotrophic**

- Contain chlorophyll
- Can synthesis food by photosynthesis
- Few get their food by chemosynthesis

## Reproduction In Bacteria

- i) **Vegetative:** By Binary Fission
- ii) **Asexual:** By Formation of Endospores
- iii) **Sexual:** By Conjugation



## Cell Division:

The process in which the cells divide and replicate. This process is the basis for growth and replication. There are two main types of cell division, which are as under:

- 1) Mitosis
- 2) Meiosis

### Mitosis:

A type of cell division in which a cell divides into two identical daughter cells each having same number of chromosomes as that of parent cell.

#### Stages Of Mitosis:

There are four stages of mitosis, which are as under:

- i) Prophase
- ii) Metaphase
- iii) Anaphase
- iv) Telophase

#### **i) Prophase:**

- Prophase is the first phase of mitosis.
- Chromatin material condenses and becomes visible
- The nucleolus of the cell disappears
- The nuclear membrane also disappears
- Centrioles begin to move opposite ends of the cell

#### **ii) Metaphase:**

- Metaphase is the second stage of mitosis.
- Chromosomes line up in the centre of the cell, separate and become a pair of identical chromosomes.
- The chromatids become uncoiled and apart from each other.

#### **iii) Anaphase:**

- It is the third phase of mitosis.
- During this phase each set of chromosomes move towards the opposite end of the cell.

#### **iv) Telophase:**

- The fourth phase of mitosis is known as Telophase.
- During this phase spindle fibres disappear.
- Nuclear membrane appears
- Cell divides into two daughter cells
- Nucleolus re-appear
- The chromosomes disperse and are no longer visible.

#### **Significance Of Mitosis:**

1. Growth: The number of cells within an organism increases by mitosis and this is the basis of growth in multicellular organisms.

2. Cell Replacement: Cells are constantly sloughed off, dying and being replaced by new ones in the skin and digestive tract. When damaged tissues are repaired, the new cells must be exact copies of the cells being replaced so as to retain normal function of cells.

3. Regeneration: Some animals can regenerate parts of the body, and productions of new cells are achieved by mitosis.

4. Vegetative Reproduction: Some plants produce offspring which are genetically similar to themselves. These offspring are called clones.

### Meiosis:

A type of cell division in a cell divides into four daughter cells with having half number of chromosomes as compared to parent cell.

#### Characteristics Of Meiosis:

- Takes place in sexual reproduction at the time of formation of male and female gametes
- In animals it takes place during the formation of sperms and ova while in plants during spore formation
- Diploid cells reduce to haploid cells
- Consists of two consecutive divisions
- First division is reductional or meiotic and the second is simple mitotic division.

#### Stages Of Meiotic Division:

- i) Prophase I
- ii) Metaphase I
- iii) Anaphase I
- iv) Telophase I
- v) Prophase II
- vi) Metaphase II
- vii) Anaphase II
- viii) Telophase II

#### Prophase I:

Prophase I consists of 5 sub stages, these are:

##### **a. Leptotene**

- Nucleus increases in size
- Chromosomes become long and uncoiled threads
- They become more visible

##### **b. Zygotene**

- Homologue (similar) chromosomes attract each other and form pairs.
- This process is called synapses

### **c. Pachytene**

- Chromosomes become condensed due to widening of coils
- They form chiasmata i.e. cross each other in double nature or bivalents.

### **d. Diplotene**

- Homologous chromosomes go apart from each other except at chiasmata
- Chromosomes become more short and thicker

### **e. Diakinesis**

- The bivalents become more apart.
- Chromosomes become deeply stained
- Nucleolus and nuclear membrane disappear and spindles become distinct

### **Metaphase I:**

- Chromosomes now rearrange themselves in an equatorial line
- Spindles attach to the centrosome of the chromosomes

### **Anaphase I:**

- Spindles start to contract
- Split the tetrahedral chromosomes into two chromatids and drag them to opposite poles
- Here the reduction takes place.

### **Telophase I:**

- Spitted chromosomes reach to opposite poles
- Nucleolus and nuclear membrane reappear
- At the end of Telophase I, prophase II starts.

### **Prophase II:**

- Chromatin network breaks into bivalent chromosomes
- Nuclear membrane and nucleolus disappear and spindles start to reappear

### **Metaphase II:**

- Bivalent chromosomes rearrange themselves at equator
- Spindles attach to the centrosomes of each chromosome

### **Anaphase II:**

- Spindles contract and split the chromosomes longitudinally into two chromatids
- Each chromatid travel to opposite pole

### **Telophase II:**

- Each chromatid reach to the opposite pole
- Spindles disappear and nuclear membrane and nucleoli reappear
- As a result 4 nuclei are formed

### **Significance Of Meiosis:**

- To allow trait inheritance in offspring
- To maintain diploid number in each generation
- To ensure the production of haploid gametes in sexual reproduction
- To produce genetic variations among offspring

## Classification Of Plants:

Plants are those organisms which contain chlorophyll and synthesize their own food through photosynthesis. Plants are divided into:

- 1) Flowering Plants OR Phanerogams
- 2) Non-Flowering Plants OR Cryptogams

### Flowering Plants:

Flowering plants are those plants which contain seed. These are known as Phanerogams. They are further subdivided into:

- i) Gymnosperms
- ii) Angiosperms

### Gymnosperms:

Gymnosperms are those flowering plants which contain naked and unprotected seeds.

**Examples:** Pine, Fir, Cedar, Spruce and Cypress etc.

### Angiosperms:

Angiosperms are those flowering plants whose seeds are protected by a fruit or seed pod.

**Examples:** Grass, Crops, Vegetables, Fruits and weeds.

### Non-Flowering Plants:

Non-Flowering plants are also known as cryptogams. These are the plants which do not have seed or in other words they are seedless. Following are the main characteristics of these plants:

- They reproduce by spores
- They have long life
- They have no long fibres
- They cannot grow to greater size
- They generally have simple structure, except ferns.

**Examples:** Mosses, Ferns, Algae.

## Flower & Its Parts:

The flower is the reproductive part of the plant. It is mainly concerned with formation of seeds. It is regarded as the modified shoot for the purpose of reproduction.

### Parts Of Flower:

A typical flower consists of a short axis known as the thalamus, on which floral leaves are inserted in four distinct whorls, which are as under:

- i) Calyx
- ii) Corolla
- iii) Androecium
- iv) Gynaecium

### Calyx:

Calyx is the outermost whorl of floral leaves called sepals. The sepals can be defined as the green and leaf like structures which are mainly concerned with the protective function.

### Corolla:

Corolla is the second whorl of floral leaves called petals. The petals are beautifully coloured which are responsible for the attraction to the insects towards them.

### Androecium:

The third whorl of the leaves consists of stamens. It is considered as the male part of the flower.

### Gynaecium:

Gynaecium is the inner most whorl of the floral leaves called carpels. It is considered as the female part of the flower.

## Parts Of Plants:

- i) Ginger: Modified Stem (rhizome) and it is also a root.
- ii) Cinnamon: Bark of stem
- iii) Radish: Root
- iv) Potato: Stem (tuber)
- v) Peanut: Seed
- vi) Saffron: Stigma/flower
- vii) Almond: Fruit
- viii) Chillies: Fruit
- ix) Spinach: Leaves
- x) Tomato: Fruit
- xi) Turnip: Root
- xii) Carrot: Root
- xiii) Cucumber: Fruit

## Photosynthesis:

### Definition:

Photosynthesis is a process in which plants manufacture their food (simple carbohydrates) in the presence of chlorophyll and sunlight by the combination of carbon dioxide and water.

### Raw Material For Photosynthesis:

- i) Carbon dioxide: Taken from air
- ii) Water: Absorbed by roots from soil
- iii) Sunlight: From Sun
- iv) Chlorophyll: green pigment present in leaves

### By-Products Of Photosynthesis:

- i) Carbohydrates (simple sugar): used by plants as a food material and excess of it is

- converted into starch  
ii) Oxygen: Released into air

### **Importance Of Photosynthesis:**

- i) Major process of food production in plants
- ii) Utilization of CO<sub>2</sub> of the atmosphere and liberation of oxygen
- iii) Important in reducing CO<sub>2</sub> of the atmosphere which is dangerous for the human beings as well as animal health.

## **Pollination:**

- It is the process by which seeds are produced.

### **Definition:**

Pollination is the phenomenon of transfer of pollen from male reproductive organ (anther) to female reproductive organ (stigma) in flowering plants through biological or physical agency.

### **Types Of pollination:**

There are two types of Pollination

#### **i) Self-Pollination:**

In this type of pollination pollens are transferred to the stigma in the same flower. Some plants are by nature self-pollinated as wheat and grasses.

#### **ii) Cross Pollination:**

In this type the pollen grains are transferred from the anther of one flower to the stigma of another flower. The cross pollination is considered and advantageous to the plant as the seeds produced by cross-pollination are usually greater in number and the plant germinated from them are superior in vigour, height and weight.

### **Vehicles For Pollination:**

Vehicles for pollination are animals, water, wind and insects. Therefore cross pollination may be:

- a) Entomophily-by insects
- b) Anemophily-by wind
- c) Hydrophily-by water
- d) Zoophily-by animals

### **Importance Of Pollination:**

- Vital process for reproduction in plants
- Reproduction is carried out by reproductory organs of plants due to pollination

## **Fertilization:**

The fusion of male and female gametes is called fertilization.

### **Types Of Fertilization:**

Following are the major types of fertilization:

- i) External Fertilization
- ii) Internal Fertilization
- iii) Self-Fertilization
- iv) Cross-Fertilization

### **External Fertilization:**

- This type of fertilization is generally observed in simple aquatic animals.
- In such animals both ova and sperms are released into the water where fertilization occurs.
- In terms of evolution external fertilization is of primitive type and is not better biologically as compared to internal fertilization.

### **Internal Fertilization:**

- In the internal fertilization the females keep ova inside their bodies and males deposit sperms within the tube of reproductive tracts of females.
- For all land animals internal fertilization is almost must because sperms are quickly killed by dehydration.
- In terms of evolution internal fertilization is highly evolved and much better biologically as compared to external fertilization.

### **Self-Fertilization:**

- Self-fertilization occurs within the same animal.
- It is that fertilization in which sperms are used by the ovaries of same animal e.g. Tapeworm

### **Cross-fertilization:**

- Cross-fertilization is the process in which sperms of one animal are transferred into the body of another animal e.g. Earthworm.

## **Genetic Engineering:**

The deliberate modification of the characteristics of an organism by manipulating its genetic material.

**OR**

Scientific alteration of the structure of genetic material in a living organism. It involves the production and use of recombinant DNA and has been employed to create bacteria that synthesize insulin and other human proteins.

## Significance Of Genetic Engineering:

### **i) To Cure the genetic disorders**

Heredity diseases can possibly be treated by this technique by transplanting normal genes in the place of abnormal or diseased genes.

### **ii) To Prepare Better Crops**

Crops with desired characteristics could possibly be produced by introducing desired genes.

### **iii) To Get Better Breeds Of Animals**

Like plants better breeds of animals can also be produced by the introduction of recombinant DNA.

### **iv) Interferon**

Interferons are effectively used in the treatment of Hepatitis of A & B.

### **v) Insulin**

Human insulin is being produced by genetic engineering to treat diabetes

### **vi) Vaccines**

Genetic engineering has also helped in the production of vaccines which are used for controlling and treating viral diseases.

## Biotechnology:

The exploitation of biological processes for industrial and other purposes, esp. the genetic manipulation of microorganisms for the production of antibiotics, hormones, etc.

## OR

Biotechnology is the use of living organisms (especially microorganisms) in industrial, agricultural, medical and other technological applications.

### Importance Of Biotechnology:

- i) To increase production
- ii) To introduce improved quality of seeds and plants
- iii) To introduce plants resistant to disease and insect pests
- iv) To introduce varieties suited to particular climates and soils.
- v) To introduce varieties resistant to lodging
- vi) To improve nutritional value of crops
- vii) To save rare varieties of plants by rapid clonal propagation for breeders to use in future.



## Teeth:

The humans have two sets of teeth one replaced by the second. The primary set or milk or deciduous teeth are 20 in number while there are 32 permanent teeth in adults.

### **1. In children there are 20 deciduous or milk teeth. These are**

Incisor: 2 pair  $\times 2 = 8$

Canine: 1 pair  $\times 2 = 4$

Premolars: 2 pair  $\times 2 = 8$

### **2. In adults there are 32 permanent teeth. In each jaw on each side there are:**

Incisors: 2 pair  $\times 2 = 8$

Canines: 1 pair  $\times 2 = 4$

Premolars: 2 pair  $\times 2 = 8$

Molars: 3 pair  $\times 2 = 12$

### Incisors:

The central front teeth are called incisors. There are four in upper jaw and four in lower jaw.

### Canines:

The pointed, dark colored teeth on either side of the incisors are canines. 2 in upper jaw and 2 in lower jaw.

### Premolars:

These are bi-cusped teeth after the canines. There are 8 premolars. 4 in the upper jaw and 4 in the lower.

### Molars:

There are 12 molars, 6 in the upper jaw and 6 in the lower jaw.

### Structure Of Teeth:

Each tooth consists of a crown which is the visible part and the root, which anchors it in sockets in the jaw. A tooth consists mainly of dentine. The crown is coated with even harder enamel, while the root is covered with cementum to help anchor it in the jaw. Inside each tooth, there is a cavity full of pulp, carrying nerves and the tooth's blood and eats through the dentine to the pulp when the decay reaches the pulp, pain and inflammation follows and tooth may die.

A nerve, an artery, a vein and lymph duct enters the pulp cavity through the root canal. The nerves give sensation of hot and cold.

## Antibody:

Antibody is a protein produced by white blood cells that help to destroy bacteria. Antibodies react with the antigens and inactivate or destroy them. A large number of antibodies are produced in blood which are targeted against various types of antigens. Antigens are foreign molecules, cells, bacteria, viruses or fungi which enter the body usually a disease causing microorganisms. Antibodies are the integral part of the defence mechanism of human body. They are also involved in immunity against disease.

## Hemophilia:

- It is a disease in which the person has prolonged blood clotting time resulting in excessive bleeding from injury.
- It is due to the deficiency of vitamin K.
- It is a semilethal disease controlled by a recessive gene.
- It is less common in women than in men.

## Important Facts About Human Physiology:

**The largest gland of the body: Liver**

**The largest organ of the body: Skin**

**The longest bone of the body: Femur**

**The total number of bones in the body: 206**

**The hardest bone of the body: Tooth**

**The smallest bone of the body: Stapes**

**Total number of muscles in the body: 600**

**The filter of the body: Kidney**

**The pump of the Body: Heart**

**Total number of bones in vertebral column: 33**

**The normal body temperature: 98.4 F (37 C)**

**The normal respiratory rate of the Body: 16-18 per min**

**The total volume of blood in body: 4-5 litres**

**Total number of bones in face: 14**

**Vascular connection between foetus and uterus: Placenta**

## Brain:

Human brain is contained in skull. It has three major parts.

- i) The Cerebrum or bigger brain
- ii) The Cerebellum or Smaller brain
- iii) Medulla Oblongata or hind brain

The cerebrum constitutes the major volume of brain. It consists of two large masses of nervous material known as cerebral hemispheres. Human consciousness, thought, emotions, sight, will, hearing, sensation of pain, memory and speech are centered in the cerebrum. Some parts of it also control motor nerves, operating the arms and legs.

The cerebellum or the smaller brain is related with the coordination of action of nerves and muscles. In this way movements of body are managed. Medulla or hind brain contains the centres for reflex actions in addition to automatic movements such as breathing and walking.

## Reflex Action:

- Reflex actions are the responses to environmental changes both internal and external and are immediate or automatic and are without intervention of will.
- These reflexes may be simple or conditioned e.g. watering of mouth on seeing or smelling of food.
- Simple reflexes are inborn, inherited or unlearned responses to stimuli.
- The structural and functional basis of simple reflex is called reflex arc.
- Impulses are carried from receptors to sensory neurons to CNS from where they are passed on via motor neurons to the effectors for necessary response.

## Thermoplastics:

Substances (esp. synthetic resins) that become plastic on heating and harden on cooling and are able to repeat these processes

### OR

A type of plastic that can be softened by heat, hardened by cooling, and then softened by heat over and over again.

### Properties of Thermoplastics:

Thermoplastics have wide ranging properties.

- They can be very much like rubber, or as strong as aluminium.
- are light in weight,
- Can withstand temperature extremes of up to 600 F, while others retain their properties at - 100 F. Some
- Thermoplastic materials have no known solvents at room temperature.
- Most thermoplastic materials are excellent insulators, both electrical and thermal.
- Are recyclable materials that are used frequently today to create objects such as foam cups, polyethylene squeeze bottles, acrylic lenses and safety helmets.
- In general the combination of light weight, high strength, and low processing costs make thermoplastics well suited to many applications.

### Uses:

- They are useful for a variety of applications, including consumer goods, machine parts, medical equipment and packaging and storage materials.

### Examples:

- PVC/Vinyl
- Polystyrene
- Polyethylene
- Cellulose Acetate
- PTFE/Teflon
- Nylon/Polyamide
- Polyester

## Synthetic Polymers:

Polymers are composed of very large molecules (macromolecules) formed by linking together many smaller, more simple units called monomers. There can be as few as five or as many as several thousand monomers units in a polymer. There are a large number of synthetic polymers prepared and in use. Some of these are polyamides( nylon), polyethylene, propylene, polyvinylchloride, synthetic rubber, cellulose acetate, cellulose nitrate and silicones.

## Heredity:

### Terminology Of Genetics:

#### Gene:

The basic unit of hereditary material which is responsible for development of a trait.

#### Alleles:

Alternatives forms of genes are called alleles, e.g. tall versus dwarf.

#### Dominant:

The dominant alleles are those traits which show complete expression even in heterozygous state. Dominant alleles dominate the recessive alleles in heterozygous state.

#### Recessive:

Recessive alleles or traits are those which fail to express themselves in heterozygous state. For example r and y are recessive alleles for wrinkle and green seeds.

#### Homozygous:

Homozygous is a condition in which an individual possess similar alleles for a particular trait. For example TT for tallness and tt for dwarfness.

#### Heterozygous:

Heterozygous is a condition in which an individual possess dissimilar alleles for a particular trait. For example Tt for tallness.

#### Genotype:

Genetic make of an organism is called genotype.

#### Phenotype:

External appearance or expression of genotype is called phenotype. For example, roundness, wrinkleness of seeds and tall or dwarf plants represent different phenotype.

## Gene:

### Definition:

The fundamental unit of heredity, formed as a sequence of bases in DNA.

### Characteristics Of Genes:

- Each gene has a definite position at the chromosome and may occur as alleles.
- The name gene was introduced by Johannsen in 1909 and the structure of DNA was elaborated by Watson and Crick in 1953.
- Genes determine all the structural and functional characters of an individual, like eye colour, skin colour, height, weight, blood group, hair, intelligence, temperament and all others.
- The characters from one generation to other are taken by genes.
- They sometimes change through the process of mutation. This gives variety in characters.
- The accurate structure of the proteins and enzymes in the body is determined by genes.

## Chromosomes:

A chromosome is a rod-like portion of the chromatin of a cell nucleus, performing an important part in meiotic cell division, and in the transmission of heredity characteristics. Normally they are constant in number for any species; there are 22 pairs of chromosomes and two sex chromosomes in the human.

Types Of Chromosomes: in higher animals and plants, there are two fundamental types of chromosomes, which are classified on the basis of sex determination these are:

- i) Autosomes
- ii) Sex Chromosomes:

### Autosomes:

These are paired somatic chromosomes that play no part in sex determination of organisms. These chromosomes are similar in males and females.

### Sex Chromosomes:

The chromosomes that determine sex in organisms are called sex chromosomes. There are two types of sex chromosomes.

- a) X- chromosome
- b) Y- Chromosome

# Animals:

## Types Of Animals:

- i) Invertebrates: Animals having no backbone or vertebral column.
- ii) Vertebrates: Animals with backbone or vertebral column.

## Classification Of Invertebrates:

The invertebrates are classified into following categories:

- i) Phylum Protozoa
- ii) Phylum Porifera
- iii) Phylum Coelentrata
- iv) Phylum Platyhelminthes
- v) Phylum Nematode
- vi) Phylum Annelida
- vii) Phylum Mollusca
- viii) Phylum Arthropoda
- ix) Phylum Echinodermata

**Following are the most common examples of invertebrate animals with their relative phyla:**

- Euglena: Phylum Protozoa
- Paramecium: Phylum Protozoa
- Amoeba: Phylum Protozoa
- Sponges: Phylum Porifera
- Hydra: Phylum Coelentrata
- Jelly fish: Phylum Coelentrata
- Tapeworm: Phylum Platyhelminthes
- Ascaris: Phylum Nematode
- Hookworm: Phylum Nematode
- Filaria: Phylum Nematode
- Snails: Phylum Mollusca
- Squids: Phylum Mollusca
- Cockroach: Phylum Arthropoda
- Honey bee: Phylum Arthropoda
- Mosquito: Phylum Arthropoda
- Butter fly: Phylum Arthropoda

## Classification Of Vertebrates:

Vertebrates have been divided into following five major classes:

- i) Fishes
- ii) Amphibians
- iii) Reptilian
- iv) Birds
- v) Mammals

## Some Animals & Their Location

- i) Blue whale: Found in all oceans
- ii) Panda: China
- iii) Dolphin: In seas
- iv) Porpoises:
- v) Kangaroo: Australia
- vi) Snow Leopard: Central Asia

- vii) Yak: Central Asia
- viii) Llama: South America
- ix) Ibex: Wild mountain goat
- x) Cobra: South Asia
- xi) Alligator: N.America
- xii) Tortoise: Water
- xiii) Rattle Snake: America
- xiv) Lizards:
- xv) Crocodiles:
- xvi) Ostrich: Deserts Of Africa
- xvii) Penguin: Antarctic Region
- xviii) Kiwi: New Zealand
- xix) Rhea: South America
- xx) Emu: Australia
- xxi) Shark: Found in all oceans
- xxii) Trout: Fresh water fish
- xxiii) Cod:

**Scavenger:**

Scavengers are the animals that ‘Clean up’ after the other animals by consuming their leavings and sometimes prey on sick or dying animals or consume dead bodies. Scavengers are also called detritus feeders. Vultures, coyotes, jackals, hyenas and wild dogs are scavengers which eat the left over prey or dead bodies of hunted animals.