Chapter-01

Heat & Thermodynamics

Heat

1. Therm is the unit of

(A) Power (B) Heat
(C) Light (D) Distance

Ans. (B) **(SSC Tax Asst. 2007)**

Exp: Therm is the non SI unit of heat, just as celsius and fahrenheit are of temperature.

2. Ice is packed in sawdust because

(A) Saw dust does not stick to the ice
(B) Saw dust will not get melt easily
(C) Saw dust is a good conductor of heat
(D) Saw dust is a poor conductor of heat

Ans. (D) **(SSC CGL 2015)**

Exp: Saw dust is a poor conductor of heat. Thus it does not let the atmospheric heat to pass through it and melt the ice.

3. Water is used in hot water bags because

(A) It is easily available
(B) It is cheap and not harmful
(C) Its specific heat is more
(D) Water can be heated easily

Ans. (C)

Exp: The water has high specific heat. Thus it takes more time to loose heat and get cool.

4. Which of the following metal has the maximum thermal conductivity?

(A) Iron (B) Aluminium
(C) Copper (D) Silver

Ans. (D) **(SSC CGL 2016)**

Exp: Silver has the maximum thermal conductivity.

5. A body absorbs maximum amount of heat when it is

(A) Black and rough (B) Black and smooth
(C) White and rough (D) White and smooth

Ans. (A) **(SSC stenographer 2011)**

Exp: Best absorbers - Black & Rough surface.
Best reflectors - White & Smooth surface

6. Heat of a reaction does not depend upon.

(A) Temperature of reaction
(B) Path by which final product is obtained
(C) Physical state of product and reactant
(D) Reaction takes place at constant pressure or constant volume.

Ans. (B) **(SSC CHSL –2012)**

Exp: The heat of reaction is a state function & it depends upon the physical condition of reactant, product, pressure and volume and does not depend on the path by which final product is obtained.

7. In Winter season water coming out of hand pumps is hot because

(A) In winter our body temperature remains low, so water makes us feel hot.
(B) Inside the earth temperature is more than the atmospheric temperature
(C) Due to pumping function is produced which causes heat and makes water hot
(D) Water comes out from the Earth and gains the heat from surroundings

Ans. (B) **(SSC CHSL 2011)**

Exp: Mud being a poor conductor of heat does not allow heat of underground water to escape out. Hence, we find it warm.

8. Which of the following causes more burn?

(A) Boiling water (B) Hot water
(C) Steam (D) None of these

Ans. (C) **(SSC CPO–2006)**

Exp: Steam causes more burn because it has more heat in the form of Latent Heat of Vaporization.

9. The direction of flow of heat between any two system depends on

(A) Their specific heat (B) Their latent heat
(C) Their individual temperature
(D) Amount of heat they contain individually.

Ans. (C) **(SSC MTS –2013)**

Exp: Heat always flows from higher temperature to lower temperature. So, direction of flow of heat always depends upon bodies individual temperatures.

10. Due to the horizontal motion of air, transfer of heat is known as :

(A) Advection (B) Convection
(C) Conduction (D) Radiation

Ans. (A) **(SSC MTS –2008)**

Exp: The transfer of heat or matter by the flow of fluid horizontally is known as Advection.

11. Burns caused by steam cause much more irritation than those caused by boiling water because

(A) Temperature of steam is higher
(B) Steam has latent heat of vaporization
(C) Steam is a gas and engulfs the pores of body quickly
(D) Steam pierces through the pores of body quickly.

Ans. (B) **(SSC CGL 2015)**

Exp: Burns caused by steam cause much more irritation than those caused by boiling water because steam has more heat energy in the form of Latent heat of vaporization.

12. Convection occurs in which of the following

(A) Only solids and liquids
(B) Only liquids and gases
(C) Only gases and solids
(D) Solid, liquid and gases

Ans. (B) **(SSC FCI 2012)**

Exp: Convection is the movement of molecules in a solution (liquid, gases, plasma) according to their kinetic energy which is imparted by heat energy. It can not occur in solids. Since no molecular motion is possible in solids.

13. Which of the following liquid contains highest rate of vaporization.

(A) Kerosene oil (B) Water
(C) Petrol (D) Alcohol

Ans. (D) **(SSC Stenographer 2014)**

Exp: Lower the boiling point, more will be the rate of vaporization. Alcohol has the lowest boiling point of all the four, hence highest rate of vaporisation.

14. The hottest part of gas flame is known as

(A) Non- luminous zone (B) Blue zone
(C) Luminous zone (D) Dark zone

Ans. (A) **(SSC MTS 2013)**

Exp: Non-Luminous zone is the hottest part of the gas flame. It is the outermost part of gas flame & hence complete combustion takes place here.

15. Earth is a

(A) Good reflector of heat
(B) Bad absorber of heat
(C) Good absorber and good radiator of heat
(D) Bad absorber and bad radiator of heat.

Ans. (D)

Exp: All bad absorbers are bad radiators. Earth being a bad absorber, it is a bad radiator as well.

16. Why are the handles of metallic teapots made of wood?

(A) Wood is a bad conductor of heat
(B) It does not cause electric shocks
(C) It makes containers look beautiful
(D) It makes containers look clean

Ans. (A) **(SSC CHSL 2011)**

Exp: As wood is a bad conductor of heat it does not let heat to pass through it and it makes it easier to hold metallic teapots with a wooden handle.

17. Why two thin shirts can keep us warmer than a single thick shirt in winters?

(A) Two shirt become thicker so present the permission of heat
(B) Layer of shirt acts as a conductor of heat between two shirts
(C) Layer of air acts as an insulating medium between two shirt
(D) Radiation of heat doesn't take place.

Ans. (C) **(SSC CGL 2008)**

Exp: Air trapped between two shirts act as an insulator and does not let body heat to travel out.

18. Energy travels from sun to earth by which of the following method

(A) Conduction (B) Insolation
(C) Radiation (D) Modulation

Ans. (C) **(SSC CGL 2016)**

Exp: Radiation is the emission and propagation of energy in the form of waves or particles. The sunlight is an electromagnetic radiation it reaches earth by the process of Radiation.

19. The characteristics invalid for heat radiation is that it travels

(A) In a straight line (B) In all directions
(C) With the speed of light
(D) Heating the medium through which it passes.

Ans. (D) **(SSC M.T.S 2013)**

Exp: Heat radiations do not need any material medium for its propagation, hence no heating takes place as no medium is present.

20. Which of the following is a good conductor of heat but bad conduction of electricity.

(A) Mica (B) Asbestos
(C) Celluloid (D) Paraffin wax

Ans. (A) **(SSC (10+2) DEO & LDC 2012)**

Exp: Mica is a good conductor of heat but bad conductor of electricity because it does not have free electrons.

21. Which of the following has the largest value of specific heat.

(A) Glass (B)Copper
(C) Lead (D) Water

Ans. (D) **(SSC (DEO) 2008)**

Exp: The specific heat of water is 1 calorie/gram°C. The specific heat of water is higher than any other common substance.

22. When hot water is sprinkled on a hotter glass tumbler it breaks because

(A) Glass suddenly expands
(B) Glass suddenly contracts
(C) Water evaporates
(D) Glass reacts chemically with water

Ans. (B) **(SSC Matric Level 2000)**

Exp: On sprinkling water on hot glass tumbler it suddenly contracts. Due to this rapid contraction, it breaks.

23. Which one of the following is an insulator?

(A) Copper (B) Wood
(C) Mercury (D) Aluminium

Ans. (B) **(SSC CGL 2016)**

Exp: Insulators are the substances/materials which do not readily allow the passage of heat and electricity through them. Examples of insulators are glass, wood, plastic, rubber etc.

24. Heat is transmitted from higher temperature to lower temperature through the actual motion of the molecules in

(A) Conduction (B) Convection
(C) Radiation
(D) Both conduction and convection

Ans. (B) **(SSC CGL 2016)**

Exp: Convection - It is the transfer of energy by actual movement of a medium particles.
Conduction - The molecules excite their successive neighbours but don't leave their position.
Radiation - The energy is transferred in the form of waves. No medium is required.

25. Which of the following are methods of heat transfer

(A) Convection (B) Evaporation
(C) Revolution (D) Thermal Expansion

Ans. (A) **(SSC CGL 2016)**

Exp: Convection - It is the process of heat transfer in a gas or liquid by circulation of the currents downwards to upwards.

26. Which of the following devices can be used to detect radiant heat

(A) Liquid thermometer
(B) Six's maximum and minimum thermometer
(C) Constant volume air thermometer
(D) Thermopile

Ans. (D)

Exp: Thermopile is a set of thermocouples arranged for measuring small quantities of radiant heat.

27. Match the following

List I Process	List II Changes
A. Evaporation	(1) Liquid into Gas
B. Sublimation	(2) Solid into Gas
C. Freezing	(3) Liquid into Solid
D. Melting	(4) Solid into Liquid

	A	B	C	D
(A)	1	2	3	4
(B)	3	1	2	4
(C)	2	1	4	3
(D)	2	1	3	4

Ans. (A) **(SSC LDC DEO (2011)**

Exp: Evaporation - Liquid into Gas
Sublimation - Solid into Gas
Freezing - Liquid into Solid
Melting - Solid into Liquid

Thermodynamics

28. Why white clothes keep you cooler as compared to black clothes?

(A) They absorb whole of the light
(B) They reflect the whole light
(C) Penetration of light does not occur
(D) Make the sunlight completely cool.

Ans. (B) **(SSC CHSL 2011)**

Exp: Because white clothes reflect the whole light and do not absorb any heat radiation.

29. The unit of planck's constant is

(A) Js (B) Js^{-1}
(C) Js^{-2} (D) Js^{2}

Ans. (A)

Exp: E = h
E = Energy of a photon
h = planck's constant
= frequency of the radiation
$[J] = h[s^{-1}]$
[h] = Js

30. The dimensional formula of plank's constant (h) contains the dimension of

(A) Linear Motion (B) Angular Momentum
(C) Energy (D) Force

Ans. (B)

Exp: Angular Momentum = Perpendicular Distance × momentum
$= [L]\,[MLT^{-1}]$
$[ML^2T^{-1}]$ = dimension of planck's constant.

31. When hot liquid is poured into a thick glass tumbler it cracks because glass:

(A) Is a bad conductor of heat so only inner surface expands
(B) Has high temperature coefficient of expansion
(C) Has very low specific heat
(D) Has very low temperature coefficient of expansion.

Ans. (A) **(SSC CGL 2014)**

Exp: Inner surface of the glass will expand more than the outer surface.

32. I^{st} Law of Thermodynamics is normally related to

(A) Law of conservation of Energy
(B) Newton's law of cooling
(C) Boyle's Law (D) Charle's Law

Ans. (A) **(SSC CPO 2015)**

Exp: The First Law of Thermodynamics states that total energy of an isolated system is constant.
Q = U + W
Q = Heat absorbed
U = Change in internal energy
W = Work done by the system

33. A real gas can act as ideal gas at

(A) Low pressure and High temperature
(B) High pressure and Low temperature
(C) Low temperature and High pressure
(D) High temperature and Low pressure

Ans. (A)

Exp: At low pressure and high temperature, Real gas can act as ideal gas as intermolecular force of attraction is negligible.

34. A white and smooth surface is

(A) Good absorber and Good reflector of heat
(B) Bad absorber and Good reflector of heat
(C) Good absorber and Bad reflector of heat
(D) Bad absorber and Bad reflector of heat

Ans. (B) **(SSC CHSL 2015)**

Exp: White surface does not absorb any incident radiations that fall on it. It reflects all the incident radiation.

35. A cycle tyre bursts suddenly. This represents an

(A) Isothermal process (B) Adiabatic process

(C) Isochoric process (D) Isobaric process

Ans. (B) **(SSC (10+2) LDC & DEO 2015)**

Exp: Bursting of cycle tyre is considered as an adiabatic process because it happens suddenly without any time for heat exchange.

36. The wavelength at which the peak of intensity of black body radiation occurs.

(A) Increases with increase in temperature

(B) Decreases with increase in temperature

(C) Is the same at all temperature

(D) Does not follow any pattern as temperature changes

Ans. (B) **(SSC M.T.S 2013)**

Exp: This is according to the Wien's displacement Law, Higher the temperature, lower is the wavelength.

37. A blackbody can absorb radiations of

(A) Lower wavelengths only

(B) Intermediate wavelength only

(C) Higher wavelengths only

(D) All wavelengths

Ans. (D) **(SSC 10+2) DEO & LDC 2013)**

Exp: A blackbody is a body that absorbs all incident radiations falling on it regardless of the frequency and wavelength of the radiation.

38. In a refrigerator a cooling system should always be

(A) At the top (B) At the bottom

(C) At the middle (D) Can be anywhere

Ans. (A) **(SSC CGL 2004)**

Exp: Air on getting warmer rises up. This air is trapped by cooling unit on the upward side and made cool.

39. In a refrigerator what produces cooling?

(A) The ice which deposits on the freezer

(B) The sudden expansion of a compressed gas

(C) The evaporation of a volatile liquid

(D) None of these

Ans. (B) **(SSC CGL 2004)**

Exp: Refrigerator consists of devices that Compress and expand refrigerant gas. When gas is compressed it expels heat and when it is expanded, it absorbs heat. Thereby produce cooling.

40. Outside of cooking utensils are generally left black from below because

(A) It is difficult to clean daily

(B) Black surface is a good conductor of heat

(C) Black surface is a poor conductor of heat

(D) Black surface is a good absorber of heat

Ans. (D) **(SSC Constable 2013)**

Exp: Black colour absorbs all the radiations that falls on it. Hence, to supply more heat to the food in the utensil they are kept black.

Temperature

41. What is not true about temperature?

(A) It is one of the Seven SI base quantities

(B) It is measured in degree Celsius in SI unit.

(C) Temp 0°C = 273.15 K. (D) All are true.

Ans. (B)

Exp: The S.I unit of temperature is Kelvin (K).

42. Density of water is 1G/CC. It is strictly valid at:

(A) 0°C (B) 4 °C

(C) 25 °C (D) 100 °C

Ans. (B) **(SSC CHL 2013)**

Exp: Because at 4°C, the density of water is maximum and volume of water is minimum.

43. When temperature difference between liquid & its surroundings is doubled, the rate of loss of heat will

(A) Remains same (B) Double

(C) Three times (D) Four times

Ans. (B) **(SSC CAPF 2016)**

Exp: According to Newton's Law of Cooling, the rate of loss of heat from a body is directly proportional to the temperature difference between the body and its surroundings.

44. The temperature of a liquid is 32°F what is the temperature in Celsius scale?

(A) 32°C (B) 0°C

(C) 100°C (D) 212°C

Ans. (B) **(SSC CGL 2016)**

Exp: $T(°C) = \{[T(F)] - 32\} \times \frac{5}{9}$

$T°(C) = (32 - 32) \times \frac{5}{9}$

$T°(C) = 0°C$

45. The temperature at which Reading of both Fahrenheit scale and Celsius scale are same :

(A) 400 (B) – 40

(C) – 340 (D) – 1440

Ans. (B) **(SSS MTS 2006)**

Exp: $F = \frac{9}{5}C + 32$

Let us say F = C

$C = \frac{9}{5}C + 32$

$-32 = \frac{4}{5}C$

$C = -40$

i.e. at – 40 both Fahrenheit and Celsius scale show same reading.

46. Temperature of distant luminous bodies can be determined by

(A) Mercury Thermometers

(B) Gas Thermometers

(C) Pyrometers

(D) Colour Thermometers

Ans. (C) **(SSC CGL 2016)**

Exp: Pyrometer is a device that measures temperature of a surface of the spectrum of thermal radiation from a distance.

47. To measure very high temperature, we use :

(A) Mercury thermometer
(B) Platinum Resistance thermometer
(C) Thermoelectric Pyrometer
(D) None of these

Ans. (C) **(SSC CGL 2006)**

Exp: To measure very high temperature thermo-electric pyrometer is used because it can measure 200°C to 1660°C

48. On a cold day when the room temperature is 15°C the metallic cap of a pen becomes much colder than its plastic body though both are at the same temperature of 15°C because

(A) Metals have high thermal capacity than plastics
(B) Plastics have lower density than metals
(C) Metals are good conductor of heat
(D) Plastics have higher thermal conductivity than metals

Ans. (C) **(SSC CGL 2016)**

Exp: Metals have higher coefficient of thermal conductivity than plastic. So, Metal conducts heat away from our body. But as plastic is an insulator, it will not do so.

49. 0 K is equivalent to

(A) 273°C (B) – 273°C
(C) 0°C (D) 100°C

Ans. (B) **(SSC CGL 2016)**

Exp: 0 K is absolute zero i.e., the lowest possible temperature. At absolute zero all molecular motion cease and the molecules have minimum kinetic Energy.

0 K = – 273.16°C

50. The minimum temperature is measured by

(A) Alcohol Thermometer (B) Thermometer
(C) Maximum Reading Thermometer
(D) Minimum Reading Thermometer

Ans. (A) **(SSC-CHSL 2015)**

Exp: Because freezing point of alcohol (– 114.1°C) is very low. So, alcohol thermometer can be used to measure very low temperature.

51. Temperature inversion is :

(A) Positive lapse rate (B) Negative lapse rate
(C) Neutral condition (D) None of these

Ans. (B) **(SSC-CHSL 2012)**

Exp: Lapse Rate - The rate at which atmospheric temperature decreases with an increase in altitude.

Temperature Inversion - It is when atmospheric temperature increases with increase in altitude, hence it is negative Lapse Rate.

52. To produce the low temperature which of the following principle is used :

(A) Super conductivity (B) Joule – kelvin Effect
(C) Heading effect of current
(D) Adiabatic Demagnetization process

Ans. (D)

Exp: Adiabatic demagnetization is a process of cooling. The principle is that when some materials (rare earth elements) are placed in magnetic field they heat up and get cool down when removed from the magnetic field.

53. Absolute zero is defined as the temperature

(A) At which all molecular motion ceases
(B) At which water boils at 298K
(C) At which liquid helium boils
(D) At which volume becomes zero

Ans. (A) **(SSC CGL 2016)**

Exp: Absolute zero is 0 K. It is the lowest possible temperature. At 0 K, all molecular motion cease and molecules have minimum kinetic energy.

54. In which form is the supplied heat energy stored during change in temperature of substance?

(A) Heat Energy (B) Kinetic Energy
(C) Potential energy
(D) Both kinetic and potential energy

Ans. (B) **(SSC CGL 2016)**

Exp: On supplying heat, atoms of the substance begin to vibrate due to increased kinetic energy.

55. Gas thermometers are more sensitive than liquid thermometer because the gases

(A) Have larger coefficient of expansion
(B) Are lighter
(C) Have low specific heat
(D) Have high specific heat

Ans. (A) **(SSC LDC & DEO 2013)**

Exp: Gas molecules have larger coefficient of expansion than liquid. Hence for a small amount of heat, they show greater volatility.

56. What changes will happen to a bowl of ice and water kept at exactly zero degree Celsius.

(A) All ice will melt (B) All water will become ice
(C) No change will happen
(D) Only some ice will melt

Ans. (C) **(SSC CGL 2010)**

Exp: Heat flows from a body at a higher temperature to a body at lower temperature. As both ice and water are at 0°C. Therefore, no heat flow will take place, hence no change will happen.

57. The temperature of boiling water in a steam engine may be high because

(A) There are dissolved substances in water
(B) There is low pressure inside the boiler
(C) There is high pressure inside the boiler
(D) The fire is at very high temperature

Ans. (C) **(SSC CHSL (2011))**

Exp: The higher the pressure inside a boiler, the higher the temperature of boiling water.

58. Which of the following instruments is used to measure humidity?

(A) Kata Thermometer (B) Anemometer
(C) Sling Psychrometer (D) Clinical Thermometer

Ans. (A) **(SSC Tax. Asst. 2007)**

Exp: Sling Psychrometer consists of two thermometers mounted together with a handle attached on a chain.

Freezing Point and Boiling Point

59. What is triple point of water :

(A) 273.16 K (B) 273.15 K
(C) 0°C (D) 100°C

Ans. (A)

Exp: Triple point – The temperature and pressure at which a substance can exist in equilibrium in the solid, liquid and gaseous state. The triple point of pure water is 0.01°C (273.16 K).

60. The freezing point of fresh water is :

(A) 3°C (B) 5°C
(C) 0°C (D) 4°C

Ans. (C) **(SSC CGL (Tier-I) 2014**

Exp: The freezing point of a liquid is the temperature at which a liquid changes its state to solid. The freezing point of water is 0°C.

61. Lake freeze in cold countries in winter, leaving the water underneath at :

(A) 0°C (B) 0°F
(C) 4°C (D) 4°F

Ans. (C) **(SSC FCI 2012)**

Exp: Ice being a poor conductor of heat, it does not allow atmospheric cold to reach below it. Hence, keeping the water underneath at 4°C.

62. Why boiling point of water decreases with increase in altitude

(A) Low temperature
(B) Low atmospheric pressure
(C) High temperature
(D) High atmospheric pressure

Ans. (B) **(SSC CGL 2012)**

Exp: With increase in altitude, atmospheric pressure decreases. So, the boiling point decreases. As boiling point is directly proportional to the pressure.

63. Why clouds float in atmosphere?

(A) Low pressure (B) Low density
(C) Low viscosity (D) Low temperature

Ans. (B) **(SSC MTS 2014)**

Exp: Clouds are made up of tiny water droplets which have very low density, which makes them very light. This is why clouds float in atmosphere.

64. Soldering of two metals is possible due to the property of

(A) Diffraction (B) Viscosity
(C) Surface tension (D) Cohesion

Ans. (D) **(SSC CHSL 2015)**

Exp: Soldering is the process by which two metals are joined together. Cohesion is the property of material due to which its molecules stick together.

65. In extreme cold conditions in cold countries, water pipes get busted

(A) Because on freezing water expands
(B) Due to the contraction of water pipes
(C) Due to high atmospheric pressure
(D) All of these

Ans. (A)

Exp: On freezing water expands. Thus on expanding the water exerts pressure on the pipe from inside and thus pipe gets busted.

66. Pressure cooker cooks faster because

(A) Boiling point increases with increase in pressure
(B) It cooks the food at low pressure
(C) Higher temperature is attained for cooking
(D) The material of the cooker is a good conductor.

Ans. (A) **(SSC CGL 2012)**

Exp: Inside a pressure cooker, pressure is high which increases the boiling point of water, thereby decreasing time for cooking.

67. Water is not vaporized if

(A) Temperature is 0°C (B) Humidity is 0%
(C) Humidity is 100% (D) Temperature is 100°C

Ans. (C) **(SSC Steno. 2011)**

Exp: If humidity is 100%, water will not get evaporated as air is already saturated with moisture.

68. When heated from 0°C to 100°C volume of a given mass of water will

(A) Increase gradually (B) Decrease gradually
(C) Increase and then will decrease
(D) Decrease and then will increase

Ans. (D) **(SSC CGL 2002)**

Exp: When heated from 0° to 100°C volume of a given mass of water will first decrease and then will increase. This is because of anomalous expansion of water, till 4°C the water will attain maximum density and then decreases. For a given mass, density is inversely proportional to volume. Thus volume will first decrease and then will increase.

69. Vegetables are cooked in lesser time by adding a pinch of salt while cooking because

(A) Boiling point of water increases
(B) Latent heat of vaporization of water decreases
(C) Latent heat of vaporization of water increases
(D) Boiling point of water decreases

Ans. (A) **(SSC CGL 2016)**

Exp: Adding salt raises the boiling point of water, this allows food to get cooked at higher temperature. The higher the temperature, the higher the rate of heat transfer between food and water, thus food gets cooked more quickly.

70. The boiling point of liquid vary as

(A) Pressure varies (B) Temperature varies
(C) Volume varies (D) Density varies

Ans. (A) **(SSC CGL 2016)**

Exp: On increasing pressure, boiling point increases. On decreasing pressure, boiling point decreases.

71. When water freezes its density.

(A) Decreases (B) Becomes zero
(C) Remains constant (D) Increases

Ans. (A) **(SSC Constable 2015)**

Exp: At 4°C water reaches its maximum density. As it approaches, the freezing point there is a decrease in its density.

72. Super cooling stands for cooling of a liquid

(A) At freezing point (B) At melting point
(C) Below freezing point (D) Above melting point

Ans. (C) **(SSC CGL 2016)**

Exp: Supercooling is the process of cooling of a liquid below its freezing point without undergoing solidification or crystallization.

Miscellaneous

73. Refrigerator protects the food from contamination because

(A) At its low temperature bacteria & fungus become non-reactive.
(B) Germs get died at this temperature.
(C) Germs get freeze at this temperature.
(D) It makes food free from germs.

Ans. (A) **(SSC DEO 2009)**

Exp: At low temperature germs can not multiply and thus become non-reactive.

74. Cryogenic science is related to

(A) High temperature (B) Low temperature
(C) Friction and wear-tear
(D) Increment in crystals.

Ans. (B) **(SSC CGL 2005)**

Exp: Cryogenics is the branch of physics which deals with the production and behaviour of materials at very low temperature.

75. What determines the colour of a star?

(A) Temperature (B) Distance
(C) Radius (D) Atmospheric Pressure

Ans. (A) **(SSC CGL 2014)**

Exp: The colour of star depends on its surface temperature, as at dry temperature stars emit frequencies of different colour.

76. The rate of cooling depends on which factor?

(A) Temperature difference between body and its surroundings
(B) Nature of radiated surface
(C) Area of radiated surface
(D) All of the above

Ans. (D) **(SSC CPO 2009)**

Exp: According to Newton's law of cooling, the rate of cooling of an object for a given area depends upon the temperature difference between the body and the surroundings. Conductors are bettter Radiators. More the area, higher will be the rate of cooling.

77. A copper disc has a hole. If the disc is heated the size of hole

(A) Increases (D) Decreases
(C) No change
(D) First increase then decreases

Ans. (A) **(SSC Matric Level 2011)**

Exp: Metal expands on heating, the hole will expand in the same ratio in which the metal expands.

78. During hot weather the fan produces a feeling of comfort this is because

(A) Fan supplies cool air (B) Fan cools the air
(C) Our perspiration evaporates rapidly
(D) Conductivity of air increases

Ans. (C) **(SSC Combined Matric Level 2002)**

Exp: The fan circulates air. When the moving air comes in contact with our perspiration it carries away the heat from our skin and thus produces cooling.

79. Ocean currents are an example of

(A) Convection (B) Conduction
(C) Insulation (D) Radiation

Ans.(A) **(SSC Matric Level 2002)**

Exp: Wind and Ocean currents are example of convection currents.

80. A circular plate, a cube and a sphere all made up of same material and having the same mass are heated to 300°C and left in a room Which of them will have slowest rate of cooling?

(A) Circular plate (B) Cube
(C) Sphere
(D) All will cool at the same rate

Ans. (C) **(SSC CGL 2000)**

Exp: Rate of cooling is directly proportional to the surface area of body through which heat is transferred. For same volume, sphere has minimum area and circular plate has maximum area. So, sphere will have slowest rate of cooling and circular plate will have maximum rate of cooling.

81. Conversion of heat energy into electric energy is achieved by using

(A) Ammeter (B) Hydrometer
(C) Voltmeter (D) Thermocouple

Ans. (D) **SSC Steno (Grand C & D) 2010**

Exp: Thermocouple is a device which converts incoming heat radiations (heat energy) into electrical energy.

82. On heating frozen foods in sealed pouches in a microwave why do you first poke holes in the pouch?

(A) To prevent steam pressure from bursting open the pouch.
(B) To allow the heat get into the food through the hole
(C) To allow the microwaves to get into the food through the holes.
(D) To allow the aroma of the food to come out through the hole.

Ans. (A) **(SSC Matric Level 2000)**

Exp: Water content inside frozen foods converts into steam on heating. Holes are picked in the pouch to allow steam to escape.

83. Cloudy nights are warmer because clouds mainly.

(A) Absorb heat from the atmosphere and send it towards the Earth.

(B) Prevent cold waves from the sky descending on the earth

(C) Reflect back the heat given by the Earth.

(D) Producing heat and radiate it toward the Earth.

Ans. (C) **(SSC Investigator 2010)**

Exp: On a clearer night, there are no clouds to reflect heat back to the earth's atmosphere. So heat escapes from the atmosphere. But on a cloudy night, clouds trap the heat and reflect back the heat which try to escape from the atmosphere.

84. The word insolation means

(A) The matters which insulate

(B) Incoming solar radiation

(C) Insoluble matters (D) None of these above

Ans. (B) **(SSC CHSL 2015)**

Exp: Insolation - It is the amount of solar radiation reaching to the earth's surface in a given area.

85. The cooling by a desert cooler is based on

(A) Hot air replacement (B) Air dehydration

(C) Evaporative cooling (D) Air rehydration

Ans. (C) **(SSC CGL 2016)**

Exp: Desert coolers are based on the principle of evaporative cooling. Water gets evaporated by taking heat from the surrounding air. Thereby reducing the temperature of surroundings, which produces cooling effect.

86. The energy that can harness heat stored below the earth's surface is known as

(A) Thermal Energy (B) Nuclear Energy

(C) Tidal Energy (D) Geo-Thermal energy

Ans. (D) **(SSC CHSL 2011)**

Exp: Geothermal energy is the heat generated and stored inside the earth's surface.

87. A gap is left between two rails of a railway track to accommodate _____ of the metal.

(A) Areal Expansion (B) Volume Expansion

(C) Linear Expansion (D) Apparent Expansion

Ans. (C) **(SSC Matric Level 2002)**

Exp: In summer the metal expands. In winter the metal contracts. Since the expansion in metallic rails is lengthwise, it is termed as Linear expansion

88. In a diesel engine the high temperature needed to ignite the fuel is achieved by

(A) Using heat from exhaust

(B) The battery

(C) Compressing air in the cylinders

(D) An electrical spark

Ans. (C) **(SSC Matric Level 2002)**

Exp: Diesel engines use the heat of compressed air to ignite the fuel. The work done on gas to compress it gets converted to its internal energy and thus temperature gets raised.

89. Mud houses are cooler in summers and warmer in winters as compared to brick houses because

(A) Mud is a good conductor

(B) Mud is bad conductor

(C) Mud is good insulator

(D) Evaporation of water causes cooling in summers and sunlight coming through holes causes warming in winters.

Ans. (C) **(SSC Matric level 2002)**

Exp: Mud is a bad conductor of heat. In summer the outside heat can not enter the house and in winter inside heat can not flow outside.

90. Relative humidity is expressed in terms of

(A) Gram (B) Kilogram

(C) Percentage (D) Ratio

Ans. (C) **(SSC CGL 2014)**

Exp: Relative humidity is the ratio of water vapour density to the saturation water vapour density and expressed in percentage

$$\text{Relative Humidity} = \frac{\text{Actual vapour Density}}{\text{Saturation Vapour Desnsity}} \times 100$$

91. Woollen cloth protects the body from cold because

(A) It is a good conductor of heat

(B) It is a poor conductor of heat

(C) External heat rays enter into the body through the woollen cloth

(D) It reflects heat

Ans. (B) **(SSC Combined Matric Level 2002)**

Exp: Woollen cloths are a poor conductor of heat, hence do not allow body heat to escape outside.

92. The 'four stroke petrol engine' is based on

(A) Carnot - cycle (B) Otto - cycle

(C) Diesel - cycle (D) Boyle's - cycle

Ans. (B) **(SSC Combined Matric Level 2002)**

Exp: The four stroke petrol engine is based on Otto cycle. The cycles are.

(i) Intake stroke (ii) Compression stroke

(iii) Expansion stroke (iv) Exhaust stroke

93. Water is used in car radiator because of its

(A) Low density (B) Easy availability

(C) High specific heat capacity

(D) Low boiling point

Ans. (C) **(SSC Combined Matric Level 2006)**

Exp: Water has high specific heat which allows water to draw up more heat from the radiator and hence keeps it cool.

94. How much mechanical work must be done to completely melt 1 gram of ice at 0° C?

(A) 4.2 J (B) 80 J

(C) 336 J (D) 2268 J

Ans. (C) **(SSC Combined Matric Level 2006)**

Exp: The heat required to convert 1 gm of ice at 0°C into 1 gm of water at 0°C is called as Latent Heat of Fusion. It is 336 J for ice to water.

95. Heat stored in water vapour is

(A) Specific heat (B) Latent heat
(C) Absolute heat (D) Relative heat

Ans. (B) **(SSC Combined Matric Level 2008)**

Exp: When phase of water is changed from liquid to vapour, heat energy gets stored, which is known as Latent heat of vapourization.

96. What happens to a liquid, when the vapour pressure equals the atmospheric pressure?

(A) The liquid cools (B) The liquid boils
(C) No change (D) The liquid evaporates

Ans. (B) **(SSC DEO 2008)**

Exp: The condition when vapour pressure of liquid is equal to the atmospheric pressure is termed as Boiling. Hence at that temperature the liquid boils.

97. Specific gravity is defined as the ratio of

(A) Density of the substance to the density of water
(B) Density of the substance to the density of water at 0°C
(C) Density of water at 4°C to the density of the substance
(D) Density of the substance to the density of water at 4° C

Ans. (D) **(SSC MTS 2013)**

Exp: Specific gravity is the density of any substance relative to the density of water at 4°C.

98. Which of the following options correctly explains the term heat budget?

(A) It is a mode of transfer of heat through matter by molecular activity
(B) It is the balance between incoming and outgoing heat radiation
(C) It is the radiation from the earth in the form of long waves
(D) It is the amount of heat which the surface of earth receives from the sun

Ans. (B) **(SSC CGL 2015)**

Exp: Heat budget is the balance between incoming solar radiation and the heat radiation emitted back by earth. Any unbalance in this, makes the earth warmer or cooler.

99. Alcohol is more volatile than water because _____ is lower than water.

(A) Its boiling point (B) Its density
(C) Its viscosity (D) Its surcface tension

Ans. (A) **(SSC CGL 2016)**

Exp: Lower the boiling point higher is the volatility. Alcohol has boiling point 78°C whereas boiling point of water is 100°C.

100. At boiling point of liquids, its

(A) Temperature increases
(B) Atmospheric pressure increases
(C) Temperature remains constant
(D) Vapour pressure decreases

Ans. (C) **(SSC CGL 2016)**

Exp: Temperature remains constant at boiling point because the extra heat added is utilized as Latent heat of vapourization to change the phase of liquid to vapour.

101. Why the clear nights are cooler than the cloudy nights?

(A) Conductance (B) Condensation
(C) Radiation (D) Insulation

Ans. (C) **(SSC CPO 2017)**

Exp: Radiation- The energy is transferred in the form of waves. No medium is required for radiation. On a clearer nights, there are no clouds to reflect heat back to the earth's atmosphere. So, heat escapes from the atmosphere.

102. Direction of heat flow depends on _____.

(A) Density (B) Energy
(C) Mass (D) Temperature

Ans. (D) **(SSC CPO 2017)**

Exp: Direction of heat flow depends on temperature. Heat always flows from a body at higher temperature to a body at a lower temperature.

103. The working principle of a mercury thermometer is _____.

(A) Change in density of matter on heating
(B) Expansion of matter on heating
(C) Thermal resistance of matter
(D) Change in mass of matter on heating

Ans. (B) **(SSC CPO 2017)**

Exp: Mercury thermometer is based on the principle that liquids expand when heated and contract when cooled. So, when the temperature increases, the mercury expands and rises up in the tube and when the temperature decreases it contracts and falls down in the tube.

104. The first law of thermodynamics is related to conservation of which one of the following?

(A) Energy (B) Number of molecules
(C) Number of moles (D) Temperature

Ans. (A) **(SSC CPO 2017)**

Exp: First Law of Thermodynamics is a version of the Law of Conservation of Energy. This law states that the total energy of an isolated system is constant; energy can be transformed from one form to another, but can neither be created nor be destroyed.

105. At what temperature water converts to water vapour?

(A) 273 K (B) 100 K
(C) 373 K (D) 0 K

Ans. (C) **(SSC CPO 2017)**

Exp: At 373K (100°C) temperature water converts to water vapour.

106. Which one of the following is a bad Thermal Conductor?

(A) Aluminium (B) Copper
(C) Glass (D) Silver

Ans. (C) **(SSC CGL 2017)**

Exp: Glass is a bad thermal conductor because in glass there is no flow of electron. So, it doesn't conduct heat. It is also bad conductor of electricity.

107. Which of the following device is best suited for measuring the temperature inside metallurgical furnaces?

(A) Pyrometer (B) Thermocouple
(C) Thermometer (D) Thermistor

Ans. (A) **(SSC CGL 2017)**

Exp: Pyrometer is the device used for measuring relatively high temperatures such as are encountered in furnaces. Pyrometer works on the principle of sensation of heat radiation.

108. At what temperature (in Fahrenheit) pure water freezes?

(A) 32 (B) 0
(C) 48 (D) 37

Ans. (A) **(SSC CGL 2017)**

Exp: Pure water freezes at 32 Fahrenheit,0 degree Celsius, 273.15 Kelvin.

$T(F^\circ) = T(^\circ C) \times \frac{9}{5} + 32$

109. What is the SI unit of temperature?

(A) Kelvin (B) Joule
(C) Celsius (D) Fahrenheit

Ans. (A) **(SSC CGL 2017)**

Exp: S.I. unit of temperature is Kelvin (K) named after Lord Kelvin. The Kelvin is defined as the fraction $\frac{1}{273.16}$ of the thermodynamic temperature of the triple point of water (exactly 0.1°C or 32.018°F)

110. Who invented the Centigrade scale?

(A) Anders Celsius
(B) Daniel Gabriel Fahrenheit
(C) William Thomson
(D) Wright Brothers

Ans. (A) **(SSC CGL 2017)**

Exp: The centigrade scale was invented by Swedish Astronomer Anders Celsius (1701-1744) has 100 degrees between the freezing point (0°C) and boiling point (100°C) of pure water at sea level air pressure.

111. At what temperature (in degree celsius), the numerical values on Celsius and Fahrenheit scales become equal?

(A) -40 (B) 40
(C) 273 (D) -273

Ans. (A) **(SSC CGL 2017)**

Exp: The temperature when both are equal by given below equation:-

Formula:-

$$^\circ C = \left(^\circ C \times \frac{9}{5}\right) + 32$$

$$^\circ C - ^\circ C \times \frac{9}{5} = 32$$

$$\frac{-4}{5} \times ^\circ C = 32$$

$$^\circ C = -32 \times \frac{5}{4}$$

$$^\circ C = -40$$

$$^\circ F = \left(^\circ F \times \frac{9}{5}\right) + 32$$

$$^\circ F - \left(^\circ F \times \frac{9}{5}\right) = 32$$

$$\frac{-4}{5} \times ^\circ F = 32$$

$$^\circ F = -32 \times \frac{5}{4}$$

$$^\circ F = -40$$

So, the temperature when both the Celsius and Fahrenheit Scales are the same is –40 degrees.

112. Kelvin (K) is the unit of measurement of _____.

(A) Density (B) Pressure
(C) Mass (D) Temperature

Ans.(D) **(SSC CGL 2017)**

Exp- **Same as Q. No. 109**

113. The melting point of ice is ____ K.

(A) 253.16 (B) 263.16
(C) 273.16 (D) 283.16

Ans. (C) **(SSC CGL 2017)**

Exp: Melting point of a solid is the temperature at which it changes its state from solid to liquid at atmospheric pressure. For ice, Melting point of ice is 0°C or 273K.

Chapter-02

WAVES

Type, Properties and Wave Motion

1. When a stone is thrown in calm water of a pond waves produced are-

(A) Longitudinal wave (B) Transverse wave
(C) Both A and B (D) Wave does not Produced

Ans. (C) **(SSC CHSL 2013)**

Exp: The particles execute a clockwise motion i.e. up-down as well as to and fro. Hence, both tranverse and longitudinal waves are produced.

2. Which instrument can be used to study the wave form of a signal?

(A) Spectrometer (B) Oscilloscope
(C) Sonometer (D) P-n Junction diode

Ans. (B) **(SSC MTS 2014)**

Exp: An oscilloscope is an instrument which displays the electronic signal in the form of waveforms on a screen.

3. What is found in frequency modulation?

(A) Fixed frequency (B) Fixed dimension
(C) Change in frequency and dimension
(D) Change in dimension only

Ans. (B) **(SSC Sec. Officer (Audit) 1997)**

Exp: In frequency modulation, the frequency of the signal is varied whereas amplitude (dimension) is kept constant.

4. These waves cannot be transmitted through vacuum

(A) Light (B) Sound
(C) Heat (D) Electromagnetic

Ans. (B) **(SSC Matric Level 2002)**

Exp: Sound wave is a longitudinal wave. Hence it requires a material medium for its propagation. Hence, it can not travel in vacuum.

5. Stationary wave is formed by

(A) A transverse wave superposing a longitudinal wave
(B) Two waves of the same speed superposing
(C) Two waves of same frequency travelling in the same direction
(D) Two waves of same frequency travelling in the opposite direction

Ans. (D) **(SSC CGL 2013)**

Exp: A stationary wave is formed by superposition of two waves having same amplitude and frequency but are moving in opposite direction.

6. Intensity of any wave is proportional to which of the following?

(A) Amplitude (B) Square of amplitude
(C) Square root of amplitude
(D) Cube of amplitude

Ans. (B) **(SSC CGL 2016)**

Exp: Intensity of a wave is proportional to the square of its amplitude, i.e. Intensity $\propto$ Amplitude^2.

EM Waves

7. The reverse effect of X-ray emission is

(A) Raman Effect (B) Compton Effect
(C) Zeeman Effect (D) Photoelectric Effect

Ans. (D) **(SSC CGL 2016)**

Exp: X-rays are produced when electrons strike metal target. While in photoelectric effect electrons are emitted when incident radiation of suitable frequency falls on a metal target.

8. Which of the following waves can not be polarized.

(A) Radio (B) Ultraviolet
(C) Infrared (D) Ultrasonic

Ans. (D) **(SSC CGL 2016)**

Exp: ultrasonic waves are sound waves. As sound waves are longitudinal waves, they cannot be polarized because longitudinal waves cannot be polarised.

9. Which one of the following is not an electromagnetic wave?

(A) X-ray (B) Gamma-ray
(C) Cathode Ray (D) Infrared

Ans. (C) **(SSC CGL 2016)**

Exp: The electromagnetic radiation is classified into Radio wave, Microwave, Infra-red wave, Visible light, Ultraviolet wave, X-rays and Gamma rays on the basis of wavelength.

10. Which of the following has the lowest frequency?

(A) Visible Ray (B) Gamma Ray
(C) X-Ray (D) Ultraviolet Rays

Ans. (A) **(SSC CGL 2016)**

Exp: The electromagnetic spectrum is in order of increasing frequencies: Radiowaves, Microwaves, Infrared waves, Visible Light, Ultraviolet waves, X-rays and Gamma Rays.

11. Every hot object emits

(A) X-rays (B) Visible light
(C) Infrared Rays (D) Ultraviolet Rays

Ans. (C) **(SSC CGL 2016)**

Exp: All hot object emits Infrared radiation. This radiation cannot be seen with naked eyes but can only be felt in form of heat.

12. Which of the following is not true about X-rays?

(A) Have low penetrating power
(B) Travel with the speed of light
(C) Can be reflected or refracted
(D) Can affect photographic plates.

Ans. (A) **(SSC CGL 2016)**

Exp: X-rays have high penetrating power as they can penetrate through spine and heel taking images of bones.

13. In which region of electromagnetic spectrum does the Lyman series of Hydrogen atom lie

(A) Visible (B) Infrared
(C) Ultraviolet (D) X-Ray

Ans. (C) **(SSC CGL 2016)**

Exp: When an electron jumps from higher energy state to the ground state (n = 1)
The series of spectral lines emitted are called Lyman series and it is in Ultraviolet region.

14. Which of these travels in glass with minimum velocity

(A) Red light (B) Violet Light
(C) Green Light (D) Yellow Light

Ans. (B) **(SSC CGL 2015)**

Exp: Speed of light in any medium is directly proportional to the wavelength of light.
As violet has minimum wavelength, So its speed is minimum.

15. X-Rays are

(A) Positively charged particles
(B) Negatively charged particles
(C) Neutral particles (D) None of these

Ans. (C) **(SSC CGL 2015)**

Exp: X-rays are high energy EM-waves, with very short wavelength. The x-rays consists of neutral particles called photons.

16. The damage of the human body due to radiation (X-Rays or -rays) is measured in

(A) Rems (B) Roentgen
(C) Curei (D) Rads

Ans. (D) **(SSC CGL 2014)**

Exp: Rads refer to radiation absorbed doses. It is the amount of energy carried by radiation that gets absorbed by body tissues.

17. Transition ions absorb light in region

(A) Infrared (B) Ultraviolet
(C) Microwave (D) Visible

Ans. (D) **(SSC CGL 2014)**

Exp: Transition ions absorbs light in visible region and also reflect some visible spectrum. For example:
Cu (II) absorbs entire light in visible spectrum execpt blue hence it appears blue.

18. Green house effect is the heating up of the Earth's atmosphere which is due to

(A) The Ultraviolet Rays (B) Gamma-rays
(C) The infrared rays (D) X-rays

Ans. (C) **(SSC MTS 2014)**

Exp: The Infrared rays of the sunlight are the component responsible for heating. The Green house effect is the phenomenon of heating up of the earth's atmosphere by sunlight.

19. Indicate the correct arrangement for electromagnetic radiation in order of their increasing wavelength

(A) Microwave, Infrared, Visible, X-Rays
(B) X-Rays, Visible, Infrared, Microwave
(C) Visible, Infrared, Microwave, X-Rays
(D) X-rays, Infrared, Visible, Microwave

Ans. (B) **(SSC CAPFs and CISF 2013)**

Exp: The E.M. wave spectrum in order of decreasing wavelength is as follows Radiowaves, Microwaves, Infrared, Visible, U.V., X-rays and γ Rays.

20. Which of the following supports particle nature of photons?

(A) Diffraction (B) Polarization
(C) Photoelectric effect (D) Interference

Ans. (C) **(SSC CAPF CISF 2013)**

Exp: Photoelectric effect is the phenomenon of emission of electron when a light of suitable frequency falls on metal surface. Here the photon (Particle) transfers its energy to electrons.

21. Matter waves are

(A) de Broglie waves (B) Electromagnetic waves
(C) Transverse waves (D) longitudinal waves

Ans. (A) **(SSC CHSL 2013)**

Exp: Matter waves are de-Broglie waves. Matter waves are the waves which show dual nature. They behave like particle and travel like waves.

22. Which electromagnetic radiation is used for satellite communication?

(A) Ultraviolet (B) Infrared
(C) Microwave (D) Millimeter wave

Ans. (C) **(SSC CHSL 2013)**

Exp: Microwaves have short wavelength and high frequency, hence they pass through earth's atmosphere and can reach to satellite easily.

23. The radiation initially produced in fluorescent tube is

(A) Infrared (B) Ultraviolet
(C) Microwaves (D) X-Rays

Ans. (B) **(SSC Matric Level 2002)**

Exp: Flourescent tube emits ultraviolet radiation. Due to this flourescent tubes cause various health risk to humans.

24. Waves that are required for long distance wireless communication are

(A) Infrared Rays (B) Ultraviolet Rays
(C) Radio waves (D) Microwaves

Ans. (C) **(SSC CHSL 2013)**

Exp: Radio waves are used for long distance wireless communication. They get transmitted from sender, gets reflected by ionosphere and thus reaches to reciever.

25. Ultra violet radiations of the Sun do not reach the earth because, earth's atmosphere is surrounded by

(A) Carbon dioxide (B) Ammonia
(C) Chlorine (D) Ozone

Ans. (D) **(SSC Sec. Officer 2001)**

Exp: Ozone layer is composed of O_3 molecules which absorbs harmful U.V rays coming from the sun hence they cannot penetrate earths atmosohere.

26. Gamma rays can cause

(A) Gene mutation (B) Sneezing
(C) Iodine (D) Sodium chloride

Ans. (A) **(SSC CPO 2002)**

Exp: Gamma rays can cause gene mutation which is the alternation in the sequence of DNA.

27. Ultraviolet radiations has more energy as compare to-

(A) Infrared Radiation (B) Gamma Radiation
(C) X-Rays (D) Space Rays

Ans. (A) **(SSC Sec. Off. 2002)**

Exp: Energy of E.M. radition directly proportional to the frequency. Higher the frequency, higher will be the energy. Order of energy for given options is:
Space rays > Gamma Radiation > X rays > UV rays > Infrared radiation.

28. Ultraviolet rays can be used in water treatment as

(A) Precipitator (B) Hydrolyser
(C) Disinfectant (D) Flocculator

Ans. (C) **(SSC CGL 2013)**

Exp: U.V. light acts as disinfectant by changing the DNA pattern of bacteria in water so that they can't multiply.

29. The device used for measuring the wavelength of X-rays is:

(A) Cyclotron (B) Bragg's Spectrometer
(C) Mass spectrometer (D) GM counter

Ans. (B) **(SSC CGL 2013)**

Exp: Bragg's spectrometer is used to measure the wavelength of X-rays. It operates on the principle of diffraction.

30. Radar is used to-

(A) To locate submerged submarines.
(B) Receive signal from radio receivers.
(C) Detect and locate distant objects.
(D) Locate geostationary satellites.

Ans. (C)

Exp: RADAR refers to Radio Detection and Ranging. RADAR uses radiowave to detect and locate distant objects.

31. Who is the inventor of RADAR?

(A) H.N. Van Tessel (B) William K. Rontgen
(C) P.T. Farnswarth
(D) A.H. Taylor and Lio C. Young

Ans. (D)

Exp: A.H. Taylor and Lio C. Young are credited with the invention of RADAR.

32. Who discovered X-Rays?

(A) Roentgen (B) Becquerel
(C) Marie curie (D) Wan Loo

Ans. (A) **[SSC Tax. Asst. 2009]**

Exp: William conrad roentgen discovered X-rays.

33. The least penetrating power ray is —

(A) α-rays (B) β-ray
(C) γ-rays (D) X-ray

Ans. (A)

Exp: -rays have the least penetrating power it can even be blocked by a piece of paper.

β – rays can pass through aluminium foil.

γ – rays can even pass through lead box.

X – rays can penetrate human body and are thus used to create image of bones.

34. X-rays can be used.

(A) To detect defects in precious stones and diamonds.
(B) To detect heart diseases.
(C) To detect gold under the earth
(D) For cutting and welding of metals.

Ans. (A) **(SSC CGL 2002)**

Exp: By studying the X-rays diffraction pattern of precious stone, defects can be detected.

35. Wavelength of visible spectrum is –

(A) 1300 Å– 3000 Å (B) 3900 Å – 7600 Å
(C) 7800 Å – 8000 Å (D) 8500 Å – 9800 Å

Ans. (B) **(SSC CPO 2005)**

Exp: The visible region lies in the wavelength range of 3900 Å – 7800Å.

36. In a Filament type Light bulb most of the electric power consumed appear as –

(A) Visible Light (B) Infrared Light
(C) Ultraviolet (D) Fluorescent Light

Ans. (B) **(SSC CHSL 2013)**

Exp: In a filament type light bulb only 2% – 4% energy is converted to visible light where as more than 95% energy is wasted as heat in the form of infrared light.

37. Which of the following is used in MRI machine?

(A) Sound wave (B) X-rays
(C) Ultrasonic wave (D) Magnetic wave

Ans. (D) **(SSC FCI 2012)**

Exp: MRI stands for magnetic resonance imaging. It uses magnetic waves to form image of internal body organs.

38. A wavelength of 0.3 m is produced in air and it travels at a speed of 300 m/s. Then it will be an-

(A) Audible wave (B) Ultrasonic
(C) Microwave (D) Infrasonic

Ans. (A) **(SSC CHSL 2005)**

Exp: Frequency = $\frac{\text{Velocity}}{\text{wavelength}} = \frac{300}{0.3} = 1000$ Hz

Since, Audible frequency range is 20 – 20,000 Hz. Hence, the given wave will be audible in nature.

39. Bolometer is used to measure which of the following?

(A) Frequency (B) Temperature
(C) Velocity (D) Wavelength

Ans. (B) **(SSC Tax. Asst. 2009)**

Exp: Bolometer is an instrument used for detecting heat or electromagnetic radiation. It is used in thermal cameras, to detect forest fires, etc.

40. Coolidge tube is used to produce

(A) Radio waves (B) Micro waves
(C) X-rays (D) Gamma rays

Ans. (C) **(SSC CGL 2002)**

Exp: Coolidge tube is a vacuum tube which is used in the production of X-rays. X-rays are high energy EM waves.

41. Which of the following parts of the sunlight makes the solar cooker hot?

(A) Ultraviolet (B) Red light
(C) Infrared (D) Cosmic rays

Ans. (C) **(SSC Tax Asst. 2004)**

Exp: Infra Red component of white light is responsible for heating. Thus it is Infra-Red waves which make solar cooker heat up.

42. When a vehicle passes, TV reception gets distorted. This is because

(A) Metal reflects radiowaves
(B) Spark plug creates electromagnetic disturbances
(C) Vehicle pollution affects the performance of the TV components
(D) Modern vehicles use electro-ignition system

Ans.(B) **(SSC CPO SI 2005)**

Exp: Spark plug in vehicle emits electro magnetic waves and they interfere with electromagnetic waves of T.V receiver, antenna and create disturbances. Due to this T.V reception gets distorted.

43. Where are mesons found?

(A) Cosmic rays (B) X-rays
(C) Gamma rays (D) Laser beam

Ans. (A) **(SSC Sec. Officer 2005)**

Exp: Mesons are found in cosmic rays. Mesons are subatomic particles which are very unstable.

44. What is the full form of 'AM' regarding radio broadcasting?

(A) Amplitude Movement (B) Anywhere Movement
(C) Amplitude Matching (D) Amplitude Modulation

Ans. (D)

Exp: AM stands for amplitude modulation. It is used in electronic communication in which amplitude of the carrier waves is modulated according to the modulating signal.

45. The scientist who first sent electromagnetic waves to distant places is

(A) James Clerk Maxwell (B) Heinrich Hertz
(C) Thomas Alva Edison (D) John Logie Baird

Ans. (B) **(SSC CISF ASI 2010)**

Exp: Heinrich hertz first sent electromagnetic waves to distant places. Electromagnetic waves are used to transmit signals to T.V., telephone etc.

46. Gamma rays have greatest similarity with

(A) α-rays (B) β-rays
(C) X-rays (D) U.V.-rays

Ans. (C) **(SSC Asst. Grade 2011)**

Exp: Gamma rays and X-rays have various similarities like both travel at the speed of light, both have high energy photons and both are the forms of electromagnetic waves.

47. The audio signals of TV are

(A) Amplitude modulated (B) Frequency modulated
(C) Unmodulated (D) Velocity modulated

Ans. (B) **(SSC Matric Level 2002)**

Exp: Audio signals of TV are frequency modulated. Audio signals have frequency in the range of 20 Hz to 20,000 Hz. This is also the limit of human hearing.

48. Tape recorder should not be kept near one of the following things:

(A) Clock (B) Magnet
(C) Electrical switchboard (D) Radio

Ans. (B) **(SSC Matric Level 2002)**

Exp: Tape recorder works on the principle of magnetic field. So if it will be kept near magnet, the magnetic field of magnet and tape will interfere and cause problem in working of tape recorder.

49. Night photography and photography in mist and fog are possible using

(A) Ultra-violet radiation (B) Infra-red radiation
(C) Microwave radiation (D) Gamma radiation

Ans. (B) **(SSC Matric Level 2002)**

Exp: Fog, mist, clouds and darkness are transparent to Infrared radiation.

50. Forged documents are detected by

(A) Ultraviolet rays (B) Infra-red rays
(C) Beta rays (D) Gamma rays

Ans. (A) **(SSC Matric Level 2002)**

Exp: Documents that are authentic, will glow when illuminated by Ultraviolet radiation.

51. In the remote control of television, electromagnetic waves used are

(A) Ultraviolet (B) Microwave
(C) Radiowave (D) Infrared

Ans. (D) **(SSC Delhi Police SI 2012)**

Exp: Remote control of the television make use of infrared waves to send signals. Infrared radiation is a kind of invisible light and human eye cannot detect it.

52. Which of the following radiations has the least wavelength?

(A) X-rays (B) α-rays
(C) γ-rays (D) β-rays

Ans. (C) **(SSC MTS 2013)**

Exp: Electromagnetic spectrum includes waves from longer wavelength to shorter wavelength. γ-rays are placed at the end of electromagnetic spectrum having shortest wavelength.

Simple Harmonic Motion

53. A seconds pendulum is a pendulum whose time period is —

(A) 1 sec (B) 4 sec
(C) 3 sec (D) 2 sec

Ans. (D)

Exp: A seconds pendulum is a pendulum whose time period is 2 sec, one second for swing in one direction and one second for the return swing.

54. What is the motion which repeats itself after regular interval of time?

(A) Periodic Motion (B) Simple Harmonic Motion
(C) Undamping Motion (D) Vibratory Motion

Ans. (A) **(SSC MTS 2013)**

Exp: Periodic motion is the motion which repeats itself after a regular interval of time.
eg. motion of pendulum of clock.

55. Which of the following waves has the highest frequency?
(A) Radio (B) Infrared
(C) Microwaves (D) Gamma-rays

Ans. (D) **(SSC CPO 2017)**

Exp: Gamma-rays has the highest frequency.
The order of increasing frequency:- Radio waves < Micro waves < Infrared waves < Gramma-rays.

56. _____ are used for communication in artificial satellites.
(A) Infrared waves (B) Radio waves
(C) Ultraviolet (UV) rays
(D) Amplitude Modulation (A.M.) waves

Ans. (B) **(SSC CPO 2017)**

Exp: Radio waves are used for communication in artificial satellites. Radio waves have lower frequencies and lower wavelengths than microwaves. Hence, they are used to transmit signals to television and radios.

57. What is the distance between a crest and a consecutive trough in a transverse wave?
(A) Wavelength (B) Amplitude
(C) Half of the wavelength
(D) Twice of wavelength

Ans. (C) **(SSC CPO 2017)**

Exp: The distance between consecutive crests is one wavelength and the distance between a crest and a consecutive trough in a transverse wave is half of the wavelength.

58. Which one of the following is not a property of electromagnetic waves?
(A) Electromagnetic waves do not show interference and diffraction.
(B) Oscillating electric field and magnetic field are perpendicular to each other.
(C) Electromagnetic waves are transverse waves
(D) Electromagnetic waves do not require a medium to propagate.

Ans. (A) **(SSC CGL 2017)**

Exp: Electromagnetic waves do not show interference and diffraction.

59. The time taken by a pendulum to complete one oscillation is called its?
(A) Maximum speed
(B) Average speed
(C) Time period
(D) Time interval

Ans. (C) **(SSC CGL 2017)**

Exp: Time Period is the time taken by the pendulum to make one complete oscillation. It is represented by the letter T.

Chapter-03

Light

Diffraction, Dispersion, Scattering

1. Sun appears red in colour during sunrise and sunset due to

(A) The fact that sun emits only red colour at that time
(B) Red light having longer wavelength scatters away
(C) The sun comes out of the mountains
(D) The fact that all other colours scatter away except red

Ans. (D) **(SSC CGL 2016)**

Exp: Components of light get scattered in the atmosphere. Red having the largest wavelength does not get scatter much. Therefore sun appears red in colour at sunrise and sunset. Scattering is inversely related to wavelength. Red having maximum wavelength is scattered least and hence reaches our eye.

2. The colour of the ocean appears to be blue because the sunlight falling on it is

(A) Reflected (B) Refracted
(C) Diffracted (D) Scattered

Ans. (D) **(SSC CGL 2016)**

Exp: When the sunlight falls on the ocean, components with longer wavelength (red, orange and yellow) are absorbed more strongly by water than shorter wavelength components (blue). So it is blue light that gets returned/scattered.

3. In the absence of the earth's atmosphere sky would appear

(A) Blue (B) Deep Red
(C) White (D) Black

Ans. (D) **(SSC CGL 2016)**

Exp: In the absence of the earth's atmosphere, sky will appear black because there are no particles present to scatter light.

4. Which is the phenomenon which established the transverse nature of light?

(A) Reflection (B) Refraction
(C) Diffraction (D) Polarization

Ans. (D) **(SSC CGL 2016)**

Exp: Transverse nature of light wave means the direction of oscillation of light particles is perpendicular to the direction of propagation of light. The Phenomenon of restricting the oscillation of a wave to just one direction in the transverse plan is called as Polarization.

5. Rainbows are formed when sunlight

(A) Incident on rain drops hanging in the atmosphere is dispersed after suffering refraction
(B) Incident on rain drops hanging in the atmosphere is dispersed after suffering refraction and internal reflection.
(C) Incident on raindrops hanging in the atmosphere is dispensed after suffering reflection
(D) None of the given statement is correct

Ans. (B) **(SSC CGL 2015)**

Exp: Rainbow is formed by dispersion, refraction and total internal reflection of light in the water droplet.

6. Which of the following colour of light deviates least through the prism?

(A) Yellow (B) Green
(C) Violet (D) Red

Ans. (D) **(SSC CGL 2016)**

Exp: The smaller the wavelength the larger will be the deviation (refraction). As the red light has largest wavelength, it deviates the least.

7. Rainbow is formed due to

(A) Refraction and Dispersion
(B) Scattering and Refraction
(C) Diffraction and Refraction
(D) Reflection and Refraction

Ans. (D) **(SSC CHSL 2014)**

Exp: White light on getting dispersed in its seven constituent components undergo refraction and total internal reflection which results in the formation of a rainbow.

8. Which of these waves can be polarized

(A) Sound waves in air
(B) Longitudinal waves on a string
(C) Transverse waves on a string
(D) Light waves

Ans. (D) **(SSC CHSL 2016)**

Exp: Polarization means transforming vibrations in a single plane. All other waves except light wave are in single plane. Hence only light waves can be polarised.

9. The sky appears blue due to

(A) Rayleigh scattering (B) Mie scattering
(C) Back scattering (D) None of the above

Ans. (A) **(SSC CGL 2014)**

Exp: Because air molecules scatter blue light from the sun more than they scatter red light.

This scattering of light by particles in a medium without any change in wavelength is called Rayleigh scattering.

10. The splitting of white light into its component is due to

(A) Reflection (B) Refraction
(C) Transmission (D) Dispersion

Ans. (D) **(SSC CGL 2014)**

Exp: The splitting of White Light into its constitutent seven colours is called dispersion of light.

11. Light scattering takes place in

(A) Colloidal solutions (B) Acidic solutions
(C) Electrolyte solutions (D) Basic solutions

Ans. (A) **(SSC CGL 2013)**

Exp: Colloidal solution:- It is a kind of solution in which size of solute particles (10^{-7} cm and 10^{-5}) is bigger than that of a true solution.

Colloidal solution have minute particles that scatters light and the scattering of light by colloidal solution is called Tyndall effect.

12. Which of the following statements is true when we see 'rainbow'?

(A) We face sun and raindrops
(B) The sun remains behind as and we face raindrops
(C) In light rainfall, we face sun
(D) The sky remains clear and the sun is at lower position in the sky

Ans. (B) **(SSC Sec. officer (Audit) 1997)**

Exp: During rainbow formation, sun remains behind the observer and its light passes from the raindrops, it refracts and gets totally internally reflected into 7 different colours called rainbow.

13. A soap bubble shows colours when illuminated with white light. The is due to

(A) Diffraction (B) Polarisation
(C) Interference (D) Reflection

Ans.(C) **(SSC Tax Assistant, Income Tax & Centre Excise) 2009)**

Exp: Soap bubble shows interference pattern because the reflected light from inner and outer layer is superimposed to create interference pattern.

14. The formation of Rainbow takes place, when sunlight–

(A) Scattered due to the reflection from water drops in atmosphere
(B) Scattered due to refraction from water drops in atmosphere
(C) Scattered due to refraction and total internal reflection from water drops
(D) None of the above

Ans. (C) **(SSC CGL 2015)**

Exp: Rainbows are formed when sun light diffracts, refracts and totally internally reflect by water droplets present in atmosphere.

15. The Rainbow has: (Chose incorrect Statement)

(A) Violet light as its innermost colour towards earth
(B) Its curvature bends towards earth
(C) Red light as its outermost colour toward sky
(D) Red light as its innermost colour towards earth

Ans. (D) **(SSC Steno. C, D 2012)**

Exp: As red light deviates the least it is at the outermost place and the violet with minimum wavelength is at the innermost place. The sequence of Rainbow is as follows ROYGBIV.

16. On a rainy day small oily films on water shows brilliant colour. This is due to –

(A) Scattering (B) Dispersion
(C) Interference (D) Polarization

Ans. (C) **[SSC CGL 2014]**

Exp: Oily films show colour patterns because light which gets reflected at air- oil film and oil-water film interfere and thus coloured patterns are formed.

Reflection

17. An optically plane surface reflects a beam of light

(A) As a parallel beam in one direction
(B) As diffused beams in all directions
(C) As parallel beams in all direction
(D) As a diffused beam in one direction

Ans. (A) **[SSC Matric Level 2006]**

Exp: An optically plane surface reflects a beam of light in a single direction owing to the laws of reflection.

18. Which one of the following reflects back more sunlight as compared to other three?

(A) Sand desert
(B) Land covered with fresh snow
(C) Prairie land (D) Paddy crop land

Ans. (B) **(SSC CAPFs SI 2016)**

Exp: Land covered with fresh snow reflects more sunlight because white and smooth surface are best reflectors.

19. Purpose of an optical fibre is to

(A) Reflect light of different colours
(B) Dispense light into component colours
(C) Refract light of different colours
(D) Transmit light of different colours

Ans. (D) **(SSC CGL 2016)**

Exp: Optical fibers work on the principle of total internal reflection as light ray tries to go from glass to air.

20. The Phenomenon which causes mirage is

(A) Interference (B) Diffraction
(C) Polarization (D) Total Internal Reflection

Ans. (D) **(SSC CHSL 2015)**

Exp: Mirage is an optical illusion such as the appearance of a sheet of water in a desert or in which distant objects are seen inverted. It is formed by refraction and total internal reflection.

21. Total Internal Reflection can not take place when light goes from

(A) Water to Glass (B) Glass to water
(C) Water to air (D) Glass to air

Ans. (A) **(SSC CAPF SI, CISF 2015)**

Exp: Total internal reflection is a phenomenon that occurs when light travels from denser medium to rarer medium such as glass to air or water to air.

22. Optical fibre works on the principle of

(A) Refraction (B) Scattering
(C) Interference
(D) Total Internal Reflection

Ans. (D) **(SSC CHSL 2014)**

Exp: Optical fibre works on the principle of Total Internal Reflection. Light travels great distance without undergoing attenuation inside the fibre.

23. Energy in reflected light is

(A) Does not depend on the angle of incidence
(B) Increases with increase in angle
(C) Decrease with increase in angle incidence
(D) Become maximum for an angle of incidence of 45°

Ans. (B) **(SSC CHSL 2010)**

Exp: Owing to Fresnel's equation, the larger the incident angle, larger will be the energy in reflected light.

24. Which of the following optical phenomena is responsible for the brilliance of diamond?

(A) Maximum Refraction
(B) Total Internal Reflection
(C) Total surface Reflection
(D) 100% transmission

Ans. (B) **[Tax Asst Exam 2006]**

Exp: Diamonds are cut in such a way that light undergoes total internal reflection multiple times and thus diamond sparkles.

Refraction

25. The phenomenon of change in direction of light when it passes from one medium to another is called

(A) Propagation (B) Reflection
(C) Refraction (D) Dispersion

Ans. (C) **(SSC CGL 2016)**

Exp: Refraction is the change in direction of light on passing from one medium to another.

26. Which of the following is not caused by atmospheric refraction?

(A) Sun appearing red at sunset
(B) Twinkling of stars at night
(C) Sun appearing higher in the sky than it actually is
(D) Sun becoming visible two or three minutes before actual sunrise.

Ans. (A) **(SSC CHSL 2013)**

Exp: Red colour of sun at the time of sunset is because of scattering of light.

27. A star appears twinkling in the sky because of

(A) Scattering of light by atmosphere
(B) Reflection of light by atmosphere
(C) Refraction of light by atmosphere
(D) Diffraction of light by atmosphere

Ans. (C) **(SSC CHSL 2012)**

Exp: The light from the stars undergoes multiple refractions in atmosphere before reaching to our eyes. Therefore stars appear twinkling at night.

28. A water tank appears shallower when it is viewed from top due to

(A) Rectilinear propagation of light
(B) Reflection
(C) Total Internal Reflection
(D) Refraction

Ans. (D) **(SSC CHSL 2011)**

Exp: The light rays coming from the bottom of tank comes to observer after undergoing refraction. The bent light appears to be coming from above the surface (than from actual surface). That is why tank appears shallower.

29. The reason for a swimming pool to appear less deep than the actual depth is

(A) Refraction (B) Light scattering
(C) Reflection (D) Interference

Ans. (A) **(SSC CPO S.I 2017)**

Exp: The light gets refracted at the surface of water. Thus the light reaching the eye of an observer appears to be coming from above than the actual depth of swimming pool.

30. A plane glass slab is kept over coloured letters which appears least raised is –

(A) Red (B) Green
(C) Violet (D) Blue

Ans. (C) **[SSC CHSL 2015]**

Exp: Apparent depth = $\frac{\text{Real Depth}}{\text{Refractive index}}$

Refractive index for violet will be maximum, hence its apparent depth will be minimum. Hence, violet appears least raised.

Lens and Mirror

31. Lens is made up of

(A) Pyrex glass (B) Flint glass
(C) Ordinary glass (D) Cobalt glass

Ans. (B) **[SSC CGL Exam, – 2011]**

Exp: Flint glass is an optical glass which has relatively high refractive index . Flint glass contains 60% lead oxide.

32. For a person having hypermetropia, the near point is

(A) Greater than 25 cm (B) Greater than 50 cm
(C) Less than 25 cm (D) Infinity

Ans. (C) **[FCI Asst. 2012]**

Exp: The nearest point at which an object can be brought into focus by an eye is called as near point. For a person having hypermetropia, the near point is greater than is 25 cm.

33. The head mirror used by ENT doctors is

(A) Concave (B) Convex
(C) Plane (D) Plano-convex

Ans. (A) **(SSC LDC 2011)**

Exp: Concave mirrors form magnified image. Due to this, Concave mirrors are used in head mirror of ENT specialists.

34. Vehicles use ____ to see the objects coming from behind

(A) Concave Lens (B) Convex Lens
(C) Concave Mirror (D) Convex Mirror

Ans. (D) **[SSC CGL 2016]**

Exp: Convex mirror form diminished image thus larger field is covered. Thus, we can easily see the large traffic behind.

35. What is a compound microscope

(A) A microscope that has one lens
(B) A microscope that has two set of lenses
(C) A microscope whose lenses are concave
(D) A microscope whose lenses are convex

Ans. (D) **(SSC Const. (GD) 2013)**

Exp: Compound microscope is an optical instrument consisting of two convex lenses of short focal lengths. It is used to observe highly magnified image of very tiny objects.

36. Convex mirrors are used as a rear view mirror in motor cycles because

(A) It forms real image (B) It forms erect image
(C) It forms smaller image as compared with object
(D) All of the above

Ans. (D) **(SSC CHSL 2012)**

Exp: Convex mirror form diminished image, thus it provides larger view of traffic.

37. Persons suffering from myopia are advised to use

(A) Convex lens (B) Concave lens
(C) Plano-concave lens (D) Plano-convex lens

Ans. (B) **(SSC Const. 2016)**

Exp: In myopia, image is formed in front of retina. So concave lens is used to correct myopia because it has diverging power thus it moves the image back to the retina.

38. Magnifying Glass is basically a

(A) Plano-concave lens (B) Cancave lens
(C) Convex lens (D) Cylindrical lens

Ans. (C) **(SSC steno. 2011)**

Exp: A magnifying glass is a convex lens. It produces a magnified image of an object.

39. Shaving Mirror is

(A) Convex (B) Concave
(C) Plane (D) Parabolic

Ans. (B) **(SSC CISF Const. 2011)**

Exp: A shaving mirror is a concave mirror it forms upright and enlarged image.

40. Which type of mirror is used in the head lights of vehicles

(A) Plane Mirror (B) Concave Mirror
(C) Convex Mirror (D) Parabolic Mirror

Ans. (B) **(SSC Multitasking 2011)**

Exp: Headlight of vehicles have concave mirror and the bulb of the headlight is placed at the focus of the mirror. So that light rays spread out to infinity and a large distance ahead is visible.

41. Electron Microscope is more magnifier than light magnifying because

(A) Velocity of electron is less than velocity of light
(B) Wavelength of electron is less than the wavelength of light
(C) Electron contains more energy than particles
(D) More powerful lenses are used in electron Microscope

Ans. (D) **(SSC CPO 2015)**

Exp: Electron microscope has high magnification and resolution and it employs electron beams in place of light.

42. A periscope works on the principle of

(A) Refraction (B) Total Internal Reflection
(C) Diffraction (D) Reflection

Ans. (D) **(SSC Matric Level 2008)**

Exp: A periscope works on the laws of reflection. Two mirrors are placed at 45° to each other, light incident on one mirror is reflected and falls on the other mirror which is further reflected to reach human eye.

43. In mirrors the back surface is painted with a thin layer of

(A) Mercury (B) Silver
(C) Red oxide (D) Silver Nitrate

Ans. (B) **(SSC Matric Level 2006)**

Exp: Silver is the best reflector of light. That is why silver is coated at the back surface of mirror.

44. Find the power of a convex lens if the image formed is at a distance of 10 cm from the lens when the object is placed on the other side of the lens at 40 cm from the optical centre?

(A) 12.5 dioptre (B) 7.5 dioptre
(C) –12.5 dioptre (D) –7.5 dioptre

Ans. (A) **(SSC CHSL Tier-I 2016)**

Exp: $\frac{1}{v} - \frac{1}{u} = \frac{1}{f}$

$\frac{1}{10} + \frac{1}{40} = \frac{1}{f}$

$\frac{4+1}{40} = \frac{1}{f}$

$f = 8$ cm

$\text{Power} = \frac{1}{f(\text{in metres})} = \frac{100}{8} = 12.5$ Dioptre

45. Find the power of a convex lens if the image formed is at a distance of 20 cm from the lens when the object is placed on the other side of the lens at 60 cm from the optical centre?

(A) 3.33 dioptre (B) 6.67 dioptre
(C) -6.67 diopre (D) -3.33 dioptre

Ans. (B) **(SSC CHSL Tier-I 2016)**

Exp: $\frac{1}{20}+\frac{1}{60}=\frac{1}{f}$

$\frac{3+1}{60}=\frac{1}{f}$

$f=\frac{60}{4}$ cm

$f=\frac{60}{4\times10}$

$P=\frac{20}{3}$ = 6.67 Dioptre

46. Find the power of a convex lens if the image formed is at a distance of 20 cm from the lens when the object is placed on the other side of the lens at 25 cm from the optical centre?

(A) 1 dioptre (B) – 9 dioptre
(C) 9 dioptre (D) 1 dioptre

Ans. (C)

Exp: $\frac{1}{20}+\frac{1}{25}=\frac{1}{f}$

$\frac{5+4}{100}=\frac{1}{f}$

$f=\frac{100}{9}$cm

$f=\frac{1}{9}$ m

Power = $\frac{1}{f}=\frac{1}{1/9}$ = 9 Dioptre

47. Which of the following is used to split white light into different colours?

(A) Glass slab (B) Convex lens
(C) Concave lens (D) Prism

Ans. (D) **(SSC Tax Ass. (Income Tax & Central Excise 2006)**

Exp: Prism is a transparent object. The triangular refracting surface of prism split the white light into its constituent components.

48. Spectacles used for viewing 3D films have

(A) Bifocal lens (B) Convex lens
(C) Concave lens (D) Polaroids

Ans. (D) **(SSC CPO S.I 2008)**

Exp: Polaroids are used in 3D glasses to create the illusion of 3-Dimensional images.

49. A concave lens always form an image which is

(A) Real and erect (B) Virtual and erect
(C) Real and inverted (D) Virtual and inverted

Ans. (B) **(SSC CGL Tier-I 2010)**

Exp: A concave lens always forms virtual and erect image because it is a diverging lens & rays do not actually meet each other after refraction.

50. One can distinguish a telescope from a microscope by observing

(A) Length (B) Colour
(C) Size of the lens
(D) length and size of the lens

Ans. (C) **(SSC CPO (S.I, ASI & Intelligence offier) 2011)**

Exp: Telescopes has lenses of long focal length and microscopes has lenses of short focal length.

51. To get the magnified and virtual image mirror is used–

(A) Plane Mirror (B) Convex Mirror
(C) Concave Mirror (D) Concave Lens

Ans. (C) **[SSC FCI 2012]**

Exp: When the object is placed between the principal focus and the pole of concave mirror, the image formed will be magnified, virtual and erect.

52. Which of the following always makes the smaller image of body, which is placed in front of it?

(A) Plane Mirror (B) Convex Mirror
(C) Convex Lens (D) Concave Mirror

Ans. (B) **[SSC FCI 2012]**

Exp: Convex mirrors always produce images that are reduced in size, when body is placed at any place between infinity and pole of mirror.

53. The Image formed by specific mirror; legs appears as of same size but head and his body appears smaller than its real size, when person stands in front of mirror. What is the nature of mirror?

(A) Plane and Concave (B) Convex and Concave
(C) Convex and Plane (D) Plane

Ans. (C) **[SSC MTS 2013]**

Exp: Convex mirrors always produce smaller image and same size of image can be produced by plane mirror. So the nature of mirror will be convex and plane.

54. What is a zoom lens?

(A) A lens with a definite focal length
(B) A lens with a transitional focal length
(C) It is used in Radio Telescopes.
(D) None of these

Ans. (B) **[SSC CGL 2006]**

Exp: Zoom lens is a lens which allows a camera by changing a distant shot to a close-up by varying its focal length.

55. Dioptre is the unit of–

(A) Power of lens (B) Focal length of lens
(C) Intensity of lens (D) Intensity of sound

Ans. (A) **[SSC CHSL 2013]**

Exp: Dioptre is the unit of power of lens. It is equal to the reciprocal of the focal length of lens.

56. Radio telescope are better than optical telescopes because–

(A) They can detect faint galaxies which cannot be done by optical telescope.
(B) They can even work in cloudy conditions.
(C) They can work during day and night
(D) All of the above.

Ans. (D) **[SSC CHSL 2012]**

Exp: Radio telescopes are all weather, highly efficient and can work both during day and night. Hence, they provide a wider usability than optical telescope.

57. To eliminate the glare of headlight in motor-cars–

(A) Polaroid's are used (B) Glass prism are used
(C) Thin films are used (D) Filters are used.

Ans. (A) **[SSC CPO 2012]**

Exp: Polaroids are used to eliminate the glare by headlight in motorcars as they cut the horizontally polarised light which falls on it, there by reducing glare.

Eye

58. The outer white part of the eye that protects the inner structures is____.

(A) Iris (B) Sclera
(C) Retina (D) Cornea

Ans. (B) **(31 January Evening)**

Exp: Sclera is the tough outer layer of the eye which protects the inner structures of eye.

59. Person who is color blind can not distinguish between

(A) Black and yellow (B) Red and green
(C) Yellow and white (D) Green and blue

Ans. (B) **(SSC CGL 2016)**

Exp: A colour blind person cannot distinguish between Red and Green. Colour blind people are unable to fully 'see' red, green or blue light.

60. The least distance of distinct Vision is

(A) 35 cm (B) 25 cm
(C) 45 cm (D) 15 cm

Ans. (B) **(SSC CGL 2016)**

Exp: 25 cm is the least distance of distinct vision. Least distance of distinct vision is the minimum comfortable distance between the naked human eye and object.

61. Distant objects are visible as little out of focus in the condition

(A) Presbyopia (B) Hypermetropia
(C) Astigmatism (D) Myopia

Ans. (D) **(SSC CGL 2016)**

Exp: In myopia a person cannot see distant object as the rays meet at the front of retina. Therefore distant object appear blurred.

62. Sensitivity of human eye is maximum in the

(A) Violet region (B) Green region
(C) Blue region (D) Red region

Ans. (B) **(SSC const. 2013)**

Exp: Under normal lightening conditions the cones of the eyes are most sensitive to green colour and then yellow colour.

63. A man can not see clearly beyond 10 meters. The disease he suffers from.

(A) Far sight (B) Myopia
(C) Cataract (D) Hypermetropia

Ans. (B) **(SSC Steno. 2010)**

Exp: A person having myopia can see clear object only in the range of 8 cm to 50 cm.

64. The part of the eye having largest refractive index is

(A) Cornea (B) Aqueous humor
(C) Lens (D) Virtuous humor

Ans. (C) **(SSC Steno. 2010)**

Exp: In human eye, lenses have the largest refractive index whereas largest refraction occurs at cornea due to change of medium from air to outer surface of cornea.

65. Hypermetropia or long sightedness can be corrected by using

(A) Bifocal lenses (B) Cylindrical lenses
(C) Concave lenses (D) Convex lenses

Ans. (D) **(SSC Matric Level 2006)**

Exp: In hypermetropia image is formed behind the retina. It can be corrected using convex lens as convex lens has converging power. It converges light at the retina and a clear image is formed.

66. The final image in a simple microscope is

(A) Real, diminished and inverted
(B) Real, magnified and erect
(C) Virtual, magnified and erect
(D) Virtual, diminished and erect

Ans. (C) **(SSC MTS 2006)**

Exp: Simple microscope uses biconvex lens which forms enlarged, erect and virtual image of the object.

67. Is dangerous to observe solar eclipse with naked eyes because

(A) Infrared radiations from sun burn our retina
(B) Ultraviolet radiations from sun burn our retina
(C) All radiations from sun initiate chemical reactions in eyes
(D) Cosmic rays reach eyes more during the eclipse

Ans. (B)

Exp: During solar eclipse intensity of ultraviolet rays is increased which affects the retina of human eyes.

68. Short-sight in human eye can be corrected by using proper

(A) Convex lens (B) Concave lens
(C) Cylindrical lens (D) Bifocal lens

Ans. (B) **(SSC CPO SI 2006)**

Exp: Short sightedness known as Myopia. In this image is formed in front of retina. So, concave lens is used to correct myopia because of its diverging power it moves image back to the retina.

69. Myopia is the same as

(A) Near sightedness (B) Astigmatism
(C) Presbyopia (D) Long sightedness

Ans. (A) **(SSC Combined Matric 2000)**

Exp: Myopia also known as short sightedness in which a person can see near object clearly but cannot see distant object distinctly.

70. The owl can see most clearly in total darkness because

(A) It has squint eyes
(B) It has large eyes with rods directed forward, giving it binocular sight
(C) It has light bulbs in its eyes provided by nature
(D) It produces infrasonic sounds

Ans. (B) **(Combined Matric Level 2002)**

Exp: Owls have more number of rods (which help to see at night) in their eyes and they have large eyes which makes more light to enter in the eyes.

71. What is myopia?

(A) Inability to see distant objects clearly
(B) Abnormal functioning of the thyroid gland
(C) It is a condition of enlargement of heart
(D) It is a kidney disorder

Ans. (A) **(SSC CHSL Tier-I 2016)**

Exp: Myopia is also known as Short sightedness in which a person can see near object clearly but cannot see distant object distinctly.

72. The Sky appears to an astronaut–

(A) White (B) Bark Blue
(C) Light Green (D) Black

Ans. (D) **[SSC CPO 2006]**

Exp: As in outer space there is no atmosphere to scatter light. So sky appears black to an astronaut.

73. Colour blindness defect can be corrected by using the lens–

(A) Concave Lens (B) Convex Lens
(C) Cylindrical lens (D) None of these

Ans. (D) **[SSC CGL 2006]**

Exp: Colour Blindness is the inability of human eye to distinguish between different colours. Colour blindness can not be corrected by any lens.

74. Protanopia is a kind of colourblindness, in which defected person can't see the colour –

(A) Green (B) Red
(C) Blue (D) All of these

Ans. (D) **[SSC CHSL 2013]**

Exp: Protanopia is a type of colour blindness in which a person cannot distinguish between Blue, Red and Green colour.

75. The Plate of Blue glass appears blue in sunlight because–

(A) It absorb the blue light
(B) It transmits the blue light
(C) It absorbs all the colours including blue
(D) Transmits all the colours including blue.

Ans. (B) **[SSC LDC 2005]**

Exp: The colour of any object depends on the colour of the light source and wavelength of light reflected by that object.

Miscellaneous

76. The speed of light in air is

(A) 3×10^8 m/s (B) 3×10^{-8} m/s
(C) 3×10^3 m/s (D) Infinity

Ans. (A) **(SSC constable (GD) 2013)**

Exp: Speed of light is 3×10^8 m/s. It is denoted by 'c'

77. Photon is the fundamental unit/quantum of

(A) Gravitation (B) Electricity
(C) Magnetism (D) Light

Ans. (D) **(SSC CGL 2013)**

Exp: Photon is the packet of energy. It is also known as quanta. Light wave consists of number of photons.

78. Light beam which is highly directional is called

(A) Eraser (B) Grazer
(C) Maser (D) Laser

Ans. (D) **(SSC CHSL 2010)**

Exp: Laser is a coherent, monochromatic unidirectional beam of light.

79. Persistence of vision is the principle behind

(A) Binocular (B) Camera
(C) Periscope (D) Cinema

Ans. (D) **[SSC CHSL 2013]**

Exp: Persistence of vision is the ability of an eye to see image of an object even after the object has been removed.

80. Which of the following is responsible for the working of newton's colour disc experiment

(A) Formation of pure spectra
(B) Formation of impure spectra
(C) Persistence of vision
(D) Principle of complementary colour

Ans. (C) **(SSC CGL 2011)**

Exp: Newton's disc is made by colouring seven colors on wedge of paper and pasting it on the rotating wheel. When the wheel is rotated, our eye is unable to see the colours seperately and sees the colours mixed together to form white. It is possible due to the principle of persistence of vision.

81. Solar cells work on the principle of

(A) Photovoltaic effect (B) Photoelectric effect
(C) Photoconductive effect
(D) Photosynthesis

Ans. (A) **(SSC CHSL 2010)**

Exp: Solar cell works on the principle of photovoltaic effect i.e. when light falls on some particular substance a voltage is created.

82. A light year is a unit of

(A) Time (B) Distance
(C) Speed of light (D) Intensity of light

Ans. (B) **(SSC constable 2012)**

Exp: Light year is the distance travelled by light in one year in space.

83. Ozone layer above the surface of Earth provides a shield against

(A) X-rays (B) Ultra Violet Rays
(C) Gamma Rays (D) Infrared Rays

Ans. (B) **(SSC CHSL 2011)**

Exp: Ozone layer consists of O_3 molecules, it protects the earth atmosphere from harmful ultra-violet rays.

84. The primary colours in photography are

(A) Red, Blue, Yellow (B) Red, Yellow, Green
(C) Red, Blue, Green (D) Blue, Yellow, Green

Ans. (C) **[SSC CHSL 2011]**

Exp: Red, Blue and Green are primary colours which are used to produce other colour on intermixing.

85. Which of the following is not a part of a CRT?

(A) Phosphor Screen (B) Shadow Mask
(C) Electron Gun (D) Gas Plasma

Ans. (D) **(SSC Steno 2011)**

Exp: In cathode ray tube images are produced when an electron beam strikes a phosphor-coated screen. Its basic components are electron gun, deflecting coils, phosphor-coated screen, shadow mask etc.

86. Light travels fastest in

(A) Nitrogen (B) Air
(C) Steel (D) Vacuum

Ans. (D) **(SSC CHSL Tier-I 2016)**

Exp: Light travels in vacuum with the speed of 3×10^8 m/s.

87. Who Invented Laser?

(A) William FrieseGreene
(B) Arthur Fry
(C) Gordon Gould (D) Otto von Guericke

Ans. (C) **(SSC CHSL Tier-I 2016)**

Exp: Gordon gould was the first one to publish his paper on LASER in 1959.

88. Who Invented LED?

(A) Nick Holonyak (B) Elias Howe
(C) Chuck Hull (D) Christiaan Huygens

Ans. (A) **(SSC CHSL Tier-I 2016)**

Exp: In 1962, Nick Holonyak, invented the first visible light LED.

89. Instrument for measuring blueness of the sky or ocean is called _____.

(A) Bathymeter (B) Ceraunograph
(C) Cyanometer (D) Barometer

Ans. (C) **(SSC CHSL Tier-I 2016)**

Exp: Cyanometer is the instrument which is used to measure the intensity of blue colour of sky.

90. Lumen is a unit of –

(A) Luminous Flux (B) Luminous Intensity
(C) Luminous density (D) Brightness

Ans. (A) **[SSC CGL 2012]**

Exp: Lumen is the SI unit of luminous flux. Luminous flux is the measure of total quantity of visible light emitted by any source.

91. White Light constitutes the colours –

(A) 4 (B) 5
(C) 6 (D) 7

Ans. (D) **[SSC FCI 2012]**

Exp: White light comprises seven constitutent components namely VIBGYOR (Violet, Indigo, Blue, Green, Yellow, Orange and Red.)

92. Atomic clock transitions depends upon the –

(A) Sodium (B) Caesium
(C) Magnesium (D) Aluminum

Ans. (B) **[SSC CGL 2010]**

Exp: Atomic clock is regulated by the vibrations of atomic or molecular system such as caesium.

93. The photoelectric effect is described as the ejection of electrons from the surface of a metal when –

(A) It is heated
(B) It is placed in the strong electric field.
(C) Electron of suitable velocity impinge on it.
(D) Light of suitable wavelength falls on it.

Ans. (D) **[SSC CHSL 2013]**

Exp: When a light of suitable wavelength falls on a metal surface it transfers its energy to that surface and an electron is ejected. This principle is called Photoelectric effect.

94. Which of the following gase is used in the Yellowish lamps used as street Lights?

(A) Sodium (B) Neon
(C) Hydrogen (D) Nitrogen

Ans. (B) **[SSC CGL 2011]**

Exp: When sodium gets excited by energy, it gives out a yellowish light.

95. Photo oxidation process is initiated by –

(A) Light (B) Heat
(C) Oxygen (D) Catalyst

Ans. (A) **[Tax Asst. 2008]**

Exp: Photo means light. Hence, photo-oxidation is the process in which oxidation is caused out by light.

96. What is a Hologram?

(A) Graphical Representation of frequency distribution

(B) 3D– MRI

(C) A 3D Shadow to reproduce the photographic record

(D) A Liquid Crystal Display

Ans. (C) **[SSC Steno. 2005]**

Exp: Hologram is a 3-d image formed by the interference of light beams from any coherent light source.

97. Who invented the optical fibre?

(A) Samuel Cohen (B) Narinder Kapany

(C) Percy Spencer (D) T.H. Maimah

Ans. (B) **[SSC CPO 2006]**

Exp: Narinder Kapany an Indian born U.S scientist invented optical fibre.

98. Which of the following purpose optical fibre is used for?

(A) Weaving (B) Musical Instrument

(C) Eye Surgery (D) Communication

Ans. (D) **[SSC MTS 2006]**

Exp: Optical fibres are used for long distance communication. It is based on the principle of TIR. Light travels inside an optical fibre with little or no attenuation.

99. Sir C.V. Raman is awarded by Nobel Prize for his experiment of –

(A) Reflection of Light (B) Dispersion of Light

(C) Scattering of Light (D) Diffraction of Light

Ans. (C) **[SSC Sten. 2014]**

Exp: C.V. Raman won Nobel Prize for his experiment of scattering of light called Raman effect.

100. Light Waves are –

(A) Electric Wave (B) Magnetic Wave

(C) Electromagnetic Wave

(D) Electrostatic Wave

Ans. (C) **[SSC MTS 2008]**

Exp: Light waves are electro-magnetic waves. They travel in the form of electric and magnetic field.

101. Time taken by the Sun Light to reach the earth?

(A) 5.5 min. (B) 6.8 min.

(C) 8.3 min. (D) 9.5 min.

Ans. (C) **[SSC MTS 2006]**

Exp: Sunlight takes 8.3 min to reach the surface of earth.

102. The speed of light with the rise in the temperature of the medium:

(A) Increases (B) Decreases

(C) Remains unaltered (D) Drops suddenly

Ans. (C) **[SSC CGL 2004]**

Exp: Speed of light does not depend on the temperature of medium. Speed of light is constant.

103. Who measured the velocity of light first?

(A) Galileo (B) Newton

(C) Romer (D) Einstein

Ans. (C) **[SSC CPO SI 2005]**

Exp: First real measurement of light was done by Ole Romer in 1676.

104. Which colour is the complementary colour of yellow?

(A) Blue (B) Green

(C) Orange (D) Red

Ans. (A) **[SSC Sec. Officer 2007]**

Exp: Complentary colours are those colours, which gives black or white colour when mixed with each other.

105. Ability to distinguish two closely placed objects is _____.

(A) Resolving power (B) Video power

(C) Distinguish power (D) Magnifying power

Ans. (A) **(SSC CPO 2017)**

Exp: Resolving power is the capacity of an optical instrument to resolve two points which are closely placed.

106. Which of the following phenomena is involved in Kaleidoscope?

(A) Refraction (B) Reflection

(C) Total Internal reflection

(D) Diffraction

Ans. (B) **(SSC CPO 2017)**

Exp: Kaleidoscope is based on the principle of reflection. The law of reflection states that when a light hits a smooth and shiny surface at certain angle, the light is reflected away from that surface at the same angle.

107. In a magnifying glass _____ lens is used.

(A) Convex (B) Concave

(C) Plano concave (D) Plano convex

Ans. (A) **(SSC CPO 2017)**

Exp: A magnifying glass is a convex lens that is used to produce a magnified image of an object. A magnifying glass can be used to focus light.

108. When an object is kept between two parallel plane mirrors then what is the number of images formed?

(A) 1 (B) 2

(C) 4 (D) Infinite

Ans. (D) **(SSC CPO 2017)**

Exp: When two mirrors are placed parallel to each other. It forms infinite images of any object.

109. A _____ splits sunlight into seven colours.

(A) Concave lens (B) Convex lens

(C) Prism (D) Concave mirror

Ans. (C) **(SSC CPO 2017)**

Exp: A Prism is a transparent optical element with flat and polished surfaces that refract light. A dispersive prism can be used to split sunlight into seven colours.

110. Which type of mirror is used by dentists to see large images of teeth?

(A) Concave mirror (B) Convex mirror
(C) Plane mirror (D) Cylindrical mirror

Ans. (A) **(SSC CPO 2017)**

Exp: Dentist and ENT doctors use concave mirrors in their treatment procedure to obtain a larger image than the original size of teeth, ear or skin etc.

111. According to law of reflection:

(A) Angle of incidence is greater than angle of reflection
(B) Angle of incidence is smaller than angle of reflection
(C) Angle of incidence is always equal to angle of reflection
(D) Both angles are always unequal

Ans. (C) **(SSC CPO 2017)**

Exp: Law of Reflection states that angle of Incidence is always equal to the angle of Reflection.

112. Who invented first working laser?

(A) A. H. Taylor (B) W. K. Roentgen
(C) T. H. Maiman (D) Fred Morrission

Ans. (C) **(SSC CGL 2017)**

Exp: T.H. Maiman invented first working laser. He made the first laser operate on 16 may 1960 at Hughes Research Laboratory in California, by shining a high-power flash lamp on a ruby rod with silver coated surfaces. So, it is also called Ruby laser.

113. Reflection from a smooth surface like that of a mirror is called _____ reflection.

(A) Regular (B) Irregular
(C) Diffused (D) Fused

Ans. (A) **(SSC CGL 2017)**

Exp: The regular reflection is the reflection of light ray when they falls on a smooth (uniform) and glistening surface so, the reflected ray of light move only in a fixed direction or in one direction.

114. Why does a black board appears black in colour?

(A) It reflects black colour
(B) It absorbs black colour
(C) It reflects all colours
(D) It absorbs all the colours

Ans. (D) **(SSC CGL 2017)**

Exp: Black board doesn't reflect any colour. It absorbs all the colours/light that falls on it. So, it appears as 'Black', which is actually the absence of colour.

115. The bending of light when it passes around a corner or a slit is due to _____.

(A) Reflection (B) Refraction
(C) Diffraction (D) Total internal reflection

Ans. (C) **(SSC CGL 2017)**

Exp: Diffraction of light is phenomena which occur when light wave passes by a corner or through an opening or slit that is physically the approximate size of even smaller than that light's wavelength.

116. What is the reason for formation of Mirage in desert?

(A) Refraction of light
(B) Reflection of light
(C) Total internal reflection of light
(D) Both Refraction and Total internal reflection of light

Ans. (D) **(SSC CGL 2017)**

Exp: Mirage is an optical illusion such as the appearance of a sheet of water in a desert or in which distant objects are seen inverted. It is formed by refraction and total internal reflection.

117. Speed of light is maximum in _____.

(A) Vacuum (B) Solids
(C) Liquids (D) Gases

Ans. (A) **(SSC CGL 2017)**

Exp: Speed of light is maximum in vacuum because in vacuum, there is no particles present for the photons to interact with. So it doesn't get absorbed by any particle and appears to travel with the maximum speed.

118. Convex mirror is generally used in _____.

(A) Solar cookers (B) Ophthalmoscope
(C) Reflector for head light
(D) Rear view mirror

Ans. (D) **(SSC CGL 2017)**

Exp: A convex mirror is used as rear view mirror because they form erect, virtual and diminished images which allow the driver to view a large area of traffic.

119. If objects appear enlarged and inverted in a rear view mirror, then which type of mirror is used?

(A) Concave (B) Convex
(C) Cylindrical (D) Plane

Ans. (A) **(SSC CGL 2017)**

Exp: A concave mirror forms enlarged image of the object. The nature of image depends on the distance of the object from the concave mirror.

120. Why does water tank appear shallower when viewed from the top?

(A) Due to reflection (B) Due to refraction
(C) Due to diffraction
(D) Due to total internal reflection

Ans. (B) **(SSC CGL 2017)**

Exp: The light rays coming from the bottom of tank comes to observer after undergoing refraction. The bent light appears to be coming from above the surface (than from actual surface). That is why tank appears shallower.

121. Which colour is formed when Red and Green are mixed?

(A) Light blue (B) Yellow
(C) White (D) Grey

Ans. (B) **(SSC CGL 2017)**

Exp: The three primary colours in additive mixing are Red, Green and Blue. In the absence of colours or when no colour are showing, the result is black. If all three primary colours are showing the result is white. When Red and Green is combined, the result is Yellow.

122. Which phenomena shows the particle nature of light?

(A) Diffraction (B) Interference
(C) Photoelectric effect (D) Polarisation

Ans. (C) **(SSC CGL 2017)**

Exp: Photoelectric effect/Photoemission shows the particle nature of light.

123. Which colour is formed when Blue and Green are mixed?

(A) Cyan (B) Brown
(C) Black (D) Violet

Ans. (A) **(SSC CGL 2017)**

Exp: When blue colour and green colour are mixed, the result is cyan colour.

124. Optical fibre works on which of the following principle of light?

(A) Reflection (B) Refraction
(C) Diffraction (D) Total internal reflection

Ans. (D) **(SSC CGL 2017)**

Exp: Optical fibre works on the principle of Total Internal Reflection. Light travels great distance without undergoing attenuation inside the fibre.

125. When light passes from one medium to another, this phenomenon of change in its direction is called _____.

(A) Refraction (B) Diffraction
(C) Propagation (D) No option is correct

Ans. (A) **(SSC CGL 2017)**

Exp: Refraction of light is defined as the bending of ray of light rarer to denser when it passes from rarer medium to denser medium and vice-versa is called refraction of light.

126. The side mirrors of vehicles are of which type of mirrors?

(A) Convex (B) Concave
(C) Plane (D) Inverted

Ans. (A) **(SSC CGL 2017)**

Exp: Side/rear-view mirror of a vechicle is a convex mirror as it gives diminished, virtual and an erect image of the side or rear with wider field of view of traffic.

127. An image formed by a plane mirror, that cannot be obtained on a screen is called _____.

(A) Virtual image (B) Real image
(C) Inverted image (D) Erect image

Ans. (A) **(SSC CGL 2017)**

Exp: The image formed by a plane mirror is always virtual (that cannot be obtained on a screen) and of the same shape and size as the object it is reflecting.

128. The impression of an image persists on the retina for about _____ of a second.

(A) $1/10^{th}$ (B) $1/8^{th}$
(C) $1/16^{th}$ (D) $1/5^{th}$

Ans. (C) **(SSC CGL 2017)**

Exp: The impression of an image does not vanish immediately from the retina. It persists there for about $\frac{1}{16}$th of a second. So, if still images of a moving object are flashed on the eye at a rate faster than 16 per second, then the eye perceives this objects as moving.

129. An image formed by a concave mirror on a screen is called _____?

(A) Virtual image (B) Real image
(C) Inverted image (D) Erect image

Ans. (B) **(SSC CGL 2017)**

Exp: Concave mirror forms real and inverted image of an object.

130. The incident ray, the _____ at the point of incidence and the reflected ray all lie in the same plane.

(A) Surface (B) Tangent
(C) Normal (D) Angle of reflection

Ans. (C) **(SSC CGL 2017)**

Exp: The Law of Reflection states that the incident ray, the reflected ray and the normal to the surface of the mirror all lie in the same plane. Further more, the angle of incidence is equal to the angle of reflection.

131. The reflection formed by the plane mirror is _____.

(A) Vertical inversion (B) A real image
(C) Lateral inversion (D) An enlarged image

Ans. (C) **(SSC CGL 2017)**

Exp: The phenomenon due to which left-hand side of an object appears as right-hand side of the object and vice-versa is called Lateral Inversion.
For example, the word AMBULANCE is painted left-right inverted on the ambulance.

132. Convex and concave mirrors are examples of?

(A) Plane mirrors (B) Spherical mirrors
(C) Inverted mirror (D) Erect mirror

Ans. (B) **(SSC CGL 2017)**

Exp: A spherical mirror is a mirror which has the shape of piece cut out of a spherical surface. There are two types of spherical mirror :- (A) Convex mirror (B) concave mirror.

133. The angle between the _____and the incident ray is called the angle of incidence.

(A) Surface (B) Normal
(C) Tangent (D) Reflected ray

Ans. (B) **(SSC CGL 2017)**

Exp: The angle formed between the normal and the incident ray at the point of incidence is called the Angle of Incidence.

Chapter-04

Sound

1. The velocity of sound in moist air is more than in dry air because the moist air has –

(A) Less pressure than dry air
(B) More density than dry air
(C) Less density than dry air
(D) More pressure than dry air

Ans. (C) [SSC CGL 2015]

Exp: The speed of sound in a medium is inversely proportional to the square root of medium's density. Density of moist air is less than density of dry air. Hence, speed of sound is more in moist air as compared to dry air.

2. Hertz is the unit of.....

(A) Frequency (B) Wavelength
(C) Intensity (D) Clarity of waves

Ans. (A) [SSC CPO 2015]

Exp: Hertz is the unit of frequency. It is equal to one complete cycle per second.

3. The Unit of noise pollution (level) is–

(A) Decibel (B) Decimal
(C) Ppm (D) None of the above

Ans. (A)

Exp: Noise pollution is measured in Decibels.

4. What is Decibel?

(A) Amusical instrument (B) Wavelength of noise
(C) A musical note (D) Scale of sound level

Ans. (D)

Exp: Decibel is the unit used to measure the intensity of sound.

5. The Permissible noise level at residential area during day time is....

(A) 45 dB (B) 55 dB
(C) 75 dB (D) 80 dB

Ans. (B)

Exp: Permissible noise level at residential area during day time is 55 dB and night time is 45 dB.

6. The range of frequency of ultrasonic wave.

(A) Greater than 20 KHz (B) Greater than 20,000 KHz
(C) Below than 20 KHz (D) Greater than 02 KHz

Ans. (A)

Exp: The term 'Ultrasonic' refers to anything above the frequencies of audible sound and includes waves of frequency greater than 20 KHz.

7. In which of the following frequency Range, Human ear feels the sensitivity of vibration of sound?

(A) 0 – 5 Hz (B) 6 – 10 Hz
(C) 11 – 15 Hz (D) 20 – 20,000 Hz

Ans. (D) [SSC MTS 2013]

Exp: Audible range of frequencies, that human ear can sense is 20-20,000 Hz. But it is more sensitive to sounds between 1,000 Hz and 4,000 Hz.

8. If the ratio of intensity of wave is 25:9. What is the ratio of their amplitude?

(A) 50 : 18 (B) 5 : 3
(C) 3 : 5 (D) 25 : 9

Ans. (B) [SSC CHSL 2015]

Exp: Intensity of wave is directly proportional to square of its amplitude

$$\frac{I_1}{I_2} = \frac{25}{9}$$

$$I \propto A^2$$

$$\frac{I_1}{I_2} = \frac{A_1^2}{A_2^2}$$

$$\frac{25}{9} = \frac{A_1^2}{A_2^2}$$

$$\frac{A_1}{A_2} = \sqrt{\frac{25}{9}} = \frac{5}{3}$$

$$A_1 : A_2 = 5 : 3$$

9. Supersonic air plane creates a shock wave called –

(A) Transition wave (B) Ultrasound wave
(C) Sonic Boom (D) Transverse

Ans. (C) [SSC CGL 2012]

Exp: Sonic boom is the common name of loud noise created by the shock wave produced by supersonic air plane. It is a conical cavity of disturbance behind the tail of supersonic air plane.

10. Which of the following does not have any effect on velocity of sound?

(A) Pressure (B) Temperature
(C) Humidity (D) Density

Ans. (A) [SSC MTS 2014]

Exp: Velocity of the sound wave depends upon temperature, density of medium in which it is travelling. It also depends on moisture content in medium.

11. Sound cannot pass through–

(A) Water (B) Steel
(C) Air (D) Vacuum

Ans. (D) [SSC CGL 2008]

Exp: Sound wave requires medium to travel. So it cannot pass through vaccum.

12. In which of the following speed of sound is maximum?

(A) Steel (B) Air
(C) Vacuum (D) Water

Ans. (A)

Exp: Sound wave travels fastest in solids as the atoms are tightly bounded and elastic content is higher. Speed of the sound is directly proportional to the square root of elastic property of medium.

13. In which of the following medium speed of sound will be comparatively high?

(A) Carbon dioxide (B) Iron Rod
(C) Steam (D) Water

Ans. (B) **[SSC Sten. 2014]**

Exp: Same as above

14. Pitch of a sound depends upon its –

(A) Frequency (B) Intensity
(C) Velocity (D) Amplitude

Ans. (A) **[SSC Sten. 2011]**

Exp: Pitch of the sound depends upon frequency of the sound. Frequency is measured in Hertz and it is equal to one vibration per second.

15. Which of the following character of sound wave change with the change in temperature in atmosphere.

(A) Frequency (B) Amplitude
(C) Wavelength (D) Intensity

Ans. (A) **[SSC CHSL 2015]**

Exp: On increasing the temperature kinetic energy of air molecules increases. So, number of vibrations per second increases. Hence, there is an increase in frequency with an increase in temperature.

16. Which phenomenon do bat or dolphins used to find prey, predators or obstacles?

(A) Refraction of sound (B) Formation of beats
(C) Scattering of sound (D) Echolocation

Ans. (D) **[SSC CGL 2011]**

Exp: Echolocation is the use of sound waves to locate where the objects are in space. Echolocation is used by mammals like dolphins, bats and whales.

17. When a vibrating tuning fork is placed on table, a loud sound is heard. This is due to –

(A) Reflection (B) Refraction
(C) Forced vibration (D) Damped vibration

Ans. (C) **[SSC FCI 2012]**

Exp: Forced vibrations are the vibration induced in body under the influence of another vibrating body. Table top experiences forced vibrations due to tuning fork. As more air molecules are in contact with table top it induces vibrations among them and hence a louder sound is heard.

18. Sound waves do not exhibit the phenomenon of

(A) Interference (B) Diffraction
(C) Refraction (D) Polarisation

Ans. (D)

Exp: Sound waves are longitudinal waves and polarisation can take place only in transverse waves.

19. Sound waves cannot be polarised because they

(A) Require a mateial medium for propagation
(B) Are longitudinal
(C) Are tranverse (D) Have low velocity

Ans. (B)

Exp: Same as above

20. The velocity of sound in a gas depends on

(A) Wavelength only
(B) Density and elasticity of gas
(C) Intensity only
(D) Amplitude and frequency

Ans. (B)

Exp: Velocity of sound depends on elastic property of material medium and density of material medium.

$$v = \sqrt{\frac{B}{\rho}}$$

B = Bulk modulus

ρ = density of medium

21. When we hear a sound, we can identify its source from

(A) Wavelength of sound
(B) The overtones present in the sound
(C) The intensity of sound
(D) The amplitude of sound

Ans. (B)

Exp: The overtones present in the sound gives us knowledge of the source as every source has fixed fundamental frequency. When instruments are played above fundamental frequency overtones can be recognized.

22. Which of the following type of waves is different from others?

(A) Light waves (B) X-rays
(C) Radio waves (D) Sound waves

Ans. (D)

Exp: All the three except sound waves are Transversal, whereas sound waves are Longitudinal.

23. Quality is that sensation of sound which is felt by our ears by virtue of

(A) Waveform of sound wave
(B) Frequency of sound wave
(C) Amplitude of sound wave
(D) None of these

Ans. (A)

Exp: Waveform of the sound wave pertains to quality of the sound. Every instrument has a different waveform.

24. Beats occur because of

(A) Interference (B) Reflection
(C) Refraction (D) Doppler effect

Ans. (A)

Exp: Beat is an interference pattern between two sounds of slightly different frequencies.

25. The loudness of sound depends upon

(A) Velocity (B) Pitch
(C) Amplitude (D) Wavelength

Ans. (C)

Exp: Loudness of sound is a measure of response of sound to our ear. It depends upon the amplitude of sound wave.

26. Pitch is sensation which depends upon

(A) Frequency (B) Amplitude
(C) Wavelength(D) Velocity

Ans. (A)

Exp: Pitch of the sound depends upon frequency of the sound wave. The higher the frequency, the higher the pitch will be.

27. The quality of sound produced by an instrument depends on the

(A) Frequency (B) Intensity
(C) Number of overtones (D) None of these

Ans. (D)

Exp: Quality of sound depends on the waveform and quality of musical note depends on overtones.

28. Sound waves of wavelength greater than that of audible sound are called.

(A) Infrasonic waves (B) Ultrasonic wave
(C) Sonic wave (D) Seismic waves

Ans. (A)

Exp: Infrasonic waves have greater wavelength than that of audible sound. Infrasonic sound is very low frequency sound.

29. If a sound travels from air to water, the quantity that remain unchanged is

(A) Velocity (B) Frequency
(C) Wavelength (D) Amplitude

Ans. (B)

Exp: Frequency of the sound does not change with the change in medium.

30. Ultrasonic waves can be detected by

(A) Telephone (B) Hebb's method
(C) Kundt's tube (D) Quincke's tube

Ans. (C)

Exp: Kundt's tube consists a long transparent horizontal pipe which contains a fine powder such as talc.

31. The waves used in sonography are-

(A) Micro waves (B) Infra-red waves
(C) Sound waves (D) Ultrasonic waves

Ans. (D) **[SSC CGL 2014]**

Exp: Ultrasonic sounds with frequency more than 20KHz are used in the sonography which is used to diagnose internal body organs.

32. Echo is produced due to

(A) Reflection of sound (B) Refraction of sound
(C) Resonance (D) None of these

Ans. (A)

Exp: Echo is produced due to reflection of sound waves through a large obstacle.

33. SONAR is based on the principle of

(A) Echo (B) Resonance
(C) Reverberation (D) None of these

Ans. (A)

Exp: SONAR locate object from the echo of a signal that is reflected off the object.

34. Instrument used to study the behaviour of a vibrating string is:

(A) Hygrometer (B) Sonometer
(C) Barometer (D) Hydrometer

Ans. (B) **[SSC CGL 2013]**

Exp: Sonometer is used to study the behaviour of a vibrating string. It works on the principle of resonance.

35. Sound travels fastest in

(A) Steel (B) Air
(C) Water (D) Vacuum

Ans. (A)

Exp: Same as Q.No. 12

36. Speed of sound in a gas is proportional to

(A) Square root of isothermal elasticity
(B) Square root of adiabatic elasticity
(C) Isothermal elasticity (D) Adiabatic elasticity

Ans. (A)

Exp: Speed of sound in gas is proportional to square root of isothermal elasticity. Why isothermal-because change in temperature will bring change in speed of sound.

37. The Doppler's effect is applicable for

(A) Light wave (B) Sound wave
(C) Space wave (D) Both (A) and (B)

Ans. (D)

Exp: Doppler's effect can be described as change in frequency or wavelength of a wave for an observer which is moving with respect to its source.

38. Which one of the following animals can hear ultrasonic sound?

(A) Rat (B) Squirrel
(C) Cat (D) Bat

Ans. (D) **(SSC Tax Asst. (Income Tax & Central Excise 2006)**

Exp: Bats can hear higher frequencies of sound beyond the range of human hearing and ultrasonic sound higher frequency sound. That is why bats can hear ultrasonic sound.

39. Submerged objects can be located using

(A) Radar (B) Sonar
(C) Quasar (D) Pulsar

Ans. (B) **(SSC Tax Asst. (Income Tax & Central Excise 2006)**

Exp: Sonar (Sound, Navigation and Ranging) is used to navigate, communicate with or detect objects on or under the surface of water.

40. Velocity of sound in air does not change with the change of

(A) Temperature of air (B) Pressure of air
(C) Moisture content in air
(D) Wind in the direction of propagation of sound

Ans. (B) **(SSC Sec. officer 2008) (SSC CPO S.I 2010)**

Exp: Velocity of the sound waves depends upon temperature, density of medium in which it is travelling through and also depends on moisture content in medium but it does not depend on pressure of the medium.

41. The frequency of ultrasound wave is typically

(A) Above 20,000 KHz (B) Above 20 KHz
(C) Below 02 KHz (D) Below 2000 KHz

Ans. (B) **(SSC CPO S.I 2010)**

Exp: Ultrasonic waves are those waves whose frequency is above 20 KHz. It is inaudible to human ear.

42. The velocity of sound in air

(A) Decreases with increase of temperature
(B) Increase with decrease of temperature
(C) Does not depend on temperature
(D) Decreases with decrease in temperature

Ans. (D) **(SSC CPO S.I 2010)**

Exp: The velocity of sound increases with increase in temperature of medium or vice versa as $V \propto \sqrt{T}$

43. The device which converts sound energy into electrical energy is called

(A) Amplifier (B) Speaker
(C) Microphone (D) Transmitter

Ans. (C) **(SSC Combined Matric Level (Pre) 1999)**

Exp: Microphone converts one form of energy to another form of energy. Microphone converts sound energy into electrical energy.

44. Least aduible sound for most of the human ear is:

(A) 10.0 μ bar (B) 0.0002 μ bar
(C) 0.005 μ bar (D) 5.0 μ bar

Ans. (B) **(SSC (10+(B) Level D.T.O & LDC 201(B)**

Exp: 0.0002 μ bar is the least pressure created by sound waves to which human ear is sensitive.

45. The ordinary and maximum tolerance limit of sound by human being is

(A) 50 dB to 70 dB (decibel)
(B) 60 dB to 80 dB (decibel)
(C) 65 dB to 75 dB (decibel)
(D) 70 dB to 85 dB (decibel)

Ans. (B) **(SSC Graduate Level Tier-I 201(C)**

Exp: Tolerance limit of ears refers to the limit upto which human ears are sensitive without getting any damage. This limit is 60 dB for ordinary and 80 dB as extreme limit.

46. Sound is heard over longer distances on rainy days because

(A) Sound travels slowly in moist air
(B) Sound travels faster in moist air
(C) Moist air does not absorb sound
(D) Moist air absorbs sound

Ans. (B) **(SSC CGL Tier-I 2015)**

Exp: Velocity of sound depends on density of medium. In rainy days air will be more moist and density will be lower, sound will travel faster.

47. Which of the following property of sound is affected by change in air temperature

(A) Frequency (B) Intensity
(C) Amplitude (D) Wavelength

Ans. (A) **(SSC CHSL (10+(B) LDC, DEO & PA/SA 2015)**

Exp: As the temperature rises, molecules begin to vibrate more rapidly, thereby increasing the frequency of sound.

48. A person standing on a railway platform listens to the whistles of arriving and departing trains.

(A) The same in both cases in all respects
(B) Of higher intensity when train arrives
(C) Of higher pitch when train arrives
(D) Of higher pitch when train departs

Ans. (C) **(SSC sec. officer 200(A)**

Exp: Sound of higher pitch will be heard compared to the sound of lower pitch.

49. Which term is not associated with sound wave?

(A) Hertz (B) Decibel
(C) Candela (D) Mach

Ans. (C) **(SSC CHSL Tier-I CBE) 2016)**

Exp: Candela is the SI unit of Luminous intensity. Hertz, Decibel and Mach all are associated with sound wave.

50. If density of oxygen is 16 times that of hydrogen. What will be their corresponding ratio of velocity of sound?

(A) 4 : 1 (B) 2 : 1
(C) 1 : 16 (D) 1 : 4

Ans. (D) **(SSC CHSL (10+(B) LDC, DEO & PA/SA 2015)**

Exp: $v \propto \sqrt{\frac{1}{\rho}}$

$$\frac{v_1}{v_2} = \sqrt{\frac{1}{\rho}}$$

$$\frac{v_{oxygen}}{v_{hydrogen}} = \sqrt{\frac{\rho_{hydrogen}}{\rho_{oxygen}}} = \sqrt{\frac{1}{16}}$$

$$\frac{v_{oxygen}}{v_{nydrogen}} = \sqrt{\frac{1}{4}} = 1 : 4$$

51. Conversion of sound energy into electrical energy is done by

(A) Solar cell (B) Gramophone
(C) Microphone (D) Loud speaker

Ans. (C) **(SSC (10+(B) Level D.E.O & LDC) 201(B)**

Exp: As microphone is a type of transducer, it converts sound energy into electrical energy.

52. A bomb explodes on the moon. You will hear its sound on earth after ____

(A) 20 minutes (B) 2 hours 20 minutes
(C) 3.7 hours
(D) You cannot hear the sound of explosion

Ans. (D) **(SSC CGL (CBE) 2016)**

Exp: We cannot hear the sound of explosion which happend on moon because sound needs medium to travel and moon is surrounded by vacuum.

53. Bats can sense obstacles because they produce
(A) Supersonic sound waves
(B) Ultrasonic sound waves
(C) Infrasonic sound waves
(D) Micro sound waves
Ans. (B) **(SSC Combined Matric Level 200(B)**
Exp: Bats use ultrasonic sound waves to locate the objects in space.

54. Quality of a musical note depends on
(A) Fundamental frequency
(B) Amplitude of the wave
(C) Harmonics present
(D) Velocity of sound in the medium
Ans. (C) **(SSC CGL Tier-I 2016)**
Exp: Quality of musical note depends on overtones of sound. Overtones of sound also referred as harmonics.

55. Which of the following is the unit of perceived loudness of sound?
(A) Decibel (B) Sone
(C) Hertz (D) Phon
Ans. (A)
Exp: Percieved loudness of sound is measured in decibel (dB).

56. Hydroscope is an instrument that shows changes in
(A) Sound under water (B) Atmospheric humidity
(C) Density of liquid (D) Elevation of land
Ans. (A)
Exp: Hydroscope - It is used for seeing below the surface of water.
Hydrophone - It is used to detect sound waves under water.

57. The SI unit of intensity of sound is _____.
(A) Watt per square meter
(B) Joule per square meter
(C) Newton per square meter
(D) Tesla per square meter
Ans. (A) **(SSC CHSL Tier-I 2016)**
Exp: The SI unit of intensity of sound is watt per square meter. It is commonly referred to as decibles (dB).

58. Women have shrill voice because of _____.
(A) Low frequency (B) High frequency
(C) Shrill vocals (D) Strong epiglottis
Ans. (B) **(SSC CHSL Tier-I 2016)**
Exp: Shrillness of sound depends on its frequency. Voice is shrill because of higher frequency of sound.

59. The instrument used to study the laws of vibrating string is _____.
(A) Hydrometer (B) Sonometer
(C) Sphygmomanometer (D) Electrometer
Ans. (B) **(SSC CPO 2017)**
Exp: Sonometer is used to study the laws of vibrating strings. It is a device based on the principle of Resonance. It is used to verify the laws of vibration of stretched string and also used to determine the frequency of a tuning fork.

60. In fluid mechanics, Mach number is 1, if the speed of an object is equal to the _____?
(A) Speed of light
(B) Rotational speed of sun
(C) Speed of sound
(D) Speed of revolution of earth around the sun
Ans. (C) **(SSC CPO 2017)**
Exp: In fluid mechanics, Mach number is defined as the ratio of the speed of a body to the speed of sound in the surrounding medium.
It is used with a numeral (as mach 1, mach 2, etc.) to indicate the speed of sound, twice the speed of sound and so on.

61. What is the unit of frequency?
(A) Decibel (B) Watt
(C) Hertz (D) Newton
Ans. (C) **(SSC CPO 2017)**
Exp: The S.I. Unit of frequency is hertz. 1 Hertz (Hz) is defined as one Cycle per second. It is named after Heinrich Rudolf Hertz.

62. Sounds of frequencies below 20 Hz are called _____.
(A) Infrasonic sound (B) Ultrasonic sound
(C) Intrasonic sound (D) Reflected sound
Ans. (A) **(SSC CPO 2017)**
Exp: Infrasonic sound is a sound that is lower in frequency than 20 Hz or cycles per seconds. The lower limit of human hearing.

63. What is the minimum distance (in metres) required to hear an echo?
(A) 10 (B) 13
(C) 17 (D) 21
Ans. (C) **(SSC CGL 2017)**
Exp: The minimum distance to hear an echo will be partly based upon the observers ability to resolve different sounds. Considering the speed of sound to be 343 m/s, the minimum distance (d = vt) to hear distinct echo is 17.2 m.

64. Which among the following determines the pitch of a sound?
(A) Amplitude (B) Frequency
(C) Loudness (D) Wavelength
Ans. (B) **(SSC CGL 2017)**
Exp: Pitch is determined by the frequency of a wave and frequency is the combination of wavelength and speed at which the wave is travelling.

65. What is the SI unit of frequency?
(A) Newton (B) Watt
(C) Farad (D) Hertz
Ans. (D) **(SSC CGL 2017)**
Exp: S.I. Unit of frequency is hertz (Hz). It is equal to one complete cycle per second.

66. Who pioneered diagnostic ultrasound?
(A) Alexander Fleming (B) Ian Donald
(C) A. Laveran (D) Robert Koch
Ans. (B) **(SSC CGL 2017)**
Exp: Ian Donald (1910-87) was a Scottish physician who pioneered the use of diagnostic ultrasound in medicine.

67. What is the SI unit of intensity of sound?
(A) Decibel (B) Newton
(C) Heartz (D) Tesla
Ans. (A) **(SSC CGL 2017)**
Exp: The S.I. unit of intensity of sound is Decibel.

Chapter-05

Kinematic

1. What should a person do on a freely rotating turn-table to decrease his angular speed?

(A) Brings his hands together
(B) Raises his hands up
(C) Spreads his hands outward
(D) Sits down with raised hands

Ans. (C) **(SSC CGL - 2008)**

Exp: When a person on a freely rotating turn-table spreads his hands outward, it will decrease the angular rotation, maintaining the same angular momentum.

2. Which of the following particle has maximum momentum, if all particles are moving with a same speed?

(A) Electron (B) Proton
(C) Deuteron (D) Alpha prticle

Ans. (D) **(SSC Sten. 2011)**

Exp: As momentum is proportional to mass of any object, the moment of heaviest object will be the maximum.

3. Which of the followig law of conservation applicable on the motion of a rocket?

(A) Conservation of mass
(B) Conservation of charge
(C) Conservation of momentum
(D) Conservtion of energy.

Ans. (C) **(SSC MTS 2002, COP 2010)**

Exp: According to Law of Conservation of Momentum, total momentum of an object before explosion is equal to the momentum of the object after explosion.

4. When the speed of car is doubled, then what will be the braking force of the car to stop it in the same distance?

(A) Four times (B) Two times
(C) Half (D) One-fourth

Ans. (B) **[SSC Section officer (Audit) 1997]**

Exp: Force = mass × acceleration

$$= m \times \frac{dv}{dt}$$

If speed of car will be doubled then force required to stop the car will be doubled.

5. The dimension of which of the following is the same as that of impulse?

(A) Volume (B) Momentum
(C) Torque
(D) Change in the rate of momentum

Ans. (B) **(SSC Section officer (Audit) 1997)**

Exp: Impulse = Force × Time

$= \text{Kg m/sec}^2 \times \text{sec}$

$= \text{kg m/sec} \Rightarrow \left[MLT^{-1}\right]$

momentum = m v = kg m /sec $\Rightarrow \left[MLT^{-1}\right]$

Impulse and momentum both have same dimensions.

6. Rain drops fall from great height. Which among the following statements is true regarding it?

(A) They fall with that ultimate velocity, which are different for different droplets
(B) They fall with same ultimate velocity
(C) Their velocity increases and they fall with different velocity on the earth
(D) Their velocity increases and they fall with same velocity on the earth

Ans. (A) **(SSC Section officer (Audit) 1997)**

Exp: When rain drops fall from great height, they fall due to gravitational pull and their velocity depends on their size.

7. While catching a ball, a player pulls down his hands to lower the

(A) Force (B) Momentum
(C) Impulse (D) Catching time

Ans. (B) **(SSC Section officer (Audit) 2003)**

Exp: When a player catches a ball, he lowers his hand to lower the rate of change of momentum.

8. If the velocity-time graph of a particle is represented by y = mt+c, then the particle is moving with

(A) Constant speed (B) Constant velocity
(C) Constant acceleration (D) Varying acceleration

Ans. (C) **(SSC Tax ass. InT. 2004)**

Exp: Equation y = mt + c represents linear velocity with respect to time linear velocity and time graph shows that particle is moving with constant acceleration.

9. The swing of a spinning cricket ball in air can be explained on the basis of

(A) Sudden change in wind direction.
(B) Buoyancy of air.
(C) Turbulence caused by wind.
(D) Bernoulli's theorem.

Ans. (C) **(SSC Section officer (Audit) 2008)**

Exp: The swing of a spinning cricket ball in air can be explained on the basis of turbulence caused by wind

10. The spokes used in the wheel of a bicycle increase its

(A) Moment of inertia (B) Velocity
(C) Acceleration (D) Momentum

Ans. (A) **(SSC Exm. 2010)**

Exp: The spokes used in the wheel of bicycle increases its moment of inertia. The more is the moment of inertia, the more smooth will be the motion of bicycle

11. The function of ball bearings in a wheel is :

(A) To increase friction
(B) To convert kinetic friction into rolling friction
(C) To convert static friction into kinetic friction
(D) Just for convenience

Ans. (B) **(SSC combined Graduate - 2011)**

Exp: The main function of ball bearings is to reduce friction between the surface of bearing and the surface it is rolling over.

12. A sphere rolls down on two inclined planes of different angles but same height, it does so

(A) In the same time
(B) With the same speed
(C) In the same time with the same speed
(D) In the same time with the same kinetic energy

Ans. (B) **(SSC Combined Matric Level- PRE 2000)**

Exp: The velocity of sphere depends on the height of inclined plane and acceleration due to gravity.

13. An athlete runs before long jump to get advantage on

(A) Inertia of motion (B) Frictional force
(C) Moment of a force (D) Principle of moments

Ans. (A) **(SSC combined Matric Level 2002)**

Exp: An athlete runs before the long jump to gain the moment of inertia to get forward momemtum in order to get longer jump.

14. A pilot has to release the bomb to hit a target

(A) Right above the target (B) Beyond the target
(C) Before the target (D) None of these

Ans. (C) **(SSC combined Martirc Level- 2002)**

Exp: According to Newton's First Law of Motion an object will stay at rest if in rest and stays in motion if in motion unless an external force is applied on it so to hit the target pilot should release the bomb before the target, because bomb will have the velocity of plane.

15. A bomb at rest explodes into a large number of tiny fragments. The total momentum of all the fragments.

(A) Is zero
(B) Depends on the total mass of all the fragments
(C) Depends on the speeds of various fragments
(D) Is infinity

Ans. (A) **(SSC Combined Martirc Level- 2006)**

Exp: According to Law of Conservation of Momentum, total momentum of objects before collision is equal to the total momentum of the objects after collision. It will also apply in case of explosion. That is why the total momentum of all fragments of bomb after explosion will be zero.

16. The slope of a velocity-time graph represents

(A) Acceleration (B) Displacement
(C) Distance (D) Speed

Ans. (A) **(SSC Combined Martirc Level- 2006)**

Exp: Slope of velocity-time graph represents acceleration.

17. Railway tracks are banked on curves so that

(A) Necessary centrifugal force may be obtained from the horizontal component of the weight of the train
(B) No frictional force may be produced between the tracks and the wheels of the train
(C) Necessary centripetal force may be obtained from the horizontal component of the weight of the train
(D) The train may not fall down inwards

Ans. (C) **(SSC Sten. Grade - 2011)**

Exp: Railway tracks are banked on curves so that it provides necessary centripetal force to enable it to move smoothly round the curve

18. When a running car stops suddenly, the passengers tends to lean forward because of :

(A) Centrifugal force (B) Inetria of rest
(C) Inertia of motion (D) Gravitational force

Ans. (C) **(SSC 10+2 Level Data Entry- 2012)**

Exp: When a running car stops suddenly, the passengers tend to lean forward due to inertia of motion.

19. A metal ball and a rubber ball, both having the same mass, strike a wall normally with the same velocity. The rubber ball rebounds and the metal ball does not rebound. It can be concluded that:

(A) The rubber ball suffers greater change in momentum
(B) The metal ball suffers greater change in momentum.
(C) Both suffer the same change in momentum
(D) The initial momentum of the rubber ball is greater than that of the metal ball.

Ans. (A) **(SSC CHSL, LDC - 2014)**

Exp: The rubber ball suffers greater change in momentum than metal ball that is why rubber ball rebounds and metal ball does not rebound.

20. The motion of the wheels of a bullock-cart while moving on the road is an example of

(A) Oscillatory and rotatory motion
(B) Oscillatory and translatory motion
(C) Translatory and rotatory motion
(D) Translatory motion only

Ans. (C) **(SSC CGL- 2014)**

Exp: The motion of wheels of bullock cart is an example of both translatory and rotatory motion.

21. The moment of inertia of a body does not depend upon its

(A) Axis of rotation (B) Angular velocity
(C) Form of mass (D) Distribution of mass

Ans. (B) **(SSC CGL- 2014)**

Exp: Moment of Inertia is the property of mass of a body. It does not depend upon its angular velocity.

22. To open a door easily, the handle should be fixed.

(A) Near the hinges
(B) Away from mid-point opposite to hinges
(C) In the middle (D) None of these

Ans. (B) **(SSC CGL- 2014)**

Exp: Torque = Force × distance
To open a door easily, handle should be fixed at greatest distance to give maximum torque to open the door.

23. A particle is moving in a uniform circular motion with constant speed v along a circle of radius r. The acceleration of the particle is

(A) Zero (B) $\frac{v}{r}$
(C) $\frac{v}{r^2}$ (D) $\frac{v^2}{r}$

Ans. (D) **(SSC CGL - 2014)**

Exp: If a particle is moving in a uniform circular motion with constant speed v along a circle of radius r, then the acceleration of particle will be $\frac{v^2}{r}$.

24. An object covers distance which is directly proportional to the square of the time. Its accelaration is

(A) Increasing (B) Decreasing
(C) Zero (D) Constant

Ans. (D) **(SSC CHSL (10+2) DEO LDC 2014)**

Exp: Distance is directly proportional to the square of time
Let distance = S
time = t $S \propto t^2$
$S = kt^2$
$\frac{ds}{dt} = 2kt$
$v = 2kt$
$\frac{dv}{dt} = 2k$
Hence, acceleration is constant

25. An object with a constant speed

(A) Is not accelerated
(B) Might be accelerated
(C) Is always accelerated
(D) Also has a constant velocity

Ans. (A) **(SSC CHSL (10+2) DEO & LDC 2014)**

Exp: Acceleration is defined as the rate of change of velocity. If an object is moving with constant speed, it cannot be accelerated.

26. The average kinetic energy of the molecules of an ideal gas is directly proportional to

(A) Velocity of Molecules
(B) Mass of Molecules
(C) Absolute temperature of the gas
(D) Temperature of environment

Ans. (C) **(SSC CGL Tier-I 2015)**

Exp: The average kinetic energy of molecules of ideal gas is directly proportional to the temperature. Thus the average kinetic energy of the particle increases with increase in temperature

27. Why does a cannon recoil after firing?

(A) Conservation of energy
(B) Backward thrust of gases produced
(C) Newton's third law of motion
(D) Newton's first law of motion

Ans. (C) **(SSC CGL Tier- (CBE) 2016)**

Exp: Recoil is caused due to firing of bullet in forward direction due to Newton's Third Law of motion.

28. Rate of change of momentum is

(A) Area (B) Pressure
(C) Force (D) Velocity

Ans. (C) **(SSC CHSL Tier-I 2016)**

Exp: Rate of change of momentum is equal to the force with respect to time.
Momentum = mv
Force = $\frac{dP}{dt}$

29. What is impulse equal to?

(A) Change in momentum
(B) Change in force
(C) Change in velocity (D) Change in acceleration

Ans. (A) **(SSC CHSL Tier-I 2016)**

Exp: Impulse is equal to the change of momentum.
Impulse = F. dt
Force (F) = $\frac{dP}{dt}$
Impulse = dP
Where P = momentum

30. Momentum of an object depends on which factors?

I. Mass of the object II. Speed of the object
III. Volume of the object

(A) I only (B) I and II only
(C) I and III only (D) I, II and III

Ans. (B) **(SSC CPO 2017)**

Exp: Momentum of an object ($\vec{p}$) depends on an object's mass (m) and its velocity ($\vec{v}$). Momentum is a vector quantity. Its given by formula: $\boxed{\vec{p} = m\vec{v}}$

31. Jet engine works on the principle of conservation of _____.

(A) Heat (B) Mass
(C) Linear momentum (D) Angular momentum

Ans. (C) **(SSC CPO 2017)**

Exp: A jet engine works on the principle of Conservation of Linear Momentum. Conservation of Linear Momentum expresses the fact that a body or system of bodies in motion retains its total momentum (the product of mass and velocity), unless an external force applied to it.

32. Which of the following is not a unit of speed?

(A) m/s (B) km/hr
(C) m^2/hr (D) cm/s

Ans. (C) **(SSC CPO 2017)**

Exp: m^2/hr is not a unit of speed.

33. The phenomena of raising the outer edge of the curved roads above the inner edge to provide necessary centripetal force to the vehicles to take a safe turn is called _____.

(A) Banking of roads (B) Cornering of roads
(C) Elevation of roads (D) Tempering of roads

Ans. (A) **(SSC CGL 2017)**

Exp: The vehicles can go round the curved track at a reasonable speed without skidding, the sufficient centripetal force is managed for it by raising the outer edge of the track a little above the inner edge. It is called Banking of roads.

34. If the speed of an object moving along a straight line keeps changing, its motion is said to be _____.

(A) Uniform (B) Periodc
(C) Circular (D) Non- uniform

Ans. (D) **(SSC CGL 2017)**

Exp: Non-Uniform motion is defined as the motion of an object in which the object travels with varied speed and it does not cover same distance in equal time interval irrespective of the time interval length. For eg. The motion of a train.

35. If the speed of an object moving along a straight line is constant, its motion is said to be _____.

(A) Uniform (B) Periodic
(C) Circular (D) Non- uniform

Ans. (A) **(SSC CGL 2017)**

Exp: If an object that is moving in a specific direction at a constant speed, its motion is said to be uniform motion. Uniform motion describes object moving in a straight line, keeping its speed constant.

36. In the formula average velocity = (u + v) /2, u is the _____.

(A) Final velocity (B) Initial displacement
(C) Initial velocity (D) Final displacement

Ans. (C) **(SSC CGL 2017)**

Exp: Average velocity, $v_{av.} = (u + v)/ 2$ where 'u' is the Initial velocity and 'v' is the final velocity.

37. The distance-time graph for the motion of an object moving with a constant speed is a _____.

(A) Dot (B) Circle
(C) Straight Line (D) Curve

Ans. (C) **(SSC CGL 2017)**

Exp: An object moving with a constant speed is called Uniform Motion. The distance-time graph for uniform motion would be a straight line, because the objects covers the equal distance in equal interval of time.

38. If an object moves in a circular path with uniform _____, its motion is called uniform circular motion.

(A) Speed
(B) Time
(C) Velocity
(D) Acceleration

Ans. (A) **(SSC CGL 2017)**

Exp: When a object moves in a circular path with uniform speed, its motion is called Uniform Circular Motion.