UNIT 10 Simple Harmonic Motion and Waves

Q.1 Define vibratory motion (oscillatory motion).
10110001

Q.2 What is meant by Simple Harmonic Motion? Prove that mass attached with a spring performs Simple Harmonic Motion. **(Board 2015)** 10110002

Q.3 Explain the motion of ball in bowl perform Simple Harmonic Motion. **(Board 2016)** 10110003

Q.4 What is Simple Pendulum? Prove that motion of Simple Pendulum is SHM. 10110004

Q.5 Explain the following terms: 10110005
(a) Vibration **(Board 2014)**   (b) Time Period **(Board 2014)**   (c) Frequency
(d) Amplitude **(Board 2014)**   (e) Periodic Motion   (f) Displacement

Q.6 Write the characteristics of Simple Harmonic Motion.   OR
What are the important features of SHM? **(Board 2014,17)** 10110006

Q.7 What are damped oscillations? How damping progressively reduces the amplitude of oscillation?   OR
What do you mean by Damped Oscillation? Explain. **(Board 2016)** 10110007
OR
How can the strength of oscillations be reduced? Also describe its application.

Q.8 What is wave? Write its importance in our daily life. **(Board 2018)** 10110008

Q.9 What is wave motion? Explain. **(Board 2017)** 10110009
OR
What is wave motion? Demonstrate the production and propagation of waves with vibratory motion of object.

Q.10 How many categories of waves are there? Give examples of each. 10110010
OR
How can you define the term wave? Elaborate the difference between mechanical and electromagnetic waves? Give examples of each. **(Board 2017)**

Q.11 Explain the types of Mechanical Waves. Explain with examples. 10110011

Q.12 Define the following terms: 10110012
(i)   Crest   (ii)   Trough   (iii)   Wavelength

Q.13 Write a note on "waves as a carrier of energy". Also describe the factors upon which the amount of energy carried by the wave depends. **(Board 2014)** 10110013
OR
Waves are the means of energy transfer without transfer of matter. Justify this statement with the help of a simple experiment.

Q.14 What is wave equation? Establish a relation between wave speed (v), frequency (f) and wavelength (λ) or prove that v = f λ. **(Board 2015)** 10110014
OR
Derive a relationship between velocity, frequency and wavelength of a wave. Write a formula relating velocity of a wave to its time period and wavelength.

Q.15 Write a note on Ripple Tank. How can we generate straight waves and circular waves with the help of Ripple Tank? 10110015

Q.16 Describe the following characteristics of waves: 10110016
(a) Reflection (b) Refraction (c) Diffraction **OR**
Explain the following properties of waves with reference to ripple tank experiment
(a) Reflection (b) Refraction (c) Diffraction

Q17. What are wave fronts? 10110017

Choose the correct answer from the following choices:

Exercise MCQs

1. Which of the following is an example of simple harmonic motion? 10110018
   (a) Motion of a simple pendulum
   (b) The motion of ceiling fan
   (c) The spinning of the Earth on its axis
   (d) A bouncing ball on a floor

2. If the mass of the bob of a pendulum is increased by a factor of 3, the period of the pendulum's motion will:
   (Board 2016) 10110019
   (a) be increased by a factor of 2
   (b) remain the same
   (c) be decreased by a factor of 2
   (d) be decreased by a factor of 4

3. Which of the following devices can be used to produce both a transverse and longitudinal waves? **(Board 2015)** 10110020
   (a) a string
   (b) a ripple tank
   (c) a helical spring (slinky)
   (d) a tuning fork

4. Waves transfer: **(Board 2014 & 2015)** 10110021
   (a) energy   (b) frequency
   (c) wavelength   (d) velocity

5. Which of the following is a method of energy transfer? **(Board 2015)** 10110022
   (a) conduction   (b) radiation
   (c) wave motion   (d) all of these

6. In a vacuum all electromagnetic waves have the same: **(Board 2018)** 10110023 (a) speed
   (b) frequency
   (c) amplitude   (d) wavelength

7. A large ripple tank with a vibrator working at a frequency of 30 Hz produces 25 complete waves in a distance of 50 cm. The velocity of the wave is: **(Board 2014)** 10110024
   (a) 53 cms^{-1} (b) 60 cms^{-1}
   (c) 750 cms^{-1} (d) 1500 cms^{-1}

8. Which of the following characteristics of a wave is independent of the others?
   (Board 2014,17) 10110025
   (a) speed   (b) frequency
   (c) amplitude   (d) wavelength

9. The relation between v, f and λ of a wave is: **(Board 2014 & 2015,18)** 10110026
   (a) $v f = \lambda$ (b) $f \lambda = v$
   (c) $v \lambda = f$ (d) $v = \lambda / f$

Additional MCQs

10. The disturbance travelling in a medium is called: 10110027
    (a) Wave motion
    (b) Simple Harmonic Motion
    (c) Motion
    (d) Both a, and b

11. The waves, which are used to detect the broken bones are called: 10110028
    (a) Light waves   (b) X-rays
    (c) Sound waves   (d) Both b and c

12. The force applied on the mass attached with a spring is represented by:
    10110029
    (a) F_a (b) F_c
    (c) F_{ext} (d) F_s

13. **If there is no extension in the spring then this position is called:** 10110030
    (a) Equilibrium position
    (b) Unequilibrium
    (c) Neutral equilibrium
    (d) Stable equilibrium
14. **The unit of spring constant is:** 10110031
    (a) m   (b) kg
    (c) Nm^2 (d) Nm^{-1}
15. **If the displacement in spring is 'x' of mass "m" attached with a spring then restoring force is:** 10110032
    (a) $F = ma$ (b) $F = kx$
    (c) $F = -kx$ (d) $F = \dfrac{m}{a}$
16. **The ratio of external force applied on the spring to displacement is called:**
    (a) Hooke's Law   10110033
    (b) Constant
    (c) Spring constant
    (d) Force
17. **The time required to complete one round trip (vibration) about mean position is called:** 10110034
    (a) Time period   (b) Frequency
    (c) Amplitude   (d) Vibration
18. **The time period of mass attached with a spring can be calculated by:**
    (Board 2015) 10110035
    (a) $T = 2\pi \sqrt{\ell / g}$
    (b) $T = \dfrac{2\pi \sqrt{\dfrac{k}{m}}}{}$
    (c) $T = 2\pi \sqrt{g / \ell}$
    (d) $T = 2\pi$
19. **The time period of simple pendulum can be calculated by:** **(Board 2014,15)** 10110036
    (a) $T = 2\pi \sqrt{\ell / g}$
    (b) $T = 2\pi$
    (c) $T = 2\pi \sqrt{g / \ell}$
    (d) $T = 2\pi \sqrt{\dfrac{k}{m}}$
20. **The maximum displacement from mean position is called:** 10110037
    (a) Maximum height
    (b) Time period
    (c) Amplitude
    (d) Interval
21. **The displacement produced in the spring is directly proportional to force is called:** 10110038
    (a) Hooke's law
    (b) Boyle's law
    (c) Newton's law
    (d) Joule's law
22. **At mean position of pendulum, the potential energy of the pendulum is:** 10110039
    (a) Maximum   (b) Minimum
    (c) Much more   (d) Both a and c
23. **At mean position kinetic energy of the ball is:** 10110040
    (a) Minimum   (b) Zero
    (c) Maximum   (d) 10 J
24. **At extreme position potential energy of the pendulum is:** 10110041
    (a) Maximum   (b) Minimum
    (c) Both a and b   (d) Zero
25. **In Simple Harmonic Motion, the acceleration of the body is_____ proportional to the displacement.** 10110042
    (a) Inversely   (b) Directly
    (c) Equally   (d) Ratio
26. **The value of acceleration in Simple Harmonic Motion at mean position is:**
    (a) Maximum   (b) Zero   10110043
    (c) 10 N   (d) Both a and b
27. **The waves in which particles of the medium vibrate parallel to the direction of waves are called:** 10110044
    (a) Longitudinal waves
    (b) Transverse waves
    (c) Electromagnetic waves
    (d) Both b and c
28. **The waves in which particles of the medium vibrate perpendicular to the direction of waves are:** 10110045
    (a) Electromagnetic waves
    (b) Sound waves
    (c) Both 'a' and 'b'
    (d) Transverse waves
29. **The sound waves are the example of:**
    (a) Longitudinal waves   10110046
    (b) Transverse waves
    (c) Electromagnetic waves
    (d) X-rays

30. The energy is transferred from one place to another : 10110047
    (a) through matter
    (b) through waves
    (c) Both a and b
    (d) through vacuum

31. The waves have properties: 10110048
    (a) Reflection   (b) Refraction
    (c) Diffraction   (d) All of these

32. The time period of body attached to spring depend on: 10110049
    (a) mass
    (b) gravitational constant
    (c) length
    (d) amplitude

33. The part of waves at which particles of the medium are below the normal position are called: 10110050
    (a) Extreme position
    (b) Crest
    (c) Trough
    (d) Compression

34. The distance between two consecutive trough or crest is called: 10110051
    (a) Wavelength   (b) Frequency
    (c) Time period   (d) Amplitude

35. The number of waves passing through a point in one second is called: 10110052
    (a) Time period   (b) Cycle
    (c) Frequency   (d) Amplitude

36. The unit of frequency is: 10110053
    (a) Hertz
    (b) Vibration per second
    (c) Cycle per second
    (d) all a, b and c

37. The speed of waves can be calculated by: 10110054
    (a) vt   (b) d × t
    (c) fλ (d) Tf

38. The water waves after striking the hurdle will: 10110055
    (a) Reflect   (b) Refract
    (c) Diffract   (d) All a, b and c

39. The motion in which the friction reduces the mechanical energy of the system as time passes and the amplitude of motion reduces is called: 10110056
    (a) SHM
    (b) Random motion
    (c) Damped motion
    (d) Circulatory motion

40. The oscillations of a system in the presence of which force are called damp oscillations: 10110057
    (a) Resistive force
    (b) Attractive force
    (c) Coulomb force
    (d) Both a and b

41. The example of shock absorber of the vehicles are: (Board 2014) 10110058
    (a) Simple harmonic motion
    (b) Vibratory motion
    (c) Damped motion
    (d) Linear motion

42. Time period is reciprocal of 10110059
    (a) Frequency   (b) Cycle
    (c) Wave-length   (d) Amplitude

43. The water waves obey the laws of 10110060
    (a) Reflection   (b) Refraction
    (c) Diffraction   (d) All of these

44. The product of frequency and time period is equal to: 10110061
    (a) v   (b) 1
    (c) 0   (d) λ

45. If the mass of bob of a simple pendulum is doubled, its time period:
    (a) is doubled   10110062
    (b) becomes four times
    (c) remains same
    (d) becomes half

46. If the length of a simple pendulum is halved, its time period 'T' will become:
    (a)   (b)) 10110063
    (c) T   (d) 2T

47. Diffraction of wave can be observed clearly only when the size of slit or obstacle is nearly _____ to the wavelength of the wave: 10110064
    (a) Two times   (b) Equal
    (c) Four times   (d) Half

48. **In simple pendulum motion, restoring force is provided by:** (Board 2014) 10110065
    (a) Air resistance
    (b) Tension in the string
    (c) Inertia
    (d) Weight of the body
49. **Ripple tank is an instrument which is used to study the characteristics of:**
    (a) Mechanical Waves   10111066
    (b) Light Waves
    (c) Radio Waves
    (d) Electro-Magnetic Waves
50. **Radio waves are:**   10111067
    a) Longitudinal waves
    b) Transverse waves
    c) Electromagnetic waves
    d) Mechanical waves
51. **The product of frequency and wavelength is equal to:**
                    (Board 2015)   10110068
    (a) time period   (b) amplitude
    (c) wave speed   (d) wave energy
52. **When a body moves to and fro about a point, its motion is called:** (Board 2015) 10110069
    (a) random motion
    (b) vibratory motion
    (c) linear motion
    (d) rotatory motion
53. **If time period is given the frequency is calculated as:**   (Board 2015) 10110070
    (a) $f = \dfrac{1}{T}$ (b)

    $f = \dfrac{2}{T}$

(c) $f = \dfrac{3}{T}$ (d)

    $f = \dfrac{4}{T}$

54. **The distance between two consecutive waves compressions or rarefactions is called:**   (Board 2015)   10110071
    (a) focal length   (b) wave length
    (c) frequency   (d) time period
55. **The spring constant is:**
                    (Board 2016) 10110072
    (a) $k = \dfrac{-F}{x}$ (b) $F = ma$

    (c) $w = mg$ (d) $k = \dfrac{-x}{m}$

56. **Frequency is equal to:**
                    (Board 2016)   10110073
    (a) $f = \dfrac{1}{T}$ (b) $f = \dfrac{l}{g}$

    (c) $f = 2\pi\sqrt{\dfrac{l}{g}}$ (d) $f = kx$

Q.10.1 What is simple harmonic motion? What are the necessary conditions for a body to execute simple harmonic motion? OR Define simple harmonic motion. Write down its three properties.
                    (Board 2014,15) 10110074
Q.10.2 Think of several examples in everyday life of motion that are simple harmonic?   10110075
Q.10.3 What are damped oscillations. How damping progressively reduces the amptitude of oscillation?   10110076
Q.10.4 How can you define the term wave? Elaborate the difference between mechanical and electromagnetic waves?
                    10110077
Q.10.5 Distinguish between longitudinal and transverse waves with suitable examples.
                    (Board 2014 & 2015,17)   10110078

Q.10.6 Draw a Transverse wave with an amplitude of 2 cm and a wavelength 4 cm. Label a crest and trough on the wave. 10110079

Q.10.7 Derive the relationship between velocity, frequency and wavelength of a wave. Write a formula relating velocity a wave to its time period and wavelength.

Q.10.8 Waves are the means of energy transfer without transfer of matter. Justify this statement with the help of simple experiment. 10110081

Q.10.9 Explain the following properties of waves with reference to ripple tank experiment 10110082
(a) Reflection (b) Refraction (c)Diffraction

Q.10.10 Does increasing the frequency of a wave also increase its wavelength? If not, how are these quantities related? 10110083

Q10.1 If the length of simple pendulum is doubled. What will be change in time period? (Board 2015) 10110084

Q10.2 A ball is dropped from a certain height onto the floor and keeps bouncing. Is the motion of the ball simple harmonic? Explain. 10110085

Q10.3 A student performed two experiments with a simple pendulum. He / She used two bobs of different masses by keeping other parameters constant. To his/her astonishment the time period of the pendulum did not change! Why? 10110086

Q10.4 What types of waves do not require any material medium for their propagation? 10110087

Q10.5 Plane waves in the ripple tank undergo refraction when they move from deep to shallow water. What change occurs in the speed of the waves? 10110088

Q.1 Define Vibratory motion. Give conditions of vibratory motion. 10110089

Q.2 What is meant by Time Period? (Board 2018) 10110090

Q.3 What are Mechanical waves?
OR
Define mechanical waves and give an example. 10110091

Q.4 Define Transverse waves. (Board 2014, 16) 10110092

Q.5 Define crest and trough of a wave. 10110093

Q.6 What is frequency? Write its unit.

10110094

Q.7 State Hooke's Law. (Board 2015) 10110095

Q.8 What is meant by Amplitude? (Board 2017) 10110096

Q.9 Define Compressional waves. / Longitudinal Waves. (Board 2014) 10110097

Q.10 Define the following terms Reflection, Refraction and Diffraction.10110098

Q.11 Give an example, which explain that energy is transferred through waves. 10110199

Q.12 Define damped oscillations. 10110100

Side Information

Q.13 How does a spider detect its prey?
10110101

Q.14 Under which restoring force a ball oscillates in a bowl when displaced from the centre of bowl? 10110102

Q.15 What will be the displacement of an object in SHM when the kinetic and potential energies are equal? 10110103

Q.16 Tell whether or not below mentioned motions are SHM. 10110104

Q.17 Who invented the pendulum clock and when? 10110105

Q.18 Relate the speed of longitudinal and transverse waves through solid, liquid or gas. 10110106

Q.19 How much energy is required to generate the high frequency wave as compared to the low frequency wave?
10110107

Q.20 What are Seismic Waves? Explain.
10110108

Q.21 What happens to the angle of refraction when water waves pass from deep to shallow part of the water? 10110109

Q.22 Does the magnitude of angle of incidence and angle of refraction equal?
10110110

Q.24 How many times does the human ear drum can oscillate in one second?
10110111

Q.25 Do mechanical waves pass through vacuum, that is, empty space? 10110112

Q.26 What do the dark and bright fringes on the screen of the ripple tank represent? 10110113

Solved Examples

10.1 Find the time period and frequency of a simple pendulum 1.0m long at a location where $g = 10.0$ ms^{-2}. 10110114

10.2 A wave moves on a slinky with frequency of 4Hz and wavelength of 0.4m. What is the speed of the wave? 10110115

10.3 A student performs an experiment with waves in water. The student measures the wavelength of wave to be 10cm. By using stopwatch and observing the oscillations of a floating ball. The student measures the frequency of 2 Hz. If the student starts a wave in one part of a tank of water, how long will it take the wave to reach the opposite side of the tank 2m away?

Numerical Problems

10.1 The time period of a simple pendulum is 2s. What will be its length on Earth? What will be its length on the moon if $g_m = \dfrac{g_e}{6}$? Where $g_e = 10$ms^{-2}.
10110117

10.2 A pendulum of length of 0.99m is taken to the moon by an astronaut. The time period of the pendulum is 4.9s. What is the value of 'g' on the surface of the moon? 10110118

10.3 Find the time periods of a simple pendulum of 1 meter length, placed on Earth and on moon. The value of g on the surface of moon is 1/6th of its value on Earth. Where g_e is 10ms^{-2}.
10110119

10.4 A simple pendulum completes one vibration in two seconds. Calculate its length when $g = 10.0$ ms^{-2} 10110120

10.5 If 100 waves pass through a point of a medium in 20 seconds, what is the frequency and time period of the wave? If wavelength is 6cm, calculate the wave speed. 10110121

10.6 A wooden bar vibrating into the water surface in a ripple tank has a frequency of 12 Hz. The resulting wave has

a wavelength of 3cm. What is the speed of the wave? 10110122

10.7 A transverse wave produced on a spring has a frequency of 190 Hz and travels along the length of the spring of 90m, in 0.5s. 10110123

a. What is the time period of wave?

b. What is the speed of wave?

c. What is the wavelength of wave?

10.8 Water waves in a shallow dish are 6.0 cm long. At one point, the water waves move up and down at a rate of 4.8 oscillations per second. 10110124

(a) What is the speed of water waves?

(b) What is the time period of water waves?

10.9 At one end of a ripple tank 80cm across, a 5 Hz vibrator produces waves whose wavelength is 40mm. Find the time the wave need to cross the tank. 10110125

10.10 What is the wavelength of the radio waves transmitted by an FM station at 90 MHz? Where $1MHz = 10^6 Hz$, and speed of radio wave is 3×10^8 ms^{-1}. 10110126

UNIT
11

Sound

Q.1   **What is Acoustics?**   10111001

Q.2   **How is sound produced? Give an example.**   10111002

Q.3   **Give an experiment which shows that sound is produced due to vibration of a body.**
10111003

Q.4   **Show by experiment that sound requires a material medium for its propagation.** 0111004
          OR   **(Board 2014)**

      How can you prove the mechanical nature of sound by a simple experiment?

Q.5   **What do you understand by the longitudinal wave? Describe the longitudinal nature**
of sound waves.   **OR**

      What is the nature of sound? Explain.   10111005

Q.6   **Explain the characteristics of sound.**   **(Board 2017)**   10111006

Q.7   **Calculate sound level (intensity level).**   10111007

          OR

      What do you mean by the term intensity level? Name and define unit of intensity level
of sound.

Q.8   **Explain reflection of sound (Echo).**   10111008

          OR

      Explain is there any difference between echo and reflection of sound? What is
condition for Echo?

Q9.   **Show that sound waves reflect at the same angle at which angle they strike.**   10111009

Q.10 **How does speed of sound vary in different material?**   10111010

Q.11 **How can we measure speed of sound by Echo method?**   10111011

Q.12 **Define music and noise.**   10111012

Q.13 **Explain Noise Pollution and what is the safe level of noise?**   **OR**   10111013
      OR   **Explain that noise is a nuisance.**

Q.14 **What is the importance of acoustic protection?**   **OR**   10111014
      Describe the importance of acoustic protection.

Q.15 **Describe Audible Frequency Range. OR What is the range of audible frequency of**
sound.   **OR**   **(Board 2015, 16)**   10111015

      What is the audible frequency range for human ear? Does this range very with the
      age of people? Explain.

Q.16 **What are audible frequency range for young children and old people?** **(Board 2014)** 10111016

Q.17 **Define Ultrasonic and write their uses.**   **(Board 2014, 15,17)**   **OR** 10111017
      What is the use of ultrasound in medical field?   **(Board 2015)**

Multiple Choice Questions

Choose the correct answer from the following choices.

1. Which is an example of a longitudinal wave? (Board 2014,15,18) 10111018
   (a) Sound wave
   (b) Light wave
   (c) Radio wave
   (d) Water wave

2. How does sound travel from its source to your ear? 10111019
   (a) By changes in air pressure
   (b) By vibration in wires or strings
   (c) By electromagnetic waves
   (d) by infrared waves

3. Which form of energy is sound? (Board 2015,17) 10111020
   (a) Electrical
   (b) Mechanical
   (c) Thermal
   (d) Chemical

4. Astronauts in space need to communicate with each other by radio links because: 10111021
   (a) Sound waves travel very slowly in space.
   (b) Sound waves travel very fast in space.
   (c) Sound waves cannot travel in space.
   (d) Sound waves have low frequency in space

5. The loudness of a sound is most closely related to its: 10111022
   (a) Frequency
   (b) Period
   (c) Wavelength
   (d) Amplitude

6. For a normal person audible frequency range for sound wave lies between: (Board 2014,17,18) 10111023
   (a) 10Hz and 10kHz
   (b) 20Hz and 20kHz
   (c) 25H and 25kHz
   (d) 30Hz and 30kHz

7. When frequency of sound wave is increased, which of the following decreases?
   (i) Wavelength 10111024
   (ii) Period **(iii) Amplitude**
   (a) (i) only
   (b) (iii) only
   (c) (i) and (ii) only
   (d) (i) and (iii) only

8. The speed of sound was accurately measured in: 10111025
   (a) 1736
   (b) 1737
   (c) 1738
   (d) 1739

9. The speed of sound in air at 21°C is: 10111026
   (a) $336ms^{-1}$
   (b) $343ms^{-1}$
   (c) $430ms^{-1}$
   (d) $470ms^{-1}$

10. Bats can hear sound of frequency up to: 10111027
   (a) 100,000Hz
   (b) 25000Hz
   (c) 120,000Hz
   (d) 1000Hz

11. The unit of intensity of sound: (Board 2017) 10111028
   (a) Wm^{-1}
   (b) Wm
   (c) Wm^{-2}
   (d) Wm^2

12. The intensity of lawn mover is: 10111029
   (a) $10^{-1}Wm^{-2}$
   (b) $10^{-2}Wm^{-2}$
   (c) $10^{-3}Wm^{-2}$
   (d) $10^{-4}Wm^{-2}$

13. Frequency of tuning fork depends upon its of prongs: 10111030
   (a) Weight
   (b) Speed
   (c) Mass
   (d) Distance

14. The speed of sound in air at 0°C is: (Board 2015, 16) 10111031
   (a) $331ms^{-1}$
   (b) $231ms^{-1}$
   (c) $376ms^{-1}$
   (d) $386ms^{-1}$

15. The speed of sound in sea water at 25°C is: 10111032
   (a) $1530ms^{-1}$
   (b) $1531ms^{-1}$
   (c) $1560ms^{-1}$
   (d) $1570ms^{-1}$

16. The speed of sound in iron at 25°C is:
   (a) 5950m/sec 10111033

(b) 5900 m/sec

(c) 6950m/sec

(d) 6940 m/sec

17. **The frequency of silent whistle is:**

(a) 20,000 Hz – 25000Hz   **10111034**

(b) 2000 Hz – 25000Hz

(c) 200 KHz – 2000 Hz

(d) 25000 KHz

18. **The sound level of rustling of leave is:**

(a) 1dB   (b) 20dB   **10111035**

(c) 30dB   (d) 10dB

19. **To hear echoes, the minimum distance of the obstacle from source of sound should be:**   **10111036**

(a) 10m   (b) 15m

(c) 17m   (d) 20m

20. **Old people cannot hear sound above than .**   **10111037**

(a) 1000 **Hz**   (b) 15000 **Hz**

(c) 20000 **Hz**   (d) 10000 **Hz**

21. **Intensity level of the sound produced by mosquito buzzing is:**   **10111038**

(a) 70dB   (b) 40dB

(c) 10dB   (d) 120dB

22. **The speed of sound in air at 100ºC is:**   **10111039**

(a) 380ms^{-1} (b) 382ms^{-1}

(c) 386ms^{-1} (d) 300ms^{-1}

23. **The intensity level of whispering is:**   **10111040**

(a) 20dB   (b) 30dB

(c) 40dB   (d) 50dB

24. **The intensity of rustling of leaves is:**

(a) 10^{-11} Wm^{-2} **(Board 2017) 10111041**

(b) 10^{-10} Wm^{-2}

(c) 10^{-9} Wm^{-2}

(d) 10 Wm^{-2}

25. **Which frequency is used by elephants to communicate with each other?10111042**

(a) zero frequency

(b) low frequency

(c) medium frequency

(d) high frequency

26. **The intensity level of train siren is:**

    (Board 2014) 10111043

(a) 150dB   (b) 130dB

(c) 100dB   (d) 120dB

27. **The pitch of a sound is most closely related to its:**   **10111044**

(a) frequency   (b) period

(c) wavelength   (d) amplitude

28. **The quality of sound is most closely related to its:**   **10111045**

(a) wave form   (b) period

(c) amplitude   (d) frequency

29. **Safe level of noise depends on factors:**

    10111046

(a) one   (b) two

(c) three   (d) four

30. **The technique or method used to absorb undesirable sounds by soft and porous surface is called:**   **10111047**

(a) ultrasonics

(b) acoustic protection

(c) infrasonics

(d) echo

31. **Mice can hear frequencies upto: 10111048**

(a) 100,000 Hz   (b) 25,000 Hz

(c) 120,000 Hz   (d) 1,000 Hz

32. **Sound waves having frequency lower than 20Hz are called:**   **10111049**

(a) ultrasonic   (b) infrasonic

(c) audible   (d) echo

33. **Sound waves having frequency higher than 20,000 Hz are called:**   **10111050**

(a) ultrasonic   (b) infrasonic

(c) audible   (d) echo

34. **1 bel =**   **10111051**

(a) 0.1 dB   (b) 10 dB

(c) 100 dB   (d) 0.01 dB

35. **Ultrasound waves carry energy:**

(a) less   (b) more   **10111052**

(c) equal   (d) none of these

36. **Level of noise recommended in eight-hour work day:**

10111053

(a) 80-90 dB   (b) 80-85 dB

(c) 85-90 dB   (d) 90-95 dB

37. The sensation of sound persists in our brain for: 10111054
(a) 0.1sec   (b) 0.01 sec
    (c)   1 sec   (d) 10 sec

38. The speed of sound in a liquid is ____ than that in gases: 10111055
(a) ten times
(b) fifteen times
(c) five times
(d) two times

39. We can distinguish between the notes of a piano and flute due to __ of sound.   10111056
(a) loudness   (b) pitch
(c) quality   (d) intensity

40. The characteristics of sound by which we can distinguish between two sounds of same loudness and pitch is called:

           (Board 2016)   10111057
(a) intensity   (b) quality
(c) loudness   (d) pitch

41. Example of Mechanical waves is:
           (Board 2016)   10111058
(a) radio waves   (b) x-rays
(c) light waves   (d) sound waves

42. The main categories of waves are:
           (Board 2017)   10111059
(a) 1   (b)   2
(c) 3   (d)   4

Q.11.1 What is the necessary condition for the production of sound?   10111060

Q.11.2 What is the effect of the medium on the speed of sound? In which medium sound travels more faster: air, solid or liquid? Justify your answer.   10111061

Q.11.3 How can you prove the mechanical nature of sound by a simple experiment?

Q.11.4 What do you understand by the longitudinal wave? Describe the longitudinal nature of sound waves.   10111063

Q.11.5 Sound is form of wave. List at least three reasons to support the idea that sound is a wave?   10111064

Q.11.6 We know that waves manifest Phenomenon of reflection, refraction and diffraction. Does sound also manifest these characteristics?   10111065

Q.11.7 What is the difference between the loudness and intensity of sound? Derive the relationship between the two.   10111066

Q.11.8 On which factors does the loudness of sound depends? (Board 2014,15)   10111067

Q.11.9 What do you mean by the term intensity level of the sound? Name and define the unit of intensity level of sound.

Q.11.10 What are the units of loudness? Why do we use logarithmic scale to describe range of the sound intensities we hear?

Q.11.11 What is the difference between frequency and pitch? Describe their relationship graphically. (Board 2017) 10111070

Q.11.12 Describe the effect of change in amplitude on loudness and the effect of change in frequency on pitch of sound. 10111071

Q.11.13 If the pitch of sound is increased, what are the changes in the following?
(a) The frequency   (b) The wavelength
(c) The wave velocity
(d) The amplitude of the wave   10111072

Q.11.14 If we clap or speak in front of a building while standing at a particular distance. We rehear our sound after sometime. Can you explain how does this happen?   10111073

Q.11.15 What is the audible frequency range for human ear? Does this range vary with age of people? Explain.   10111074

Q11.16 Explain that noise is a nuisance. 10111075

Q11.17 Describe the importance of acoustic protection. 10111076

Q11.18. What are the uses of ultrasound in medicine? 10111077

Q.1 Why two tin cans with a string stretched between them could be better way to communicate than merely shouting through the air? 10111078

Q.2 We can recognize persons speaking with the same loudness from their voice. How is this possible? 10111079

Q.3 You can listen to your friend around a corner, but you cannot watch him/ her. Why? 10111080

Q.4 Why must the volume of a stereo in a room with wall-to-wall carpet be tuned higher than in a room with a wooden floor? 10111081

Q.5 A student says that the two terms speed and frequency of the wave refer to the same thing. What is your response? 10111082

Q.6 Two people are listening to the same music at the same distance. They disagree on its loudness. Explain how this could happen. 10111083

Q.7 Is there any difference between echo and reflection of sound? Explain. 10111084

Q.8 Will two separate 50dB sounds together constitute a 100dB sound? Explain. 10111085

Q.9 Why ultra sound is useful in medical field? (Board 2015) 10111086

Q.10 Is there any medium required for propagation of sound? 10111087

Q.11 Write the names of characteristics of sound. (Board 2017) 10111088

Q.12 Define Loudness. 10111089
OR
What is meant by loudness of sound?

Q.13 What do you mean by intensity of sound? Also write its unit. 10111090

Q.14 Distinguish between noise and musical sound. (Board 2014,18) 10111091
(OR)
What is the difference between noise and music? (Board 2015) 10111092

Q.15 How can you explain that greater the surface area the greater is sound? 10111093

Q.16 How many times is the speed of sound in water faster than in air? 10111094

Q.17 Describe the compression and rarefactions produced in the sound wave? 10111095

Q.18 Define pitch and quality? (Board 2014,17)
OR What is the difference between pitch and quality of sound? (Board 2015) 10111096

Q.19 Describe the factors on which a safe level of noise depends. (Board 2014) 10111097

Q.20 What is meant by pitch of sound? On what factors does it depend? 10111098

Q.21 Is speed of sound more in solids or liquids? And why? (Board 2014) 10111099

Q.22 On what factors loudness of sound depend? (Board 2014, 15) 10111100

Q.23 Define acoustic protections? 10111101

Q.24 What is the reflection of sound? OR Define "Echo". (Board 2015,16) 10111102

Q.25 How can depth of sea be measured by ultrasonics? (Board 2014) 10111103

Q.26 What is meant by ultrasound? (Board 2015) 10111104

Q.27 What do you mean by noise pollution? (Board 2015) 10111105

Q.28 What is meant by SONAR? 10111106

Q.29 Why sound waves are called mechanical waves? 10111107

Q.30 How is sound produced? 10111108

Q.31 How can we hear the sound through stethoscopes? Or What is stethoscope? (Board 2016) 10111109

Q.32 What is silent whistle? OR What is meant by soundless whistle? 10111110

Q.33 Identify which part of these instruments vibrate to produce sound?
(a) Electric Bell 10111111
(b) Loud Speaker
(c) Piano
(d) Violin
(d) Flute

Q.34 Can sound waves travel on moon? 10111112

Q.35 How can the singers shatter the glass by sound waves? 10111113

Q.36 Why is the voice of women more shrill than that of men? 10111114

Q.37 Which property of sound wave determines its: 10111115
(a) loudness (b) pitch

Q.38 On which factor does the frequency of tuning fork depend upon? 10111116

Q.39 Which sound is the loudest animal sound ever recorded? 10111117

Q.40 How do elephants detect the low frequency sound waves? 10111118

Q.41 Can we see sound wave on screen? How? 10111119

Q.42 What is higher frequency range of the following? 10111120
(a) Bats (b) Mice
(c) Dogs (d) Cats

Q.43 By whom and when was the speed of sound in air first accurately measured? Explain. 10111121

Q.44 Which property displays by the sound when it interacts with materials and boundaries? 10111122

Q.45 Can bats and dolphins travel without vision? Explain how. 10111123

Q.46 What would happen to the loudness of sound with increase frequency? 10111124

Q.47 How does speed of sound vary with temperature? 10111125

Q.48 What is the relationship between decibel scale and amplitude of sound waves. 10111126

Q.49 Suppose you and your friend are on the moon. Will you be able to hear any sound produced by your friend? 10111127

11.1 Calculate the intensity levels of the (a) faintest audible sound (b) rustling of leaves. (Board 2014) 10111128

11.2 Calculate the frequency of a sound wave of speed $340 ms^{-1}$ and wavelength 0.5 m. (Board 2014, 15,17,18) 10111129

11.3 Flash of lightning is seen 1.5 seconds earlier than the thunder. How far away is the cloud in which the flash has occurred? (speed of sound $= 332 ms^{-1}$) 10111130

Numerical Problems

11.1 A normal conversation involves sound intensities of about 3.0×10^{-6} Wm^{-2}. What is the decibel level for this intensity? What is the intensity of the sound for 100 dB? (Board 2015)   10111131

11.2 If at Anarkali bazaar Lahore, the sound level is 80dB, what will be the intensity of sound there? (Board 2014)   10111132

11.3 At a particular temperature, the speed of sound in air is 330ms^{-1}. If the wavelength of a note is 5cm, calculate the frequency of the sound wave. Is this frequency lies in the audible range of the human ear?   10111133

11.4 A doctor counts 72 heartbeats in 1 min. Calculate the frequency and period of the heartbeats.   (Board 2015)   10111134

11.5 A marine survey ship sends a sound wave straight to the sea bed. It receives an echo 1.5s later. The speed of sound in sea water is 1500 ms^{-1}. Find the depth of the sea at this position.   (Board 2016)   10111135

11.6 A student clapped his hands near a cliff and heard the echo after 5 s. What is the distance of the cliff from the student if the speed of the sound, v is taken as 346ms^{-1}? 10111136

11.7 A ship sends out ultrasound that returns from the seabed and is detected after 3.42s. If the speed of ultrasound through seawater is 1531 ms^{-1}, what is the distance of the seabed from the ship?   10111137

11.8 The highest frequency sound humans can hear is about 20,000 Hz. What is the wavelength of sound in air at this frequency at a temperature of 20°C? What is the wavelength of the lowest sounds we can hear of about 20 Hz? Assume the speed of sound in air at 20°C is 343ms^{-1}.   10111138

11.9 A sound wave has a frequency of 2kHz and wavelength 35 cm. How long will it take to travel 1.5 km?   10111139

Unit 12

Geometrical Optics

Q1. Define Optics and Geometrical Optics. 10112001

Q.2 Define the reflection of light. Also describe the laws and types of reflections. 10112002

OR (Board 2014)

What do you understand by reflection of light: Draw a ray diagram to illustrate reflection at a plane surface? (Board 2015)

Q.3 What are spherical mirrors? Also describe the types of spherical mirrors. 10112003

Q.4 Define the following terms used in spherical mirrors. 10112004

Q.5 Describe the characteristics of focus of a concave and convex mirror. 10112005

Q.6 Describe the reflection of light by spherical mirrors. 10112006

Q.7 How can we tell about the nature of image and the size of image compared with the size of object? 10112007

Q.8 Define Refraction of light. Describe the passage of light through parallel-sided transparent material. **OR** What is meant by Refraction? Describe the refraction of light through glass slab. 10112008

Q.9 What are Laws of Refraction? Also describe Snell's Law and cause of refraction of light. (Board 2017) 10112009

Q.10 What is meant by total internal reflection? Write its conditions. (Board 2014, 15) 10112010

OR Explain total internal reflection with the help of diagram.

Q.11. What is critical angle? Derive the relationship between critical angle and the refractive index of a substance. **OR** Define Critical Angle: (Board 2014,17,18) 10112011

Q.12 Define total internal reflection. Also explain totally reflecting prism and their uses.10112012

Q.13 Write a note on optical fibre. **OR** What are optical fibres? Describe how total internal reflection is used in light propagation through the optical fibre. (Board 2016) 10112013

Q.14 What is light Pipe? Write down its uses? **OR** Write medical use of light pipe.10112014

Q.15 Define Endoscope. Also write its types. (Board 2016) 10112015

Q.16 Explain the refraction through prism. 10112016

OR

Describe the passage of light through a glass prism and measure angle of deviation.

Q.17 Define lens. Also describe its uses and types. 10112017

Q.18 In lens terminology define the following: 10112018

i) Principal Axis (Board 2014) ii) Optical center (C) (Board 2014)

iii) Focal length (f)

Q.19 What is meant by the Principal Focus of a (a) Convex lens (b) Concave lens? Illustrate your answer with ray diagrams. 10112019

Q.20 Draw and explain the ray diagram of refraction and image formation through lenses with the help of three principal rays. 10112020

Q.21 Define power of the lens. Also define unit of power of lens. (Board 2015,16) 10112021

Q.22 Explain the image formation and characteristics of image, with ray diagrams, for object placed at different positions from a convex lens. 10112022

Q.23 Explain the characteristics of image formed by the concave lens, with ray diagram. 10112023

Q.24 What is lens equation? How can we locate the image by lens equation? 10112024

Q.25 What do you mean by linear magnification? 10112025

Q.26 Describe the applications of lenses in following optical devices, with ray diagram. 10112026

i. Camera   **ii. Slide Projector.**   **iii. Photograph Enlarger**   **(Board 2014)**

Q.27 With the help of a ray diagram, how can you show the use of thin converging lens as a magnifying glass.   **OR**   Define simple microscope. Also derive the formula of magnifying power.
10112027

Q.28 What do you mean by resolving power of an instrument?   **(Board 2018)**   10112028

Q.29 Define compound microscope and give its features. Also describe the magnification of compound microscope with ray diagram.   10112029

Q.30 Define telescope and refracting telescope. Also describe the working and magnification of telescope with ray diagram.   10112030

Q.31 Describe the structure and image formation in human eye.   **(OR)**   10112031
Draw a ray diagram to show the formation of image in the normal human eye.

Q.32 What do you mean by Accommodation? Also describe the mechanism for focusing in eye.   10112032

Q.33 Describe near point and far point of an eye.   10112033

Q.34 What do you mean by defect of vision? Describe the main defects of vision and how are they minimized?   **(Board 2015, 16,18)**   10112034

OR

What is meant by the term near sightedness and far sightedness? How can these defects be corrected?

Choose the correct answer from the given choices.

EXERCISE MCQs

1. **Which of the following quantities is not change during refraction of light?** **(Board 2014, 15,18)** 10112035
   - (a) its direction
   - (b) its speed
   - (c) its frequency
   - (d) its wavelength

2. **A converging mirror with a radius of 20cm creates a real image 30 cm from the mirror. What is the object distance?** **(Board 2014)** 10112036
   - (a) 5.0 cm
   - (b) 7.5 cm
   - (c) 15 cm
   - (d) 20 cm

3. **An object is placed at the centre of curvature of a concave mirror. The image produced by the mirror is located:** 10112037
   - (a) out beyond the centre of curvature
   - (b) at the centre of curvature
   - (c) between the centre of curvature and the focal point
   - (d) at the focal point

4. **An object is 14 cm in front of a convex mirror. The image is 5.8 cm behind the mirror. What is the focal length of the mirror?** **(Board 2014)** 10112038
   - (a) -4.1 cm
   - (b) -8.2 cm
   - (c) -9.9 cm
   - (d) -20 cm

5. **The index of refraction depends on:** **(Board 2015,17)** 10112039
   - (a) the focal length
   - (b) the speed of light
   - (c) the image distance
   - (d) the object distance

6. **Which type of image is formed by a convex lens on a screen?** 10112040
   - (a) inverted and real **(Board 2015)**
   - (b) inverted and virtual
   - (c) upright and real
   - (d) upright and virtual

7. **Which type of image is produced by the converging lens of human eye if it views a distant object?** 10112041

(a)   real, erect, same size
(b)   real, inverted, diminished
(c)   virtual, erect, diminished
(d)   virtual, inverted, magnified

8.   Image formed on a camera is:
                                        10112042
(a)   real, inverted, and diminished
(b)   virtual, upright and diminished
(c)   virtual, upright and magnified
(d)   real, inverted and magnified

9.   If a ray of light in glass is incident on   an air surface at an angle greater than the critical angle, the ray will:
(a)   refract only   **10112043**
(b)   reflect only
(c)   partially refract and partially reflect
(d)   diffract only

10.   The critical angle for a beam of light passing from water into air is 48.8 degrees. This mean that all light rays with an angle of incidence   greater   than this angle will be:
(a)   absorbed   **10112044**
(b)   totally reflected
(c)   partially reflected and partially transmitted
(d)   totally transmitted

Additional MCQs

11.   The diameter of spherical mirror is called: **10112045**
(a)   curvature   (b)   aperture
(c)   sphere   (d)   both a and b

12.   The center of curved surface of spherical mirror is called: **10112046**
(a)   focus   (b)   axis
(c)   centre   (d)   pole

13.   Half of radius of curvature is called:
(a)   focal length   **10112047**
(b)   principal focus
(c)   axis
(d)   aperture

14.   The point through which rays of light pass after reflection from concave mirror is called principal:
                                        10112048

(a)   focus   (b)   circle
(c)   axis   (d)   radius

15.   The distance between principal focus and pole of mirror is called:
                                        10112049
(a)   Principal focus
(b)   focal length
(c)   Aperture
(d)   image

16.   The mirror whose inner surface is reflecting is called: **10112050**
(a)   concave mirror
(b)   convex mirror
(c)   mirror   (d)   lens

17.   The mirror whose outer surface is reflecting is called: **10112051**
(a)   concave mirror
(b)   convex mirror
(c)   lens   (d)   mirror

18.   The line which passes through pole of the mirror and center of curvature is called principal:
10112052
(a)   axis   (b)   focus
(c)   line   (d)   vertex

19.   The ray of light after reflection from concave mirror passes through:
(a)   centre   **10112053**
(b)   principal focus
(c)   pole
(d)   radius of curvature

20.   Spherical mirrors are used in:
(a)   medical   **10112054**
(b)   search light
(c)   microscope
(d)   all of these

21.   Magnification of mirror is given by:
                                        10112055
(a)   m =   (b)   m =
(c)   m = p × q   (d)   m   =
$$\frac{1}{p+q}$$

22.   The distance of the object from the mirror is represented by: **10112056**
(a)   q   (b)   p
(c)   m   (d)   F

23.   The distance of image from mirror is represented by: **10112057**

(a) q　　　　　　　(b) p
(c) F　　　　　　　(d) m

24. Snell's law is: 　　　10112058

(a) $n = \dfrac{\sin \angle x}{\sin \angle r}$ 　　(b) $n = \dfrac{\sin \angle i}{\sin \angle r}$

(c) $n = \dfrac{\sin \angle r}{\sin \angle i}$ 　　(d) $\dfrac{\angle i}{\angle r}$

25. Concave mirror formula is given by: 　10112059

(a) R = 2f 　　　(b) $\dfrac{\sin \angle i}{\sin \angle r}$
(c) = + 　　　　　(d) = -

26. Focal length for concave mirror is:
(a) -ve 　　(b) +ve 　　10112060
(c) Same 　(d) zero

27. Bouncing back of light after striking the surface is called:
　　　　　10112061
(a) refraction
(b) reflection
(c) diffraction
(d) interference

28. The ratio of image height to object height is called: 　10112062
(a) linear magnification
(b) power
(c) refraction
(d) radius of curvature

29. When a ray of light enters from denser medium to rare medium, the angle of incidence for which angle of refraction is 90º is called: 　10112063
(a) angle of incidence
(b) critical angle
(c) angle of refraction
(d) angle of deviation

30. The critical angle for glass is:
(a) 24º 　　(b) 48º 　　10112064
(c) 42º 　　(d) 50º

31. The critical angle for water is:
(a) 49º 　　(b) 42º 　　10112065
(c) 62º 　　(d) 50º

32. Critical angle for diamond is:

(a) 60º 　　(b) 24º 　　10112066
(c) 26º 　　(d) 49º

33. Angle opposite to the base of triangle of prism is called: 　10112067
(a) angle of incidence
(b) angle of refraction
(c) angle of prism
(d) emerging angle

34. The refracted light striking to the side of prism is called: 　10112068
(a) refracted ray
(b) incident ray
(c) reflected ray
(d) emergent ray

35. The minimum value of angle of deviation is called: 　10112069
(a) minimum angle
(b) incident angle
(c) angle of minimum deviation
(d) none of these

36. The angle at which prism deviates the incident ray is called: 　10112070
(a) angle of incident
(b) angle of reflection
(c) angle of deviation
(d) angle of minimum deviation

37. To see from submarine and the ship at the surface of water, we use:
　　　　　10112071
(a) telescope 　　(b) microscope
(c) periscope 　　(d) prism

38. In totally reflecting prism one angle is of: 　10112072
(a) 45º 　　(b) 90º
(c) 180º 　　(d) 120º

39. In totally reflecting prism one angle is of 90º, and other two angles are of: 　10112073
(a) 30º, 30º 　　(b) 45º, 90º
(c) 45º, 45º 　　(d) 40º, 40º

40. Totally reflecting prism is used in:
(a) periscope 　　10112074
(b) binoculars
(c) periscope and binocular
(d) telescope

41. Totally reflecting prism turns the incident ray at an angle of: 10112075
(a) 90º 　　　　　(b) 60º

(c) 75°   (d) 45°

42. The refractive index of internal coating of optical fibre is: 10112076
(a) 1.56   (b) 1.51
(c) 1.53   (d) 1.58

43. Optical fibres are: 10112077
(a) cheap   (b) flexible
(c) lighter   (d) all of these

44. To see stomach problems we use:
(a) gastroscope   10112078
(b) bronchoscope
(c) cystoscope
(d) stethoscope

45. Sun light consists of _____ colours: 10112079
(a) 6   (b) 5
(c) 7   (d) 2

46. The refractive index of air is: 10112080
(a) 6   (b) 1.0003
(c) 7   (d) 2

47. Power of lens is:(Board.2015) 10112081
(a)   (b)
(c)   (d)

48. Speed of light in air in ms^{-1} is:
(a) 3×10^8 10112082
(b) 340
(c) 3×10^5
(d) 3×10^{11}

49. A normal eye can see near objects clearly at a distance of: 10112083
(a) 20 cm   (b) 25 cm
(c) 30 cm   (d) 35 cm

50. Power of a convex lens is 10D. Its focal length is: 10112084
(a) 100 m   (b) 10 m
(c) 1 m   (d) 0.1 m

51. Which of following is always virtual in case of convex mirror?   10112085
(a) P   (b) Image
(c) Object   (d) All of these

52. The refractive index of diamond is (Board 2014,18)10112086
(a) 1.66   (b) 1.52
(c) 2.42   (d) 2.4

53. The speed of light in water is:

(Board 2018)   10112087
(a) 2.1×10^3 ms^{-1}
(b) 2.5×10^3 ms^{-1}
(c) 2.3×10^8ms^{-1}
(d) 2.3×10^{-8} ms^{-1}

54. A converging lens becomes a magnifying glass when an object is placed: 10112088
(a) outside of focal length
(b) inside the focal length
(c) equal of focal length
(d) at double of focal length

55. In compound microscope, the objective have focal length than eye-piece: 10112089
(a) smaller   (b) larger
(c) equal   (d) equal and larger

56. Which animal have ability to move his eye lens?   10112090
(a) snake   (b) fish
(c) ant   (d) tiger

57. The value of refractive index of water is: 10112091
(a) 2.33   (b) 1.36
(c) 1.33   (d) 1.39

58. The formula of focal length is:
(Board 2015,16)   10112092
(a) f =   (b) f = 2R
(c) fR = 2   (d) $R = \dfrac{f}{2}$

59. Optical fibres works on the principle of: (Board 2015)   10112093
(a) reflection
(b) refraction
(c) total internal reflection
(d) diffraction

60. The refractive index of ice is:
(Board 2016)   10112094
(a) 1.00   (b) 1.33
(c) 1.31   (d) 2.42

61. the The change in the focal length of eye lens is called.(Board 2017)10112095
(a) Modification
(b) Induction
(c) Accommodation
(d) Distinct vision

62. The types of spherical mirrors are:
(Board 2018)   10112096

(a)	2	(b)	4
(c)	6	(d)	8

Q.12.1 What do you understand by reflection of light? Draw a diagram to illustrate reflection at a plane surface. **10112097**

Q.12.2 Describe the following terms used in reflection **10112098**
   (i) Normal (ii) Angle of incidence (iii) Angle of reflection.

Q.12.3 State laws of reflection. Describe how they can be verified graphically. **10112099**

Q.12.4 Define refraction of light. Describe the passage of light through parallel- sided transparent material. **10112100**

Q.12.5 Define the following terms used in refraction (i) Angle of incidence (ii) Angle of refraction. **10112101**

Q.12.6 What is meant by refractive index of a material? How would you determine the refractive index of a rectangular glass slab? **10112102**

Q.12.7 State the laws of refraction of light and show how they may be verified using rectangular glass slab and pins. **10112103**

Q.12.8 What is meant by term total internal reflection? **10112104**

Q.12.9 State the conditions for total internal reflection. **10112105**

Q.12.10 What is critical angle? Derive the relationship between critical angle and the refractive index of a substance. **10112106**

Q.12.11 What are optical fibres? Describe how total internal reflection is used in light propagating through optical fibres. **10112107**

Q.12.12 Define the following terms applied to a lens: **10112108**
   (i) Principal axis (ii) Optical centre (iii) Focal length

Q.12.13 What is meant by the principal focous of (a) convex lens (b) concave lens? Illustrate your answer with ray diagrams. **10112109**

Q.12.14. Describe how light is refracted through Convex lens. **10112110**

Q.12.15. With the help of a ray diagram, how can you show the use of thin converging lens as a magnifying glass. **10112111**

Q.12.16 A coin is placed at a focal point of a converging lens. Is an image formed? What is its nature? **10112112**

Q.12.17 What are the differences between real and virtual images? **10112113**

Q.12.18 How does a converging lens form a virtual image of real objects? How does diverging lens can form a real image of a real object? **10112114**

Q.12.19 Define power of a lens and its units. **10112115**

Q.12.20 Describe the passage of light through a glass prism and measure the angle of deviation.

Q.12.21 Define the term resolving power and magnifying power. **10112117**

Q.12.22 Draw the ray diagrams of **(Board 2018)** **10112118**
   (i) Simple microscope   (ii) Compound microscope (iii) Refracting telescope

Q.12.23 Mention the magnifying powers of following optical instruments. **10112119**
   (i) Simple microscope   (ii) Compound microscope (iii) Refracting Telescope

Q.12.24 Draw ray diagrams to show the formation of images in the normal human eye.

Q.12.25 What is meant by the term near sightedness and far sightedness? How can these defects be corrected? 10112121

Q.1 A man raises his left hand in a plane mirror, the image facing him is raising his right hand. Explain why? 10112122

Q.2 In your own words, explain why light waves are refracted at a boundary between two materials? 10112123

Q.3 Explain why a fish under water appears to be at a different depth below the surface than it actually is. Does it appear deeper or shallower? 10112124

Q.4 Why or why not concave mirrors are suitable for make up? 10112125

Q.5 Why is the driver's side mirror in many cars convex rather than plane or concave? 10112126

Q.6 When an optician's testing room is small, he uses a mirror to help him test the eye sight of his patients. Explain why? 10112127

Q.7 How does the thickness of lens affect its focal length? 10112128

Q.8 Under what conditions will a converging lens form a virtual image? (Board 2015) 10112129

Q.9 Under what conditions will a converging lens form a real image that is the same size as the object? 10112130

Q.10 Why do we use refracting telescope with large objective lens of large focal length? 10112131

Q.11 For which purpose the gastroscope, cystoscope and bronchoscope are used in medical field? 10112132

Q.12 What are spherical mirrors? Also write their types. (Board 2016,17) 10112133

Q.13 Define principal axis and principal focus. 10112134

Q.14 Define focal length (f). 10112135

Q.15 What is linear magnification? 10112136

Q.16 What is endoscope? 10112137

Q.17 What should be angle of incidence for total internal reflection? 10112138

Q.18 What are the types of defects in vision? 10112139

Q.19 What is farsightedness and how is it removed? 10112140

Q.20 What is near sightedness and how is it removed? 10112141

Q.21 Define refractive index? What is its unit? (Board 2014) 10112142

Q.22 What is the difference between regular and irregular reflection. (OR) Describe types of reflection. 10112143

Q.23 State laws of reflection. 10112144

Q.24 Define Snell's law. Write down its formula. (Board 2014, 15) 10112145

Q.25 What is the difference between magnifying power and resolving power? 10112146

Q.26 Define refraction of light. 10112147

Q.27 Describe the simple microscope. (Board 2015) 10112148

Q.28 What are the application of lenses? (Board 2015) 10112149

Q.29 What is prism? (Board 2015) 10112150

Q.30 State the difference between concave and convex mirror. 10112151

Q.31 Define total internal reflection. (Board 2015) 10112152

Q.32 Define resolving power. (Board 2015) 10112153

Q.33 Define pole of mirror. (Board 2016) 10112154

Q.34 Write any three uses of spherical mirrors in our daily life. 10112155

Q.35 Fish can see the objects around them clearly Why? 10112156

Q.36 Which lenses have greater power, the lens of less focal length or of greater focal length? 10112157

Q.37 If the refractive index of ice is 1.31. Find the critical angle. 10112158

Q.38 Describe the difference between compound microscope and simple microscope. 10112159

Side Information

Q.39 How do you use a printed page of book and why do you "see" some printed words as black areas? 10112160

Q.40 What was the idea about the nature of light in early 1700s? 10112161

Q.41 What were the theories given by the following scientists about the nature of light? 10112162

(i) Newton

(ii) Maxwell

(iii) Thomas Young   (iv) Planck

Q.42 Where is image formed in the plane /flat mirror? 10112163

Q.43 A well polished spoon acts like which type of mirror explain? 10112164

Q.44 Where does the centre of curvature and focus lie in convex mirror? 10112165

Q.45 Why are the convex mirrors used in large shopping centers for security purpose? 10112166

Q.46 What is the relation between focal length and radius of curvature of a spherical mirror? 10112167

Q.47 In optics, does the word magnification always mean enlargement? 10112168

Q.48 Why does a light ray passing through a triangular prism deviate from its path? 10112169

Q.49 Will the bending of the light be more or less for a medium with high refractive index? 10112170

Q.50 How does the combination of two triangular prisms resemble a concave or convex lens? 10112171

Q.51 What is the similarity of refraction of light through prism and convex lens? 10112172

Q.52 What is the nature of image formed by the converging lens, if the object is located inside the focal length of lens? 10112173

Q.53 What is the nature of image formed by diverging lens? 10112174

Q.54 What is CSP? Why are lenses and mirrors used in CSP? 10112175

Q.55 Define optics. Also explain the geometrical optics. 10112176

Q.56 What is the procedure to estimate the focal length of converging lens? 10112177

Q.57 What is a pinhole camera? 10112178

Q.58 Where is a pen placed in front of convex lens if the image is equal to the size of the pen? What will be the power of lens in dioptres? 10112179

Q.59 What is magnifying glass? Also describe the nature of image formed by the magnifying glass? 10112180

Q.60 At which part of an eye, the image of an object is formed? 10112181

Q.61 What is astronomical telescope? Describe the focal length of objective lens and eye piece in astronomical telescope? 10112182

Q.62 What is difference between terrestrial telescope and refracting telescope? 10112183

Q.63 Describe the magnification of a combination of lenses. 10112184

Q.64 Can a telescope make stars look bigger? 10112185

Q.65 How many individual stars can we see with naked eye and with telescope? 10112186

Q.66 How will the size of the pupil of our eye change? 10112187

a. In dim light?

b. In bright light?

Q.67 What are contact lenses? Also describe what keeps the lens in place? 10112188

Q.68 How can the animals like fish see the objects around them? 10112189

Q.69 How can we prevent the glare of reflected light? 10112190

Q.72 Why does dispersion of light occur? 10112191

Q.73 What is the effect of dispersion on water drops? 10112192

Q.74 What happen to the light when it passes through 10112193
i) Concave lens
ii) Convex lens?

Q.75 Why are dioptres handy to use?

10112194

Q.76 How can you compare lenses simply by looking at them? 10112195

Q.77 How can you measure the focal length of a magnifying glass? 10112196

Q.78 What is compound microscope? What should be the distance between objective and eyepiece of compound microscope? 10112197

Solved Examples

12.1 A convex mirror is used to reflect light from an object placed 66 cm in front of the mirror. The focal length of the mirror is f= -46 cm (note the minus sign). Find the location of the image. 10112198

12.2 An object is placed 6 cm in front of a concave mirror that has 10 cm focal length. Determine the location of the image. 10112199

12.3 A ray of light enters from air into glass surface. The angle of incidence is 30º If the refractive index of glass is 1.52, then find the angle of refraction r. (Board 2014)
10112200

12.4 Find the value of critical angle for water if the refracted angle is 90º. The refractive index of water is 1.33 and that of air is 1. (Board 2015) 10112201

12.5 A person 1.70 m tall is standing 2.5 m in front of a camera. The camera uses a convex lens whose focal length is 0.05m. Find the image distance (the distance between the lens and the film) and determine whether the image is real or virtual. 10112202

12.6 A concave lens has focal length of 15 cm. At what distance should the object from the lens be placed so that it forms an image at 10 cm from the lens? Also find the magnification of the lens. 10112203

12.1 An object 10.0 cm in front of a convex mirror forms an image 5.0 cm behind the mirror. What is the focal length of the mirror? 10112204

12.2 An object 30.0 cm tall is located 10.5 cm from a concave mirror with focal length 16.0 cm. (a) Where is the image located? (b) How high is it? 10112205

12.3 An object and its image in a concave mirror are of the same height, yet inverted, when the object is 20.0 cm from the mirror. What is the focal length of the mirror? 10112206

12.4 Find the focal length of a mirror that forms an image 5.66 cm behind a mirror of an object placed at 34.4 cm in front of the mirror. 10112207

12.5 An image of a statue appears to be 11.5 cm behind a convex mirror with focal length 13.5 cm. Find the distance from the statue to the mirror. (Board 2014) 10112208

12.6 An image is produced by a concave mirror of focal length 8.70 cm. The object is 13.2 cm tall and at a distance 19.3 cm from the mirror. (a) Find the location and height of the image.
(b) Find the height of the image produced by the mirror of the object is twice as far from the mirror. 10112209

12.7 Nabeela uses a concave mirror when applying makeup. The mirror has a radius of curvature of 38.0 cm. (a) What is the focal length of the mirror? (b) Nabeela is located 50 cm from the mirror. Where

will her image appear? (c) Will the image be upright or inverted?

12.8 An object 4 cm high is placed at a distance of 12 cm from a convex lens of focal length 8cm. Calculate the position and size of the image. Also state the nature of the image. 10112211

12.9 An object 10 cm high is placed at a distance of 20 cm from a concave lens of focal length 15 cm. Calculate the position and size of the image. Also state the nature of the image. (Board 2014) 10112212

12.10 A convex lens of focal length 6 cm is to be used to form a virtual image three times the size of the object. Where must the lens be placed? (Board 14, 15, 16) 10112213

12.11 A ray of light from air is incident on a liquid surface at an angle of incidence 35º. Calculate the angle of refraction if the refractive index of the liquid is 1.25. Also calculate the critical angle between the liquid air inter-face. 10112214

12.12 The power of a convex lens is 5D. At what distance the object should be placed from the lens so that its real and 2 times larger image is formed?
10112215

Unit 13 Electrostatics

Q.1 Define Electrostatics. 10113001

Q.2 How is the charge produced on a body by rubbing? OR How can you show by simple experiments that there are two types of Electric Charges? 10113002

Q.3 Explain the phenomenon of electrostatic induction. 10113003

Q.4 Describe the method of charging bodies by electrostatic induction. 10113004

Q.5 What is gold leaf electroscope? Discuss its working principle with a labelled diagram. 10113005

Q.6 With the help of electroscope how can you find presence of charge on a body. 10113006

Q.7 How would you charge the electroscope Positively. 10113007

Q.8 Describe how would you determine the nature of the charge on a body by using electroscope. 10113008

Q.9 How can we identify the conductors and insulators with the help of Charged Electroscope? 10113009

Q.10 State and explain Coulomb's Law. OR Explain Coulomb's law of electrostatics and write its mathematical form. **(Board 2015)** 10113010

Q.11 What is meant by electric field and electric field intensity? **(Board 2017)** 10113011

Q.12 What are electric lines of forces or electric field lines? Explain. **(Board 2014,17)** 10113012

Q.13 What do you mean by Electrostatic Potential? Explain. 10113013

Q.14 What are capacitors? Describe its construction. 10113014

Q.15 How are capacitors connected in parallel? Describe the characteristic features of this combination. **(Board 2017)** 10113015

Q.16 How are capacitors connected in series? Describe the features of this combination.
OR Derive the formula for the equivalent capacitance for a series combination of a number of capacitors. 10113016

Q.17 What are capacitors? Describe their types. OR
Discuss different types of capacitors. 10113017

Q.18 Write the uses of capacitors. (OR) **(Board 2014)** 10113018
Write two uses of capacitors. (OR) **(Board 2015, 16)**
Enlist some uses of capacitors.

Q.19 Which capacitor is superior to other? OR What is Ceramic Capacitors. 10113019

Q.20 What are the applications of electrostatics? Explain. OR
Discuss one application of static electricity. **(Board 2018)** 10113020

Q.21 What are the hazards of static electricity? **(Board 2014,18)** 10113021

Multiple Choice Questions

Choose the correct answer from the following choices.

1. **A positive electric charge:**
   (Board 2014)   10113022
   - (a) Attracts other positive charge
   - (b) Repels other positive charge
   - (c) Attracts a neutral charge
   - (d) Repels a neutral charge

2. **An object gains excess negative charge after being rubbed against another object, which is:**   10113023
   - (a) neutral
   - (b) negatively charged
   - (c) positively charged
   - (d) either, a, b or c

3. **Two uncharged objects A and B are rubbed against each other. When object B is placed near a negatively charged object C, the two objects repel each other. Which of these statements is true about object A?**   10113024
   - (a) remains uncharged
   - (b) becomes positively charged
   - (c) becomes negatively charged
   - (d) unpredictable

4. **When you rub a plastic rod against your hair several times and put it near some bits of paper, the pieces of papers are attracted towards it. What does this observation indicate?**   10113025
   - (a) the rod and the paper are oppositely charged
   - (b) the rod acquires a positive charge
   - (c) the rod and the paper have the same charges
   - (d) the rod acquires a negative   charge

5. **According to Coulomb's law, what happens to the attraction of two oppositely charged objects as their distance of separation increases?** (Board 2015) 10113026
   - (a) increases
   - (b) decreases
   - (c) remains unchanged
   - (d) can not be determined

6. **The Coulomb's law is valid for the charges which are:**   10113027
   - (a) moving and point charges
   - (b) moving and non-point charges
   - (c) stationary and point charges
   - (d) stationary and large size charges

7. **A positive and a negative charge are initially 4 cm apart. When they are moved closer together so that they are now only   1cm apart, the force between them is:**   10113028
   - (a) 4 times smaller than before
   - (b) 4 times larger than before
   - (c) 8 times larger than before
   - (d) 16 times larger than before

8. **Five joules of work is needed to shift 10 C of charge from one place to another. The potential difference between the places is:**
   (Board 2015) 10113029
   - (a) 0.5 V   (b) 2 V
   - (c) 5 V   (d) 10 V

9. **Two charged spheres are separated by 2 mm. Which of the following would produce the greatest attractive force?**
   (Board 2015) 10113030
   - (a) +1q and +4q   (b) −1q and −4q
   - (c) +2q and +2q   (d) +2q and −2q

10. **Electric field lines:**   10113031
    - (a) always cross each other
    - (b) never cross each other
    - (c) cross each other in the region of strong field
    - (d) cross each other in the region of weak field

11. **Capacitance is defined as:**
    (Board 2014,15,17,18)10113032
    - (a) VC   (b) Q/V

(c) QV   (d) V/Q

12. **One micro coulomb charge is equal to:**

    (a) $10^{-3}C$ (b) $10^3 C$ 10113033

    (c) $10^6 C$ (d) $10^{-6}C$

13. **In SI the unit of charge is:**
                  (Board 2015,18) 10113034

    (a) Joule   (b) Volt

    (c) Coulomb   (d) Watt

14. **One coulomb is equal to charge of electrons:**   10113035

    (a) 6.25×10^{-19} b) 6.25×10^{19}

    (c) 6.25×10^{18} (d) 6.25×10^{-18}

15. **If we double the distance between two charges, then force becomes:**   10113036

    (a) 4-times   (b) $\frac{1}{4}th$

    (c) Double   (d) Half

16. **The electrostatic force acting on two charges each of 1C separated by 1m is about:**   10113037

    (a) $9 \times 10^9 N$ (b) $9 \times 10^{-9} N$

    (c) $9 \times 10^8 N$ (d) $9 \times 10^{-8} N$

17. **Value of 'k' depends upon:**
                      10113038

    (a) System of unit

    (b) Nature of medium

    (c) Both (a) and (b)

    (d) None of these

18. **Electric field lines were introduced by:**

    (a) Faraday   10113039

    (b) Newton

    (c) Coulomb

    (d) Joule

19. **Positive charge in an electric field always tend to move:**   10113040

    (a) Does not move

    (b) From lower to higher potential

    (c) From higher to lower potential

    (d) All of these

20. **The unit of electrical energy is:**
10113041

    (a) Joule   (b) Watt

    (c) Volt   (d) electron volt(eV)

21. **The unit of capacitance is:**
                 (Board 2017)   10113042

    (a) Farad   (b) Volt

    (c) Watt   (d) Coulomb

22. **1 nano Farad is equal to:**   10113043

    (a) $1 \times 10^{-12} F$ (b) $1 \times 10^9 F$

    (c) $1 \times 10^{-9} F$ (d) $1 \times 10^{-6} F$

23. **1 Pico Farad is equal to:**
10113044

    (a) $10^{-9} F$ (b) $10^{12} F$

    (c) 10^{-12} F   (d) $10^{-6} F$

24. **SI unit of electric intensity is:**

                (Board 2014,15) 10113045

    (a) watt   (b) NC^{-1}

    (c) NS^{-1} (d) Nm

25. **Electric intensity is a quantity:**
10113046

    (a) Scalar   (b) Vector

    (c) Base   (d) None of these

26. **Electric potential is a quantity:**
10113047 (a) Scalar   (b) Vector

    (c) Base   (d) All of these

27. **SI unit of electric potential is:**

                 (Board 2015)   10113048

    (a) Watt   (b) Volt

    (c) Coulomb   (d) Joule

28. **1 volt is equal to:**   **(Board 2018)**
10113049

    (a) JC (b) JC^{-1}

    (c) JC^{-2} (d) JC^{-3}

29. **SI unit of capacitance is:**
        (Board 2015)   10113050
    (a) Joule   (b) Volt
    (c) Watt   (d) Farad

30. **In variable capacitor, dielectric medium is:**   10113051
    (a) Paper   (b) Air
    (c) Mica   (d) Ceramic

31. **If a dielectric medium is present between two point charges then electrostatic force will be**   10113052
    (a) Increased   (b) Decreased
    (c) Vanishes   (d) Remain same

32. **Static electricity can be generated by:**   10113053
    (a) lubrication   (b) friction
    (c) motion   (d) smaller the objects

33. **Three capacitors of capacitance of 3µF, 4µF, and 5µF are connected in parallel. Its equivalent capacitance is:**
    10113054
    (a) 10µF   (b) 12µF
    (c) 15µF   (d) 20µF

34. **Give the number of factors which affect the ability of a capacitor to store charge.** (Board 2014)   10113055
    (a) 2   (b) 3
    (c) 4   (d) 5

35. **The value of K in SI unit is:**
        (Board 2014)   10113056

    (a) 9×10^{20} Nm^{2}C^{-2}

    (b) 8×10^{9} Nm^{2}C^{-2}

    (c) 9×10^{9} Nm^{2}C^{-2}

    (d) 10×10^{-9} Nm^{2}C^{-2}

36. **To protect the gold leaves of electroscope from the external electric disturbances, the aliminium foil is grounded by a thin wire, which is made up of:** (Board 2014)   10113057
    (a) Aluminium   (b) Silver
    (c) Copper   (d) Brass

37. **Capacitors are used to store:**

        (Board 2014)   10113058
    (a) Current   (b) Voltage
    (c) Charge   (d) Resistance

38. **Electroscope is used for detecting:**
        (Board 2015,16) 10113059
    (a) Current   (b) Charge
    (c) Voltage   (d) Resistance

39. **If the distance between two point charges is reduced to half, the Coulomb's force become:**   10113060
    (a) half   (b) two times
    (c) one fourth   (d) four times

40. **If the distance between the charged bodies is much greater as compared to their sizes then the bodies are considered as:**
    (a) positive charge   10113061
    (b) negative charge
    (c) point charge
    (d) zero charge

41. **If capacitors of 3µF and 6µF are connected in series then their equivalent capacitance is:**   10113062
    (a) 9µF   (b) 2µF
    (c) 12µF   (d) 18µF

42. **Positive charge can be produced by:**
    (a) combing in hair   10113063
    (b) rubbing glass rod on silk
    (c) by rubbing ebonite rod on wool
    (d) by rubbing glass rod wool

43. **If a neutral body is brought near to the electroscope its leaves:**   10113064
    (a) diverge   (b) contract
    (c) shut
    (d) remain in normal position

44. **If the field is stronger than lines of force are to each other:**   10113065
    (a) far away   (b) separated
    (c) closer   (d) no effect

45. **If the potential energy of one coulomb charge is one joule then its potential will be:**
(a) 5 volt   (b) 2 volt   10113066
(c) 3 volt   (d) 1 volt

46. **The product of charge 'q' and potential difference is equal to:**
10113067
(a) power   (b) force
(c) capacitance   (d) energy

47. **What will be the capacitance of capacitor by joining them in parallel?**
(a) increased   (b) much less   10113068
(c) decrease   (d) no change

48. **Two opposite charges of 500μc and 100μc are placed at a distance of 0.5m then force of attraction between them is:** 10113069
(a) 1850 N   (b) 1900 N
(c) 1800 N   (d) 1880 N

49. **When a positive charge of 2 coulombs is placed at a point in an electric field, it experiences a force of 6N. The intensity of electric field at this point is:**
10113070
(a) 6 NC^{-1} (b) 3 NC^{-1}
(c) 12 NC^{-1} (d) 1.5 NC^{-1}

50. **In electrostatic all charges are in:**
(a) the same direction   10113071
(b) opposite direction
(c) motion
(d) static state

51. **1μC =**   10113072
(a) 10^{-6}C   (b) 10^{-12}C
(c) 10^{-10}C   (d) 10^{-11}C

52. **Which type of capacitor is cylindrical in shape?**
10113073
(a) paper capacitor
(b) mica capacitor
(c) variable capacitor
(d) plates capacitor

53. **Each volt of lightening contains energy:**
(a) 4×10^6 joules   10113074

(b) 1000 joules
(c) 1000 million joules
(d) 10 joules

54. **Capacitors that are used in resonant circuits that tune radios to particular frequencies, such circuits are called:**
10113075
(a) series circuits   (b) filter circuits
(c) parallel circuits (d) AC circuits

55. **The capacitance of a parallel plate capacitor is 100 pF and the potential difference between its plate is 50 volts. What is the quantity of charge on its plates?**   10113076
(a) 5000 C   (b) 50 C
(c) 5 nC   (d) 5 μC

56. **If there is divergence of leaves by touching a body with electroscope then the body is:**   10113077
(a) semi conductor   (b) neutral
(c) charge body   (d) insulator

57. **In fixed capacitor dielectric used is:**

(a) paper   (b) metal   10113078
(c) mica   (d) paper & mica

58. **Instrument used for detecting and testing the nature of charge on a body is called:**   10113079
(a) incubator   (b) spectroscope
(c) voltmeter   (d) electroscope

59. **The phenomena used in capacitor is:**
(a) electrostatic induction   10113080
(b) induced current
(c) electric field
(d) electroscope

60. **The phenomena which is used in applying paints on the surface of different articles is called:**   10113081
(a) electroplating   (b) electroscope
(c) electrostatic induction
(d) electrolytes

61. **The substance in which electric current flows easily is called:**
10113082
- (a) transistor
- (b) semi conductor
- (c) insulator
- (d) conductor

62. **Study of charges at rest is called:**
10113083
- (a) acoustics
- (b) electrostatics
- (c) electronics
- (d) electricity

63. **Coulomb's force is given by:**
10113084
- (a) $F = k$
- (b) $F = k\, q_1 q_2$
- (c) $F = kq_1\, q_2 r^2$
- (d) $F = \dfrac{kq_1 q_2}{r^2}$

64. **Electroscope can also be charged by the process of:**
10113085
- (a) electrostatics
- (b) electricity
- (c) convection
- (d) conduction

65. **F =**
10113086
- (a) qE
- (b) $q - E$
- (c) q/E
- (d) $q + E$

66. **Electric field is weak when:** 10113087
- (a) lines are far apart
- (b) lines are close together
- (c) no lines are present
- (d) lines are directed outside

67. **Which is a major cause of fires and explosions at many places?**
10113088
- (a) match sticks
- (b) bombs
- (c) static electricity
- (d) magnetism

68. **Which can be used to distinguish between insulators and conductors?** 10113089
- (a) electricity
- (b) telescope
- (c) temperature
- (d) electroscope

69. **An electrolytic capacitor is used to store large amounts of charge at:** 10113090
- (a) low voltage
- (b) high voltage
- (c) neutral
- (d) positive

70. **Parallel plate consists of 2 metal plates separated by:**
10113091
- (a) conductor
- (b) insulator
- (c) wooden plate
- (d) plastic foam

71. **The insulator between the plates of capacitor is called:**
10113092
- (a) dielectric
- (b) capacitance
- (c) resistivity
- (d) permitivity

72. **Unlike charges always:**
10113093
- (a) Attract each other
- (b) Repel each other
- (c) Produce charge
- (d) Do not affect each other

73. **Which device is used to store charge?**
(Board 2015)   10113094
- (a) resistor
- (b) capacitor
- (c) dielectric
- (d) fuse

74. **In series combination of capacitors, each capacitor will have same:**
(Board 2016) 10113095
- (a) voltage
- (b) charge
- (c) capacitance
- (d) charge and voltage

75. **One joule per coulomb is called:**
(Board 2016) 10113096
   (a) volt   (b) farad
   (c) ampere   (d) tesla

76. **Which is the unit of energy?**
10113097
   (a) KWh   (b) Electron Volt
   (c) Joule   (d) All of above

77. **Application of electrostatic is:**
10113098
   (a) Car painting
   (b) Photocopying
   (c) Extracting of dust
   (d) All of these

78. **Which process is invovled to store charge in capacitors?**   10113099
   (a) Rubbing
   (b) Electrostatic induction
   (c) Conduction
   (d) Electromagnetic induction

79. **The presence of fish by the other fish can be detected by**   (Board 2016)
10113100
   (a) Magnetic field
   (b) Electric field
   (c) Gravitational field
   (d) All of above

80. **1.6×10^{-19}J=**   (Board 2016) 10113101
   (a) 1F   (b) 1C
   (c) 1N   (d) 1eV

81. **The direction of electric field lines due to positive charge is**
10113102
   (a) Away from the charge
   (b) Towards the charge
   (c) Both a and b
   (d) None of these

82. **A capacitor stores 0.24 coulombs at 10 volts. It capacitance is:**   10113103
   (a) 0.024F   (b) 0.12F
   (c) 0.6F   (d) 0.8F

83. **If three 15µF capacitors are connected in series, the net capacitance is:**
10113104
   (a) 5µF   (b) 45µF
   (c) 30µF   (d) 50µF

84. **A dielectric must be:**   (Board 2016)
10113105
   (a) resistor
   (b) insulator
   (c) good conductor
   (d) semi conductor

85. **A paper capacitor is usually available in the form of:**
10113106
   (a) tubes   (b) rolled foil
   (c) disc   (d) plates

86. **Capacitors are mainly used for radio frequency tuning**   (Board 2016)
10113107
   (a) Paper Capacitor
   (b) Air Capacitor
   (c) Mica Capacitor
   (d) Electrolytic Capacitor

87. **A unit of electric charge, euqal to the charge of 6.25×10^{18} electrons is**   10113108
   (a) Electricity
   (b) Coulomb
   (c) Electric potential
   (d) Volt

88. **The electric potential energy per unit charge is called:**
10113109
   (a) Electric field
   (b) Electric potential
   (c) Electric intensity
   (d) All of above

89. **The substances which do not have free electrons are called:**
10113110
   (a) Insulators
   (b) Conductors
   (c) Semiconductors
   (d) None of these

Review Questions

Q13.1 How can you show by simple experiments that there are two types of electric charges?

Q13.2 Describe the method of charging bodies by electrostatic induction. 10113112

Q13.3 How does electrostatic induction differ from charging by friction. 10113113

Q.13.4 What is gold leaf electroscope? Discuss its working principle with a labelled diagram.

Q13.5 Suppose you have a glass rod which becomes positively charged when you rub it with wool. Describe how would you charge the electroscope (i) negatively (ii) Positively 10113115

Q.13.6 With the help of electroscope how you can find presence of charge on a body.

Q.13.7 Describe how you would determine the nature of the charge on a body by using electroscope. 10113117

Q.13.8 Explain coulomb's law of electrostatics and write its mathematical form. 10113118

Q.13.9 What is meant by electric field and electric intensity? 10113119

Q.13.10 Is electric intensity a vector quantity? What will be its direction? 10113120

Q13.11 How would you define potential difference between two points? Define its unit. 10113121

Q13.12. Show that potential difference can be described as energy transfer per unit charge between two points. 10113122

Q13.13 What do you mean by the capacitance of a capacitor? Define units of capacitance.

Q.13.14 Derive the formula for the equivalent capacitance for a series combination of a number of capacitors. 10113124

Q.13.15 Discuss different types of capacitors. 10113125

Q.13.16 What is difference between fixed and variable capacitors. (Board 2017) 10113126

Q.13.17 Enlist some uses of capacitors. 10113127

Q.13.18 Discuss one application of static electricity. 10113128

Q.13.19 What are hazards of static electricity? 10113129

Q.1 An electrified rod attracts pieces of paper. After a while these pieces fly away. Why? 10113130

Q.2 How much negative charge has been removed from a positively charged electroscope, if it has a charge of 7.5×10^{-11} C? 10113131

Q.3 In what direction will a positively charged particle move in an electric field? 10113132

Q.4 Does each capacitor carry equal charge in series combination? Explain. 10113133

Q.5 Each capacitor in parallel combination has equal potential difference between its two plates. Justify the statement. 10113134

Q.6 Perhaps you have seen a gasoline truck trailing a metal chain beneath it. What purpose does the chain serve? 10113135

Q.7 If a high-voltage power line fell across your car while you were in the car, why should you not come out of the car? 10113136

Q.8 Explain why, a glass rod can be charged by rubbing when held by hand but an iron rod cannot be charged by rubbing, if held by hand? 10113137

Additional Short Questions

Q.9 What are the factors which affect the ability of a capacitor to store charge?

OR On what facts does the capacitance of capacitor depends? **(Board 2015)** 10113138

Q.10 Define static electricity. 10113139

Q.11 Define electrostatic induction. 10113140

Q.12 What is an electroscope? 10113141
(OR) Define electroscope. Describe its construction.

Q.13 State Coulomb's Law. 10113142

Q.14 Define electric field. 10113143

Q.15 Define electric Intensity and write its unit. 10113144

Q.16 Define electric lines of force. Who introduced them? 10113145
OR
Define electric field lines.

Q.17 Define electric potential. 10113146

Q.18 Define potential difference. 10113147

Q.19 What is meant by dielectric? 1011148

Q.20 What is capacitor? 10113149

Q.21 Define capacitance. State its SI unit. **(Board 2014,18)** 10113150

Q.22 Define Point Charge. **OR** 10113151
What is meant by point charge.

Q.23 Write the formula of parallel combination of capacitor. 10113152

Q.24 Connect three capacitors in series and draw their circuit diagrams. 10113153

Q.25 What is the difference between capacitors and dielectric? 10113154

Q.26 Write the names of different types of capacitors? 10113155

Q.27 Static electricity is a major cause of fires and explosions at many places. Describe briefly. **(Board 2015)** 10113156

Q.28 What do you mean by electrolytic capacitor? **(Board 2015)** 10113157

Q.29 What is a mica capacitor? 10113158

Q.30 What is electrostatic air cleaner? **(Board 2016)** 10113159

Q.31 Define Farad. **(Board 2016)** 10113160

Q.32 What is the difference between gravitational potential and electric potential? 10113161

Q.33 How can electroscope be charged by conduction? 10113162

Q.34 How many methods are there to charge a body? 10113163

Q.35 Why are lightning conductors used in tall building? 10113164

Q.36 Why is a metallic chain of a petrol supply tanker made to roll on the road. 10113165

Q.37 On a dry day if we walk in a carpeted from and then touch some conductor we will get a small electric shock. Can you tell why does it happen? 10113166

Q.38 What is "Faraday cage"? How does it work? 10113167

Q.39 Rubber tyres get charged from friction with the road. What is the polarity of the charge? 10113168

Self Assessment

Q.40 Do you think amount of positive charge on the glass rod after rubbing it with silk cloth, will be equal to the amount of negative charge on the silk? Explain. 10113169

Q.41 What would happen if a neutral glass rod is brought near a positively charged glass rod? 10113170

Q.42 Explain any two application of electrostatic. **(Board 2017)** 10113171

Side Information

Q.43 What is the value of electrostatic force when two charges of one Coulomb are separated by one meter? 10113172

Q.44 Define coulomb, the unit of charge. 10113173

Q.45 How are potential energy and electric potential related with electric field. 10113174

Q.46 Who invented the first practical battery? (OR) Who invented voltaic pile and when? 10113175

Q.47 What is the range of energy of lightning? 10113176

Q.48 What is the danger of static electricity and how can it be avoided? 10113177

Q.49 Why leaves of charged electroscope diverge if you touch its disk with a metal rod but they do not diverge if you touch the disk with a rubber rod? 10113178

Q.50 What is amount of force required to pull back the positive and negative charge, which is separated by a pencil point? 10113179

Q.51 If we double the distance between two charges, what will be the change in the force between the charges? 10113180

Q.52 Are electric field line physical entities? Justify your answer. 10113181

Q.53 Is voltage and potential difference considered as same quantity? 10113182

Q.54 In which form does capacitor store energy between its plates? 10113183

Q.55 How an aeroplane get charged and discharged? OR Why is some conducting material used in the tyres of aeroplane? 10113184

Q.56 Is the equivalent capacitance of parallel capacitors larger or smaller than the capacitance of any individual capacitor in the combination? 10113185

Q.57 Is the equivalent capacitance of series capacitors larger or smaller than the capacitance of any individual capacitor in the combination? 10113186

Q.58 Capacitors blocks d.c but allows a.c to pass through a circuit. How does this happen? 10113187

13.1 Two bodies are oppositely charged with 500 μ C and 100 μ C. Find the force between the two charges if the distance between them in air is 0.5 m. 10113188

**13.2** The capacitance of a parallel plate capacitor is 100 μ F. If the potential difference between its plates is 50 Volts, find the quantity of charge that capacitor can store. What will be the charge on each plate? 10113189

13.3 Three capacitors with capacitances of 3.0 μ F, 4.0 μ F, and 5.0 μ F are arranged in parallel combination with a battery of 6V (1 μ F = 10⁻⁶F). Find

(a) The total capacitance 10113190

(b) The voltage across the capacitors

(c) The quantity of charge on each plate of the capacitor

Calculation: Diagram is shown in
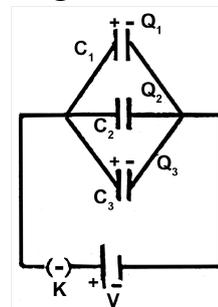
13.4 Three capacitors with capacitances of 3.0 μ F, 4.0 μ F, and 5.0 μ F are arranged in series combination to a battery of 6V (1 μ F = 10⁻⁶F). Find. 10113191

(a) The total capacitance of the series combination.

(b) The quantity of charge across each capacitor.

(c) The voltage across each capacitor

13.1 The charge of how many negatively charged particles would be equal to 100 μ C. Assume charge on one negative particle is 1.6×10^{-19} C? 10113192

13.2 Two point charges $q_1 = 10\mu C$ and $q_2 = 5\mu C$ are placed at a distance of 150 cm. Find the Coulomb's force between them. Also find the direction of this force? 10113193

13.3 The force of repulsion between two identical positive charges is 0.8 N, when the charges are 0.1 m apart. Find the value of each charge. 10113194

13.4 Two charges repel each other with a force of 0.1 N when they are 5cm apart. Find the forces between the same charges when they are 2 cm apart? 10113195

13.5 The potential at a point in an electric field is 10^4 V. If a charge of + 100 μ C is brought from infinity to this point. What would be the amount of work done on it? 10113196

13.6 A point charge of +2C is transferred from a point at potential 100V to a point at potential 50V, what would be the energy supplied by the charge? 10113197

13.7 A capacitor holds 0.06 coulombs of charge when fully charged by a 9 volt battery. Calculate capacitance of the capacitor. **(Board 2015)** 10113198

13.8 A capacitor holds 0.03 coulombs of charge when fully charged by a 6 volt battery. How much voltage would be required for it to hold 2 coulombs of charge? **(Board 2014,17)** 10113199

13.9 Two capacitors of capacitances 6 μ F and 12 μ F are connected in series with 12V battery. Find the equivalent capacitance of the combination. Find the charge and the potential difference across each capacitor. 10113200

13.10 Two capacitors of capacitances 6 μ F and 12 μ F are connected in parallel with a 12 V battery. Find the equivalent capacitance of the combination. Find the charge and the potential difference across each capacitor. 10113201

UNIT
14

Current Electricity

Q.1   Define and explain Electric Current.   (Board 2015,17,18)   10114001
Q.2   Explain Conventional Current.   10114002
Q.3   What is Galvanometer?   10114003
Q.4   What is potential difference? Write the name of its Unit.   (Board 2014)   10114004
Q.5   What is meant by electromotive force?   (Board 2017)   10114005
            Or
        What do we mean by the term e.m.f? Is it really a force? Explain.
Q.6   Write some sources of electromotive force.   10114006
Q.7   How is potential difference measured?   10114007
Q.8   How is e.m.f of a battery measured?   (Board 2014)   10114008
Q.9   Define and Explain Ohm's Law. What are its limitations?   (Board 2014, 15) 10114009
Q.10   Define resistance and its unit.   (Board 2016) 10114010
Q. 11 Explain characteristics of Ohmic and non-ohmic conductors.   (Board 2015,16)   10114011
Q.12   Define specific resistance (Resistivity).On which factor does resistance R of a
conductor depend. Calculate its value.   (Board 2014, 15)   10114012
Q.13   What are conductors? Explain? Different materials have different value of resistivity?
            OR   Define conductors.   (Board 2016)   10114013
Q.14   What are insulators? Explain.   10114014
Q.15   Discuss the main features of series combination of resistors and determine the
equivalent resistance also.   (Board 2017)   10114015
Q.16   Discuss the main features of parallel combination of resistors and also determine the
equivalent resistance.   (Board 2016)   10114016
Q.17   State and Explain the Joule's Law. (OR)
            Explain the energy dissipation in a resistance. What is Joule's Law? (Board 2018) 10114017
Q.18   Define Electric power. Write its formula and unit.   (Board 2015)   10114018
Q.19   Define kilowatt-hour and prove that 1kWh = 3.6 MJ   (Board 2015)   10114019
Q.20   How can we find the energy in kilowatt-hour.   10114020
Q.21   How can we calculate the amount of electricity bill?   10114021
Q.22   Differentiate between Direct current and Alternating current and explain it.   10114022
Q.23   How is electric current supplied to a house?   10114023
Q.24   Write a note on house wiring.   10114024
Q.25   What are electricity Hazards?   OR   How is a circuit short circuited? (Board 2015)10114025
Q.26   Write a note on safe use of electricity in homes?   (Board 2014)   10114026
Q.27   Write a note on fuse.   10114027
Q.28   Write a note on circuit breaker. / Briefly define the uses of circuit breaker in an
electric circuit. How does circuit breaker work?   (Board 2014,15)   10114028
Q.29   Write a note on Earth wire.   (Board 2014)   10114029

Multiple Choice Questions

Choose the correct answer from the following choices.

Exercise MCQs

1.   **An electric current in conductors is due to the flow of** (Board 2017) 10114030
   - (a) positive ions
   - (b) negative ions
   - (c) positive charges
   - (d) free electrons

2.   **What is the voltage across a 6 Ω resistor when 3 A of current passes through it?** (Board 2015,18) 10114031
   - (a) 2 V
   - (b) 9 V
   - (c) 18 V
   - (d) 36 V

3.   **What happens to the intensity or the brightness of the lamps connected in series as more and more lamps are added?**
   - (a) increases (Board 2015) 10114032
   - (b) decreases
   - (c) remains the same
   - (d) cannot be predicted

4.   **Why should household appliances be connected in parallel with the voltage source?** 10114033
   - (a) to increase the resistance of the circuit
   - (b) to decrease the resistance of the circuit
   - (c) to provide each appliance the same voltage as the power source
   - (d) to provide each appliance the same current as the power source

5.   **Electric potential and e.m.f** 10114034
   - (a) are the same terms
   - (b) are the different terms
   - (c) have different units
   - (d) both (b) and (c)

6.   **When we double the voltage in a simple electric circuit, we double the** (Board 2014,18) 10114035
   - (a) current
   - (b) power
   - (c) resistance
   - (d) both (a) and (b)

7.   **If we double both the current and the voltage in a circuit while keeping its resistance constant, the power** 10114036
   - (a) remains unchanged
   - (b) halves
   - (c) doubles
   - (d) four time

8.   **What is the power rating of a lamp connected to a 12 V source when it carries 2.5 A?** (Board 2014,16) 10114037
   - (a) 4.8 W
   - (b) 14.5 W
   - (c) 30 W
   - (d) 60 W

9.   **The combined resistance of two identical resistors, connected in series is 8Ω. Their combined resistance in a parallel arrangement will be** 10114038
   - (a) 2 Ω
   - (b) 4 Ω
   - (c) 8 Ω
   - (d) 12 Ω

Additional MCQs

10.   **The ampere is a unit of:** 10114039
   - (a) energy
   - (b) potential difference
   - (c) electric potential
   - (d) electric current

11.   **The rate of flow of charge through any cross-sectional area is called:** 10114040
   - (a) Potential difference
   - (b) energy
   - (c) charge
   - (d) electric current

12.   **Battery converts chemical energy into which energy:** 101140341
   - (a) Mechanical
   - (b) Electrical
   - (c) Thermal
   - (d) Sound

13.   **The resistance of conductors is due to:** 10114042
   - (a) Protons
   - (b) Fixed atoms
   - (c) Molecules
   - (d) Neutrons

14.   **The unit of potential difference is:** 10114043
   - (a) volt
   - (b) coulomb
   - (c) ampere
   - (d) joule

15.   **Mathematical form of Ohm's Law is:** (Board 2018) 10114044
   - (a) $P = IV$
   - (b) $V = IR$
   - (c) $Q = IT$
   - (d) $W = \dfrac{Q}{V}$

16.   **What type of graph is in between V and I, if metal obeys ohm's law?** 10114045
   - (a) Curved
   - (b) Parabola
   - (c) Straight line
   - (d) Linear

17. **The unit of () in formula R = is:**
   - (a) Ω
   - (b) Ω-m 10114046
   - (c) Ω-m^2
   - (d) Ω-m^{-2}

18. SI unit of resistance is:
(Board 2015)   10114047
(a) Volt   (b) Ampere
(c) Ohm   (d) Joule

19 Resistance of conductor is directly proportional to: 10114048
(a) Length   (b) Pressure
(c) Area   (d) All of these

20. The equivalent resistance in parallel combination is: 10114049
(a) $R_e = R_1 + R_2 + R_3 + \ldots\ldots + R_n$
(b) $= + + + \ldots\ldots +$
(c) Both a & b
(d) None of these

21. Which instrument is used to detect current?   10114050
(a) Galvanometer   (b) Voltmeter
(c) Ammeter   (d) Electroscope

22. How Galvanometer is connected in circuit to detect current?   10114051
(a) In Series   (b) In Parallel
(c) Fixed   (d) Variable

23. Joule's law is W =   10114052
(a)   (b) IRt^2
(c) IR^2t (d) I^2Rt

24. The unit of electric power is:
(Board 2014)   10114053
(a) volt   (b) watt
(c) joule   (d) coulomb

25. The A.C used in Pakistan has frequency: 10114054
(a) 60 Hz   (b) 30 Hz
(c) 50 Hz   (d) 130 Hz

26. The current used in houses is: 10114055
(a) Alternating current
(b) Conventional current
(c) Direct current
(d) Battery current

27. The current which changes its direction is called: 10114056
(a) Transient Current
(b) Conventional current
(c) A.C   (d) D.C

28. That period in which voltage repeats its value in equal intervals is called: 10114057
(a) Cycle   (b) Time period
(c) Frequency   (d) Amplitude

29. The current which does not change its direction is called: 10114058
(a) A.C   (b) Conventional
(c) D.C   (d) Transient current

30. The resistance of voltmeter is: 10114059
(a) zero   (b) low
(c) very high   (d) 10 Ω

31. The colour of live wire is: 10114060
(a) Black or blue   (b) Green or yellow
(c) White or Grey   (d) Red or Brown

32. Specific resistance of copper is: 10114061
(a) 1.62×10^{-8}Ω-m
(b) 1.69×10^{-8}Ω-m
(c) 5.25×10^{-8}Ω-m
(d) 2.75×10^{-8}Ω-m

33. Current is equal to: (Board 2015) 10114062
(a) RV   (b) QR
(c)   (d) $\dfrac{t}{Q}$

34. As the temperature of a conductor rises, its resistance: 10114063
(a) Increases
(b) Decreases
(c) Does not change
(d) None of these

35. The property of substance, which opposes the flow of current through it is called: 10114064
(a) Resistance   (b) Reactance
(c) Resistivity   (d) Inductance

36. When resistances are connected in series the current passing through them is: 10114065
(a) different   (b) zero
(c) the same   (d) none of these

37. The equivalent resistance of a parallel combination is: 10114066
(a) equal to sum of all resistance
(b) is greater than the largest resistance of combination
(c) is smaller than the smallest resistance of combination
(d) all of these

38. A digital multimeter is used to measure: 10114067
(a) Current
(b) Resistance
(c) Potential difference
(d) All of above

39. A thermister is a dependent resistors:
10114068

(a) Heat   (b) Temperature
(c) Energy   (d) Mass

40. Diamond does not conduct electricity, because it has no: 10114069
   (a) free electrons
   (b) free protons
   (c) free neutrons
   (d) free positive charge

41. The power of washing machine is:
          (Board 2014)   10114070
   (a) 700 W   (b) 750 W
   (c) 650 W   (d) 800 W

42. The power of small fan is: 10114071
   (a) 40W   (b) 50W
   (c) 60W   (d) 80W

43. What is the amount of current passing through an electric heater, if it takes 1800C charge pass through it in 3 minute?
                          10114072
   (a) 16 A   (b) 10 A
   (c) 100 A   (d) 0.1 A

44. If 2 Joules of energy is required to transfer one coulomb of charge from one point to another, the potential difference between these points will be: 10114073
   (a) 1 V   (b) 2 V
   (c) 4 V   (d) 6 V

45. Watt is equal to: 10114074
   (a) Coulomb per second
   (b) Newton per second
   (c) Volt per second
   (d) Joule per second

46. The commercial unit of electrical energy is: 10114075
   (a) Joule   (b) Watt
   (c) Kilowatt hour (d) Electron Volt

47. Circuit breaker words on the principle of:
   (a) Electric current   10114076
   (b) Magnetism
   (c) Electromagnetism
   (d) Electrostatics

48. The galvanometer has been named after the scientist: 10114077
   (a) Lewis
   (b) Lowry Bronsted
   (c) Luigi Galvano
   (d) Galvano Einstein

49. Human skin, in dry conditions, has a resistance of: 10114078
   (a) 20,000 ohm   (b) 100,000 ohm
   (c) 30,000 ohm   (d) 2000 ohm

50. 100×10^{-3} A =   10114079
   (a) 10^{-3}A   (b) 10^{-2} A
   (c) 10 A   (d) 10^{-1} A

51. If $R_1 = 6\Omega$ and $R_2 = 12\Omega$, then value of R_e in series combination is: 10114080
   (a) 4Ω (b) 18Ω
   (c) 12Ω (d) 6Ω

52. By keeping resistance constant if we double the voltage then current will be: 10114081
   (a) Double   (b) 4 times
   (c) ¼ times   (d) Half

53. V^2/R =   10114082
   (a) Power   (b) Energy
   (c) Voltage   (d) Resistance

54. When resistances are connected in parallel, the current passing through them is: 10114083
   (a) Same   (b) Zero
   (c) Different   (d) Infinite

55. When a potential of 10 volt is applied across a conductor, a current of 5 milliampere flows through it, the resistance of the conductor will be:
10114084
   (a) 200 ohm   (b) 2000 ohm
   (c) 0.2 ohm   (d) 0.002 ohm

56. The resistance of voltmeter is: 10114085
   (a) Zero   (b) Low
   (c) Very high   (d) None of these

57. Total energy supplied in driving one coulomb of charge around a complete circuit is called: 10114086
   (a) Potential
   (b) Potential difference
   (c) Electromotive force
   (d) Potential energy

58. The value or current I passing through a conductor is inversely proportional to:
                          10114087
   (a) Temperature
   (b) Potential difference
   (c) e.m.f.
   (d) Resistance

59. The range of galvanometer to measure current is: 10114088

(a) Few amperes
(b) Few micro amperes
(c) Few milli amperes
(d) Mega amperes

60. By connecting suitable high resistance in series with galvanometer it will convert into:
10114089
(a) Voltmeter   (b) Galvanometer
(c) Ammeter   (d) Multimeter

61. In a dry cell, chemical energy changes into: 10114090
(a) Mechanical energy
(b) Electrical energy
(c) Potential energy
(d) Kinetic energy

62. Battery is one of the source of: 10114091
(a) Heat   (b) Light
(c) Current   (d) Sound

63. The colour of neutral wire is: 10114092
(a) Black or Blue (b) Green or Red
(c) Green or Blue (d) Red or White

64. The resistance of an ammeter should be: 10114093
(a) High   (b) Very high
(c) Low   (d) Constant

65. An ideal voltmeter is that which draws:
10114094
(a) Small current (b) No current
(c) High current (d) None of these

66. An additional wire used along with live and neutral wire is: 10114095
(a) Cable wire   (b) Earth wire
(c) Grip wire   (d) Hot wire

67. A fuse is connected in series with:
10114096
(a) Neutral wire (b) Live wire
(c) Earth wire   (d) Cable wire

68. Earth wire is connected with those appliances whose casing is made of: 10114097
(a) Metals   (b) Wood
(c) Glass   (d) Plastic

69. The resistance of conductor is inversely to: 10114098
(a) Temperature
(b) Length
(c) Area of cross section
(d) Pressure

70. With the increase in temperature the resistance of pure metals: 10114099
(a) increases   (b) decreases
(c) remains same (d) none of these

71. For which of following ampere second could be the unit?   10114100
(a) energy   (b) current
(c) charge   (d) power

72. The rating of a fuse wire is always expressed in: 10114101
(a) ampere-hours (b) KWh
(c) volts   (d) amperes

73. The filament of an electric bulb is made of: 10114102
(a) nickel   (b) aluminium
(c) tungsten   (d) carbon

74. A 3Ω resistor having 2A current will dissipate the power of: 10114103
(a) 12W   (b) 4W
(c) 6W   (d) 8W

75. Resistance of a wire of conductor of 2Ω resistance is doubled: 10114104
(a) 4Ω (b) 6Ω
(c) 8Ω (d) 10Ω

76. Nichrome wire is an alloy of: 10114105
(a) Lead and Zinc (b) Silver and copper
(c) Nickel of and Chromium
(d) Iron and copper

77. Thermocouples convert: 10114106
(a) Heat energy into electrical energy
(b) Heat energy into light energy
(c) Heat energy into mechanical energy
(d) Chemical energy into electrical energy

78. Which is the best material for making connecting wires?   10114107
(a) iron   (b) copper
(c) tungsten   (d) nickel

79. In liquids and gases the current is due to the motion of: 10114108
(a) negative charges
(b) positive charges
(c) both positive and negative charges
(d) none of these

80. Which is not an e.m.f source?   10114109
(a) generator   (b) solar cell
(c) battery   (d) rheostat

81. A parallel circuit is also used as a divider for: 10114110

(a) power   (b) resistance
(c) current   (d) voltage

82. Specific resistance of silver is: 10114111

(a) $1.7 \times 10^{-8} \, \Omega.\text{m}$ (b) $2.63 \times 10^{-8} \, \Omega.\text{m}$

(c) $2.75 \times 10^{-8} \, \Omega.\text{m}$ (d) $7.0 \times 10^{-8} \, \Omega.\text{m}$

83. Specific resistance of Aluminium in $(10^{-8} \, \Omega.\text{m})$ is: 10114112

(a) 1.7   (b) 2.75
(c) 5.25   (d) 1.69

84. Which of the following is an insulator?   10114113

(a) Copper   (b) Iron
(c) Silk   (d) Silver

85. Power of electric heater is: 10114114

(a) 1500 W   (b) 750 W
(c) 100 W   (d) 50 W

86. Power of hair dryer is: 10114115

(a) 1000 W   (b) 750 W
(c) 10 W   (d) 75 W

87. The amount of current that can be felt is: 10114116

(a) 1A   (b) 0.1 A
(c) 0.001A   (d) 2A

88. The amount of current that can be painful is: 10114117

(a) 0.005A   (b) 0.001 A
(c) 1A   (d) 2A

89. The amount of current that causes the loss of muscle control is: 10114118

(a) 0.1A   (b) 0.015A
(c) 2A   (d) 1A

90. The amount of current that goes through the heart is: 10114119

(a) 0.070A   (b) 0.1A
(c) 0.015   (d) 2A

91. Which instrument is used to measure current, resistance and potential difference: 10114120

(a) glavanometer   (b) digital meter
(c) Voltmeter   (d) Ammeter

92. Earth wire is connected to the: 10114121

(a) power house   (b) transformer
(c) ground   (d) generator

93. Simplest electrical circuits use: 10114122

(a) one wire   (b) two wires
(c) four wires   (d) five wires

94. What does a switch do?   10114123

(a) oppose the current
(b) open and close the circuit
(c) store energy
(d) provide voltage

95. If one of the resistors in a parallel circuit is removed, the total resistance will be: 10114124

(a) doubled   (b) decreased
(c) increased   (d) remain same

96. The formula of e.m.f is: **(Board 2017)**   10114125

(a) $E = \dfrac{J}{Q}$ (b) $F = \dfrac{W}{I}$

(c) $E = \dfrac{W}{Q}$ (d) $E = \dfrac{Q}{I}$

Q.14.1 Define and explain the term electric current. 10114126

Q.14.2 What is the difference between electronic current and conventional current? 10114127

Q.14.3 What do we mean by the term e.m.f? Is it realty a force? Explain. 10114128

Q.14.4 How can we differentiate between e.m.f and potential difference? 10114129

Q.14.5 Explain Ohm's law. What are its limitations? 10114130

Q.14.6 Define resistance and its units. 10114131

Q.14.7 What is the difference between conductors and insulators? 10114132

Q.14.8 Explain the energy dissipation in a resistance. What is Joule's Law? 10114133

Q.14.9 What is difference between D.C and A.C? 10114134

Q.14.10 Discuss the main features of parallel combination of resistors. 10114135

Q.14.11 Determine the equivalent resistance of series combination of resistors. 10114136

Q.14.12 Describe briefly the hazords of house hold electricity. 10114137

Q.14.13 Describe four safety measures that should be taken in connection with the household circuit. 10114138

Q.14.14 Design a circuit diagram for a study room that needs the following equipment in parallel: 10114139

(a) One 100 W lamp operated by one switch.

(b) One reading lamp fitted with a 40 W bulb which can be switched on and off from two points.

(c) What is the advantage of connecting the equipments in parallel instead of series combination.

Conceptual Questions

Q.1 Why in conductors charge is transferred by free electrons rather than by positive charges? 10114140

Q.2 What is the difference between a cell and battery? (Board 2014,17) 10114141

Q.3 Can current flow in a circuit without potential difference? 10114142

Q.4 Two points on an object are at different electric potentials. Does charge necessarily flow between them? 10114143

Q.5 In order to measure current in a circuit why is ammeter always connected in series? 10114144

Q.6 In order to measure voltage in a circuit why is voltmeter always connected in parallel? 10114145

Q.7 How many watt-hours are there in 1000 joules? 10114146

Q.8 From your experience in watching cars on the roads at night, are automobile headlamps connected in series or in parallel? 10114147

Q. 9 A certain flash-light can use a 10-Ohm bulb or a 5-Ohm bulb. Which bulb should be used to get the brighter light? Which bulb will discharge the battery first? 10114148

Q.10 It is impracticable to connect an electric bulb and an electric heater in series, Why? 10114149

Q.11 Does a fuse in a circuit control the potential difference or the current? 10114150

Q.12 What do you mean by alternating current (A.C)? 10114151

Q.13 What do you mean by direct current or D.C? 10114152

Q.14 Sate Joule's Law. Write down its formula. (Board 2014, 15,17,18) 10114153

Q.15 What is kilowatt hour (kWh)? 10114154

Q.16 In metals, how is electric current produced? 10114155

Q.17 What do you mean by resistance? (OR) Define resistance and give name of its unit. 10114156

Q.18 What do you mean by specific resistance? Or Define Resistivity and write the formula. (Board 2014) 10114157

Q.19 Define unit of Resistance (Board 2015) (OR) Define Ohm. 10114158

Q.20 What is Electromotive force? Write its unit. (Board 2014, 15) 10114159

Q.21 What is the net result in the absence of electric field? Why current cannot pass through conductor in normal state? 10114160

Q.22 What is parallel combination of resistance? (Board 2015) 10114161

Q.23 What is equivalent resistance? Or Write the formulae for equivalent resistance for series and parallel combination. 10114162

Q.24 What is series combination of resistance? 10114163

Q.25 Define the following terms. 10114164

Q.26 What is electric power?(Board 2015) 10114165

Q.27 Prove that: 1 kWh = 3.6×10^6 J (Board 2015) 10114166

Q.28 What is circuit breaker? Write its working principle. (Board 2014) 10114167

Q.29 Why is Ammeter connected in circuit? (Board 2014) 10114168

Q.30 Is there any effect on current, when ammeter is connected in a circuit? 10114169

Q.31 How galvanometer is converted into an ammeter? 10114170

Q.32 How is Galvanometer converted into Voltmeter? 10114171

Q.33 What is the difference between earth wire and live wire? 10114172

Q.34 Why does resistance of conductors increase by increasing temperature? (Board 2014, 16) 10114173

Q.35 Define ohm's law and write its formula? (Board 2014, 15,17) 10114174

Q.36 What is the difference between fuse and circuit breaker? (Board 2014) 10114175

Q.37 What is the difference between electric power and kilo watt hour? 10114176

Q.38 What is the function of voltmeter and ammeter? (Board 2015) 10114177

Q.39 Prove that : $P=I^2R$ 10114178

Q.40 What is the difference between live wire and neutral wire? (Board 2015) 10114179

Q.41 Which devices are used to measure current? Write names. (Board 2015) 10114180

Q.42 What are the sources of emf? Write names. 10114181

Q.43 Write down the power of electric heater and washing machine? 10114182

Q.44 What is meant by potential difference? (Board 2015) 10114183

Q.45 Give any two uses of fuses. 10114184

Q.46 Describe two reasons of cables insulation damage. (Board 2015) 10114185

Q.47 Define electric current and write its mathematical form? 10114186

Q.48 What is SI unit of electric power. Define it. (Board 16) 10114187

Q.49 What do you mean by electrical energy. 10114188

Q.50 How is Voltmeter connected in circuit? 10114189

Q.51 How does current flow in the electrolytes? 10114190

Q.52 What will be the force between two wires when one ampere current passes through them? 10114191

Q.53 What is digital multimeter? 10114192

Q.54 What is meant by thermister? Or What is thermistor? Write its one use. (Board 2016) 10114193

Q.55 Why is diamond conductor for heat and insulator for electricity? (OR)
How do the jewellers identify that diamond is real or a fake one? (Board 2014) 10114194

Q.56 Write the heating effect of electric current for different purposes. 10114195

Q.57 Why is energy saver better source of light? 10114196

Q.58 How is total energy found in appliances when switch on? 10114197

Q.59 What is electrical grounding? 10114198

Q.60 Why is unit of potential difference named so? 10114199

Q.61 Why is galvanometer named so? 10114200

Q.62 What is the history of the discovery of chemical cell and battery? 10114201

Q.63 In a dry cell chemical energy changes into which form of energy? 10114202

Q.64 What is the importance of switches in an electric circuit? 10114203

Q.65 How long does it take a current of 10mA to deliver 30 C of charge? 10114204

Q.66 Which metal is used as the filament of an electric bulb? Explain with reason. (Board 2015) 10114205

Q.67 A bird can sit harmlessly on high tension wire. But it must not reach and grab neighboring wire. Do you know? why? 10114206

Q.68 What is circuit diagram? 10114207

Q.69 Which formula can be used to determine resistance, if the values of all the resistors in a parallel circuit are the same? 10114208

Q.70 A light bulb is switched on for 40 s. If the electrical energy consumed by the bulb during this time is 2400 J, find the power of the bulb. 10114209

Q.71 What are the colours of live wire, neutral wire and earth wire? 10114210

Q.72 What are the symbols of the components of the circuits? 10114211

Solved Examples

14.1 If 0.5C charge passes through a wire in 10s, then what will be the value of current flowing through the wire? 10114212

14.2 Reading on voltmeter connected across a heating element is 60V. The amount of current passing through the heating element measured by an ammeter is 2A. What is the resistance of the heating coil of the element? 10114213

14.3 If the length of copper wire is 1 meter and its diameter is 2mm. Then find the resistance of this copper wire. 10114214

14.4 If two resistors of 6 kΩ and 4 kΩ are connected in series with the a 10V battery, then find the following quantities. 10114215

(a) Equivalent resistance of the series combination.

(b) The current flowing through each of the resistance.

(c) Potential difference across each of the resistances.

14.5 If in the circuit $R_1 = 2\Omega$, $R_2 = 3\Omega$, $R_3 = 6\Omega$, and V = 6V, then find the following quantities: 10114216

(a) Equivalent resistance of the circuit.

(b) Current passing through each of the resistances.

(c) The total current of the circuit.

14.6 If a current of 0.5 A passes through a bulb connected across a battery of 6 V

for 20seconds, then find the rate of energy transferred to the bulb. Also find the resistance of the bulb.   10114217

14.7   The resistance of an electric bulb is 500Ω. Find the power consumed by the bulb when a potential difference of 250 V is applied across its ends.   10114218

14.8   Calculate the one month cost of using 50 W energy saver for 8 hours daily in your study room. Assume that the price of a unit is Rs. 12.   10114219

14.1   A current of 3mA is flowing through wire for 1 minute. What is the charge flowing through the wire?   10114220

14.2   At 100,000Ω, how much current flows through your body if you touch the terminals of a 12V battery? If your skin is wet, so that your resistance is only 1000Ω, how much current would you receive from the same battery?   10114221

14.3   The resistance of a conductor wire is 10MΩ. If a potential difference of 100 volt is applied across its ends, then find the value of current passing through it in mA.
                     (Board 2015)   10114222

14.4   By applying a potential difference of 10V across a conductor a current of 1.5 A passes through it. How much energy would be obtained from the current in 2 minutes?   10114223

14.5 Two resistances of 2kΩ and 8kΩ are joined in series, if a 10V battery is connected across the ends of this combination, find following quantities.
                     10114224

(a)   Equivalent resistance of the parallel combination.
(b)   Current passing through each of the resistances.
(c)   Potential difference across their resistance.

14.6   Two resistances of 6kΩ and 12kΩ are connected in parallel. A 6V battery is connected across its ends, find the values of the following quantities.   10114225
(a)   Equivalent resistance of the parallel combination.
(b)   Current passing through each of the resistances.

(c)   Potential difference across each of the resistance.

14.7   An electric bulb is marked with 220V, 100W. Find the resistance of the filament of the bulb. If the bulb is used 5 hours daily, find the energy in Kilowatt hour consumed by the bulb in one month (30-days).   10114226

14.8   An incandescent light bulb with an operating resistance of 95Ω is labelled "150 W". Is this bulb designed for use in a 120V circuit or a 220V circuit?   10114227

14.9   A house is installed with   10114228
 (a)   10 bulbs of 60W each of which are used 5 hours daily.
 (b)   4 fans of 75 W each of which runs 10 hours daily.
(c)   One TV of 250 W which is used 2 hours daily.
(d)   One electric iron of 1000W which is used for 2 hours daily.
If the Cost of one unit of electricity is Rs.4. Find the monthly expenditure of electricity.   (One month = 30 days)

14.10   A 100 W lamp bulb and a 4 kW water heater are connected to a 250 V supply. Calculate (a)   the current which flows in each appliance and (b)   the resistance of each appliance when in use.

14.11   A resistor of resistance 5.6Ω is connected across a battery of 3.0 V by means of wire of negligible resistance. A current of 0.5 ampere passes through the resistor. Calculate the (a) power dissipated in the resistor (b) total power produced by the battery. (c) Give the reason of difference between these two quantities.   10114230

UNIT
15

Electromagnetism

Q.1   Define Electromagnetism. Write its uses.   10115001
Q.2   What are the magnetic effects of steady current?   10115002
Q.3   Describe an experiment to show that when a straight current carrying conductor is placed in a magnetic field, it experiences a force. Also state the rule by which the direction of this force can be determined.   10115003
Q.4   How current carrying coil rotate in a magnetic field?   10115004
          OR
          State that a current carrying coil placed in magnetic field experience a torque.
Q.5   Write a note on D.C. Motor.   10115005
          OR What is an electric motors? Explain the working principle of D.C motor.
Q.6   Explain the Electromagnetic Induction and also state Faraday's Law.   10115006
OR   Describe a simple experiment to demonstrate that a changing magnetic field can induce e.m.f in circuit.   OR
          Define electromagnetic induction and explain with an example.   (Board 2014)
Q.7   Define and explain Lenz's Law.   OR   How can we find out the direction of induced e.m.f.?   OR
          Describe the direction on induced e.m.f in a circuit? How does this phenomenon relate to conservation of energy?   10115007
Q.8   What is A.C. Generator? Explain its construction and working.   10115008
OR   Draw a labelled diagram to illustrate the structure and working of A.C generator.
Q.9   What is meant by mutual induction? Describe an experiment to explain this phenomenon.   OR   What do you understand by the term mutual induction? 10115009
Q.10   What is Transformer? Explain its construction and working.   10115010
OR   What is a transformer explain the working of a transformer in connection with mutual induction.
Q.11   Describe the High Voltage Transmission.   10115011
Q.12   Define Electromagnet. Write one application of electromagnetic effect.   10115012

Choose the correct answer from the following choices.

Exercise MCQs

1. **Which statement is true about the magnetic poles?**   10115013
    a) unlike poles repel
    b) like poles attract
    c) magnetic poles do not effect each other
    d) a single magnetic pole does not exist

2. **What is the direction of the magnetic field lines inside a bar magnet?**
                  10115014
    a) from north pole to south pole
    b) from south pole to north pole
    c) from side to side
    d) there are no magnetic field lines

3. **The presence of a magnetic field can be detected by a:**   10115015
    a) small mass
    b) stationary positive charge
    c) stationary negative charge
    d) magnetic compass

4. **If the current in a wire which is placed perpendicular to a magnetic field increases, the   force on the wire:**
    a) increases   (Board 2014)   10115016
    b) decreases
    c) remains the same
    d) will be zero

5. **D.C motor converts:**   10115017
    a) mechanical energy into electrical energy

b) mechanical energy into chemical energy
c) electrical energy into mechanical energy
d) electrical energy into chemical energy

6. **Which part of a D.C. motor reverses the direction of current through the coil every half-cycle?** (Board 2018) 10115018
a) the armature   b) the commutator
c) the brushes   d) the slip rings

7. **The direction of induced e.m.f. in a circuit is in accordance with conservation of:** (Board 2014,17) 10115019
a) mass   b) charge
c) momentum   d) energy

8. **The step-up transformer** (Board 2015)
a) increases the input current 10115020
b) increases the input voltage
c) has more turns in the primary
d) has less turns in the secondary coil

9. **The turn ratios of a transformer is 10. It means**   Board 2014,15) 10115021
a) $I_S = 10 I_P$ b) $N_S = N_P / 10$
c) $N_S = 10 N_P$ d) $V_S = V_P / 10$

Additional MCQs

10. **A transformer has N_p = 100 and N_s = 500, if 6 volt D.C is applied across its primary, the induced voltage is:**
a) 0 V   b) 30 V   10115022
c) 45 V   d) 60 V

11. **Iron core is used in transformer to:**
a) Enhance the flux   10115023
b) decrease the flux
c) keep flux the same
d) both a and b

12. **Transformer works on the principle of:** (Board 2015,17) 10115024
a) Self induction
b) Mutual induction
c) Electrostatic
d) Induction

13. **Equation for transformer is:** 10115025

14. a) $\dfrac{N_s}{V_p} = \dfrac{V_s}{N_s}$ b) $\dfrac{N_s}{N_p} = \dfrac{V_p}{V_s}$
c) $\dfrac{V_s}{V_p} = \dfrac{N_s}{N_p}$ d) $\dfrac{V_p}{N_p} = \dfrac{N_s}{N_p}$

14. **The number of lines of force in a magnetic field depends upon:** 10115026
a) Shape of coil   b) Size of coil
c) Magnet   d) Strength of field

15. **If current is flowing from bottom end to the top end in a wire, according to right hand rule the direction of line of forces would be:** 10115027
a) Anti-clock wise
b) Clock wise
c) Left to right
d) Along the conductor

16. **The lines will be in the form of concentric circles, if conductor is:** 10115028
a) Circular   b) Straight
c) Solenoid   d) None of these

17. **The end of solenoid from which lines of force emerge out is called:** 10115029
a) North pole
b) South pole
c) North and south pole
d) None

18. **The end of solenoid from which line of forces enter is called:** 10115030
a) North pole
b) South pole
c) North and south pole
d) None

19. **The magnetic field of a solenoid resembles as:** 10115031
a) Iron wire
b) U-shape magnet
c) Bar magnet
d) Point charge

20. **A current carrying conductor produces a field around it is called:** 10115032
a) Electric field
b) Magnetic field
c) Gravitational field
d) None

21. **According to Fleming's left hand rule the direction of magnetic field is indicated by:** 10115033
    a) Thumb   b) Forefinger
    c) Middle finger d) Right hand rule
22. **According to Fleming's left hand rule the direction of force on the conductor is given by:** 10115034
    a) Thumb   b) Fore finger
    c) Middle finger d) None
23. **The force on a current carrying conductor is maximum if angle between field and conductor is:** 10115035
    a) 0°   b) 90°
    c) 180°   d) 45°
24. **The force on a current carrying conductor will be minimum if angle between conductor and field is:** 10115036
    a) 0°   b) 90°
    c) 45°   d) 60°
25. **In D.C. motor split rings are made of:** 10115037
    a) Steel   b) Carbon
    c) Copper   d) Iron
26. **Who discovered Electromagnetic Induction?** 10115038
    a) Michael Faraday
    b) Fleming
    c) Ohm
    d) Coulomb
27. **Michael Faraday belonged to.**
    (Board 2015) 10115039
    a) British   b) U.S.A.
    c) K.S.A   d) Russia
28. **A device which converts electrical energy into mechanical energy is called:**
    a) DC motor   **(Board 2018)** 10115040
    b) Generator
    c) Transformer
    d) All of these
29. **Which device has two coils, primary and secondary?** 10115041
    a) D.C Motor   b) Transformer
    c) A.C. generator   d) a and b
30. **The voltage is decreased by:** 10115042
    a) Step-up transformer
    b) Step-down transformer

c) A.C. generator
d) D.C. Motor
31. **Transformer which increases voltage is called:** 10115043
    a) Step-up transformer
    b) Step-down transformer
    c) D.C. Motor
    d) A.C. Generator
32. **In A.C generator flux will be zero if coil is to the field:** 10115044
    a) 90°   b) 45°
    c) parallel   d) inclined
33. **If the change of current in a circuit induces a current in another circuit, this phenomena is known as:** 10115045
    a) Self induction
    b) Mutual induction
    c) Electromagnetic induction
    d) Non-mutual induction
34. **The shape of magnetic lines of force in case of a straight current carrying conductor is:** 10115046
    a) elliptical   b) triangular
    c) rectangular   d) circular
35. **When a current carrying conductor is placed in magnetic field at right angle to it. The direction of force acting upon it is:** 10115047
    a) the same as direction of field
    b) opposite to the direction of the field
    c) makes an angle of 45° with the current
    d) at right angle to both the field and the current
36. **Bank credit cards have a strips engraved on them:** 10115048
    a) Electric
    b) Electronic
c) Magnet   d) Mechanical
37. **Which thing works on the principle of electromagnetic induction in hydro electric power house?(Board 2014)** 10115049
    a) Motor   b) Generator
c) Galvanic Cell   d) Voltaic Cell
38. **Law of electromagnetic induction and electrolysis were presented by:**

a) Simon Ohm   **(Board 2015)** 10115050
b) George Coulomb
c) Newton
d) Michael Faraday

39. **A current carrying conductor produces a field around it is called:**
10115051
a) Electric field
b) Magnetic field
c) Gravitational field
d) Nuclear field

40. **An electrical device which is used to increase or decrease the value of alternating voltage is called:** 10115052
a) Transformer
b) Electric Motor
c) Capacitor
d) Generator

41. **If current is coming out from the plane surface of paper, we put the sign:** 10115053
a) cross (×)
b) summation   (+)
c) distribution (÷)
d) dot (.)

42. **A step up transformer has turns ratio 1:20, When 100V are supplied to the primary coil, the secondary coil will give volt:**
10115054
a) 3000   b) 4000
c) 2000   d) 1000

43. **Which rule shows the direction of lines of forces?**
10115055
a) Right hand rule
b) Left hand rule
c) Fleming's rule
d) Joule's law

44. **The simple coil in DC motor, placed in a magnet cannot rotate more than:** 10115056
a) 180°   b) 90°
c) 360°   d) 270°

45. **The rotating coil of electric motor is called:**
10115057
a) Solenoid   b) Shaft
c) Armature   d) Axle

46. **"Magnetic field must produce an electric current". This statement is proposed by:** 10115058
a) Ampere   b) Coulumb
c) Ohm   d) Faraday

47. **Which is used to control a large current with the help of small current?** 10115059
a) Relay   b) Resistance
c) Capacitance   d) Circuit

48. **A generator is a resembles to which of these if its input and output reversed.**
a) Transformer   b) Capacitor 10115060
c) Motor   d) Solenoid

49. **If the current is flowing from top towards the bottom, then the direction of lines of force would be:** 10115061
a) Anti-clockwise
b) Clockwise
c) Left to right
d) Along the conductor

50. **Which statement is true for step up transformer?** 10115062
a) $I_s < I_p$ b) $V_s > V_p$
c) $V_s < V_p$ d) $N_p > N_s$

51. **Which statement is true for step down transformer?** 10115063
a) $I_p < I_s$ b) $V_s > V_p$
c) $V_s < V_p$ d) $N_s > N_p$

52. **Faraday was physicist.** 10115064
a) British   b) American
c) German   d) French

53. **The power is transmitted over a large distance to minimize loss of energy at high.** 10115065
a) Current   b) Power
c) Resistance   d) Voltage

54. **What is the working of split rings in DC motor?** 10115066
a) To convert AC to DC
b) To convert DC to AC
c) Maintain current
d) To reverse the direction of current

55. **Who discovered that when a current passes through a conductor it produces magnetic field around it?**
10115067
a) Faraday   b) Ampere

c) Henry   d) Coulomb

a) Capacitor   b) Transformer

c) Generator   d) DC Motor

56. The current carrying coil is itself a:

a) Resistance   b) Magnet   10115068

c) Diode   d) Capacitor

60. For an ideal transformer we can write: 10115072

a) $P_p = P_s$ b) $P_p > P_s$

c) $P_p < P_s$ d) $P_p = 0$

57. Lenz's law is the manifestation of the: 10115069

a) Law of conservation of energy

b) Law of conservation of momentum

c) Law of conservation of mass

d) Law of conservation of power

61. Equation for an ideal transformer: 10115073

a) $V_s I_p = V_p I_s$ b) $V_p I_p = V_s I_s$

c) $V_p I_p > V_s I_s$ d) $V_p I_p < V_s I_s$

58. Metal detectors detect metal weapons using the principle of: 10115070

a) Electromagnetic induction

b) Self induction

c) Mutual induction

d) Electrolysis

62. Transformer is used to change the value of: (Board 2016,17) 10115074

a) Voltage b) Power

c) Energy   d) Charge

59. Which does play an important role in power distribution: 10115071

Q.15.1. Demonstrate by an experiment that a magnetic field is produced around a straight current carrying conductor. 10115075

Q.15.2. State and explain the rule by which the direction of the lines of force of the magnetic field around a current- carrying conductor can be determined.   10115076

Q.15.3 You are given an unmarked magnetized steel bar and a bar magnet, its north and south ends are marked N and S respectively. State how would you determine the polarity at each end of the unmarked bar?   10115077

Q.15.4. When a straight current carrying conductor is placed in a magnetic field, it experiences a force. State the rule by which the direction of this force can be found out.   10115078

Q.15.5 State that a current carrying coil in a magnetic field experiences a torque. 10115079

Q.15.6. What is an electric motor? Explain the working principle of D.C motor? 10115080

Q.15.7 Describe a simple experiment to demonstrate that a changing magnetic field can induce e.m.f. in a circuit.   10115081

Q.15.8. What are the factors which affect the magnitude of the e.m.f induced in a circuit by changing magnetic field. 10115082

Q.15.9 Describe the direction of an induced e.m.f. in a circuit? How does this phenomenon relate to the conservation of energy?   10115083

Q.15.10 Draw a labeled diagram to illustrate the structure and working of A.C generator.   10115084

Q.15.11 What do you understand by the term mutual induction?   10115085

Q.15.12. What is a transformer? Explain the working of a transformer in connection with mutual induction.

    10115086

Q.15.13. The voltage chosen for the transmission of electrical power over large distances is many times greater than the voltage of the domestic supply. Give two reasons why electrical power is transmitted at high voltage.   10115087

Q.15.14 Why is the voltage used for the domestic supply much lower than the voltage at which the power is transmitted?

    10115088

Q.1   Suppose someone handed you three similar iron bars and told you one was not magnet but the other two were. How would you find the iron bar that was not magnet?   10115089

Suppose you have a coil of wire and a bar magnet. Describe how you could use them to generate an electric current. 10115090

Q.2   Which device is used for converting electrical energy into mechanical energy? 10115091

Q.3   Suppose we hang a loop of wire so that it can swing easily. If we now put a magnet into the coil, the coil will start swinging. Which way will it swing relative to the magnet and why?   10115092

Q.4   A conductor wire generates a voltage while moving through a magnetic field. In what direction should the wire be moved, relative to the field to generate the maximum voltage?   10115093

Q.5   What is the difference between a generator and a motor? (Board 2014) 10115094

Q.6   What reverses the direction of electric current in the armature coil of D.C motor?   10115095

Q.7   A wire lying perpendicular to an external magnetic field carries a current in the direction shown in the diagram below. In what direction will the wire move due to the resulting magnetic force?   10115096

Q.8   Can a transformer operate on direct current?   10115097

Q.9 What do you understand by magnetic flux? 10115098
Ans. The number of magnetic lines of force passing through any surface is known as magnetic flux.

Q.10 On what factors does the magnitude of induced e.m.f. depend? 10115099

Q.11 What is an A.C. generator? Write its principle. 10115100

Q.12 What is Mutual Induction? 10115101

Q.13 What is a Transformer? On which principle does it work?(Board 2014, 15) 10115102

Q.14 What are two types of transformer and how they are made? / What do you mean by step up and step down transformers? (Board 2015,18) 10115103

Q.15 What is meant by Primary and Secondary coils? 10115104

Q.16 What is the function of split rings in D.C. motor? 10115105

Q.17 What is a D.C. motor? On which principle does it work? 10115106

Q.18 State Fleming's Left Hand Rule. 10115107

Q.19 State the rule to find north and south poles of a current carrying solenoid. 10115108

Q.20 What is the principle to find the direction of magnetic field? State it. 10115109

Q.21 What is a Solenoid. What type of magnetic field does it possess? 10115110

Q.22 When the force on a current carrying conductor in a magnetic field maximum and when is it minimum? 10115111

Q.23 What is relay? How does it works?
Ans: Relay (Board 2014,15) 10115112

Q.24 Define Lenz's law. 10115113

Q.25 How many coils are used in transformers? Write their names. 10115114

Q.26 What is meant by intensity of magnetic field? 10115115

Q.27 Define electromagnetic induction 10115116

Q.28 What is the fundamental difference between magnetism and electricity? 10115117

Q.29 What do you mean by MRI? Write its uses. 10115118

Q.30 How the account information of the user stored in bank credit cards? 10115119

Q.31 How do magnetic field lines help us? 10115120

Q.32 Who was Michael Faraday and what he discovered? 10115121

Q.33 Who had observed an induced current before Faraday? 10115122

Q.34 What is a connection between a generator and a DC motor? 10115123

Q.35 What are walk- through gates? Also write their working principle. 10115124

Q.36 Which field resembles with the magnetic field of a coil? 10115125

Q.37 How does electromagnet works? 10115126

Q.38 Can a high power transformer reduces the voltage keeping the power constant. 10115127

Q.39 In what way generator produces electricity on hydroelectric dam? 10115128

Solved Example

15.1 If a transformer is used to supply voltage to a 12 V model train which draws current 0.8 A. Calculate the current in the primary if the voltage of the A.C source is 240 V. 10115129

15.1 A transformer is needed to convert a main 240 V supply into a 12 V supply. If

there are 2000 turns on the primary coil, then find the number of turns on the secondary coil. 10115130

15.2 A step-up transformer has a turn ratio of 1: 100. An alternating supply of 20 V is connected across the primary coil. What is the secondary voltage? 10115131

15.3 A step-down transformer has a turn ratio of 1: 100. An ac voltage of amplitude 170 V is applied to the primary. If the current in the primary is 1.0 mA, what is the current in the secondary? 10115132

15.4 A transformer, designed to convert the voltage from 240 V a.c main to 12 V, has 4000 turns on the primary coil. How many turns should be on the secondary coil? If the transformer were 100% efficient, what current would flow through the primary coil when the current in the secondary coil was 0.4A? 10115133

15.5 A power station generates 500 MW of electrical power which is fed to a transmission line. What current would flow in the transmission line if the input voltage is 250 kV? 10115134

UNIT
16

Basic Electronics

Q.1   What is meant by Electronics?   10116001

Q.2   What is Thermionic Emission? Explain.   10116002

Q.3   What are the properties of the electrons?   (OR)   (Board, 2014, 15)
       Explain the deflection of electron by electric and magnetic field.   10116003

Q.4   What is Cathode-Ray Oscilloscope (C.R.O)? Write its two uses.   10116004

       OR   Explain the working of different parts of Oscilloscope.

       OR   Explain the construction of C.R.O.

       OR   What is cathode ray oscilloscope? Write a brief note on its components.

Q.5   Write a note on analogue Electronics.   10116005

Q.6   Define and explain digital electronics.   10116006

Q.7   What do you know about ADC and DAC?   10116007

Q.8   What are basic operations of digital electronics?   10116008

Q.9   Explain AND operation. (OR) Draw circuit diagram of AND gate and write its truth table?   10116009

Q.10   Explain OR operation.   10116010

Q.11   Explain NOT operation.   10116011

Q.12   Explain NAND Gate.   10116012

Q.13   Explain NOR Gate.   10116013

Q.14   Explain the uses of the Logic Gate.   10116014

Choose the correct answer from the following choices:

Exercise MCQs

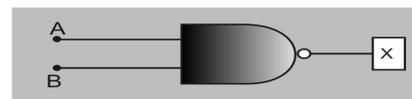1.   The process by which electrons are emitted by a hot metal surface is known as: (Board 2015,18) 10116015

a) boiling
b) evaporation
c) conduction
d) thermionic emission

2.   The particles emitted from a hot cathode surface are:

(Board 2014,15,17,18) 10116016

a) positive ions   b) negative ions
c) protons   d) electrons

3.   The logical operation performed by this gate is: 10116017

(b) NAND Gate

a) AND   b) NOR
c) NAND   d) OR

4.   AND gate can be formed by using two: (Board 2015)   10116018

a) NOT gates   b) OR gates
c) NOR gates   d) NAND gates

5.   The output of a two input NOR gate is 1 when: 10116019

a) A is 1 and B is 0
b) A is 0 and B is 1
c) both A and B are 0
d) both A and B are 1

6. If X = A.B, then X is 1 when:

a) A and B are 1   **(Board 2014,16)**
10116020
b) A or B is 0
c) A is 0 and B is 1
d) A is 1 and B is 0

7. The output of a NAND gate is 0 when:

a) both of its inputs are 0   10116021
b) both of its inputs are 1
c) any of its inputs is 0
d) any of its inputs is 1

<div align="center">

Additional MCQs

</div>

8. Electronics is a branch of: 10116022

a) Atomic Physics
b) Applied Physics
c) Mechanics
d) Nuclear Physics

9. Electronics is the study of principles by means of which we control the: 10116023

a) flow of electrons
b) nuclear fission
c) fusion reaction
d) radiations

10. The quantities, whose values remain constant or vary continuously are called:

10116024
a) analogue quantities
b) digital quantities
c) maximum quantities
d) minimum quantities

11. Analogue quantity is:
10116025
a) time   b) pressure
c) distance   d) all of these

12. Public address system is the example of:

a) analogue electronics   10116026
b) digital electronics
c) binary system
d) none of these

13. The digits used in electronics are:

a) 1   b) 0   10116027
c) 0 and 1   d) 1 and 2

14. Digital technology is used in:
10116028
a) bulb   b) radar
c) electric motor   d) all of these

15. The converter of analogue to digital signal is: 10116029

a) ADC   b) DAC
c) ATDC   d) none of these

16. The converter of digital to analogue signal is: 10116030

a) ADC   b) DAC
c) DATC   d) DTC

17. A closed switch in Boolean expression is represented by:
10116031

a) 0   b) 1
c) 10   d) 2

18. An open switch in Boolean expression is represented by:

10116032
a) 0   b) 1
c) 10   d) 2

19. AND operation can be expressed by:

a) $X = A + B$ b) $X = A.B$
                                    10116033
c) $X = \overline{A.B}$ d) $X = \overline{A + B}$

20. NAND gate is symbolically written as: 10116034

a) $X = \overline{A + B}$ b) $X = \overline{A.B}$

c) $X = A.B$ d) $X = A - B$

21. If A input is 1, and B is zero, then in AND operation output will be: 10116035

a) 0   b) 0, 1
c) 1   d) None

22. The output of OR gate would be '0' when: **(Board 2014)**   10116036

a) Both of its inputs are zero
b) One of its two inputs is zero
c) Both of its inputs are 1
d) Anyone of its inputs is 1

23. The output of an AND gate is 1, when:

10116037

a) Both of its inputs are zero
b) Anyone of the two inputs is zero.
c) Both of its inputs are 1
d) Anyone of the two inputs is 1

24. The two inputs of a NAND gate are A and B. Its output would be zero when:
a) A = 0 , B = 0
10116038
b) A = 1 , B = 0
c) A = 1 , B = 1
d) A = 0 , B = 1

25. A and B are the two inputs of a NOR gate. Its output would be 1 when:10116039
a) A = 1 , B = 1
b) A = 0 , B = 1
c) A = 1 , B = 0
d) A = 0 , B = 0

26. When we heat the metal at high temperature they emit: (Board 2014)
10116040
a) Holes
b) Protons
c) Neutrons
d) Electrons

27. In NOT gate number of input terminals is/are: (Board 2014) 10116041
a) 1
b) 2
c) 3
d) 4

28. The cathode ray oscilloscope consists of main parts: (Board 2015)
10116042
a) Two
b) Three
c) Four
d) Five

29. George Boole invented: (Board 2015)
a) Boolean algebra
10116043
b) Arithmetic algebra
c) Mean algebra
d) Geometry

30. The standard group of bits in digital electronics is:
10116044
a) 5 bits
b) 6 bits
c) 7 bits
d) 8 bits

31. Eight bits combine to form: 10116045
a) A byte
b) Megabyte
c) Kilobyte
d) Gigabyte

32. In C.R.O grid is always connected with potential: (Board 2017)
10116046

a) Negative
b) Positive
c) High Positive
d) Zero Positive

33. The instrument which is used to display the magnitude of changing electric current is called: 10116047
a) Evacuated tube
b) Cathode rays Oscilloscope
c) Television tube
d) Picture tube

34. Electron gun has an electrode called for controlling the flow of electrons in the beam:
10116048
a) Plate
b) Grid
c) Screen
d) Filament

35. The more negative potential of grid, the more electrons will be: 10116049
a) Attracted
b) Repelled
c) Attracted as well as repelled
d) Neither attracted nor repelled

36. In medical field, C.R.O is used to display: 10116050
a) Heart beats
b) Pictures of organs
c) Pictures of bones
d) Blood pressure

37. LDR can act as: 10116051
a) Diode
b) Switch
c) Transistor
d) Rectifier

38. Which gate is used for safety alarm?
a) AND
b) NAND 10116052
c) OR
d) NOR

39. AND operation is represented by:
10116053
a) Dot (.)
b) Addition (+)
c) Division (÷)
d) Minus (−)

40. In OR operation inputs are connected as: 10116054
a) Series
b) Parallel
c) Both series or parallel
d) None of these

41. OR operation is represented by:
a) (×) sign
b) ÷ sign 10116055
c) + sign
d) − sign

42. Which combination forms NAND gate? 10116056

a) AND & OR
b) AND & NOT
c) NOT & OR
d) NAND & NOR

43. **J.J Thomson observed deflection of cathode rays in:** 10116057
   a) 1895   b) 1896
   c) 1897   d) 1898

44. **The screen of a cathode ray tube consists of a thin layer of:** 10116058
   a) Sodium   b) Nitrogen
   c) Oxygen   d) Phosphorus

45. **NOT gate is also called:** 10116059
   a) Converter   b) Inverter
   c) Transmitter   d) Receiver

46. **At room temperature, electrons cannot escape the metal surface due to _____ of atomic nucleus:** 10116060
   a) Repulsive Forces
   b) Attractive Forces
   c) Gravitational Forces
   d) Electromagnetic Force

47. **Which is used to investigate the properties of electron beam?** 10116061
   a) LDR   b) Electroscope
   c) Proton Gun   d) Electron Gun

48. **The equation of NOT operation is:**
   a) $X = A.B$ b) $X = A + B$ 10116062
   c) $X = A - B$ d) $X = \overline{A}$

49. $X = A.B.$ **This equation is used for which operation?** 10116063
   a) AND   b) OR
   c) NOT   d) NAND

50. **How many tubes or electron guns used in a colour television set:** 10116064
   a) Two   b) Four
   c) Five   d) Three

51. **In case of OR and AND operation, if switches S_1 and S_2 both are open then lamp is** (Board 2016) 10116065
   a) On
   b) Off
   c) Sometimes on and sometimes off
   d) neither on nor off

52. **One byte is equal to:** (Board 2017) 10116066
   a) 4 bits   b) 6 bits
   c) 8 bits   d) 10 bits

Q.16.1. Describe, using one simple diagram in each case, what happens when a narrow beam of electrons is passed through
(a) A uniform electric field
(b)Uniform magnetic field.
What do these results indicate about the charge on electron? 10116067

Q.16.2. Explain the working of different parts of oscilloscope. (Board 2018) 10116068

Q.16.3. Name some uses of oscilloscope. 10116069

Q.16.4. Considering an oscilloscope explains: 10116070
(i) How is the filament heated?
(ii) Why is the filament heated? 10116071
(iii) Why is the anode potential positive with respect to the cathode potential? 10116072
(iv) Why is a large potential applied between anode and cathode? 10116073

(v) Why is the tube evacuated? 10116074

Q.16.5. What is electron gun? Describe the process of thermionic emission. 10116075

Q.16.6. What do you understand by digital and analogue quantities? (Board 2017) 10116076

Q.16.7. Differentiate between analogue electronics and digital electronics. Write down names of five analogue and five digital devices that are commonly used in everyday life. 10116077

Q.16.8 State and explain for each case whether the information given by the following devices is in analogue or in a digital form. 10116078
(i) A moving-coil voltmeter measuring the e.m.f of a cell.
(ii) Microphone generating an electric current

(iii) A central heating thermostat controlling the water pump
(iv) Automatic traffic lights controlling the flow of traffic.

Q.16.9 Write down some benefits of using digital electronics over analogue electronics. 10116079

Q.16.10. What are the three basic Logic gates? Give their symbols and truth tables? 10116080

Q.1   Name two factors which can enhance thermionic emission.   10116081

Q.2   Give three reasons to support the evidence that cathode rays are negatively charged electrons.   10116082

Q.3   When electrons pass through two parallel plates having opposite charges they are deflected towards the positively charged plate. What important characteristics of the electron can be inferred from this?   10116083

Q.4   When a moving electron enters the magnetic field, it is deflected from its straight path. Name two factors which can enhance electron deflection.   10116084

Q.5   How can you compare the logic operation X = A.B with usual operation of multiplication?

10116085

Q.6   NAND gate is the reciprocal of AND gate. Discuss.   10116086

Q.7   Show that the circuit given as below acts as OR gate.   10116087
    This is the output of OR gate so this circuit acts as OR gate.
Q.8   Show that the circuit given as below acts as AND gate.   10116088

Q.9   What do you mean by analogue quantities?   10116089
Ans.   Those quantities whose value vary continuously or remain constant are known as analogue quantities.
Q.10   What is analogue Electronics?
    10116090
Q.11   Which two digits are used in digital electronics?   10116091
Q.12   What do you understand by analogue to digital converter?   10116092

Q.13   Write down the names of three basic operations of digital Electronics.
    (Board 2014)   10116093

Q.14   Define AND gate? (OR) Draw the diagram of AND gate. (Board 2014) 10116094

Q.15   Define OR gate. Draw diagram of OR gate.   10116095

Q.16   Define NOT gate. Draw diagram of NOT gate.   10116096

Q.17   Describe the role of deflecting plates in cathode ray oscilloscope? 10116097

Q.18   What do you meant by NOT gate? How does it works?   10116098

Q.19   Differentiate between analogue and digital electronics.   (Board 2015,18) 10116099

Q.20   What is NAND gate? OR NAND is a universal gate give its symbol and truth table.   (Board 2018)   10116100

Q.21   Define NOR gate.   10116101

Q.22   What are Logic gates?   10116102

Q.23   Define Boolean variables.   10116103

Q.24 Define Boolean algebra.   10116104

Q.25 For what purpose electron gun is used in CRO?   10116105

Q.26 Give Truth table of NOT operation.   10116106

Q.27 Make the Truth table and symbols of AND gate.   10116107

Q.28 Make the Truth table and symbols of OR gate.   10116108

Q.29 How does LDR work? (Board 2015)   10116109

Q.30 What is meant by fluorescent screen?   10116110

Q.31 Explain digital signals and analogue signals.   10116111

Q.32 What is meant by thermionic emission?   (Board 2015,18)   10116112

Q.33 Write the parts of cathode ray oscilloscope.   (Board 2016,18) 10116113

Q.34 What are Truth Tables?   10116114

Q.35 Write the names of universal gates.   10116115

Q.36 In what ways is an Oscilloscope a Voltmeter?   10116116

Q.37 How is glow produced in the tube?   10116117

Q.38 What is the difference between bit and bytes?   10116118

Q.39 What is digitization?   10116119

Q.40 How can you say that rays passing through the cathode ray tube travel in straight line?   10116120

Q.41 Which thing is used to deflect electrons to the desired positions on the screen of a television?   10116121

Q.42 What was the name of beam of electrons before the discovery of electrons and why?   10116122

Q.43 Assume you have an OR gate with inputs A and B. Determine the output C? For the following cases:
a)   A = 1, B = 0
b)   A = 0, B =1
If either input is one, what is the output?   10116123

Q.44 What is meant by analogue and digital quantities? Or What is the difference between analogue and digital quantities.   Board 2014, 16)   10116124

Q.45 When a magnet is brought near to the screen of a television tube picture on the screen is distorted. Do you know why?   10116125

Q.46 What does double line indicate in Boolean expressions?   10116126

Q.47 Write a brief introduction to Boolean Algebra.   10116127

Q.48 What is logic function (or) Logic operation?   10116128

Q.49 How does TV and telephone signals travel now-a-days?   10116129

Q.50 Does digital technology become part of our lives? Explain.   10116130

Q.51 Does cathode ray deflect by external magnetic field?   10116131

UNIT 17 Information And Communication Technology

Q.1 Define and explain Information and Communication Technology (ICT)? 10117001

OR What do you understand by Information and Communication Technology?

Q.2 Discuss the components of Computer Based Information System (CBIS) in detail.

(OR) What are the components of information technology? Clearly indicate the function of each component. (Board 2014) 10117002

Q.3 What is meant by Flow of Information? Explain. 10117003

Q.4 Explain Transmission of Electrical Signal through wires in detail. (Board 2015) 10117004

Q.5 Write a note on transmission of radiowaves through space. (Board 2015,16) 10117005

Q.6 Write a brief note on Fax Machine. (Board 2017) 10117006

Q.7 Explain Cell Phone. (Board 2014) 10117007

Q.8 Explain Photo Phone. / What is photo phone? (Board 2014, 15) 10117008

Q.9 Discuss the transmission of light signals through optical fibres in detail. 10117009

OR How light signals are sent through optical fibre?

Q.10 Write a brief note on computer. 10117010

OR

What is computer? What is the role of computer in everyday life?

Q. 11 What do you mean by Primary Memory? (Board 2016) 10117011

Q.12 What do you mean by Secondary Storage Devices? (Board 2016) 10117012

Q.13 What are information storage devices? 10117013

Q.14 What are Audio and Video Cassettes? Also explain their working process. 10117014

Q.15 Write a brief note on magnetic disks. 10117015

Q.16 What is a Hard Disk? Explain. (Board 2016) 10117016

Q. 17 What is meant by Compact Disk. Or Write a note on Compact Disk (CD).

(Board 2016,18) 10117017

Q.18 What is a Flash drive? Explain. (Board 2016,18) 10117018

Q.19 Write down the names of applications of the computer. 10117019

Q.20 Write a brief note on Word Processing. 10117020

Q.21 What is Data Management, Monitoring and Control? Explain. 10117021

Q.22 Write a brief note on Internet. / What is internet? Explain in detail.(Board 2014,15)10117022

Q23. What is Browser? 10117023

Q.24 How to search the Web? 10117024

Q.25 Define Electronic Mail. Write down its three advantages. (Board 2015,17) 10117025

Q.26 What are the adverse effect of ICT on Society and the Environment? Explain. 10117026

(OR) What are the risks of ICT to society and environment? (Board 2015)

Multiple Choice Questions

Choose the correct answer for the following choices.

Exercise MCQs

1. In computer terminology information means: **(Board 2014,15,17)** 10117027
   (a) any data
   (b) raw data
   (c) processed data
   (d) large data

2. Which is the most suitable means of reliable continuous communication between an orbiting satellite and Earth? **(Board 2015,18)** 10117028
   (a) microwaves
   (b) radio waves
   (c) sound waves
   (d) any light waves

3. The basic operations performed by a computer are: 10117029
   (a) arithmetic operations
   (b) non-arithmetic operations
   (c) logical operations
   (d) both (a) and (c)

4. The brain of any computer system is: **(Board 2015,17)** 10117030
   (a) monitor
   (b) memory
   (c) CPU
   (d) control unit

5. Which of the following is not processing? **(Board 2014,15,18)** 10117031
   a) arranging
   b) manipulating
   c) calculating
   d) gathering

6. From which of the following we can get information almost about everything? **(Board 2014, 15)** 10117032
   a) book
   b) teacher
   c) computer
   d) Internet

7. What does the term e-mail stand for? **(Board 2014, 15, 16,18)** 10117033
   a) emergency mail
   b) electronic mail
   c) extra mail
   d) external mail

Additional MCQs

8. Radio waves are: **(Board 2015)** 10117034
   a) electric waves
   b) electromagnetic waves
   c) X-rays
   d) Radio-active rays

9. The data stored in C.D. is: 10117035
   a) 680 MB
   b) 650 MB
   c) 700 MB
   d) 750 MB

10. Hard disk is made of: 10117036
   a) Aluminium
   b) Copper
   c) Iron
   d) Plastic

11. CD which is made of soft material is called: 10117037
   a) hard disk
   b) floppy disk
   c) iron disk
   d) copper disk

12. A device which has two ways communication is: 10117038
   a) Television
   b) Radio
   c) Hard disk
   d) Mobile Phone

13. An example of input device of computer is: 10117039
   a) key board
   b) Printer
   c) monitor
   d) RAM

14. A data storage device is: 10117040
   a) Printer
   b) Hard disk
   c) Monitor
   d) CPU

15. What is fitted in telephone receiver?
   a) electromagnet
   b) diaphragm 10117041
   c) both (a) and (b)
   d) none

16. Information storage devices work on the principles of: 10117042
   a) heat
   b) sound
   c) light
   d) magnetism

17. Which component is output device of computer? 10117043
   a) CPU
   b) C.D
   c) Keyboard
   d) monitor

18. Which technology is used in mobile phone? 10117044
   a) heat
   b) radio
   c) light
   d) laser

19. Which of the following reasons increase the importance of computer? 10117045
   a) speedy
   b) long time storage of memory
   c) quick decision
   d) all of these

20. The speed of sound in air is: **(Board 2014)** 10117046
   a) 1243 kmh^{-1}
   b) 1244 kmh^{-1}
   c) 1245 kmh^{-1}
   d) 1246 kmh^{-1}

21. **1 KB =** (Board 2015)
10117047
    a) 1024 bytes   b) 1024KB
    c) 1024MB   d) None of these

22. **1 MB =** (Board 2015)
10117048
    a) 1022 KB   b)1023 KB
    c) 1024 KB   d)1025 KB

23. **1 GB = _____**
10117049
    a) 1022 MB   b) 1023 MB
    c) 1024 MB   d) 1025 MB

24. **Coaxialcable are used to transmit signals:** 10117050
    a) magnet
    b) electric
    c) mechanical
    d) both mechanical and magnet

25. **The waves which travel in straight line through space and have strong signals are called:** 10117051
    a) micro waves
    b) mechanical waves
    c) light waves
    d) magnet waves

26. **The advantages of electronic mail are:** 10117052
    a) Fast communication
    b) Cost free service
    c) More efficient
    d) All of these

27. **Micro waves are used in:**
(Board 2014) 10117053
    a) Radio   b) Television
    c) Mobile Phone d) All of these

28. **One byte is equal to:** (Board 2015)
10117054
    a) 7 bits   b) 5 bits
    c) 8 bits   d) 9 bits

29. **Which is not a hardware?**
(Board 2015)   10117055
    a) CPU   b) Window
    c) Keyboard   d) Mouse

30. **With broadband information can be loaded.** (Board 2015)   10117056
    a) in 1 min.   b) in 1s
    c) in 1 day   d) in 2 days

31. **First voice signal was transmitted in the form of electrical signal in:** 10117057
    a) 1870   b) 1875
    c) 1876   d) 1880

32. **The way of doing business by using web is called:** 10117058
    a) Source of entertainment
    b) Web business
    c) E-Commerce
    d) E-mail

33. **Floppy has a storage capacity**
10117059
    a) 4-5 MB   b) 3-4 MB
    c) 1-3 MB   d) 3-6 MB

34. **In CD presence of pits is indicated by:**
    a) 0   b) 2   10117060
    c) 3   d) 1

35. **Which rays are used to send or receive digital information along optical fibre?**
    a) infrared   b) alpha rays   10117061
    c) beta rays   d) mechanical

36. **A device which has two ways of communication is:** 10117062
    a) Television   b) Radio
    c) Hard disk   d) Mobile Phone

37. **Waves whose speed is equal to speed of light are:** 10117063
    a) X-rays
    b) Sound rays
    c) Electromagnetic waves
    d) Shock waves

38. **To get a design on the computer screen by moving a pointer with the help of mouse is called:** 10117064
    a) Word processing
    b) Graphic designing
    c) Data managing
    d) Telecommunication

39. **Scientist who transmitted the first radio signal in air is:** 10117065
    a) Galileo   b) Graham Bell
    c) Einstein   d) Marconi

40. **Through which can we get results from computer?** 10117066
    a) Input devices   b) CPU
    c) Output devices   d) Keyboard

41. **We can give data to computer by:**
    a) Input devices   b) CPU   10117067
    c) Output devices   d) Progam

42. **Floppy disc is made up of:** 10117068
    a) Iron   b) Plastic

c) Wood   d) Aluminum

43. The process through which we can communicate information to far off places instantly is: 10117069
     a) Telecommunication
     b) Communication
     c) I.T
     d) Computing

44. The scientific method of storing, arranging information for proper use is called: 10117070
     a) Telecommunication
     b) Communication
     c) I.T
     d) Computing

45. The mouth piece and receiver contains _____ granules.   10117071
     a) Carbon   b) Oxygen
     c) Hydrogen   d) Nitrogen

46. Waves of visible light have much higher: 10117072
     a) energy   b) wave-length

     c) frequency   d) speed

47. A DVD can store data upto: 10117073
     a) 15 GB   b) 14 GB
     c) 17 GB   d) 20 GB

48. The program through which we can write letters, books etc is called: 10117074
     a) word processing
     b) graphic designing
     c) data management
     d) web designing

49. Example of primary memory is.
                (Board 2016)   10117075
     a) Read only Memory (ROM)
     b) Hard Disk
     c) Floppy Disk
     d) Audio Cassette

50. In computer terminology the term machinery refers to:
                (Board 2017)   10117076
     a) Software   b) Hardware
     c) Data   d) Procedure

Q.17.1. What is difference between data and information?   10117077

Q.17.2. What do you understand by Information and Communication Technology (ICT)?

Q.17.3. What are the components of information technology? Clearly indicate the function of each component.   10117079

Q.17.4. Differentiate between primary memory and secondary memory.   10117080

Q.17.5. Name different information storage devices and describe their uses.   10117081

Q.17.6 Explain briefly the transmission of radio waves through space.   10117082

Q.17.7. How light signals are sent through optical fibre?   10117083

Q.17.8. What is computer? What is the role of computer in everyday life?   10117084

Q.17.9. What is the difference between hardware and software? Name different softwares.
                (Board 2017,18)   10117085

Q.17.10. What do you understand by the term word processing and data managing? 10117086

Q.17.11. What is internet? Internet is useful source of knowledge and information. Discuss.

Q.17.12. Discuss the role of information technology in school education.   10117088

Q.1 Why is optical fibre more useful tool for the communication process?   10117089

Q.2 Which is more reliable floppy or a hard disk?   **(Board. 2014)**   10117090

Q.3 What is the difference between RAM and ROM memories? (Board 2017)   10117091

Q.4   Define Word Processing.   10117092

Q.5   Define Data Management.
                    (Board 2015,18) 10117093

Q.6   Write the uses of Fax Machine. /
How fax machine works?
                    (Board 2014, 15) 10117094

Q.7   What is a computer?   10117095

Q.8   What is the main difference
between telephone and cellular phone?
                                        10117096

Q.9   Write down the use of some
electromagnetic radiation in modern
telecommunication.   10117097

Q.10   Write two advantages of e-mail.
                    (Board 2014)   10117098

Q.11   Differentiate between hard disk and
floppy.   10117099

Q.12   Write names of four output devices
of a computer.   (Board 2015)   10117100

Q.13   What is meant by web browsing?
                    (Board 2015)   10117101

Q.14   What is CPU? (Board 2015)   10117102

Q.15   What is floppy disk? (Board 2015) 10117103

Q.16   Write the function of transmitter
and receiver.   (Board 2015)   10117104

Q.17   Write the advantage of internet.
                    (Board 2015,18)   10117105

Q.18   What is the language of computer?
                    (Board 2015)   10117106

Q.19   What is meant by optical fibre?
                    (Board 2014)   10117107

Q.20   Define operating system and give
an example.   (Board 2016)   10117108

Q.21 Write the names of some sources of
telecommunication.   10117109

Q.22   Write the names of some
information storage devices.   10117110

Q.23   What are super computers? 10117111

Q.24   What is electronic banking? 10117112

Q.25   What is coaxial cable?   10117113

Q.26   What is radio Tuning Circuit?
                                        10117114

Q.27   How digital signals transmitted
across the world?   10117115

Q.28   What is the importance of Optical
Fibre?   10117116

Q.29   How can you say that Internet
connect us globally? OR   What is global
web?   (Board 2016)   10117117

Q.30   What is meant by E-Commerce?
                                        10117118

Q.31   What are radio waves?   10117119

Q.32   Name the scientist who transmitted
first radio signal through the space? 10117120

Q.33   Why are sound waves converted
into electromagnetic waves for the
transmission of signals?   10117121

Q.34   How is mobile phone better than
telephone?   10117122

Q.35   How is data transmitted across the
internet?   10117123

Q.36   In which form do computers use
data?   10117124

Q.37   How does computer's hard drive
work?   10117125

Q.38   What is the impact of ICT in
education?   10117126

Q.39   Define operating system and give
an example.   10117127

Q.40   How can you differentiate between
hard disk and floppy with the help of its
making material.   10117128

UNIT
18

Atomic and Nuclear Physics

Q.1 How were atoms discovered? Also describe atomic structure.   10118001

Q.2 Define Isotopes. Write the names of isotopes of Hydrogen.   **(Board 2014,18)**   10118002

Q.3 Define and explain Natural Radioactivity.   101118003

Q.4 What are Background and cosmic radiations?   10118004

Q.5 What is Nuclear transmutation?   10118005
        OR
What are three basic radioactive decay processes and how do they differ from each other?

Q.6 What is the nature and properties of Radiations?   10118006

Q.7 What is ionization effect of rays?   **(Board 2014)**   10118007

Q.8 Explain penetrating ability of radiation.   **(Board 2014)**   10118008

Q.9 What is meant by half-life? Explain.   **(Board 2017)**   10118009
        OR
What do you understand by half life of a radioactive element.

Q.10 Differentiate between stable and unstable nuclei. OR Define stable and unstable nuclei.   **(Board 2014)**   10118010

Q.11 What are radio isotopes? Write their uses. (OR) How are radio isotopes used as tracers and in medical field?   **(Board 2015, 16,17)**   10118011

Q.12 What is Fission Reaction? Explain.   **(Board 2017)**   10118012

Q.13 Define and explain Nuclear Fusion.   **(Board 2015,18)**   10118013

Q.14 What are Radiations Hazards? Describe them.   **(Board 2015)**   10118014

Q.15 What are safety measures of radiation? Write them.   **(Board 2015, 16)**   10118015

Choose the correct answer from the following choices.

Exercise MCQs

1. **Isotopes are atoms of same element with different:**   **(Board 2015)**   10118016
   (a) atomic mass
   (b) atomic number
   (c) number of protons
   (d) number of electrons

2. **One of the isotopes of uranium is $^{238}_{92}U$. The number of neutrons in the isotopes is:**   **(Board 2014,15,16,18)**   10118017
   (a) 92   (b) 146
   (c) 238   (d) 330

3. **Which among the following radiation has more penetrating power?**   10118018
   (a) a beta particle
   (b) a gamma ray
   (c) an alpha particle
   (d) all have the same penetrating ability

4. **What happen to the atomic number of an element which emits one alpha particle?**   **(Board 2014)**   10118019
   (a) increases by 1   (b) stays the same
   (c) decreases by 2   (d) decreases by 1

5. **The half-life of a certain isotopes is 1 day. What is the quantity of isotopes after 2days?**   **(Board 2014)**   10118020
   (a) one half   (b) one quarter
   (c) one eighth   (d) none of these

6. **When a uranium (92 protons) ejects a beta particle, how many protons are left in the remaining nucleus?**   **(Board 2017)**   10118021
   (a) 89 protons   (b) 90 protons
   (c) 91 protons   (d) 93 protons

7. **Release of energy by the sun is due to:**

(a) nuclear fission
(b) nuclear fusion
(c) burning of gases
(d) chemical reaction

8. **When a heavy nucleus splits into lighter nuclei, the process would:** 10118023
(a) release nuclear energy
(b) absorb nuclear energy
(c) release chemical energy
(d) absorb chemical energy

9. **The reason carbon dating work is that:** 10118024
(a) Plants and animals are such strong emitters of carbon 14.
(b) After a plant or animal dies, it stops taking in fresh carbon – 14.
(c) There is so much non-radioactive carbon dioxide in the air.
(d) When a plant or animal dies, they absorb fresh C-14.

Additional MCQs

10. **The temperature at the centre of sun is:** 10118025
(a) 10 million K   (b) 20 million K
(c) 30 million K   (d) 35 million K

11. **The half-life of Lead Pb is:** 10118026
(a) 10 hour   (b) 10.10 hours
(c) 10.6 hours   (d) 1 year

12. **The half-life of carbon -14 is:**
(Board 2015) 10118027
(a) 5730 years   (b) 5740 years
(c) 5750 years   (d) 5760 years

13. **When 1 kg of Uranium -235 splits then energy released is:** 10118028
(a) 6.7×10^{11}J   (b) 6×10^{7}J
(c) 67 J   (d) 7 J

14. **When 1 tonne of coal is burnt then amount of energy is released:** 10118029
(a) 36×10^{8} J   (b) 3.6×10^{10}J
(c) 36J   (d) 36×10^{10}J

15. **Nuclear fission was first observed in:**
10118030
(a) 1936   (b) 1937
(c) 1938   (d) 1939

16. **Radioactive isotopes present in atmosphere is:** 10118031
(a) cobalt -60   (b) Ph-32
(c) carbon - 14   (d) carbon 20

17. **For observing how fast plants are absorbing phosphate fertilizer we use:**
(a) I- 131   (b) P-32   10118032
(c) Co-60   (d) Ar-40

18. **The half life of radium 226 is:** 10118033
(a) 1600 year   (b) 1610 years
(c) 1620 years   (d) 1630 years

19. **Radiation was found in:** 10118034
(a) 1896   (b) 1895
(c) 1897   (d) 1898

20. **Safe limit of radiations exposure in one year:** **(Board 2015)** 10118035
(a) 4 rem   (b) 5 rem
(c) 3 rem   (d) 6 rem

21. **The half life of argon nuclide Ar-40 is:**
10118036
(a) 2×10^{8} years   (b) 2.2×10^{8} years
(c) 2.4×10^{8} years (d) 2.8×10^{8} years

22. **The half life of plutonium $^{236}_{94}Pu$ is:**
(Board 2014) 10118037
(a) 2.00 years   (b) 2.35 years
(c) 2.79 years   (d) 2.85 years

23. **The half life of cobalt $^{60}_{27}Co$ is:** 10118038
(a) 10 years   (b) 20 years
(c) 30 years   (d) 40 years

24. **N =** 10118039
(a) $N_o \times \dfrac{1}{2}$ (b) $N_o \times \dfrac{1}{2^t}$
(c) $N_o \times 2^t$ (d) $N_o \times 2^{2t}$

25. **What happens to the atomic number of an element which emits one alpha particle and a beta particle:** 10118040
(a) increased by 1
(b) stays the same
(c) decreased by 2
(d) decreased by 1

26. **To diagnose the brain tumor, it is used:** (Board 2017) 10118041
    (a) Iodine-131
    (b) Phosphorus-32
    (c) Cobalt-60
    (d) Carbon-14

27. **Radioactive cobalt 60 is used for curing:** 10118042
    (a) cancerous cells (b) AIDS
    (c) poliomyelitis (d) T.B.

28. **The radioactive material must be placed in a box of:** 10118043
    (a) carbon (b) lead
    (c) silicon (d) selenium

29. **Co-60 emits high energy:** 10118044
    (a) alpha rays (b) beta rays
    (c) gamma rays (d) gamma & beta rays

30. **In 1896, radioactivity was discovered by a French scientist:** 10118045
    (a) Alfred Nobel (b) Hawk
    (c) Henry Bacquerel (d) Madam Curie

31. **Alpha rays produce in human body:** 10118046
    (a) fluorescence
    (b) burn & sores
    (c) red spot
    (d) ulcer

32. **If a person is strongly radiated by radiation. Then he can suffer from:** 10118047
    (a) malignant tumors (b) T.B.
    (c) AIDS (d) hepatitis

33. **For curing of cancer we use:** 10118048
    (a) P-32 (b) P-31
    (c) I-131 (d) Co-60

34. **How many times proton is heavier than an electron?** 10118049
    (a) 1936 (b) 1836
    (c) 2035 (d) 1736

35. **Measuring unit of Nuclear Radiation is:** 10118050
    (a) hertz (b) coulomb
    (c) rem (d) farad

36. **The process by which lighter nuclei fuse together to form a heavy nucleus is known as:** 10118051
    (a) nuclear fission
    (b) nuclear fusion

    (c) radioactivity
    (d) electron activity

37. **When an atom of deuterium is fused with an atom of tritium, then a nucleus will be formed named:** 10118052
    (a) Kr-nucleus
    (b) Xe-nucleus
    (c) Na-nucleus (d) He-nucleus

38. **The charge and mass of electrons is equal to which of following rays:** 10118053
    (a) X- (b) gamma
    (c) alpha (d) beta

39. **The charge on alpha rays is:** 10118054
    (a) positive (b) negative
    (c) neutral (d) as electron

40. **The rays which move with speed of light are:** 10118055
    (a) gamma rays (b) alpha rays
    (c) beta rays (d) ultrasonic rays

41. **Radioactive elements have atomic number greater than:** 10118056
    (a) 80 (b) 79
    (c) 81 (d) 82

42. **1eV =** 10118057
    (a) 1.6×10^{18} J (b) 1.6×10^{-19} J
    (c) 1.6×10^{19} J (d) 1.6×10^{9} J

43. **Size of an atom is equal to:** 10118058
    (a) 10^{11}m (b) 10^{-10}m
    (c) 10^{6}m (d) 10^{-6}m

44. **When lead-207 (Z = 82) is bombarded with neutrons, it can change into:** 10118059
    (a) lead-208
    (b) lead-206
    (c) tellurium-208 (Z = 81)
    (d) bismuth-208 (Z = 83)

45. **Complete the following nuclear reaction:** $^{16}_{8}O + ^{4}_{2}He \rightarrow ^{19}_{10}Ne +$ 10118060
    (a) ^{2}p (b) $^{1}_{0}n$
    (c) $^{2}_{1}H$ (d) $^{3}_{1}H$

46. **What is the mass of the products of a nuclear fission reaction compared to the mass of the original products?** 10118061
    (a) greater (b) less
    (c) the same
    (d) varies according to the reaction

47. **The fuel for nuclear fusion is:** 10118062

(a) H (b) He
(c) U
(d) any radioactive material

48. The fuel for nuclear fission is: 10118063
(a) H
(b) He
(c) U
(d) any radioactive material

49. In the fission reaction, the number of neutrons produced: 10118064
(a) zero. (b) 1.
(c) 2. (d) 3.

50. The chief hazard of radiation is: 10118065
(a) Damage to living cells due to ionization.
(b) Damage to cells due to heating.
(c) Damage to living cells due to the creation of chemical impurities.
(d) The creation of new isotopes within the body.

51. An X-ray technician takes an average of ten X-rays per day and receives 2.5 mrem per X-ray. What is the total dose the technician receives in 250 working days? 10118066
(a) 2.50 rem (b) 5.00 rem
(c) 6.25 rem (d) 7.75 rem

52. Which of the following particles has the smallest mass? 10118067
(a) Proton (b) Electron
(c) Neutron (d) Nucleus

53. Which of the following is correct for the number of neutrons in the nucleus? 10118068
(a) $N = A - Z$ (b) $N = Z - A$
(c) $N = Z + A$ (d) $N = Z$

54. How many electrons are in the $^{12}_{6}C$ atom?
(a) 12 (b) 6 10118069
(c) 18 (d) 9

55. How many nucleons are in the $^{20}_{10}Ne$ atom? 10118070
(a) 30 (b) 18
(c) 10 (d) 20

56. How many neutrons are in the $^{23}_{11}Na$ atom? 10118071
(a) 12 (b) 11
(c) 18 (d) 24

57. How many protons are in the $^{14}_{7}N$ atom? 10118072
(a) 14 (b) 6
(c) 7 (d) 10

58. Which force is responsible for the radioactive decay of the nucleus? 10118073
(a) Gravitational force
(b) Weak Nuclear force
(c) Strong Nuclear force
(d) Electromagnetic force

59. An isotope with a high Binding Energy per nucleon: 10118074
(a) will decay in a short period of time.
(b) is very unstable.
(c) is very stable.
(d) has very few electrons.

60. Which of the following is the alpha particle? 10118075
(a) $+1e$ (b) $^{1}_{0}n$
(c) $^{1}_{1}H$ (d) $^{4}_{2}He$

61. Which of the following is the $\beta -$ particle? 10118076
(a) $+1e$ (b) $^{0}_{-1}e$
(c) $^{1}_{0}n$ (d) $^{1}_{1}H$

62. Which of the following about the gamma ray is true? 10118077
(a) It carries a negative charge.
(b) It can be deflected by a magnetic field.
(c) It can be deflected by an electric field.
(d) It has zero rest mass and a neutral charge.

63. What is the missing element from the following equation $^{226}_{88}Ra \rightarrow ? + ^{4}_{2}He$ 10118078
(a) $^{230}_{86}Rn$ (b) $^{220}_{86}Rn$
(c) $^{228}_{86}Rn$ (d) $^{222}_{86}Rn$

64. What is the missing element from the following equation $^{14}_{6}C \rightarrow ? + ^{0}_{-1}e?$ 10118079
(a) $^{12}_{6}C$ (b) $^{17}_{8}O$

(c) $^{16}_{8}O$ (d) $^{14}_{7}N$

65. A 100 g sample of a radioactive element has a half-life of 5 days. How many grams of radioactive material will remain after 15 days?   10118080
(a) 100 g   (b) 50 g
(c) 25 g   (d) 12.5 g

66. A reaction that releases more energy than is put into it is called: 10118081
(a) endothermic
(b) exothermic
(c) nuclear
(d) chemical

67. The following reaction
$^{1}_{0}n + ^{235}_{92}U \rightarrow ^{141}_{56}Ba + ^{92}_{36}Kr + 3^{1}_{0}n$ **is called:**   10118082
(a) Fusion
(b) Fission
(c) alpha decay
(d) beta decay

68. The following reaction
$^{2}_{1}H + ^{3}_{1}H \rightarrow ^{4}_{2}He + ^{1}_{0}n$ **is called:** 10118083
(a) Fusion
(b) Fission
(c) alpha decay
(d) beta decay

Q.18.1. What is difference between atomic number and atomic mass number? Give a symbolical representation of a nuclide.   10118084

Q.18.2. What do you mean by the term radioactivity? Why some elements are radioactive but some are not?   10118085

Q.18.3. How can we make radioactive elements artificially? Describe with a suitable example.   10118086

Q.18.4. what are three basic radioactive decay processes and how do they differ from each other?   10118087

Q.18.5.Write the alpha-decay process for $^{234}_{91}Pa$. Identify the parent and daughter nuclei in this decay.   10118088

Q.18.6. Explain whether the atomic number can increase during nuclear decay. Support your answer with an example.   10118089

Q.18.7. What do you understand by half life of a radioactive element?   10118090

Q.18.8. Is radioactivity a spontaneous process? Elaborate you answer with a simple experiment.   10118091

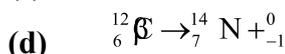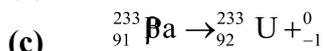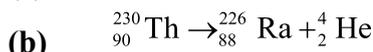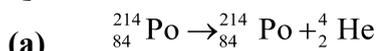**Q.18.9.Describe two uses of radioisotopes in medicine, industry or research.** (Board 2018)10118092

Q.18.10. What are two common radiation hazards? Briefly describe the precautions that are taken against them.   10118093

Q.18.11. Complete this nuclear reaction $^{235}_{92}U \rightarrow ^{140}_{54}X + ? + 2^{1}_{0}n$. Does this reaction involve fission or fusion? Justify your answer.   10118094

Q.18.12 Nuclear fusion reaction is more reliable and sustainable source of energy than nuclear fission chain reaction. Justify this statement with plausible arguments. 10118095

Q.18.13. A nitrogen nuclide $^{16}_{7}N$ decays to become an oxygen nuclide by emitting an electron. Show this process with an equation. 10118096

Q.18.15. Determine which of these radioactive decay processes are possible. 10118097

(a) $^{214}_{84}Po \rightarrow ^{214}_{84}Po + ^{4}_{2}He$

(b) $^{230}_{90}Th \rightarrow ^{226}_{88}Ra + ^{4}_{2}He$

(c) $^{233}_{91}Pa \rightarrow ^{233}_{92}U + ^{0}_{-1}$

(d) $^{12}_{6}C \rightarrow ^{14}_{7}N + ^{0}_{-1}$

Q.1 Is it possible for an element to have different types of atoms? Explain. 10118098

Q.2 Which nuclear reaction would release more energy, the fission reaction or the fusion reaction? Explain. 10118099

Q.3 Which has more penetrating power, alpha particle or gamma ray photon? Explain. 10118100

Q.4 What is the difference between natural and artificial radioactivity? 10118101

Q.5 How long would you like to wait to watch any sample of radioactive atoms completely decay? 10118102

Q.6 Which type of natural radioactivity leave the number of protons and the number of neutrons in the nucleus unchanged? 10118103

Q.7 How much of a 1-gram sample of pure radioactive matter would be left after four half-lives. 10118104

Q.8 Tritium, $^{3}_{1}H$ is radioactive isotope of hydrogen. It decays by emitting an electron. What is the daughter nucleus? 10118105

Q.9 What information about the structure of the nitrogen atom can be obtained from its nuclide $^{14}_{7}N$? In what way atom in $^{14}_{7}N$ is different from the atom in $^{16}_{7}N$? 10118106

Q.10 What is meant by artificial radioactivity? **(Board 2014)** 10118107

Q.11 Define nuclear fission and nuclear fusion? **(Board 2014, 15)** 10118108

Q.12 Describe any two hazards of radiations. **(Board 2014,16)** 10118109

Q.13 Write chemical equation for nuclear fusion. **(Board 2014)** 10118110

Q.14 Define atomic mass number and write its formula. **(Board 2014)** 10118111

Q.15 Define penetrating ability. Penetrating power. **(Board 2014,15)** 10118112

Q.16 Define ionization. **(Board 2014)** 10118113

Q.17 Describe two safety precautions to avoid hazards of radiations. 10118114

Q.18 How is fission reaction controlled?

Q.19 Define isotopes. (Board 2015,16) 10118116

Q.20 What is the difference between atomic number and atomic mass number? (Board 2015) 10118117

Q.21 What is meant by background radiation? (Board 2015) 10118118

Q.22 Write any two properties of (α) particles? (Board 2015) 10118119

Q.23 Define half life.(Board 2015,18) 10118120

Q.24 What is meant by radioactive element? 10118121

Q.25 Write two characteristics of beta radiation. (Board 2018) 10118122

Q.26 What is neutron number? 10118123

Q.27. What is positron. 10118124

Q.28. What do you know about the nuclear accident at Chernobyl Russia? 10118125

Q.29. Define Carbon dating. (Board 2018) 10118126

Q.30 What is an Atom? From which language is this word derived? 10118127

Q.31 Why don't proton repel each other in a nucleus? 10118128

Q.32 In which unit Radioactivity is measured in SI? 10118129

Q.33 What is unit of radiation and what is its safe limit? 10118130

Q.34 Two half lives do not make a whole life. Why? 10118131

Q.35 Why is extra care taken to use Gamma Rays? 10118132

Q.36 What precaution should be used during brain Radiotherapy? 10118133

Q.37 How can we check the action of fertilizer? 10118134

Q.38 Compare the penetrating ability of α, β and γ α, β and γ particles? 10118135

Q.39 When do α and β α and β particles become harmless? 10118136

Q.40 How many types of radiation can be distinguished from their path followed in external magnetic field? 10118137

18.1 Find the number of protons and neutrons in the nuclide by $^{13}_{6}X$ (Board 2015) 10118138

18.2 The activity of a sample of a radioactive bismuth decreases to one-eight of its original activity in 15 days. Calculate the half life of the sample. (Board 2014,15,17) 10118139

18.3 A radioactive element has a half-life of 40 minutes. The initial count rate was 1000 per minute. How long will it take for the count rate to drop to (a) 250 per minutes (b) 125 per minutes (c) Plot a graph of the radioactive decay of the element. 10118140

18.4 The C-14: C-12 ratio in a fossil bone is found to be $1/4^{th}$ that of the ratio in the bone of a living animal. The half-life of C-14 is 5730 years. What is the approximate age of the fossil?
10118141

18.1 The half life of $^{16}_{7}N$ is 7.3s. A sample of this nuclide of nitrogen is observed for 29.2s. Calculate the fraction of the original radioactive isotope remaining after this time.   10118142

18.2 Cobalt-60 is a radioactive element with half-life of 5.25 years. What fraction of the original sample will be left after 26 years?   **(Board 2017,18)**   10118143

18.3 Carbon-14 has a half life of 5730 years. How long will it take for the quantity of carbon -14 in a sample to drop to one-eighth of the initial quantity?   **(Board 2014,15)** 10118144

18.4 Technetium-99 is a radioactive element and is used to diagnose brain, thyroid, liver and kidney diseases. This element has half life of 6 hours. If there is 200 mg of this Technetium present, how much will be left in 36 hours.   10118145

18.5 Half-life of a radioactive element is 10 minutes. If the initial count rate is 368 counts per minute, find the time for which count rates reaches 23 counts per minute.   10118146

18.6 In an experiment to measure the half-life of a radioactive element, the following results were obtained: 10118147

Count rate	400	200	100	50	25
Time (in minutes)	0	2	4	6	8

Plot a graph between the count rate and time in minutes. Measure the value for the half-life of the element from the graph.

18.7 A sample of certain radioactive element has a half-life of 1500 years. If it has an activity of 32000 counts per hour at the present time then plot a graph of the activity of this sample over the period in which it will reduce to 1/16 of its present value.   10118148

Count per hour	3200	16000	8000	4000	2000
Half lives	Zero	IT	2T	3T	4T

18.8 Half-life of a radioactive element was found to be 4000 years. The count rates per minute for 8 successive hours were found to be 270, 280, 300, 310, 285, 290, 305, 312. What does the variation in count rates show? Plot a graph between the count rates and time in hours. Why's the graph a straight line rather than an exponential?   10118149

18.9 Ashes from a campfire deep in a cave show carbon-14 activity of only one-eight the activity of fresh wood. How long ago was that campfire made? **(Board 2014,18)**   10118150