

UNIT-2-Waves and Oscillation (PHYSICS)

- 1) Longitudinal sound wave travel in the form of alternate
a) Crest and trough
b) compression and rarefactions
c) crest and compression
d) trough and rarefaction
- 2). The maximum displacement of particle (in S.H.M.) from its mean position is called as-----
a) Frequency
b) period
c) wavelength
d) amplitude
- 3).The number of oscillations performed by a particle (in S.H. M.) in one second is called----
of oscillation.
a) Frequency
b) period
c) wavelength
d) amplitude
- 4) The time taken by a particle to complete one oscillation is called as Of oscillation.
a) Frequency
b) period
c) wavelength
d) amplitude
- 5) The distant between the center of to successive cooperation is called as.....
a) frequency
b) period
c) wavelength
d) amplitude
- 6). The distance covered by the disturbance or wave in one second called as----- of wave.
a) frequency
b)period
c) wavelength
d) velocity
- 7). The relation between velocity, frequency and wavelength is.....
a) $n = v \lambda$
b) $v = n \lambda$
c) $v = n/\lambda$
d) $v = \lambda/n$
- 8). The relation between velocity, period and wavelength is.....
a) $\lambda = v/T$
b) $v = T/\lambda$
c) $v = \lambda/T$
d) $T = v \lambda$
- 9). Ultrasonic are the sound waves having frequency-----
a) more than 20 kHz
b) more than 20 Hz
c) less than 20 Hz
d) less than 20 kHz
- 10) The sound wave of frequency less than 20 Hz are known as-----
a) infrasonic
b) audible sound
c) ultrasonic
d) supersonic
- 11) The sound wave of frequency between 20 Hz to 20 kHz is known as-----
a) infrasonic
b) audible sound
c) ultrasonic
d) supersonic
- 12)The sound wave of frequency more than 20 Hz are known as-----
a) infrasonic
b) audible sound
c) ultrasonic
d) supersonic
- 13)The normal healthy human ear can hear the sound wave of frequency-----
a) less than 20 Hz
b) 20 Hz to 20kHz
c) more than 20 kHz
d) more than 50kHz
- 14) which of the following is not a property of ultrasonic waves----
a) has shorter wavelength
b) carry high amount of sound energy
c) show negligible diffraction
d) travel with considerable loss
- 15)Jacques and Peirre Curie found that crystal like quartz develop electric charges across their faces when mechanical Pressure is applied to it is called----

- a) Piezo-electric effect
c) pressure effect
- b) converse piezo-electric effect
d) electric effect
- 16). When electric field is applied across quartz crystal then dimension of crystal change across and if alternating P. D. is applied then crystal sets into vibrations which is called as-----
a) Piezo-electric effect
c) pressure effect
- b) converse piezo-electric effect
d) vibration effect
- 17) Piezo-electric effect is -----
a) reversible
c) reversible under high pressure
- b) irreversible
d) irreversible under high pressure
- 18) The direct piezo-electric effect is used to-----
a) generates photoelectrons
c) generate ultrasound
- b) detect photoelectric current
d) detect ultrasound
- 19) The converse piezo-electric effect is used to-----
a) generates photoelectrons
c) generate ultrasound
- b) detect photoelectric current
d) detect ultrasound
- 20) Which of the following is not a piezo-electric material?
a) quartz
c) topaz
- b) Rochelle Salt
d) Uranium
- 21) Which of the following is not a natural piezo-electric material?
a) quartz
c) topaz
- b) Rochelle Salt
d) Gallium phosphate
- 22) Which of the following is not an application of ultrasonic?
a) material analysis
of flaws of material
c) SONAR
- b) detection
d) sonography
- 23) SONAR is abbreviation of
a) small navigation and random
c) sun nuclear ranging
- b) sky navigation and ranging
d) **sound navigation and ranging**
- 24) Sound waves are
a) **Longitudinal**
c) Electromagnetic
- b) Transverse
d) Only magnetic
- 25) Sound waves are produced by---
a) linear motion
c) **vibrating bodies**
- b) circular motion
d) transitional motion
- 26) Speed of sound varies with-----
a) humidity
c) **both humidity and temperature**
- b) temperature
d) none of the above
- 27). Which of the following is not an application of ultrasonic?
a) to detect and locate submarine objects
c) to break stones in kidney
- b) alcohol detector
d) to determine depth of sea
- 28). **Ultrasound is also useful for _____**
a). detecting fault in metal sheets
b). i. imaging marine depths
c). looking for metals beneath the earth's surface
d). detecting distances v. detecting earthquakes
a) ii, iii, v b) i, iv, v **c) i, ii, iv** d) ii, iii
- 29). **A piezoelectric crystal is used to produce the ultrasound waves. What kind of ultrasound is produced?**
a) **Pressure wave ultrasound**
c) Sound wave ultrasound
- b) Electrical wave ultrasound
d) Simple ultrasound
- 30). **Which of the following relations are true?**
a) **γ increases, penetration of sound increases, resolution decreases**
b) γ increases, penetration of sound decreases, resolution decreases

c). vibrate perpendicular to the direction of wave propagation

d). do not vibrate

40) The relation between wave velocity 'v', frequency 'f', and wavelength 'l' is _____.

a). $v = \frac{f}{\lambda}$

b). $v = f\lambda$

c). $v = \frac{\lambda}{f}$

d). $v = \frac{1}{f\lambda}$

41). The frequency of a wave travelling at a speed of 500 ms^{-1} is 25 Hz. Its time period will be ----

a). 20 s

b). 0.05 s

c). 25 s

d). 0.04 s

42) The amplitude of a wave is _____.

a). the distance the wave moves in one second

b). the distance the wave moves in one time period of the wave

c). the maximum distance moved by the medium particles on either side of the mean position

d). the distance equal to one wave length

43): Which of the following is not a characteristic of a musical sound?

a). Pitch

b). Wavelength

c). Quality

d). Loudness

44) Sound waves do not travel through

a). solids

b). liquids

c). gases

d). vacuum

45) The physical quantity, which oscillates in most waves, is

a). mass

b). energy

c). amplitude

d). wavelength

46) Sound waves are

a) longitudinal

b). transverse

c). partly longitudinal and partly transverse

d). sometimes longitudinal and sometimes transverse

47) The frequency which is not audible to the human ear is

a) 50 Hz

b) 500 Hz

c) 5000 Hz

d) 50000 Hz

48) The speed of sound in medium depends upon

a) amplitude

b). frequency

c). wavelength

d). properties of the medium

49) Which of the following will remain unchanged when a sound wave travels in air or in water?

a). Amplitude

- b). Wavelength
- c). Frequency**
- d). Speed

50) A sound source sends waves of 400 Hz. It produces waves of wavelength 2.5 m. The velocity of sound waves is

- a). 100 m/s
- b). 1000 m/s**
- c). 10000 m/s
- d). 3000 km/s

51) The time period of a vibrating body is 0.05 s. The frequency of waves it emits is

- a). 5 Hz
- b). 20 Hz**
- c). 200 Hz
- d). 2 Hz

52) A source of frequency of 500 Hz emits waves of wavelength 0.4 m, how long does the waves take to travel 600 m?

- a). 3 s**
- b). 6 s
- c). 9 s
- d). 12 s

53) Sound and light waves both

- a). have similar wavelength
- b). obey the laws of reflection**
- c). travel as longitudinal waves
- d). travel through vacuum

54): The method of detecting the presence, position and direction of motion of distant objects by reflecting a beam of sound waves is known as _____.

- a). RADAR
- b). SONAR**
- c). MIR
- d). CRO

55) The technique used by bats to find their way or to locate food is _____.

- a) SONAR
- b) RADAR
- c) Echolocation**
- d) Flapping

56) An ultrasonic wave is sent from a ship towards the bottom of the sea. It is found that the time interval between the sending and receiving of the wave is 1.6 s. What is the depth of the sea, if the velocity of sound in the seawater is 1400 m/s?

- a) 1120 m**
- b) 560 m
- c) 1400 m
- d) 112 m

57) An example for mechanical wave.

- a) Radio wave
- b) Light wave
- c) Infrared radiation
- d) Sound wave**

58) Which of the following quantities is transferred during wave propagation?

- a) Speed
- b) Mass
- c) Matter
- d) Energy**

59) If a vibrator strikes the water 10 times in one second, then the frequency of wave is _____.

- a) 10 Hz
- b) 0.5 Hz
- c) 5 Hz
- d) 0.1 Hz

60) Unit of wavelength is _____.

- a) newton
- b) erg
- c) dyne
- d) angstrom

61) The distance between a compression and the next rarefaction of a longitudinal wave is _____.

- a) $\frac{\lambda}{4}$
- b) 2λ
- c) $\frac{\lambda}{2}$
- d) $\frac{\lambda}{8}$

62) SI Unit of time period is _____.

- a) second
- b) hour
- c) minute
- d) nanosecond

63) The vibrations or the pressure variations inside the inner ear are converted into electrical signals by the _____.

- a) cochlea
- b) tympanic membrane
- c) pinna
- d) anvil

64) Vibrations inside the ear are amplified by the three bones namely the _____ in the middle ear.

- a) hammer, anvil and stirrup
- b) hammer, anvil and pinna
- c) hammer, cochlea and stirrup
- d) auditory bone, anvil and stirrup

65) The persistence of audible sound due to the successive reflections from the surrounding objects even after the source has stopped to produce that sound is called _____.

- a) reflection
- b) echo
- c) reverberation
- d) rarefaction

66) Which of the following variables has zero value at the extreme position in SHM?

- a) Acceleration
- b) Speed
- c) Displacement
- d) Angular frequency

Answer: b

Explanation: At the extreme position in SHM, the body comes to instantaneous rest. The force, and therefore acceleration, is maximum at this point according to the force eqn: $F = -kx$.

67). A particle is initially at the centre and going towards the left. Let T be the time period of the SHM it is undergoing. What will be its position and velocity at time $3T/4$, if it starts from the centre at $t=0$?



- a) At right extreme, zero velocity
- b) at centre, maximum speed towards left
- c) at centre, maximum speed towards right
- d) Mid-way between centre and -A

[View Answer](#)

Answer: a

Explanation: The time period of the given motion is T. It will go from centre to -A in $T/4$ secs. Then back to centre at $2T/4$ secs. And then towards the right extreme, A, at $3T/4$ secs. At this extreme position its velocity will be zero.

68) .A particle is undergoing SHM with amplitude 10cm. The maximum speed it achieves is 1m/s. Find the time it takes to reach from the mean position to half the amplitude.

- a) $\pi/60$ s
- b) $\pi/30$ s
- c) $\pi/15$ s
- d) $\pi/40$ s

Answer: a

Explanation: Let the equation of motion be: $x = 0.1\sin(\omega t)$ where ω is the angular frequency.

On derivating this equation w.r.t time we get: $v = 0.1\omega\cos(\omega t)$.

Given that maximum speed is 1m/s, we get $0.1\omega = 1$.

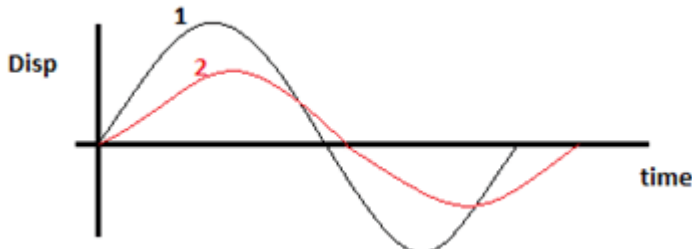
$$\therefore \omega = 10\text{s}^{-1}.$$

Now our equation of motion has become: $x = 0.1\sin(10t)$.

Assume we start from $x=0$ at $t=0$. Then by putting $x=0.05$ in the equation we can find the time. $0.05 = 0.1\sin(10t)$

$$\therefore \sin(10t) = 0.5 \therefore 10t = \pi/6 \therefore t = \pi/60 \text{ s.}$$

69).The displacement vs time graphs of 2 SHMs are given below. Which parameter is the same for both of them?



- a) Angular frequency
- b) Amplitude
- c) Maximum speed
- d) Phase constant

Answer: d

Explanation: The time period is different for both as they both complete one cycle at different times. So, their angular frequencies will be different. The maximum displacement, as seen from the graph, is different for both so their amplitudes are different. SHMs have maximum speed at their mean positions. Both the curves have different slopes at their mean positions so their maximum velocities are different. At $t=0$, both are at their mean positions and going towards their positive extremes, therefore their phase constants will be the same.

70) For a body moving with simple harmonic motion, the number of cycles per second, is known as its

- a). Oscillation
- b). Amplitude
- c). Periodic time
- d). Frequency**

71) In a simple harmonic motion, acceleration of a particle is proportional to

- a). Rate of change of velocity
- b). . Displacement**
- c). Velocity
- d). Direction

72). A mass on a spring undergoes SHM. The maximum displacement from the equilibrium is called?

- a). Period
- b). Frequency
- c). . Amplitude**
- d). Wavelength
- E. Speed

73) In a periodic process, the number of cycles per unit of time is called?

- a). Period b). . Frequency c). Amplitude d) Wavelength E. Speed

74) In a periodic process, the time required to complete one cycle is called?

- a). **Period** b). Frequency c). . Amplitude d) Wavelength E. Speed

75) At resonance condition the amplitude of driven harmonic oscillator is

- a) zero
b).) small but non-zero
c). moderate

d) maximum

76) At resonance condition the frequency of oscillator

- a) decreases
b). increases

c). remains same

d) None of the above options is correct

77) Resonance will be sharp pendulum with

A) pith bob

B) Iron bob

C) wood bob

D) same for all bobs

78) Acceleration for driven harmonic oscillator is zero at

- a) extreme position
b).) mean position
c). both A and B

d) none of the above

79) A body executing simple harmonic motion is at equilibrium at

a) extreme position

b). mean position

c). somewhere between extreme and mean position

d) no where

80) More will be the damping—— at any frequency other than resonance frequency.

- a) more sharper the resonance and more will be amplitude
b). more sharper the resonance and less will be amplitude

c). less sharper the resonance and less will be amplitude

d) less sharper the resonance and more will be amplitude

81) Damping—— the time period of oscillator.

a) increases

b). decreases

- c). not effect
- d) may increase or decrease

82)An oscillator vibrating at its natural frequency is

a) free oscillator

- b). forced oscillator
- C) driven harmonic oscillator
- D) both b and c

.83)Which of the following is the correct definition of oscillation?

- a) A linear motion from one point to another
- b) A random back-and-forth movement
- c) A repetitive to-and-fro motion about an equilibrium position
- d) A circular motion around a fixed point

Answer:c) A repetitive to-and-fro motion about an equilibrium position

84).Which of the following quantities remains constant in simple harmonic motion?

- a) Displacement
- b) Velocity
- c) Acceleration
- d) Total Energy

Answer:d) Total Energy

85).The time period of a simple pendulum depends on which of the following factors?

- a) Mass of the pendulum bob
- b) Amplitude of the oscillation
- c) Length of the pendulum
- d) Damping force

Answer: c) Length of the pendulum

86).Which of the following statements about angular frequency (ω) is correct?

- a) It is measured in meters per second squared (m/s^2)
- b) It is the reciprocal of the time period (T)
- c) It remains constant for all types of oscillations
- d) It is directly proportional to the amplitude

Answer: b) It is the reciprocal of the time period (T)

87).If a simple harmonic oscillator has got a displacement of 0.02 m and acceleration equal to 2.0 m/s^2 at any time, the angular frequency of the oscillator is equal to

- a) 10 rad/s
- b) 1 rad/s
- c) 100 rad/s
- d) 1 rad/s

Answer: a) 10 rad/s

88).The restoring force in simple harmonic motion is directly proportional to:

- a) Displacement
- b) Velocity
- c) Acceleration
- d) Time period

Answer: a) Displacement

89).A mass-spring system oscillates with a period of 2 seconds. What is the frequency of oscillation?

- a) 0.5 Hz
- b) 1 Hz
- c) 2 Hz
- d) 4 Hz

Answer: a) 0.5 Hz

90).The time period of a thin magnet is 4s. If it is divided into two equal halves, then the time period of each part will be:

- a) 4s
- b) 1s
- c) 2s
- d) 8s

Answer: c) 2s

91)The displacement of a particle performing simple harmonic motion is given by, $x = 8 \sin \omega t + 6 \cos \omega t$, where distance is in cm and time is in second. The amplitude of motion is

- a. 10 cm
- b. 14 cm
- c. 2 cm
- d. 3.5 cm

Answer: (a) 10 cm

92) A particle executes S.H.M of amplitude A. At what distance from the mean position is its kinetic energy equal to its potential energy?

- a. 0.51 A
- b. 0.61 A
- c. 0.71 A
- d. 0.81 A

93) A simple pendulum on length l and mass m is suspended vertically. The string makes an angle θ with the vertical. The restoring force acting on the pendulum is

- a. $mg \tan\theta$
- b. $mg \sin\theta$
- c. $-mg \sin\theta$
- d. $-mg \cos\theta$

Answer: (c) $-mg \sin\theta$

94) The mass and diameter of a planet are twice those of earth. The period of oscillation of pendulum on this planet will be (if it is a second's pendulum on earth)

- a. $1/\sqrt{2}$ second
- b. $2 \times \sqrt{2}$ second
- c. 2 second
- d. $\frac{1}{2}$ second

Answer: (b) $2 \times \sqrt{2}$ second

95) A particle of mass m is hanging vertically by an ideal spring of force constant k . If the mass is made to oscillate vertically, its total energy is

- a. Maximum at extreme position
- b. Maximum at mean position
- c. Minimum at mean position
- d. Same at all positions

Answer: (d) Same at all positions

96) A place where $g = 980 \text{ cm/sec}^2$ the length of seconds pendulum is about

- a. 50 cm
- b. 100 cm
- c. 2 cm
- d. 2 m

Answer: (b) 100 cm

97) The maximum velocity for a particle in S.H.M is 0.16 m/s and maximum acceleration is 0.64 m/s^2 . The amplitude is

- a. $4 \times 10^{-2} \text{ m}$
- b. $4 \times 10^{-1} \text{ m}$
- c. $4 \times 10 \text{ m}$
- d. $4 \times 10^0 \text{ m}$

Answer: (a) $4 \times 10^{-2} \text{ m}$

UNIT-3-Photo electricity (PHYSICS)

1). In photoelectric effect ----- energy converted in to -----energy.

- a) light, electrical
- c) light, chemical

- b) electrical, light
- d) light, heat

2). photoelectric effect was detected by-----

a) Hertz

b) Henry

c) Planck

d) Einstein

3). When the light of suitable frequency is incidence on metallic surface, then electrons are emitted from the metal surface, this effect is know as-----

a) Thermoelectric effect

b) photoelectric effect

c) heating effect of electric current

d) Seebeck effect

4). According to Plank's theory energy is not emitted and absorbed continuously, but in a discrete units or packets (bundle) These energy packets are called -----

a) Electrons

b) protons

c) photons

d) neutrons

5). Photons (quanta) are electrically -----

a) positive

b) negative

c) neutral

d) none of these

6). Photons travel with a speed of ----

a) of sound

b) of light

c) less than sound

d) less than light

7). Energy 'E' associate with a photon is given by-----

a) $E = \frac{h}{\nu}$

b) $h = E \nu$

c) $E = h + \nu$

d) $E = h \nu$

8). The value of 'h' planks constant have value ----- $\times 10^{-34}$

a) $3.36 \times 10^{-34} \text{js}$

b) $6.63 \times 10^{34} \text{js}$

c) $6.63 \times 10^{-34} \text{js}$

d) none of these

9). Photon is-----

a) invisible entity

b) divisible entity

c) electrical entity

d) electrically negative

10). Photons -----

a) deflected by electric field

b) deflected by magnetic field

c) do not ionize

d) ionize

11). As per Einstein's theory of relativity-----

a) $E = \frac{m}{c^2}$

b) $E = mc^2$

c) $E = mc$

d) $E = m/c$

12). Mass of photon is given by-----

a) $m = hc\lambda$

b) $m = hc/\lambda$

c) $m = \lambda/hc$

d) $m = h/c\lambda$

13). During the process of photoelectric emission, photon collides with the atom and atom absorbs energy 'hv' Atom utilizes this energy in two ways----

a) part of energy is used to separate electron from atom and remaining energy to throw electron

b) part of energy to heat atom and remaining energy to throw electron

c) part of energy to separate electron and remaining to heat atom.

d) part of energy is used to attract proton and remaining to throw electron.

14). The amount of energy required to separate electron from atom is called as-----

a) kinetic energy

b) photoelectric work function

c) potential energy

d) light energy

15). The value of photoelectric work function W_0 depends on-----

a) nature of metal

b) Speed of photons

c) medium

d) area of metal plate

16). Threshold frequency ν_0 of a metal is the ----- frequency of the incident light at which -----

30). As per the principle of photoelectric cell-----

- a) electrical energy converted into light energy b) light energy converted into electrical energy
 c) light energy converted into kinetic energy d) light energy converted into heat energy

31). Frequency below which no electrons are emitted from metal surface is

- a) minimum frequency b) angular frequency
 c) maximum frequency d) threshold frequency

32). Energy absorbed by electron is used in

- a) escaping the metal b) increasing kinetic energy
 c) both A and B d) increasing frequency

33). In photoelectric effect, electrons should be removed from the

- a) inner shells b) surface
 c) from core d) the nucleus

34). The ratio of photon energy to its frequency is _____

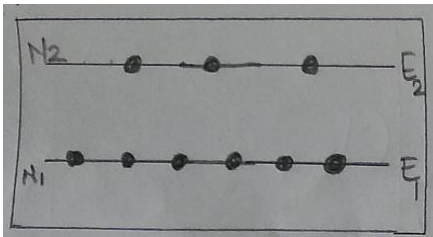
- a) its speed Option b) its velocity Option
 c) its wavelength Option d) plancks constant

35) The work function of a substance is 1.6 eV. Find the longest wavelength of light that can produce photoemission from the substance.

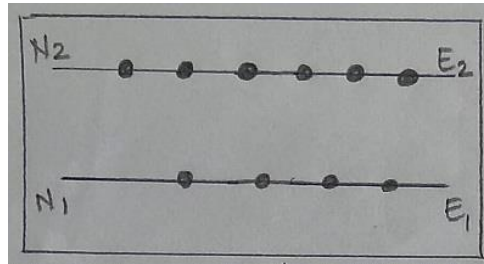
- a) 2900 A° b) 3867 A°
 c) 5800 A° d) 7734 A°

36) Out of the following which diagram explains population inversion -----

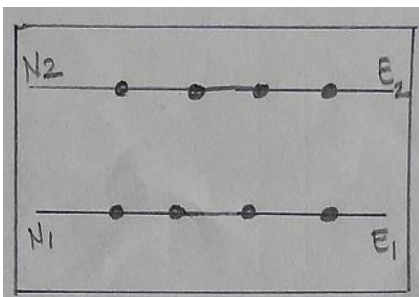
Option A



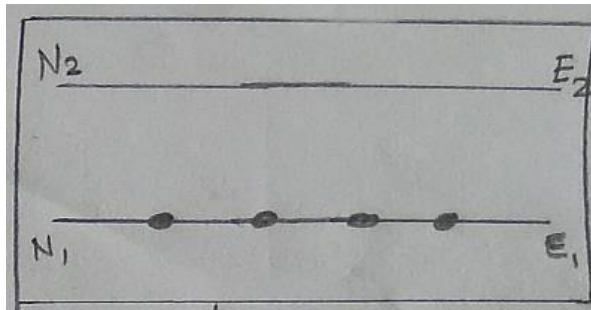
Option B



Option C



Option D



37). LASER light is coherent _____

- a) All the waves have same frequency b) All the waves are exactly in the same phase
 c) All the waves have same wavelength d) All the waves are exactly in the opposite phase

38) In He-Ne LASER, the tube is filled with _____

- a) 10 % He and 90 % Ne b) 20 % He and 80 % Ne
 c) 90 % He and 10 % Ne d) 80 % He and 20 % Ne

39) The conductivity of LDR increases as -----

- a) intensity of light increases b) intensity of light decrease
 c) wavelength of light increases d) None of the above

40) In photoelectric effect, by increasing the intensity of incident light on the surface of the metal, ---increase

- a) photoelectric current b) penetration power
 c) ionizing power d) stopping potential

41) The photoelectric work function of the metal is 3.3eV. Then the threshold frequency of the metal will be-----

- a) 7.96×10^{14} Hz b) 8.96×10^{14} Hz
 c) 7.96×10^{15} Hz d) 8.96×10^{15} Hz

42) Which of the following are properties of the photon?

- a) indivisible entity b) travels with speed of light
 c) Does not get deflected by electric or magnetic field d) All of the above

43) The wavelength of 1 keV photon is 1.24×10^{-9} m, then frequency of 1 MeV photon is _____.

- 62). In Coolidge X-ray tube, the target (T) material should have some properties. Which of the following property is not required?
- target (T) material should have high melting point
 - target (T) material have high atomic weight
 - target (T) material have high thermal conductivity
 - target (T) material have high ductility
- 63). In Coolidge X-ray tube, electrons are produce due to process known as-----
- photoelectric emission
 - thermionic emission
 - ultrasonic emission
 - hydraulic emission
- 64). In the process of x-ray production, the electrons produced from the cathode are accelerated by application of---
- high voltage between anode and cathode
 - low voltage between anode and cathode
 - electronic motor
 - high current from cathode to anode
- 65). In the process of x-ray production, the intensity of x-ray can be controlled by----
- adjusting filament current
 - adjusting P.D. between cathode and anode
 - adjusting angle of target
 - adjusting cooling rate
- 66). In the process of x-ray production, the penetration of x-ray (hard x-rays or soft x-rays) can be adjusted by----
- adjusting filament current
 - adjusting P.D. between cathode and anode
 - adjusting angle of target
 - adjusting cooling rate
- 67). Which of the following is not a property of x-rays-----
- have high penetrating power
 - produce photoelectric effect
 - affect photographic plates
 - get deflected by magnetic or electric field
- 68). X-rays travel with speed of light. X-rays produce ionization in the gases-----
- True, True
 - True, False
 - False, True
 - False, False
- 69). Which of the following is not the application of x-rays-----
- used to detect cracks in the body of aero plane
 - used to detect smuggling gold at airport
 - used as a sensor in atomization industry
 - to detect cracks in the bridge
- 70). Which of the following is not the application of x-rays-----
- used to detect bone fracture in the body
 - used in eye surgery
 - used to destroy tumors
 - used to cure diseases like cancer
- 71) Which of the following is not the application of x-rays-----
- used in speedometer of vehicle
 - used to study crystal structure
 - used in chemical analysis
 - used to study structure of substances like rubber, plastic
- 72). The energy of x-ray photon is 3×10^{-16} J. its frequency is----
- 0.497×10^{16} Hz
 - 18.52×10^{18} Hz
 - 18.52×10^{16} Hz
 - 0.497×10^{18} Hz
- 73). Calculate operating voltage of x-ray tube which emits x-ray of wavelength 0.25\AA -----
- 25kV
 - 30.6kV
 - 35.7kV
 - 49.6kV
- 74). Which of the following is a unique property of laser?
- Directional
 - Speed
 - Coherence
 - Wavelength

View Answer c

Explanation: Coherence is an important characteristic of laser beam because in laser beams, the Wave trains of the same frequency are in phase/ Due to high coherence it results in an extremely high power.

- 75). Which of the following is an example of optical pumping?

- Ruby laser
- Helium-Neon laser
- Semiconductor laser
- Dye laser

View Answer: a

Explanation: The atoms of Ruby are excited with the help of photons emitted with the help of photons emitted by an external optical source. The atoms absorb energy from photos and raises to excited state. Therefore Ruby laser is an example of optical pumping.

- c). Light Absorption by Stimulated Emission of Radiation.
- d). Light Absorption by Spontaneous Emission of Radiation.

90). Laser beam is made a of

- a) Electrons
- b) Highly coherent photon
- c). Elastic particles
- d) Excited atoms

91). The material in which the population inversion is achieve is called as

- a) Active medium
- b) metastable state
- c) passive medium
- d) stable states

92). The life time of metastable state when compared to excited state is

- a) Smaller
- b) Greater
- c) Equal

93). In population inversion process the number of atoms in metastable state is comparison to the ground state is

- a) Smaller
- b) Greater
- c) Equal

94). The population inversion process is due to the existence of

- a) Metastable state
- b) Excited state
- c) Ground state
- d) Underground state

95). In lasing action, the light amplification is due to

- a) Stimulated emission
- b) Spontaneous emission
- c) Stimulated Absorption
- d) spontaneous absorption

96). In Laser, stimulated emission depends on

- a) Number of atoms present in meta stable state
- b) The intensity of incident light
- c) Both are correct
- d) Both are wrong.

97). Which of the following is not a property of laser light?

- a) is coherent
- b) is monochromatic
- c) beam is extreme intense
- d) high penetration power

98). LASER light is coherent means-----

- a) all the wave have same frequency or wavelength
- b) all the waves are exactly in same phase
- c) all the waves are exactly in opposite phase
- d) all the waves are carry same energy

99). LASER light is monochromatic means-----

- a) all the wave have same frequency or wavelength
- b) all the waves are exactly in same phase
- c) all the waves are exactly in opposite phase
- d) all the waves are carry same energy

100). Atom in the ground state absorbs energy of incident photon and get excited towards higher energy level. This process is known as -----

- a) Spontaneous emission
- b) Stimulated emission
- c) Stimulated Absorption
- d) photon collision

101). After completion of life time, the excited atom comes to lower energy state on it's own emitting a photon. This is known as---

- a) Spontaneous emission
- b) Stimulated emission
- c) Stimulated Absorption
- d) photon collision

102) when an atom is in excited state and before coming to ground state if the atom is triggered due to an action of incident photon. The interaction between the excited atom and incident photon can trigger excited atom to make transition to ground state. This process is called as----

- a) Spontaneous emission
- b) Stimulated emission
- c) Stimulated Absorption
- d) photon collision

103). An atom remains in excited state for very very small time (10^{-8} sec) and comes to the ground state immediately. This state is known as-----

- a) short excited state
- b) temporary excited state
- c) metastable excited state
- d) ordinary excited state

104). life time of hydrogen is-----

- a) 10^{-3} sec
- b) 10^{-8} 10^{-3} s
- c)
- d) ten years

105) The relaxation time for metastable state is-----

- a) ten years
- b) 1 year
- c) 10^2 to 10^4 sec
- d) 10^{-6} sec to 10^{-3} sec

106). Which of the following is not a application of LASER-----

- a) used for engraving and embossing
- b) used for cutting and drilling metals
- c) used for chemical analysis
- d) used for computer printers

d) Detector

Answer: c

Explanation: Collimator is used to focus the generated x-rays upon the specimen. The collimator is in between the specimen under analysis and the Coolidge tube.

121). The cathode in the Coolidge tube is made of which of the following elements?

a) Quartz

b) Iron

c) Tungsten

d) Barium

Answer: c

Explanation: The cathode in the Coolidge tube is made of tungsten. The anode is made of copper.

122). The cathode in the Coolidge tube is kept in an inclined manner.

a) True

b) False

Answer: b

Explanation: The anode in the Coolidge tube is kept in an inclined manner. The anode is made of copper.

123). Which of the following is not a target metal used in the Coolidge tube?

a) Rhodium

b) Cobalt

c) Gold

d) Silver

Answer: c

Explanation: Gold is not used as a target metal in the Coolidge tube. The other target metals are copper, molybdenum and chromium.

124). When x-rays emitted from molybdenum are allowed to pass through a zirconium filter, which of the following occurs?

a) It absorbs radiation of shorter wavelength

b) It absorbs radiation of longer wavelength

c) It allows radiation of shorter wavelength to pass through

d) It allows radiation in a particular band to pass through

Answer: b

Explanation: When x-rays emitted from molybdenum are allowed to pass through a zirconium filter, it absorbs radiation of shorter wavelength. It allows radiation of a stronger wavelength to pass through.

125) Which of the following crystals are not suited for x-ray grating?

a) Topaz

b) Lithium fluoride

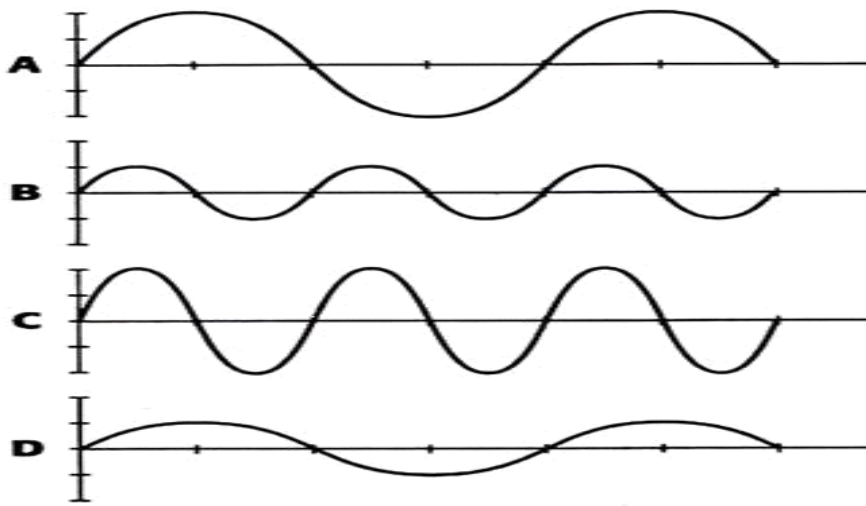
c) Calcium fluoride

d) Sodium fluoride

Answer: d

Explanation: The crystal which is not suited for x-ray grating is sodium fluoride. Other crystals which are suitable for x-ray grating are gypsum and sodium chloride.

126) Question: - Which wave has same frequency and periodic time as wave A



Option A: - Wave B

Option B: - Wave C

Option C: - Wave D

Option D: - Both (B) and (C)

127) Question: - In photoelectric effect, by increasing the intensity of incident light on the surface of the metal, _____ increases

Option A: - photoelectric current

Option B: - penetration power

Option C: - ionizing power

Option D: - stopping potential

128) Question: - The photoelectric work function of the metal is 3.3eV. Then the threshold frequency of the metal will be _____.

Option A: - 7.96×10^{14} Hz

Option B: - 8.96×10^{14} Hz

Option C: - 7.96×10^{15} Hz

Option D: - 8.96×10^{15} Hz

129) Question: - Which of the following are properties of the photon?

Option A: - indivisible entity

Option B: - travels with speed of light

Option C: - Does not get deflected by electric or magnetic field

Option D: - All of the above

130) Question: - The wavelength of 1 keV photon is 1.24×10^{-9} m, then frequency of 1 MeV photon is _____.

Option A: - 1.24×10^{15} Hz

Option B: - 2.4×10^{15} Hz

Option C: - 1.24×10^{20} Hz

Option D: - 2.4×10^{20} Hz

131) Question: - In He-Ne laser, He atom transfer their energy to Ne atom through _____

Option A: - elastic collision

Option B: - inelastic collision

Option C: - absorption

Option D: - emission

132) Question: - A laser consists of active medium of collection of _____

Option A: - atoms

Option B: - molecule

Option C: - ions

Option D: - All of these

133) Question: - The ratio of photon energy to its frequency is _____

Option A: - its speed

Option B: - its velocity

Option C: - its wavelength

Option D: - plancks constant

134) Question: - The work function of a substance is 1.6 eV. Find the longest wavelength of light that can produce photoemission from the substance.

Option A: - 2900 Å

Option B: - 3867 Å

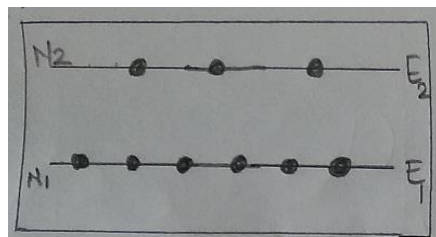
Option C: - 5800 Å

Option D: - 7734 Å

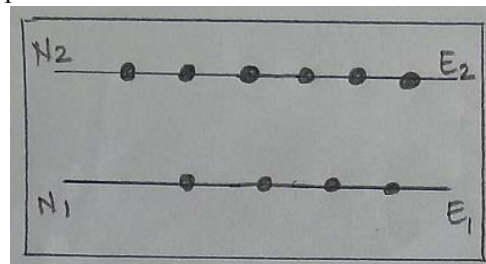
135) Question: - Out of the following which diagram explains population inversion _____

Option A

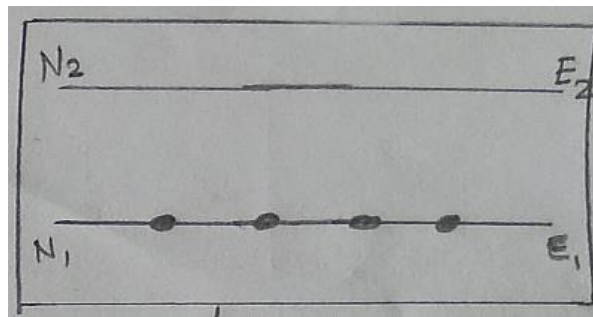
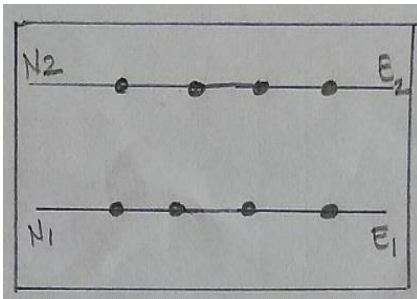
Option B



Option C



Option D



136) Question: - LASER light is coherent _____

- Option A: - All the waves have same frequency
 Option B: - All the waves are exactly in the same phase
 Option C: - All the waves have same wavelength
 Option D: - All the waves are exactly in the opposite phase

137) Question: - In He-Ne LASER, the tube is filled with _____

- Option A: - 10 % He and 90 % Ne Option B: - 20 % He and 80 % Ne
 Option C: - 90 % He and 10 % Ne Option D: - 80 % He and 20 % Ne

138) Question: - The conductivity of LDR increases as

- Option A: - intensity of light increases Option B: - intensity of light decrease
 Option C: - wavelength of light increases Option D: - None of the above

139) 1 nanometer = _____ meter

- a) 10^{-8}
 (b) 10^{-7}
 (c) 10^{-10}
 (d) 10^{-9}

140) What is the typical size range of nanoparticles?

- a) 1 to 100 millimeters
 b) 1 to 100 micrometers
 c) **1 to 100 nanometers**
 d) 1 to 100 picometers

UNIT-V-WATER TREATMENT (CHEMISTRY)

Which two of the following metals, when in compound form are most likely to cause hardness in water?

- (a) **calcium and magnesium** (b) magnesium and sodium
 (c) magnesium and potassium (d) calcium and potassium

Temporary hardness of water is caused by the presence of

- (a) chlorides of calcium and magnesium (b) sulphates of calcium and magnesium
 (c) **bicarbonates of calcium and magnesium** (d) carbonates of sodium and potassium

Permanent hardness of water is caused by the presence of

- (a) bicarbonates of calcium and magnesium (b) carbonates of sodium and potassium
 (c) **chlorides and sulphates of calcium and magnesium** (d) phosphates of sodium and potassium

Sedimentation is a physical process used to remove

- (a) colloidal particles (b) **suspended particles** (c) microorganisms (d) all of these

The purest form of naturally occurring water is---

- (a) **rain water** (b) river water (c) pond or lake water (d) well water

BOD stands for---

- (a) **biochemical oxygen demand** (b) British oxygen demand
 (c) biological oxygen depletion (d) British oxygen depletion

Water which does not produce lather with soap is

- (a) mineral water **(b) hard water** (c) soft water (d) distilled water

The liquid wastes from kitchens, bathrooms and wash basins are not called

- (a) liquid wastes (b) sullage **(c) sewage** (d) none of these

Fresh sewage may become stale in---

- (a) one hour (b) two to three hours **(c) three to four hours** (d) six hours

In ion-exchange process of water softening, exhausted cation exchanger resin is regenerated by using---

- (a) dilute acid** (b) alkali (c) coal (d) sand

In ion exchange process of water softening, exhausted anion exchanger resin is regenerated by using

- (a) alkali** (b) dilute acid (c) sand (d) zeolite

Permanent hardness is also known---

- (a) carbonate hardness **(b) non carbonate hardness** (c) both (a) and (b) (d) none of these

When soft, loose, slimy deposits are formed inside the boiler and do not stick up permanently then they are known as---

- (a) resins (b) zeolites (c) scale **(d) sludge**

Coagulation process removes---

- (a) floating materials (b) suspended particles **(c) colloidal particles** (d) micro-organisms

In chlorination process, germs are killed by---

- (a) chlorine gas (b) chloramine (c) bleaching powder **(d) all of these**

The principle of chlorination is---

- (a) formation of nascent oxygen** (b) formation of oxygen molecules
(c) formation of chlorine gas (d) formation of hydrochloric acid

In ozonisation--- is used to sterilize water.

- (a) oxygen gas **(b) ozone gas** (c) solid ozone (d) chlorine gas

Who invented the pH scale?

- (a) SPL Sorenson** (b) Benjamin Franklin (c) Henry Moseley (d) Wilhelm Roentgen

Acceptable pH range for drinking water is---

- (a) 4-5 (b) 5-6 **(c) 7-8.5** (d) 8.5-9

The presence of bicarbonate of calcium in water causes--- in water.

- (a) permanent hardness (b) total hardness
(c) temporary hardness (d) all of these

The process used for removing temporary hardness of water is---

- (a) boiling** (b) filtration (c) decantation (d) sedimentation

Which of the given process is used to obtain deionised water?

- (a) soda-lime process (b) permutit process **(c) ion exchange** (d) boiling

The exhausted zeolite can be regenerated by use of---

- (a) 12% NH_4OH (b) 10% NaOH **(c) 10% NaCl** (d) 10% MgSO_4 .

The compound in boiler feed water that causes caustic embrittlement is---

(a) NaCl **(b) NaOH** (c) Ca(HCO₃)₂ (d) Na₂SO₄

Cation exchange resins are capable of exchanging cations by--- ions.

(a) CO₃⁻ **(b) H⁺** (c) OH⁻ (d) NH₄⁺

Match the following:

A. Zeolite process 1. Process of removing suspended particles
B. Filtration 2. Process of removing colloidal particles
C. Sedimentation 3. Process of removing temporary and permanent hardness.
D. Coagulation 4. Process of removing insoluble colloidal and bacterial impurities.

(a) A-3, B-4, C-1, D-2 (b) A-3, B-2, C-1, D-3 (c) A-4, B-3, C-1, D-2 (d) A-3, B-1, C-4, D-2

Anion exchange resins are capable of exchanging anions by---

(a) OH⁻ (b) Cl⁻ (c) H⁺ (d) Ca⁺⁺

In lime soda process of softening of water, carbonates and bicarbonates are removed by sulphates and chlorides are removed by---

(a) Na₂CO₃ (b) Ca(OH)₂ **(c) both Na₂CO₃ and Ca(OH)₂** (d) none of these

The amount of oxygen consumed by the aerobic bacteria for aerobic biological decomposition of sewage is known as---

(a) chemical Oxygen Demand (COD) **(b) biochemical Oxygen Demand (BOD)**
(c) dissolved Oxygen (d) none of these

The formation of wet steam in boiler is called as---

(a) foaming **(b) priming** (c) caustic embrittlement (d) scale and sludge formation

The formation of persistent foam on the surface of boiler water is called as

(a) foaming (b) priming (c) caustic embrittlement (d) scale and sludge formation

UNIT-VI-FUELS AND COMBUSTION (CHEMISTRY)

Which substance give heat and light after combustion?

(a) flame **(b) fuel** (c) combustion (d) none of these

CNG and LPG are the examples of---

(a) solid fuels (b) liquid fuels **(c) gaseous fuels** (d) they are not fuels

Ignition temperature is at which fuel catch fire.

(a) lowest temperature (b) higher temperature (c) any temperature (d) none of these

Combustion is a---

(a) chemical process (b) physical process (c) both of these processes (d) none of these processes

The products of combustion are---

(a) carbon dioxide and water (b) oxygen and water (c) only carbon dioxide (d) only oxygen

A fraction of crude oil containing approximate composition of hydrocarbon (C₅H₁₂-C₇H₂₂) is

(a) heavy oil **(b) petroleum ether** (c) kerosene (d) gasoline

The total amount of heat or energy produced by one kg of fuel is the---

(a) heat content **(b) calorific value** (c) latent heat (d) specific heat

Moisture, ash content, volatile matter and fixed carbon are measured for coal as part of---

(a) proximate analysis (b) ultimate analysis (c) proximate and ultimate analysis (d) none of these

Knocking is observed due to---

(a) presence of moisture (b) **uneven combustion of fuel** (c) use of tetraethyl lead (d) none of these

LPG is predominantly a mixture of propane and---

(a) methane (b) **butane** (c) Isopropane (d) ethane

Combustion of which of the following fuels requires the highest amount of excess air?

(a) light diesel oil (b) LPG (c) natural gas (d) **coal**

Percentage of carbon and hydrogen present in coal can be determined by---

(a) Kjeldahl's method (b) Bomb calorimeter (c) **Combustion tube** (d) Otto Hoffman's method

Essential requirements for producing fire are---

(a) fuel (b) air (c) heat (d) **all of these**

Paraffin wax and Vaseline are prepared from--- fraction of petroleum.

(a) petroleum ether (b) **heavy oils** (c) pitch (d) uncondensed gases

The coal which produce maximum heat and minimum smoke on its combustion is---

(a) bituminous coal (b) **anthracite coal** (c) burn easily in air (d) all of these

Calorific value of gaseous fuel is ---than liquid fuel.

(a) **more** (b) less (c) equal (d) lignite coal

Calorific value is measured in---

(a) kilo litre (b) kilograms (c) **kilo joule per kg** (d) kilo metre

Incomplete combustion gives---

(a) CO₂ (b) **CO** (c) carbon (d) none of these

Which of the following is not a secondary fuel?

(a) charcoal (b) oil gas (c) **natural gas** (d) diesel oil

Which of the following is disadvantage of solid fuels?

(a) **their ash content is high** (b) they are easy to transport
(c) cost of production is low (d) easy to store

Peat may contain as much as ---% water before drying?

(a) **40-50** (b) 50-60 (c) 80-90 (d) 25-35

Anthracite contains ---% carbon content.

(a) 20-30 (b) **92-98** (c) 50-60 (d) 60-70

Which of the following gas is widely used as domestic fuel?

(a) **LPG** (b) CNG (c) PNG (d) none of these

CNG has % methane.

(a) 20-30 (b) 30-50 (c) 50-70 (d) **70-90**

Nitrogen in coal is estimated by---

(a) Orsat method (b) Eschka method (c) **Kjeldahl's method** (d) oxygen bomb method

Combustion reaction of fuel is a ---reaction.

- (a) **exothermic** (b) autocatalytic (c) endothermic (d) none of these

Ultimate analysis of coal determines its ---content.

- (a) moisture, ash, sulphur and volatile matter (b) moisture, volatile matter, ash and fixed carbon
(c) **hydrogen, carbon, sulphur, nitrogen and oxygen** (d) ash, nitrogen and volatile matter

The minimum amount of air which supplies the required quantity of oxygen for complete combustion of fuel is called as---

- (a) deficiency of air (b) sufficient air (c) excess air (d) **stoichiometric air**

The major constituent of natural gas is---

- (a) **methane** (b) ethane (c) propane (d) butane

Bomb calorimeter is used to determine calorific value of---

- (a) gaseous fuel (b) solid fuel (c) liquid fuel (d) **both (b) and (c)**

---is not stage of coalification.

- (a) Anthracite (b) **Carbide** (c) Bituminous (d) Lignite

The molecular formula of TEL is---

- (a) C_2H_5SH (b) **$Pb(C_2H_5)_4$** (c) $Pb_2C_2H_5$ (d) CH_3SH

Gobar gas is produced by--- of gobar.

- (a) hydrolysis (b) **fermentation** (c) dehydration (d) oxidation

Which fuels are used for running automobiles?

- (a) wood (b) **Gasoline** (c) coal (d) charcoal

The nominal voltage of lead-acid cell is---

- (a) 24 V (b) **2 V** (c) 1.4 V (d) 12 V

The positive and negative plates of lead acid battery are

- (a) $PbSO_4$ and Pb respectively (b) Pb and $PbSO_4$ respectively
(c) Pb and PbO_2 respectively (d) **PbO_2 and Pb respectively**

In dry cell free electrons are released at---

- (a) **anode** (b) cathode (c) anode and cathode both (d) none of these

In a charged state the Ni-Cd battery has --- in positive electrode and in the --- negative electrode.

- (a) nickel hydroxide, cadmium oxide (b) cadmium, nickel
(c) **nickel hydroxide, cadmium** (d) cadmium peroxide, nickel

Which of the following battery is not rechargeable?

- (a) Lithium-ion battery (b) Lead acid battery (c) Nickel cadmium battery (d) **Dry cell**

When five 2V cells are connected in series, then output voltage is---

- (a) 2V (b) **10V** (c) 5 V (d) none of these

When six 2V cells are connected in parallel, then output voltage is---

- (a) **2V** (b) 12 V (c) 1.5 V (d) 6 V

Dry cell is a modification of---

- (a) Daniel's cell (b) **Leclanche cell** (c) Edison cell (d) Lead acid cell

In lead acid cell, energy is stored in the form of

(a) **chemical energy** (b) electrical energy (c) electrostatic energy (d) heat energy

The electrochemical reactions are not reversible in case of---

(a) **primary cells** (b) secondary cell (c) both primary and secondary cells (d) none of these

A device that converts chemical energy into electric energy is called as---

(a) generator (b) capacitor (c) **electric cell** (d) electrolyte

In nickel cadmium cell, the cadmium is used as---

(a) **negative electrode** (b) positive electrode (c) separator (d) none of these

The positive electrode of Ni-Cd cell is made up of

(a) cadmium (b) **nickel hydroxide** (c) lead (d) none of these

In alkaline cell, the electrolyte is---

(a) dil. sulphuric acid (b) concentrated sulphuric acid (c) **KOH** (d) water

Electrolyte used in hydrogen and oxygen fuel cell is---

(a) **KOH** (b) H_2SO_4 (c) HNO_3 (d) HCl

Which of the following converts energy from the combustion of fuel directly to the electrical energy?

(a) Ni-Cd cell (b) electrolytic cell (c) dynamo (d) **fuel cell**

Chemical energy is converted to energy by a fuel cell---

(a) solar (b) **electrical** (c) potential (d) mechanical

Electrolyte used in lead acid cell is---

(a) $NaOH$ (b) water (c) conc. H_2SO_4 (d) **dilute H_2SO_4**

In lithium-ion batteries during charging---

(a) **lithium ions move from cathode to anode** (b) lithium ions move from anode to cathode
(c) none of these

In lithium-ion batteries during discharging---

(a) lithium ions move from cathode to anode (b) **lithium ions move from anode to cathode**
(c) none of these

In dry cell the graphite rod is ---and zinc container acts as ---respectively.

(a) anode, cathode (b) **cathode, anode** (c) anode, anode (d) cathode, cathode

In Li-ion battery during charging process, Li ions migrate from---

(a) anode to cathode (b) **cathode to anode** (c) no migration (d) electrolyte to cathode and anode

SI unit of specific resistance is---

(a) **ohm-m** (b) ohm/m (c) ohm/m² (d) ohm⁻¹

The unit of specific conductance is---

(a) ohm⁻¹ cm (b) ohm cm (c) **ohm⁻¹ cm⁻¹** (d) ohm cm⁻¹

SI unit of conductance is---

(a) **siemens** (b) poise (c) mho (d) dyne

The conductance of a wire having resistance 10 Ω will be---

(a) **10⁻¹ mho** (b) 10⁻² mho (c) 10 mho (d) none of these

The resistance of a conductor is directly proportional to its---

(a) length (b) area of cross section (c) temperature (d) resistivity

Equivalent conductance=--- X ---

(a) volume containing 1 gm equivalent of electrolyte, specific conductance

(b) volume containing 1 gm equivalent of electrolyte, specific resistance

(c) specific conductance, specific resistance

(d) 96500, specific conductance

Unit of cell constant is---

(a) cm **(b) cm^{-1}** (c) cm^2 (d) cm^3

In PEM electrolyser, water is introduced at---

(a) anode (b) cathode (c) electrolyte (d) none of these

Electrolyte used in solid oxide electrolyser is---

(a) NaOH **(b) ZrO_2 containing Yttrium or Scandium oxides**

(c) solid polymer (d) none of these

In SOEC, anode reaction is

(a) $2\text{O}^{2-} \rightarrow \text{O}_2 + 4\text{e}^-$ (b) $2\text{H}_2\text{O} + 4\text{e}^- \rightarrow 2\text{H}_2 + 2\text{O}^{2-}$ (c) $2\text{H}_2\text{O} \rightarrow \text{H}_2 + \text{O}_2$ (d) none of these