QUESTION BANK

SEMESTER-II

SUB: APPLIED SCIENCE(312308)

UNIT-2-Waves and Oscillation (PHYSICS)

| alternate | |
|---|--|
| b) compression and rarefactions | |
| d) trough and rarefaction | |
| I.M.) from its mean position is called as | |
| b) period | |
| d) amplitude | |
| icle (in S.H. M.) in one second is called | |
| | |
| b) period | |
| d) amplitude | |
| cillation is called as Of oscillation. | |
| b) period | |
| d) amplitude | |
| cooperation is called as | |
| b) period | |
| d) amplitude | |
| ve in one second called as of wave. | |
| b)period | |
| d) velocity | |
| wavelength is | |
| b) $v=n \lambda$ | |
| d) $v = \lambda/n$ | |
| elength is | |
| b) v= T/ λ | |
| d) T = v λ | |
| 1CV | |
| b) more than 20 Hz | |
| d) less than 20 kHz | |
| are known as | |
| b) audible sound | |
| d)supersonic | |
| to 20 kHz is known as | |
| b) audible sound | |
| d)supersonic | |
| z are known as | |
| b) audible sound | |
| d)supersonic | |
| und wave of frequency | |
| b) 20 Hz to 20kHz | |
| d) more than 50kHz | |
| rasonic waves | |
| o) carry high amount of sound energy | |
| d) travel with considerable loss | |
| e quartz develop electric charges across their faces when | |
| | |
| | |

| a)Piezo-electric effect | b) converse piezo-electric effect | | |
|--|---|--|--|
| c)pressure effect | d) electric effect | | |
| 16). When electric field is applied across quartz crystal th | hen 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 | b) converse piezo-electric effect | | |
| c)pressure effect | d) vibration effect | | |
| 17) Piezo-electric effect is | | | |
| a)reversible | b)irreversible | | |
| c)reversible under high pressure | d)irreversible under high pressure | | |
| 18) The direct piezo-electric effect is used to | , <u> </u> | | |
| a) generates photoelectrons | b)detect photoelectric current | | |
| c)generate ultrasound | d)detect ultrasound | | |
| 19) The converse piezo-electric effect is used to | | | |
| a) generates photoelectrons | b)detect photoelectric current | | |
| c)generate ultrasound | d)detect ultrasound | | |
| 20) Which of the following is not a piezo-electric materi | ial? | | |
| a) quartz | b) Rochelle Salt | | |
| c) topaz | d) Uranium | | |
| 21) Which of the following is not a natural piezo-electric | ic material? | | |
| a) guartz | b) Rochelle Salt | | |
| c) topaz | d) Gallium phosphate | | |
| 22) Which of the following is not an application of ultras | sonic? | | |
| a)material analysis | b)detection | | |
| of flaws of material | •)••••• | | |
| c)SONAR | d) sonography | | |
| 23) SONAR is abbreviation of | 2) 50110grup 1.9 | | |
| a)small navigation and random b)sk | y navigation and ranging | | |
| c)sun nuclear ranging d)so | und navigation and ranging | | |
| 24) Sound success and | | | |
| 24) Sound waves are a) Longitudinal | h)Transverse | | |
| c)Electromagnetic | d)Only magnetic | | |
| 25) Sound waves are produced by | | | |
| a)linear motion | b)circular motion | | |
| c)vibrating bodies | d)transitional motion | | |
| 26) Speed of sound varies with | | | |
| a)humidity | b)temperature | | |
| c) both numidity and temperature | d)none of the above | | |
| a) to detect and locate submarine objects | b) alcohol detector | | |
| c) to break stones in kidney | d) to determine depth of sea | | |
| 28). Ultrasound is also useful for | / 1 | | |
| 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 | 1) :: ::: | | |
| a_{j} II, III, v_{j} b_{j} I, v_{j} v_{j} c_{j} I, II, IV | | | |
| | | | |
| 29). A piezoelectric crystal is used to produce the ultra | asound waves. What kind of ultrasound is produced? | | |
| 29). A piezoelectric crystal is used to produce the ultra a) Pressure wave ultrasound | asound waves. What kind of ultrasound is produced? b) Electrical wave 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) γ increases, penetration of soun d) γ decreases, penetration of sour | d decreases, resolution increases nd increases, resolution increases | | |
|--|---|----------------|--|
| 31). What property of sound waves acts like t | the principle of ultrasound? | | |
| a) Reflection and Refraction b) Reflection only | | | |
| c) Refraction only | d) Propagation | | |
| 32)What type of waves are Sound Waves? | | | |
| a). Latitudinal waves | b). Transvers waves | | |
| c). Latitudinal mechanical waves | d). Longitudinal waves | | |
| 33). Which of the following is/ are not appl | ications of Ultrasonic Waves? | | |
| (a) For measuring the depth of | Sea. (b) In sterilizing | ; of a liquid. | |
| (c) In Ultrasonography (d) In sterilizing a needle | | ig a needle. | |
| Options are: | D O | | |
| A. Both (a) and (b) Only (b) $C = D + 1$ | B. On | ly (d) | |
| C. Both (c) and (d) | D. 0 | nly (b). | |
| 34). What is the speed of sound in air? | | | |
| a). 330 m/s b). 332 m/s | c). 334 m/s | d). 336 m/s | |
| Ans. B | | | |
| The speed of Sound in Air (0C) is 332 m/s an | d in Air (20C) is 343 m/s. | | |
| 35). What will be the effect of temperature | on speed of sound? | | |
| a). The speed of sound decrease | s with the increases of temperature of the | ne medium. | |
| b). The speed of sound decreases with the decrease of temperature of the medium. | | | |
| c). The speed of sound increase | s with the decrease of temperature of th | e medium. | |
| d). The speed of sound increase | es with the increase of temperature of | i the medium. | |

35). Which of the following statement is or are correct about longitudinal mechanical waves?

- a). The longitudinal mechanical waves which lie in the frequency range 20 Hz to 20000Hz are called audible or sound waves.
- b). The longitudinal mechanical waves having frequencies less than 20 Hz are called infrasonic.
- c). The longitudinal mechanical waves having frequencies greater than 20,000 Hz are called ultrasonic waves.
- d). All of the above are correct

36) When a wave travels through a medium _____.

| 1. | particles are transferred from one place to another |
|----|---|
| 2. | energy is transferred in a periodic manner |
| 3. | energy is transferred at a constant speed |
| 4. | none of the above statements is applicable |

37)The minimum distance between the source and the reflector, so that an echo is heard is approximately equal to

- a). 10 m
- b). 17 m
- c) 34 m
- d). 50 m

38): Bats detect the obstacles in their path by receiving the reflected _____.

- a). infrasonic waves
- b). radio waves
- c). electro-magnetic waves
- d). ultrasonic waves

39): When sound travels through air, the air particles _____.

- a). vibrate along the direction of wave propagation
- b). vibrate but not in any fixed direction

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). $\vee = \frac{f}{\lambda}$
- b).∨=fλ
- c). $\forall = \frac{\lambda}{t}$

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

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)21 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?

-<u>A</u>____A

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) π/30 s

c) π/15 s

d) π/40 s

Answer: a

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

On derivating this equation w.r.t time we get: v = 0.1wcos(wt).

Given that maximum speed is 1m/s, we get 0.1w = 1.

 \therefore w = 10s⁻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. $0.05 = 0.1 \sin(10t)$ $\therefore \sin(10t) = 0.5 \therefore 10t = \pi/6 \therefore t = \pi/60 s.$

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 itsa). Oscillationb). Amplitudec). Periodic timed). 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 up decrease SUM. The maximum displacement from the accelibration.

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/s²)
- 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 | s 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 I 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 θ
- b. mg sin θ
- c. $mg \sin \theta$
- d. $-mg\cos\theta$

Answer: (c) – mg sinθ

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. ¹/₂ second

Answer: (b) 2 x $\sqrt{2}$ 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 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/s². The amplitude is

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

Answer: (a) 4 x 10⁻² 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 | | |
| . When the light of suitable frequency is incidence on metallic surface, then electrons | | | |
| are emitted from the metal surface, this effect is k | now 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 al | bsorbed 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 | , , | | |
| h | | | |
| a) $E - \frac{1}{\nu}$ | б)п <i>-Е V</i> | | |
| c)E = h+ ν 8) The value of 'h' planks constant have value x 10^{-34} | $\mathbf{d})\mathbf{E} = \mathbf{h}\boldsymbol{\nu}$ | | |
| a) 3.36×10^{-34} is | b)6.63 x 10^{34} ic | | |
| $a)5.50 \times 10^{-34}$ is | d) none of these | | |
| (a) Photon is | a) none of these | | |
| a) invisible entity | h) divisible antity | | |
| a) invisible entity | d) alectrically recetive | | |
| () Photons | d)electrically negative | | |
| a) deflected by electric field | h) deflected by meanatic field | | |
| a) de nected by electric field | b) deflected by magnetic field | | |
| $C = \frac{1}{2} $ | d) tonize | | |
| 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 λ | | |
| 13).During the process of photoelectric emission, photon co | olloids 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 a | atom and remaining energy to throw electron | | |
| b)part of energy to heat atom and remaining energ | y to throw electron | | |
| c)part of energy to separate electron and remaining | g to heat atom. | | |
| d)part of energy is used to attract proton and remain | ning to throw electron. | | |
| 14). The amount of energy required to separate electron from | n 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 of | on | | |
| a) nature of metal | b)Speed of photons | | |
| c) medium d) area of metal plate | | | |
| 16). Threshold frequency v_o of a metal is the frequency | of the incident light at which | | |

| a) minimum, emission does not take place b)ma | ximum, emission does not take place |
|---|--|
| c) minimum, emission just take place | d)maximum, emission just begins |
| 17)). The value of photoelectric work function W_{0} and Thr | reshold frequency v_o changes from |
| a)place to place | b) time to time |
| c)one point to other | d) metal to metal |
| 18). The emission of photoelectron take place if | |
| $a)v < v_o$ | b) $v_o > v$ |
| c) $v > v_o$ | d) $\nu \nu_o$ |
| 19). The negative potential given to the photoelectric cell at | which photoelectric current becomes zero is called as |
| a)photo potential | b)light potential |
| c)stopping potential | d)zero potential |
| 20). photoelectric current is directly proportional to | |
| a)Speed of photon | b)energy of photon |
| c) frequency of light | d) intensity of incident light. |
| 21). The velocity of photoelectron is directly proportional t | 0 |
| a) Speed of photon | b)intensity of light |
| c) frequency of light | d) temperature of metal |
| 22). A metal emits photoelectrons only when | |
| a) intensity of light is high | b) Speed of photon is high |
| c) Frequency of incident light is less than threshol | d frequency v_0 |
| d) Frequency of incident light is greater than thres | shold frequency v_0 |
| 23). For a given metal surface, stopping potential is | |
| a) directly proportional to the intensity of light | |
| b) directly proportional to the frequency of incider | nt light |
| c) inversely proportional to the intensity of light | |
| d) inversely proportional to the frequency of incid | dent light |
| 24) which of the following is not a characteristics of photoe | electric effect? |
| a) this process is instantaneous | |
| b)emission take place only if frequency of inciden | t light is greater than threshold frequency v_0 |
| c) photoelectric current is directly proportional to | intensity of light |
| d) rate of emission of photoelectrons is directly pr | conortional to temperature |
| 25) Finstein's photoelectric equation is given by | |
| 1 - 2 - 1 | $1)^{1}$ 2 21 () |
| a) $\frac{1}{2}$ mv ² = h(v _o - v) | b) $\frac{1}{2}$ mv ² = 2n(v - v _o) |
| c) $\frac{1}{2}$ mv ² = h(v - v ₀) | d) $\frac{1}{2}$ mv ² = h / (v - v _o) |
| 26). In Einstein's equation $\frac{-mv^2}{2} = h(v - v_0)$ if $v < v_0$ then | |
| a) emission just begins | b) emission take place |
| c)no emission | d) rate of emission is high |
| 27). In Einstein's equation $\frac{1}{2}mv^2 = h(v - v_0)$ if $v = v_0$ then | |
| a) emission just begins | b) emission take place |
| c)no emission | d) rate of emission is high |
| 28). In Einstein's equation $\frac{1}{2}$ mv ² = h(v - v ₂) if v > v ₂ then | |
| $\frac{1}{2}$ | b) amigsion take globa |
| a) emission just begins | b) emission take place |
| c) no emission | a) rate of emission is high |
| 29). In Einstein's equation $\frac{1}{2}mv^2 = h(v - v_o)$ as v increases- | |
| a) K. E. decreases | b) velocity of photoelectrons decreases |
| c) velocity of photoelectrons increases | d) mass of photoelectrons increases |

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 c)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 b)surface a)inner shells c)rom 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°

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









37).LASER light is coherent





d) 7734 A°

Option D



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 × 10¹⁴Hz c) 7.96×10^{15} Hz d) 8.96 × 10¹⁵Hz 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 $1.24 \times 10-9$ m, then frequency of 1 MeV photon is

a) 1.24 × 10¹⁵Hz b) 2.4×10^{15} Hz c) 1.24×10^{20} Hz d) 2.4×10^{20} Hz 44) In He-Ne laser, He atom transfer their energy to Ne atom through a) elastic collision b) inelastic collision c) absorption d) emission 45) A laser consists of active medium of collection of a)atoms b) molecule c) ions d) All of these 46). In most of the application of photoelectric cell, the property used is-----a)speed of photoelectrons frequency of light b) photoelectric current frequency of light c) photoelectric current intensity of light d) none of these 47). Which of the following is not the application of photoelectric cell,-----a)Burglar alarm b) lux meter c) automatic street light controller d)to cure diseases like cancer 48). The principle of LDR is---a) its resistance decrease as intensity of incident light increase b)number of photoelectrons increases with increase in intensity of light c) its resistance increases with intensity of light d) its resistance increases with frequency of light 49). Which of the following is not the application of LDR? a) used in security alarms b)used as smoke detector c)used in dental surgery d) street light controller 50). The energy of photoelectron is 2.4eV. its frequency will be---b) 5.79×10^{14} Hz a) 2.4×10^{14} Hz c) 8×10^{14} Hz d) 9.59×10^{14} Hz 51). An accelerated electron emits a quantum of radiation with a frequency 9.59×10^{19} cycle per second. Energy of photon will be ---a) 5.97×10^{-14} J b) 2.34×10^{-14} J c) $7.6 \times {}^{-14}J$ d) 9.59×10^{-14} J 52). The photoelectric work function of a certain metal is 6×10^{-19} J. It's threshold frequency is----b) 6×10^{14} Hz a) 2×10^{14} Hz c) 9×10^{14} Hz d) 12×10^{14} Hz 53). The threshold frequency for a metal is 1.2×10^{15} Hz. It's threshold wavelength will be-----. a) 6×10^{-7} m b) 6×10^{7} m c) 2.5×10^{-7} m d) 2.5×10^{-7} m 54). The threshold frequency for a metal is 1×10^{15} Hz.If a light of frequency 2×10^{15} Hz is made incident on the Metal plate, then the maximum K.E. of the ejected photoelectron is-----a) 1×10^{-19} J b) 6.63×10^{-19} J c) 9.5×10^{-19} J d) 12.5×10^{-19} J 55). The threshold wavelength for silver 3800 A°. It's photoelectric work function will be----a) 5.2×10^{-19} J b) 1.1 × 10⁻¹⁹J c) 7.2×10^{-19} J d) 9.5×10^{-19} J 56). The threshold wavelength for silver 4000 A° When ultraviolet light of wavelength 2000 A° is incident on it, then the energy of photoelectrons will be-----a) 1.23×10^{-19} J b) 4.97×10^{-19} J c) 8.23×10^{-19} J d) 9.23×10^{-19} J 57). If photoelectric work function of a certain metal is 2×10^{-19} J.then It's threshold frequency will be---a) 3×10^{12} Hz b) 3×10^{13} Hz c) 3×10^{14} Hz d) 3×10^{15} Hz 58). The energy of photon is 6×10^{-19} J. its wavelength will be---a) 3.3×10^{-9} m b) 3.3×10^{-8} m c) 3.3×10^{-6} m d) 3.3×10^{-7} m 59). X-rays are electromagnetic waves of very short wave length in the order of----a) 10^{-10} m to 10^{-11} m b) 10⁻²m to 10⁻³m c) 10^{-5} m to 10^{-6} m d) 10⁵m to 10⁶m 60). when fast moving electrons (or cathode rays) are suddenly stopped then -----a) laser are produced b) current are produced c) X-rays are produced d) none of these 61). Metal filament is surrounded by molybdenum metal cylinder kept at negative potential to the filament. Because of this electrons emitted from filament are----a)sprinkled all around b) concentrated into fine beam c) Accelerated d) deaccelerated

| a) target (T) material should have high melting point b) target (T) material have high atomic weight c)) target (T) material have high thermal conductivity d)) target (T) material have high ductility 63). In Coolidge X-ray tube, electrons are produce due to process known as a) photoelectric emission b) thermionic emission c) ultrasonic emission d) hydraulic emission | |
|--|----------|
| b) target (T) material have high atomic weight c)) target (T) material have high thermal conductivity d)) target (T) material have high ductility 63). In Coolidge X-ray tube, electrons are produce due to process known as a) photoelectric emission b) thermionic emission c) ultrasonic emission d) hydraulic emission | |
| c)) target (T) material have high thermal conductivity d)) target (T) material have high ductility 63). In Coolidge X-ray tube, electrons are produce due to process known as a) photoelectric emission b) thermionic emission c) ultrasonic emission d) hydraulic emission | |
| d)) target (T) material have high ductility 63). In Coolidge X-ray tube, electrons are produce due to process known as a) photoelectric emission b) thermionic emission c) ultrasonic emission d) hydraulic emission | |
| 63). In Coolidge X-ray tube, electrons are produce due to process known as a) photoelectric emission b) thermionic emission c) ultrasonic emission d) hydraulic emission | |
| a) photoelectric emission b) thermionic emission c) ultrasonic emission d) hydraulic emission | |
| c) ultrasonic emission d) hydraulic emission | |
| 64) In the process of y ray production, the electrons produced from the estanda are cooperated by employ | tion of |
| a) high voltage between anode and cathode | 11011 01 |
| b) low voltage between anode and cathode | |
| c) electronic motor | |
| d) high current from cathode to anode | |
| 65). In the process of x-ray production, the intensity of x-ray can be controlled by | |
| a) adjusting filament current b) adjusting P.D. between cathode and anot | le |
| c) adjusting angle of target d) 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 | d by |
| a) adjusting filament current b) adjusting P.D. between cathode and anod | le |
| c) adjusting angle of target d) adjusting cooling rate | |
| 6/). Which of the following is not a property of x-rays | |
| a) have high penetrating power b)produce photoelectric effect c)affect photographic plates | 1 |
| 68) X-rays travel with speed of light X-rays produce ionization in the gases | 1 |
| a) True. True b) True. False | |
| c) False, True d) False, False | |
| 69). Which of the following is not the application of x-rays | |
| a)used to detect cracks in the body of aero plane | |
| b)used to detect smuggling gold at airport | |
| c) used as a sensor in atomization industry | |
| d) to detect cracks in the bridge | |
| 70). Which of the following is not the application of x-rays | |
| a)used to detect bone fracture in the body b)used in eye surgery | |
| c) used to destroy tumors d) used to cure diseases like cancer (71) Which of the following is not the application of x rays | |
| a)used in speedometer of vehicle b)used to study crystal structure | |
| c) used in chemical analysis d)used to study structure of substances like rubber, plastic | |
| 72). The energy of x-ray photon is 3×10^{-16} J. its frequency is | |
| a) 0.497×10^{16} Hz b) 18.52×10^{18} Hz | |
| c) 18.52×10^{16} Hz d) 0.497×10^{18} Hz | |
| 73).Calculate operating voltage of x-ray tube which emits x-ray of wavelength 0.25A° | |
| a)25kV b)30.6kV | |
| c)35.7kV d)49.6kV | |
| 74). Which of the following is a unique property of laser? | |
| a) Directional b) Speed | |
| c) Coherence d) Wavelength | |
| View Answer c | |
| Evaluation: Coherence is an important characteristic of laser been because in laser beens, the | |
| Explanation: Coherence is an important characteristic of laser beams 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? | |
| a) Ruby laser b) Helium-Neon laser | |
| a) Semiconductor loser d) Due loser | |
| d) 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 | |

| View Answer: a Explanation: Laser beam has very high intensity, dir it is focussed on a particular area for a long time, then other area will remain as such. This is called thermal e Vhat is the need to achieve population inversion? a) To excite most of the atoms | rectional properties and coherence. When h the area alone will be heated and the |
|---|---|
| Explanation: Laser beam has very high intensity, di it is focussed on a particular area for a long time, then other area will remain as such. This is called thermal e What is the need to achieve population inversion? a) To excite most of the atoms | rectional properties and coherence. When the area alone will be heated and the |
| it is focussed on a particular area for a long time, then other area will remain as such. This is called thermal e What is the need to achieve population inversion? a) To excite most of the atoms | the area alone will be heated and the |
| other area will remain as such. This is called thermal e What is the need to achieve population inversion? a) To excite most of the atoms | i the area afone will be neared and the |
| What is the need to achieve population inversion? a) To excite most of the atoms | СС <u>т</u> |
| a) To excite most of the atoms | effect. |
| a) To excite most of the atoms | |
| | b) To bring most of the atoms to ground state |
| c) To achieve stable condition | d) To reduce the time of production of laser |
| View Answer: a | |
| Explanation: When population inversion is achieved | d. the majority of atoms are in the |
| avoited state. This assuges amplification of the incid | last been by stimulated emission. Thus the |
| excited state. This causes amplification of the inclu | ient deam by stimulated emission. Thus the |
| laser beam 1s produced. | |
| laser is called as a non-material knife. | |
| a) False | b) True |
| View Answer: b | |
| Explanation: In laser surgery, without knife, bloodle | ess operation, cutting tissues etc can |
| he made hance loser Is called non-motivicit in the | |
| or made, hence laser is called non-material knife. | |
| JVD uses the laser. | h) False |
| View Answer: a | 0) Taise |
| Explanation: A DVD player contains a laser. By mo depths can be reached in the disc. In order to make disc, the beam has to be focused on as small an a with any other light source. | oving the lens longitudinally, different room for a lot of information on every area as possible. This cannot be done |
| a) three level laser | b) four level laser |
| c) two level laser | d) five level laser |
| The pumping source in He-Ne laser | |
| a) optical | b) electric discharge |
| c) chemical | d) mechanical |
| he ratio of He to Ne in He-Ne laser is | |
| a) 1:10 | b) 2:13 |
| c) 10:1 The estive medium in He Ne leser is | a) 3:15 |
| a) He | b) Ne |
| c) He-Ne | d) All correct |
| The role of He in He-Ne laser is | |
| a) He is an active medium b) pop | ulation inversion takes place in He |
| c) Stimulated emission takes place in He | d) He atoms help in exciting Ne atoms |
| The reason for narrow tube in He-Ne laser | |
| atomic collision with tube wall increases | b) atomic collision with tube wall decreases |
| there is no effect of narrow tube on He-Ne Laser | d) atomic collision with tube wall constant |
| a) number of atoms in ground state are more than nu | umber of atoms in excited state |
| b) number of atoms in ground state are less than | number of atoms in excited state |
| c) number of atoms in ground state is equal to numbd) none | ber of atoms in excited state |
| uj none Metastable state has life time annrovimately | |
| a) 10^{-3} s | b) 10^{-8} s |
| c) 10^{-10} s | d) 10^{-12} s |
| An excited state (except metastable state)has life time | e about |
| a) 10 ⁻³ s | b) 10 ⁻⁸ s |
| a) 10^{-15} a | d) 10^{-20} s |

b). Light Amplification by Stimulated Emission of Radiation.

| c). Light Absorption by Stimulated Emission of Radi | iation. |
|---|--|
| d). Light Absorption by Spontaneous Emission of Ra | adiation. |
| 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 ach | ieve 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 ex | xcited state is |
| a) Smaller | b)Greater |
| c)Equal | • • • • • • • • • • • • • • • |
| 93). In population inversion process the number of atoms $\frac{1}{2}$ | in metastable state is comparison to the ground state is |
| a)Smaller | b)Greater |
| c)Equal 04) The nonvertion inversion process is due to the existen | an of |
| a) Matastable state | b)Excited stage |
| c)Ground state | d) Underground state |
| 95). In lasing action, the light amplification is due to | d) Onderground state |
| 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 nave same frequency or wavelength | |
| 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 | nhoton and get excited towards higher energy level. This process is |
| known as | proton and get excited to that as inglief energy feven This process is |
| 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 gr | ound state if the atom is triggered due |
| nhoton can trigger excited atom to make transition to gro | n the excited atom and incident |
| a)Spontaneous emission | b)Stimulated emission |
| c)Stimulated Absorption | d) photon collision |
| 103). An atom remains in excited state for very very small tim | ne (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) |
| 10 ³ sec d) ten y | rears |
| 105) The relaxation time for metastable state is | |
| a)ten years (-) 10 ² to 10 ⁴ | b)1 year b) 10^{-6} res to 10^{-3} |
| C) 10 ⁻ TO 10 ⁻ Sec | a) 10° sec to 10° sec |
| a) used for engraving and embassing | b) used for outting and drilling metals |
| a juscu for chemical analysis | d) used for computer printers |
| cy used for enemical analysis | a) used for computer printers |

107). Making population of higher level more than that of ground state is called---a) population hiker b) population inversion d) none of these c)crowd maker 108).A system in which population inversion achieved is called----a) inverse system b) active system d) none of these c)perfect system 109). The process of raising atom from lower energy level(state) to higher energy state (level) is called----a)lifting b)hiking c)gaining d) pumping 110). Which of the following is not a pumping method in LASER---a) optical pumping b) electrical pumping c) chemical pumping d) jet pumping 111).In the case of He-Ne LASER, pumping method used is-----a) optical pumping b) electrical pumping d) chemical pumping c) inelastic atom-atom collision 112). Proper lasing action can be produced using-----a) one energy level laser system b)Two energy level laser system c) three energy level laser system d) none of these 113). The advantages of gas laser are----a) high monochromaticity and stability of frequency b)low monochromaticity and stability of frequency c) high speed of lasers d)low monochromaticity as well as high speed 114).In He-Ne laser, the tube is filled with-----a) 50%He and 50% Ne b)90%He and 10% Ne c) 10%He and 90% Ne d) 60%He and 40% Ne 115). In He-Ne LASER, Metastable states of He and Ne where energy transfer through collision takes place are---a)20.61eV and 20.66eV b) 18.7eV and 20.66eV c)20.66eV and 18.7eV d)18.7eV and 18.82eV 116). In He-Ne LASER lasing atoms are----a) Helium b) Neons c)Hydrogens d)Oxygens 117).Laser gain medium is a medium which can ------ the power of light. a)reduce b) subtract c) amplify d) decrease

118). In X-ray spectrometers, the specimen or the sample is placed after which of the following components?

- a) X-ray tube
- b) Monochromator
- c) Collimator
- d) Detector

Answer: a

Explanation: In X-ray spectrometers, the specimen or the sample is placed after the X-ray tube. The X-ray tube is the source of the X-ray.

119). Which of the following components are used to generate X-rays?

- a) Meyer tube
- b) West tube
- c) Anger tube
- d) Coolidge tube

Answer: d

Explanation: Coolidge tube is used to generate X-rays. It the source of X-rays. Coolidge tube requires stabilised current and high voltage.

120). Using which of the following components is the generated x-rays focussed upon the specimen?

- a) X-ray tube
- b) Monochromator
- c) Collimator

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: - penentration 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 × 1014Hz Option B: - 8.96 × 1014Hz Option C: - 7.96 × 1015Hz Option D: - 8.96 × 1015Hz 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 -9m, then frequency of 1 MeV photon is Option B: - 2.4×1015 Hz Option A: - 1.24 × 1015Hz Option D: - 2.4×1020 Hz Option C: - 1.24 × 1020Hz 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: - abosrption 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 B: - 3867 Å Option A: - 2900 Å

Option C: - 5800 Å Option D: - 7734 Å

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

Option A



Option C



Option D



| 136) Question: - LASER light is coherent | | | | |
|---|---|--|--|--|
| Option A: - All the waves have same frequency | I | | | |
| Option B: - All the waves are exactly in the sa | me phase | | | |
| Option C: - All the waves have same waveleng | th | | | |
| Option D: - All the waves are exactly in the op | posite 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 incr | eases 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 | | | | |
| (1) 10-7 | | | | |
| (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 (a) calcium and magnesium (c) magnesium and potassium | in compound for (b) magnesiur (d) calcium ar | rm are most likely to ca m and sodium nd potassium | use hardness in water? |
|--|--|--|------------------------|
| Temporary hardness of water is caused by (a) chlorides of calcium and magnesium (c) bicarbonates of calcium and magnesiu | the presence of (b) sul um(d) carbonate | phates of calcium and s of sodium and potass | magnesium sium |
| Permanent hardness of water is caused by | y the presence of | f | |
| (a) bicarbonates of calcium and magnesiu | m | (b) carbonates of sod | ium and potassium |
| (c) chlorides and sulphates of calcium and | d magnesium | (d) phosphates of soc | lium and potassium |
| Sedimentation à a physical process used to (a) colloidal particles (b) suspended part | o remove icles | (c) microorganisms | (d) all of these |
| The purest form of naturally occurring wa | ter is | | |
| (a) rain water (b) river water | (c) pond or ta | ke water (d) we | ll water |
| BOD stands for | | | |
| (a) biochemical oxygen demand (b) B | ritish oxygen der | mand | |
| (c) biological oxygen depletion | (d) British oxy | gen depletion | |

| Water which does no (a) mineral water | t produce lather w (b) hard water | ith soap is (c) sof | t water | (d) distilled water | |
|--|--|----------------------------|------------------------------------|----------------------------------|----------------------|
| The liquid wastes from (a) liquid wastes | m kitchens, bathro (b) sullage (c) | oms and wa | ash basins are ı (d) none of th | not called lese | |
| Fresh sewage may be (a) one hour | came stale in (b) two to three h | nours | (c) three to fo | our hours (d) six | hours |
| In ion-exchange proc (a) dilute acid | ess of water softer (b) alkali (c) | ning, exhaus cool | sted cation exch (d) sand | nanger resin is regener | ated by using |
| In ion exchange proce (a) alkali (b) dile | ess of water soften ute acid (c) | ing, exhaus sand | ted anion exch (d) zeo | anger resin is regenera blite | ated by using |
| Permanent hardness (a) carbonate hardne | is also known ss (b |) non carbo | nate hardness | (c) both (a) and (b) | (d) none of these |
| When soft, loose, slir known as (a) resins (b) zeo | ny deposits are for | med inside | the boiler and | do not stick up perma | nently then they are |
| 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 | | | | | |
| (a) formation of nascent oxygen(b) formation of oxygen molecules(c) formation of chlorine gas(d) formation of hydrochloric acid | | | | | |
| In ozonisation is us (a) oxygen gas | ed to sterilize wate (b) ozone gas | er. (c) sol | id ozone | (d) chlorine gas | |
| Who invented the p⊢ (a) SPL Sorenson | l scale? (b) Benjamin Frar | ıklin (c) He | nry Moseley | (d) Wilhelm Roentge | n |
| Acceptable pH range (a) 4-5 (b) 5-6 | for drinking water (c) 7-8.5 | is (d) 8.5 | 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 (a) boiling (b) filt | removing tempora ration (c) decant | ary hardnes ation | s of water is (d) sec | dimentation | |
| Which of the given p (a) soda-lime process | rocess is used to ol (b) permutit proc | btain deion ess (c) ion | ised water? • exchange | (d) boiling | |
| The exhausted zeolite (a) 12% NH₄OH | e can be regenerat (b) 10% N | ed by use o aOH | f (c) 10% NaCl | (d) 10% MgSC | D4. |

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

| (a) NaCl | (b) NaOH | (c) Ca(HCO3 ₎₂ | (d) Na ₂ SO ₄ | | |
|---|---------------------------------------|--|-------------------------------------|--|--|
| Cation exchange resins are capable of exchanging cations by ions. (a) $CO_3^{}$ (b) H ⁺ (c) OH ⁻ (d) NH ₄ ⁺ | | | | | |
| Match the following:A. Zeolite process1. Process of removing suspended particlesB. Filtration2. Process of removing colloidal particlesC. Sedimentation3. Process of removing temporary and permanent hardness.D. Coagulation4. 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 are removed by (a) Na2CO2 (b) Ca(| of softening of | water, carbonates and | d bicarbonates | are removed by sulphates and chlorides | |
| | | | | | |
| The amount of oxyger | n consumed by | the aerobic bacteria | for aerobic bio | logical decomposition of sewage is | |
| (a) chemical Oxygen Demand (COD) (b) biochemical Oxygen Demand (BOD) (c) dissolved Oxygen (d) none of these | | | | | |
| The formation of wet (a) foaming (b) pri | steam in boile ming (c) cau | r is called as stic embrittlement | (d) scale and | sludge formation | |
| The formation of pers (a) foaming (b) prin | istent foam on ming (c) cau | the surface of boiler stic embrittlement | water is called (d) scale and | as sludge formation | |
| | UNI | T-VI-FUELS AND COM | IBUSTION (CH | EMISTRY) | |
| Which substance give | host and light | after combustion? | | | |
| (a) flame (b) fue | l (c) con | nbustion | (d) none of t | hese | |
| CNG and LPG are the (a) solid fuels | examples of (b) liquid fuels | s (c) gaseous f | uels (d) th | ey are not fuels | |
| Ignition temperature (a) lowest temperatu these | is at which fue re | l catch fire. (b) higher temperati | ıre | (c) any temperature (d) none of | |
| Combustion is a (a) chemical process | (b) physical pr | ocess (c) both of th | ese 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 (C ₅ H ₁₂ -C ₇ H ₂₂) is (a) heavy oil (b) petroleum ether (c) kerosene (d) gasoline | | | | | |
| The total amount of h (a) heat content | eat or energy (b) cal | produced by one kg o orific value (c) lat | f fuel is the ent heat | (d) specific heat | |
| Moisture, ash conten | t, volatile matte | er and fixed carbon a | re measured fo | r 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 these | (b) uneven combusti | on of fuel (c) use of tetraethyl lea | ad (d) none of | | |
| LPG is predominantly a mixtu (a) methane (b) butane | ire of propane and (c) Isopropane | (d) ethane | | | |
| Combustion of which of the f (a) light diesel oil (b) LPG | following fuels require 6 (c) natural gas | s the highest amount of excess air? (d) cool | | | |
| Percentage of carbon and hy (a) Kjeldahl's method (b) Bor | drogen present in coal nb calorimeter (c) Cor | can be determined by nbustion tube(d) Otto Hoffman's me | thod | | |
| Essential requirements for pr (a) fuel (b) air | oducing fire are (c) heat | (d) all of these | | | |
| Paraffin wax and Vaseline are (a) petroleum ether (b) hea | e prepared from frac avy oils (c) pito | tion of petroleum. h (d) uncondensed gases | | | |
| The cool which produce max (a) bituminous cool (b) ant | imum heat and minim hracite coal (c) bur | um smoke on its combustion is n easily in air (d) all of these | | | |
| Calorific value of gaseous fue (a) more (b) less | l isthan liquid fuel. (c) equal (d) ligr | iite coal | | | |
| Calorific value is measured in (a) kilo litre (b) kilograms | (c) kilo joule per kg | (d) kilo metre | | | |
| Incomplete combustion gives (a) CO ₂ (b) CO | ; (c) carbon | (d) none of these | | | |
| Which of the following is not (a) charcoal (b) oil gas | a secondary fuel? (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 (a) 40-50 (b) 50-60 | % water before dry (c) 80-90 (d) 25- | ing? 35 | | | |
| Anthracite contains% carb (a) 20-30 (b) 92-98 | on content. (c) 50-60 (d) 60- | 70 | | | |
| Which of the following gas is (a) LPG (b) CNG | widely used as domes (c) PNG | tic fuel? (d) none of these | | | |
| CNG has % methane. (a) 20-30 (b) 30-50 | (c) 50-70 (d) 70 - | 90 | | | |
| Nitrogen in coal is estimated (a) Orsat method (b) Esc | by hka method (c) Kje | Idahl's method (d) oxygen bomb meth | nod | | |

| Combustion reaction (a) exothermic | of fuel is areaction. (b) autocataly | tic (c) end | othermic | (d) none of these |
|--|---|---|--|---|
| Ultimate analysis of ((a) moisture, ash, sul (c) hydrogen, carbor | coal determines itsco phur and volatile matte a, sulphur, nitrogen anc | ontent. er (b) mo l oxygen | isture, volatile matter, (d) ash, nitrogen and | ash and fixed carbon volatile matter |
| The minimum amoun | nt of air which supplies | the required q | uantity of oxygen for o | complete combustion of fuel is |
| (a) deficiency of air | (b) sufficient air | (c) excess air | (d) stoichiometric air | |
| The major constituer (a) methane (b) etl | nt of natural gas is nane (c) propane | (d) butane | | |
| Bomb calorimeter is (a) gaseous fuel is not stage of coal | used to determine calo (b) solid fuel ification. | orific value of (c) liquid fuel | (d) both (b) and (c) | |
| (a) Anthracite | (b) Carbide (c) Bitu | uminous | (d) Lignite | |
| The molecular formu (a) C_2H_5SH | la of TEL is (b) Pb(C₂H₅)₄ | (C) Pb ₂ C ₂ H ₅ | (d) CH₃SH | |
| Gobar gas is produce (a) hydrolysis (b) fe | d by of gobar. mentation (c) deh | nydration | (d) oxidation | |
| Which fuels are used (a) wood (b) Ga | for running automobil soline (c) coal | es? (d) charcoal | | |
| The nominal voltage (a) 24 V | of lead-acid cell is (b) 2 V (c) 1.4 | V (d) 12 | V | |
| The positive and neg (a) PbSO4 and Pb res (c) Pb and PbO2 resp | ative plates of lead acio pectively ectively | d battery are (b) Pb and PbS (d) PbO₂ and I | 604 respectively Pb respectively | |
| In dry cell free electr (a) anode (b) ca | ons are released at thode (c) anode and | cathode both | (d) none of these | |
| In a charged state the (a) nickel hydroxide, (c) nickel hydroxide, | e Ni-Cd battery has i cadmium oxide cadmium | n positive elect (b) cadmium, (d) cad | rode and in the ne nickel mium peroxide, nicke | gative electrode. |
| Which of the followin (a) Lithium-ion batte | ng battery is not rechar ry (b) Lead acid b | geable? pattery (c) Nicl | kel cadmium battery | (d) Dry cell |
| When five 2V cells ar (a) 2V (b) 10 | re corrected in series, tl V (c) 5 V (d) nor | hen output volt ne of these | age is | |
| When six 2V cells are (a) 2V (b) 12 | e connected in parallel, V (c) 1.5 | then output vo V (d) 6 V | ltage is | |
| Dry cell is a modifica (a) Daniel's cell | tion of (b) Leclanche | cell (c) Edis | son cell (d) Lea | ad acid cell |
| In lead acid cell, ene | gy is stored in the form | n of | | |

| (a) chemical e | energy (I | b) electrical energy | (c) electro | ostatic energy | (d) heat energy |
|--|---|---|------------------------------|---|---------------------------------------|
| The electroch (a) primary ce | emical rea ells | actions are not rever (b) secondary | rsible in cas cell (c) | e of both primary a | and secondary cells (d) none of these |
| A device that (a) generator | converts o (b) capao | chemical energy into citor (c) electric ce | electric er ll(d) electro | nergy is called a plyte | S |
| In nickel cadm (a) negative e | ium cell, lectrode | the cadmium is used (b) positive el | d as ectrode (c) | separator (d) | none of these |
| The positive e (a) cadmium In alkaline cel (a) dil. sulphu | lectrode c (b) nicke I, the elec ric acid (l | of Ni-Cd cell is made I hydroxide (c) lea trolyte is b) concentrated sulp | up of d (d phuric acid |) none of these (c) KOH | (d) water |
| Electrolyte us (a) KOH | ed in hydr (b) H ₂ SO | ogen and oxygen fu 4 (c) HNO3 | el cell is (d) HCl | | |
| Which of the t (a) Ni-Cd cell | following (b) electi | converts energy from rolytic cell (c) dyr | n the comb namo (d | oustion of fuel o) fuel cell | directly to the electrical energy? |
| Chemical ener (a) solar | rgy is conv (b) elect | verted to energy by rical (c) potential | a fuel cell (d) mecha | - inical | |
| Electrolyte us (a) NaOH | ed in lead (b) watei | acid cell is r (c) conc. H₂SC | 0 ₄ (d |) dilute H ₂ SO ₄ | |
| In lithium-ion (a) lithium ior (c) none of the | batteries 1s move f i ese | during charging rom cathode to ano | de | (b) lithium | n ions move from anode to cathode |
| 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 | | | | | n ions move from anode to cathode |
| In dry cell the graphite rod isand zinc container acts asrespectively. (a) anode, cathode (b) cathode, anode (c) anode, anode (d) cathode, cathode | | | | | |
| In Li-ion batte (a) anode to c | ry during athode (I | charging process, Li b) cathode to anode | ions migrat e (c) no mig | te from gration | (d) electrolyte to cathode and anode |
| SI unit of spec (a) ohm-m | ific resista (b) ohm/ | ance is /m (c) ohm/m² | (d) ohm ⁻¹ | | |
| The unit of sp (a) ohm ⁻¹ cm | ecific con (b) ohm | ductance is cm (c) ohm⁻¹ cm | ¹ (d) ohm c | m ⁻¹ | |
| SI unit of cond (a) siemens | luctance i (b) poise | s e (c) mho | (d) |) dyne | |
| The conductat (a) 10 ⁻¹ mho | nce of a w (b) 10 ⁻² r | vire having resistanc nho (c) 10 mho | e 10 Ω will (d) none c | be of these | |
| The resistance | e of a cond | ductor is directly pro | portional t | o its | |

(a) $2O^2 \rightarrow O_2 + 4e^-$

(d) none of these

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---(d) cm³ (a) cm (b) cm⁻¹ (c) cm^2 In PEM electrolyser, water is introduced at---(b) cathode (c) electrolyte (d) none of these (a) anode Electrolyte used in solid oxide electrolyser is---(a) NaOH (b) ZrO₂ containing Yttrium or Scandium oxides (c) solid polymer (d) none of these In SOEC, anode reaction is

(b) $2H_2O + 4e^- \rightarrow 2 H_2 + 2O^{--}$ (c) $2H_2O \rightarrow H_2 + O_2$