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## ***BE-01 Basic of Science and Engineering (MCQs)***

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### **❖ UNITS AND MEASUREMENT**

**1. What is the absolute error in a measurement?**

- A) The difference between the measured value and the true value
- B) The ratio of the absolute error to the true value
- C) The ratio of the absolute error to the measured value
- D) The difference between the measured value and the average value

• **Answer: A**

**2. How is relative error calculated?**

- A) Absolute error divided by the measured value
- B) Absolute error divided by the true value
- C) Absolute error multiplied by 100
- D) Absolute error divided by the average value

• **Answer: B**

**3. If the true value of a quantity is 50 units and the measured value is 48 units, what is the absolute error?**

- A) 2 units
- B) 4 units
- C) 2%
- D) 4%

• **Answer: A**

**4. What does a percentage error of 5% indicate?**

- A) The measurement is 5% less than the true value
- B) The measurement is 5% more than the true value
- C) The absolute error is 5% of the true value
- D) The relative error is 5%

• **Answer: C**

5. **Which of the following is true about the propagation of errors?**

- A) Errors always cancel out when combined
- B) Errors add algebraically when quantities are added or subtracted
- C) Errors multiply when quantities are multiplied
- D) Both B and C are correct
- **Answer: D**

6. **If two measurements have absolute errors of 0.1 and 0.2 units respectively, and they are added together, what is the total absolute error?**

- A) 0.3 units
- B) 0.1 units
- C) 0.2 units
- D) 0.05 units
- **Answer: A**

7. **The true value of a length is 100 cm. If a measurement gives 98 cm, what is the relative error?**

- A) 2%
- B) 2 cm
- C) 0.02%
- D) 0.02 cm
- **Answer: A**

8. **Which of the following is a source of error in measurements?**

- A) Instrumental limitations
- B) Environmental factors
- C) Human mistakes
- D) All of the above
- **Answer: D**

9. **If the true value of a quantity is 200 units and the measured value is 198 units, what is the percentage error?**

- A) 1%
- B) 2%
- C) 0.5%
- D) 0.25%

- **Answer: A**

10. In the propagation of errors, when quantities are multiplied, the percentage errors are:

- A) Added
- B) Subtracted
- C) Multiplied
- D) Divided

- **Answer: A**

11. A measurement has an absolute error of 0.5 units and a true value of 10 units. What is the relative error?

- A) 0.05
- B) 0.005
- C) 5%
- D) 0.5%

- **Answer: C**

12. If the measured value of a quantity is 50 units with an absolute error of 2 units, what is the percentage error?

- A) 4%
- B) 2%
- C) 0.4%
- D) 0.2%

- **Answer: A**

13. Which of the following operations does not affect the relative error?

- A) Addition
- B) Subtraction
- C) Multiplication
- D) Division

- **Answer: A**

14. The true value of a quantity is 100 units. If the measured value is 105 units, what is the absolute error?

- A) 5 units
- B) 5%

- C) 0.05 units
- D) 0.05%
- **Answer: A**

15. If the absolute error in a measurement is 0.1 units and the true value is 50 units, what is the relative error?

- A) 0.002
- B) 0.02
- C) 0.2
- D) 2
- **Answer: B**

16. A measurement has a relative error of 0.01. What is the percentage error?

- A) 0.1%
- B) 1%
- C) 10%
- D) 0.01%
- **Answer: B**

☐ Which of the following is a base quantity in the SI system?

- A) Velocity
- B) Force
- C) Mass
- D) Energy
- **Answer: C**

☐ What is the SI unit of electric current?

- A) Ampere
- B) Volt
- C) Coulomb
- D) Ohm
- **Answer: A**

☐ Which of the following is a derived quantity?

- A) Length
- B) Time

- C) Speed
- D) Temperature
- **Answer: C**

☐ **The unit of force in the SI system is:**

- A) Newton
- B) Joule
- C) Watt
- D) Pascal
- **Answer: A**

☐ **Which of the following is the correct SI unit for pressure?**

- A) Newton per square meter
- B) Joule per cubic meter
- C) Watt per square meter
- D) Ampere per meter
- **Answer: A**

☐ **If a quantity has the dimensions of  $[M L^2 T^{-2}]$ , which of the following is it?**

- A) Force
- B) Energy
- C) Power
- D) Pressure
- **Answer: B**

☐ **What is the SI unit of energy?**

- A) Newton
- B) Joule
- C) Watt
- D) Pascal
- **Answer: B**

☐ **Which of the following is a base quantity?**

- A) Velocity
- B) Acceleration
- C) Mass

- D) Force
- **Answer: C**

❓ **The unit of luminous intensity in the SI system is:**

- A) Candela
- B) Lux
- C) Lumen
- D) Watt
- **Answer: A**

❓ **Which of the following is a derived unit?**

- A) Meter
- B) Kilogram
- C) Second
- D) Hertz
- **Answer: D**

❓ **If a physical quantity has the dimensions  $[M L T^{-2}]$ , it represents:**

- A) Force
- B) Energy
- C) Power
- D) Pressure
- **Answer: A**

❓ **The SI unit of temperature is:**

- A) Celsius
- B) Kelvin
- C) Fahrenheit
- D) Rankine
- **Answer: B**

❓ **Which of the following is the correct SI unit for mass?**

- A) Gram
- B) Kilogram
- C) Pound
- D) Ounce

- **Answer: B**

❑ **The unit of acceleration in the SI system is:**

- A) m/s
- B)  $\text{m/s}^2$
- C)  $\text{m}^2/\text{s}$
- D)  $\text{m}^2/\text{s}^2$

- **Answer: B**

❑ **Which of the following is a derived unit?**

- A) Meter
- B) Second
- C) Newton
- D) Ampere

- **Answer: C**

❑ **If a physical quantity has the dimensions  $[\text{M L}^2 \text{T}^{-3}]$ , it represents:**

- A) Energy
- B) Power
- C) Force
- D) Pressure

- **Answer: B**

• **What is the equivalent of 1 meter (m) in centimeters (cm)?**

- A) 10 cm
- B) 100 cm
- C) 1000 cm
- D) 10000 cm

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- **Answer: B**

1. **Which of the following is an example of a systematic error?**

- a) Fluctuation in temperature affecting a measurement
- b) Misreading the instrument scale
- c) Personal error due to incorrect observation
- d) A zero error in a measuring instrument
  - **Answer: d) A zero error in a measuring instrument**

2. **Which type of error occurs due to unpredictable variations in measurements?**

- a) Systematic Error
- b) Gross Error

- c) Random Error
  - d) Instrumental Error
    - **Answer:** c) Random Error
3. **What is the absolute error in a measurement?**
- a) The ratio of the measured value to the true value
  - b) The difference between the measured and true values
  - c) The sum of all measurement errors
  - d) The percentage of systematic errors in measurement
    - **Answer:** b) The difference between the measured and true values
4. **Which error can be minimized by taking repeated measurements?**
- a) Systematic Error
  - b) Random Error
  - c) Gross Error
  - d) Instrumental Error
    - **Answer:** b) Random Error
5. **What is the formula for percentage error?**
- a) Absolute Error/True Value
  - b) Measured Value/Absolute Error
  - c) (Absolute Error/True Value)  $\times 100\%$
  - d) (True Value/Absolute Error)  $\times 100\%$ 
    - **Answer:** c) (Absolute Error/True Value)  $\times 100\%$
6. **Which of the following best describes propagation of errors?**
- a) Errors accumulate as calculations proceed
  - b) Errors cancel out automatically
  - c) Errors only occur in direct measurements
  - d) Errors are always negligible
    - **Answer:** a) Errors accumulate as calculations proceed
7. A measurement of length is recorded as  $5.12 \pm 0.02$  cm. What is the absolute error?
- a) 5.12 cm
  - b) 0.02 cm
  - c) 0.004 cm
  - d) 2.0 cm
    - **Answer:** b) 0.02 cm
8. A student measures the mass of an object as 20.5 g with a true mass of 20.7 g. Find the percentage error.
- a) 0.2%
  - b) 1%
  - c) 2%
  - d) 3%
    - **Answer:** b) 1%
9. If two quantities A and B have relative errors of 2% and 3% respectively, what is the relative error in  $Z = A \times B$ ?
- a) 5%
  - b) 6%
  - c) 1%
  - d) 3%
    - **Answer:** b) 6%
10. A student measures a time interval as 4.56 s with an absolute error of 0.02 s. What is the relative error?



- a) 0.4%
  - b) 2%
  - c) 1%
  - d) 0.44%
    - **Answer:** d) 0.44%
11. The temperature measured is  $37.5^{\circ}\text{C}$  with an error of  $0.5^{\circ}\text{C}$ . Find the percentage error.
- a) 1.33%
  - b) 5%
  - c) 10%
  - d) 0.5%
    - **Answer:** a) 1.33%
12. If a measured value of resistance is  $5.0 \pm 0.1 \Omega$ , what is the percentage error?
- a) 0.2%
  - b) 2%
  - c) 5%
  - d) 10%
    - **Answer:** b) 2%
13. What is the propagated error in  $V=IR$  if errors in  $I$  and  $R$  are 3% and 4%, respectively?
- a) 1%
  - b) 3%
  - c) 7%
  - d) 12%
    - **Answer:** c) 7%
- **1 kilogram (kg) is equal to how many grams (g)?**
    - A) 100 grams
    - B) 1000 grams
    - C) 10000 grams
    - D) 100000 grams
    - **Answer:** B
  - **What is the SI unit for pressure?**
    - A) Pascal (Pa)
    - B) Dyne (dyn)
    - C) Newton (N)
    - D) Erg (erg)
    - **Answer:** A
  - **Convert 500 grams (g) to kilograms (kg).**
    - A) 0.05 kg
    - B) 0.5 kg
    - C) 5 kg
    - D) 50 kg
    - **Answer:** B
  - **How many dynes are in 1 newton (N)?**
    - A) 10 dynes
    - B) 100 dynes
    - C)  $10^5$  dynes
    - D)  $10^6$  dynes
    - **Answer:** C
  - **If you have 10 meters (m), how many centimeters (cm) is this equivalent to?**

- A) 100 cm
  - B) 1000 cm
  - C) 10000 cm
  - D) 100000 cm
  - **Answer: B**
- **1 joule (J) is equivalent to how many ergs (erg)?**
  - A)  $10^2$  erg
  - B)  $10^4$  erg
  - C)  $10^6$  erg
  - D)  $10^7$  erg
  - **Answer: D**
- **Convert 1500 centimeters (cm) to meters (m).**
  - A) 1.5 m
  - B) 15 m
  - C) 0.15 m
  - D) 150 m
  - **Answer: A**
- **Which of the following is true about the relationship between MKS and CGS systems?**
  - A) MKS system uses meters, kilograms, and seconds as base units
  - B) CGS system uses centimeters, grams, and seconds as base units
  - C) The units in both systems are completely unrelated
  - D) Both A and B are true
  - **Answer: D**
- **1 watt (W) is equivalent to how many ergs per second (erg/s)?**
  - A)  $10^3$  erg/s
  - B)  $10^4$  erg/s
  - C)  $10^5$  erg/s
  - D)  $10^7$  erg/s
  - **Answer: D**
- **Convert 3 kilograms (kg) to grams (g).**
  - A) 30 g
  - B) 300 g
  - C) 3000 g
  - D) 30000 g
  - **Answer: C**
- **Convert 5000 dyne (dyn) to newtons (N).**
  - A) 0.05 N
  - B) 0.5 N
  - C) 5 N
  - D) 50 N
  - **Answer: A**
- **Which of the following is the correct conversion for 1000 joules (J) to ergs (erg)?**
  - A)  $10^4$  erg
  - B)  $10^5$  erg
  - C)  $10^6$  erg
  - D)  $10^7$  erg
  - **Answer: D**
- **Convert 5 pascals (Pa) to dyne per square centimeter (dyne/cm<sup>2</sup>).**
  - A) 5 dyne/cm<sup>2</sup>

- B) 50 dyne/cm<sup>2</sup>
  - C) 500 dyne/cm<sup>2</sup>
  - D) 5000 dyne/cm<sup>2</sup>
  - **Answer: B**
- **Convert 0.1 meters (m) to centimeters (cm).**
  - A) 0.01 cm
  - B) 1 cm
  - C) 10 cm
  - D) 100 cm
  - **Answer: C**
- **What is the equivalent of 2 newtons (N) in dynes (dyn)?**
  - A)  $2 \times 10^3$  dynes
  - B)  $2 \times 10^5$  dynes
  - C)  $2 \times 10^6$  dynes
  - D)  $2 \times 10^7$  dynes
  - **Answer: B**
- • The Vernier caliper is mainly used for measuring:
  - a) Mass
  - b) Small angles
  - c) Small lengths with high precision
  - d) Electrical resistance
  - Answer: c) Small lengths with high precision**
- • What is the typical least count of a standard Vernier caliper?
  - a) 1 mm
  - b) 0.01 mm
  - c) 0.1 mm
  - d) 0.5 mm
  - Answer: c) 0.1 mm**
- • What is the primary function of the ratchet stop in a micrometer screw gauge?
  - a) To lock the spindle
  - b) To prevent excessive force on the object
  - c) To reset the scale
  - d) To change the pitch of the screw
  - Answer: b) To prevent excessive force on the object**
- • The pitch of a screw in a micrometer gauge is 0.5 mm. What does this mean?
  - a) The screw moves 0.5 mm per one full rotation
  - b) The screw can measure up to 0.5 mm
  - c) The least count of the micrometer is 0.5 mm
  - d) The screw moves 5 mm per rotation
  - Answer: a) The screw moves 0.5 mm per one full rotation**
- • How many divisions are typically present on the thimble of a standard micrometer screw gauge?
  - a) 10
  - b) 20
  - c) 50
  - d) 100
  - Answer: c) 50**
- • Why is the Vernier scale used in Vernier calipers?
  - a) To increase range
  - b) To measure depth

c) To increase measurement accuracy

d) To replace the main scale

**Answer:** c) To increase measurement accuracy

- • If a Vernier caliper has 10 divisions on its Vernier scale that match with 9 divisions of the main scale (1 mm each), what is its least count?

a) 0.1 mm

b) 0.01 mm

c) 0.05 mm

d) 1 mm

**Answer:** a) 0.1 mm

- • If the sleeve of a micrometer gauge shows 5 mm and the thimble shows 20 divisions, what is the final reading? (Least count = 0.01 mm)

a) 5.02 mm

b) 5.20 mm

c) 7.02 mm

d) 5.40 mm

**Answer:** b) 5.20 mm

- • A Vernier caliper has a main scale reading of 20 mm. The 5th division of the Vernier scale coincides with the main scale. The least count is 0.1 mm. What is the final reading?

a) 20.5 mm

b) 25.5 mm

c) 20.05 mm

d) 20.1 mm

**Answer:** a) 20.5 mm

- • A micrometer screw gauge gives a main scale reading of 10 mm, and the thimble shows 35 divisions. The least count is 0.01 mm. What is the final measurement?

a) 10.35 mm

b) 13.50 mm

c) 10.53 mm

d) 10.03 mm

**Answer:** a) 10.35 mm

- • A student measures an object with a Vernier caliper and records a main scale reading of 15 mm and a Vernier scale reading of 6. If the least count is 0.1 mm, what is the final measurement?

a) 15.6 mm

b) 16.5 mm

c) 15.06 mm

d) 15.16 mm

**Answer:** a) 15.6 mm

- • A micrometer screw gauge gives a main scale reading of 5 mm and a thimble reading of 25. The least count is 0.01 mm. What is the final measurement?

a) 5.25 mm

b) 5.50 mm

c) 5.75 mm

d) 6.25 mm

**Answer:** a) 5.25 mm

## ❖ CLASSICAL MECHANICS

1. What is the SI unit of force?

- a) Joule
- b) Newton
- c) Pascal
- d) Watt

**Answer:** b) Newton

2. A ball is thrown straight up with an initial velocity of 20 m/s. What will be its velocity at the highest point?

- a) 10 m/s
- b) 20 m/s
- c) 0 m/s
- d) 9.8 m/s

**Answer:** c) 0 m/s

3. According to Newton's First Law, what will happen to an object moving in space with no external forces?

- a) It will gradually slow down and stop
- b) It will continue moving at constant velocity
- c) It will change direction randomly
- d) It will move in a circle

**Answer:** b) It will continue moving at constant velocity

4. Which of the following is an example of Newton's Third Law?

- a) A car speeding up
- b) A rocket launching into space
- c) A rolling ball coming to a stop
- d) A car moving on a curved road

**Answer:** b) A rocket launching into space

5. If a force of 10 N is applied to a 2 kg object, what will be its acceleration?

- a)  $5 \text{ m/s}^2$
- b)  $20 \text{ m/s}^2$
- c)  $2 \text{ m/s}^2$
- d)  $10 \text{ m/s}^2$

**Answer:** a)  $5 \text{ m/s}^2$

6. If two objects have the same momentum but different masses, which one moves faster?

- a) The heavier object
- b) The lighter object
- c) Both move at the same speed
- d) It depends on gravity

**Answer:** b) The lighter object

7. Which of the following best describes impulse?

- a) The change in force over time

- b) The product of mass and velocity
- c) The product of force and time
- d) The time it takes for an object to stop

**Answer:** c) The product of force and time

8. A gun recoils when fired. This is an example of which law?

- a) First Law
- b) Second Law
- c) Third Law
- d) Conservation of Energy

**Answer:** c) Third Law

9. A car starts from rest and accelerates at  $5 \text{ m/s}^2$  for 4 seconds. What is its final velocity?

- a) 20 m/s
- b) 10 m/s
- c) 15 m/s
- d) 25 m/s

**Answer:** b) 20 m/s

10. A 5 kg object is moving at 10 m/s. What is its momentum?

- a) 50 kg·m/s
- b) 5 kg·m/s
- c) 10 kg·m/s
- d) 100 kg·m/s

**Answer:** a) 50 kg·m/s

11. A football player kicks a ball with a force of 200 N for 0.1 seconds. What is the impulse?

- a) 2 Ns
- b) 20 Ns
- c) 2000 Ns
- d) 0.02 Ns

**Answer:** b) 20 Ns

12. A ball is dropped from a height of 10 m. What will be its velocity just before hitting the ground? (Take  $g=9.8 \text{ m/s}^2$   $g = 9.8 \text{ m/s}^2$   $g=9.8 \text{ m/s}^2$ )

- a) 10 m/s
- b) 14 m/s
- c) 20 m/s
- d) 30 m/s

**Answer:** b) 14 m/s

13. • What is the unit of angular velocity?

- a) m/s
- b) rad/s
- c)  $\text{rad/s}^2$
- d)  $\text{m/s}^2$

**Answer:** b) rad/s

14. • The angular velocity of a wheel increases from 2 rad/s to 10 rad/s in 4 seconds. What is its angular acceleration?

- a)  $2 \text{ rad/s}^2$
- b)  $4 \text{ rad/s}^2$

c)  $1.5 \text{ rad/s}^2$

d)  $8 \text{ rad/s}^2$

**Answer:** a)  $2 \text{ rad/s}^2$

15. • A particle moves in a circle of radius  $r$  with constant speed  $v$ . The acceleration of the particle is:

a) 0

b)  $v^2/r$  directed radially inward

c)  $v/r$  directed radially outward

d)  $v^2/r$  directed tangentially

**Answer:** b)  $v^2/r$  directed radially inward

16. • The force responsible for keeping a car moving in a curved path on a road is:

a) Gravitational force

b) Normal force

c) Centripetal force

d) Frictional force

**Answer:** c) Centripetal force

17. • If a particle moves in a circle with uniform speed, then:

a) Velocity remains constant

b) Acceleration is zero

c) The direction of velocity changes continuously

d) Angular velocity keeps increasing

**Answer:** c) The direction of velocity changes continuously

18. • If an object moves in a circle, which force provides the required acceleration?

a) Centripetal force

b) Centrifugal force

c) Normal force

d) Friction

**Answer:** a) Centripetal force

19. • Which of the following is a fictitious force?

a) Friction

b) Gravity

c) Centrifugal force

d) Magnetic force

**Answer:** c) Centrifugal force

20. • The relation between frequency and time period is:

a)  $f=1/T$

b)  $f=T$

c)  $f=T^2$

d)  $f=2/T$

**Answer:** a)  $f=1/T$

21. • What is the SI unit of angular acceleration?

a)  $\text{rad/s}$

b)  $\text{rad/s}^2$

c)  $\text{m/s}^2$

d)  $\text{m/s}$

**Answer:** b)  $\text{rad/s}^2$

22. • If the radius of a circular path is doubled, what happens to the centripetal force?

a) Increases four times

b) Remains same

c) Becomes half

d) Becomes one-fourth

**Answer:** c) Becomes half

23. • In uniform circular motion, the net force is:

a) Zero

b) Tangential

c) Radially outward

d) Radially inward

**Answer:** d) Radially inward

24. • What happens to angular velocity if the moment of inertia increases?

a) Increases

b) Decreases

c) Remains constant

d) Becomes zero

**Answer:** b) Decreases

25. • When a car turns a corner, which force prevents it from skidding?

a) Gravitational force

b) Centrifugal force

c) Frictional force

d) Normal force

**Answer:** c) Frictional force

26. • A rotating body with increasing angular velocity has:

a) Zero angular acceleration

b) Positive angular acceleration

c) Negative angular acceleration

d) Constant angular displacement

**Answer:** b) Positive angular acceleration

27. • Work is done when:

a) A force is applied but no displacement occurs

b) A displacement occurs but no force is applied

c) Force and displacement are perpendicular

d) A force is applied and displacement occurs in the direction of the force

**Answer:** d) A force is applied and displacement occurs in the direction of the force

28. • The SI unit of work is:

a) Joule

b) Newton

c) Watt

d) Pascal

**Answer:** a) Joule

29. • A force of 10 N moves an object by 5 m in the direction of the force. What is the work done?

a) 10 J

b) 20 J

c) 50 J

d) 100 J

**Answer:** c) 50 J

30. • The kinetic energy of an object depends on:

a) Mass only

b) Velocity only

c) Both mass and velocity



d) Neither mass nor velocity

**Answer:** c) Both mass and velocity

31. • If the speed of an object doubles, its kinetic energy:

a) Doubles

b) Triples

c) Becomes four times

d) Remains the same

**Answer:** c) Becomes four times

32. • Which of the following has potential energy?

a) A moving car

b) A stretched rubber band

c) A rolling ball

d) A falling stone

**Answer:** b) A stretched rubber band

33. • Power is the rate of:

a) Work done

b) Energy stored

c) Force applied

d) Distance covered

**Answer:** a) Work done

34. • A weightlifter lifts a 50 kg mass to a height of 2 meters. What is the work done?

(Take  $g=9.8 \text{ m/s}^2$ )

a) 100 J

b) 200 J

c) 980 J

d) 500 J

**Answer:** c) 980 J

35. • Which unit is NOT a unit of power?

a) Watt

b) Joule per second

c) Horsepower

d) Newton

**Answer:** d) Newton

36. • The potential energy of an object at a height  $h$  is directly proportional to:

a) Mass and height

b) Mass and velocity

c) Velocity and height

d) None of the above

**Answer:** a) Mass and height

37. • A machine with higher power rating:

a) Works slower

b) Works faster

c) Consumes less energy

d) Does not follow physics laws

**Answer:** b) Works faster

38. • If the angle between force and displacement is  $90^\circ$ , work done is:

a) Maximum

b) Minimum

c) Zero

d) Negative

**Answer:** c) Zero

39. • The energy stored in a stretched spring is:

a) Kinetic energy

b) Gravitational potential energy

c) Elastic potential energy

d) Chemical energy

**Answer:** c) Elastic potential energy

40. • 1 Horsepower is equal to:

a) 500 W

b) 746 W

c) 1000 W

d) 1500 W

**Answer:** b) 746 W

## ❖ ELECTRIC CURRENT

❑ Ohm's Law states that:

a)  $V=IR$   $V=IR$   $V=IR$

b)  $P=IV$   $P=IV$   $P=IV$

c)  $F=ma$   $F=ma$   $F=ma$

d)  $W=mg$   $W=mg$   $W=mg$

**Answer:** a)  $V=IR$   $V=IR$   $V=IR$

❑ The SI unit of resistance is:

a) Ampere

b) Volt

c) Ohm

d) Watt

**Answer:** c) Ohm

❑ If voltage is doubled and resistance remains constant, what happens to the current?

a) Remains the same

b) Doubles

c) Halves

d) Increases four times

**Answer:** b) Doubles

❑ If resistance is doubled while keeping voltage constant, what happens to the current?

a) Remains the same

b) Doubles

c) Halves

d) Increases four times

**Answer:** c) Halves

❑ What is the SI unit of current?

a) Ohm

- b) Ampere
- c) Volt
- d) Watt

**Answer:** b) Ampere

☐ A material that obeys Ohm's Law is called:

- a) Non-ohmic
- b) Ohmic
- c) Semiconductor
- d) Superconductor

**Answer:** b) Ohmic

☐ Which graph best represents Ohm's Law?

- a) Parabola
- b) Straight line through origin
- c) Hyperbola
- d) Circle

**Answer:** b) Straight line through origin

☐ Which of the following obeys Ohm's Law?

- a) Filament bulb
- b) Diode
- c) Copper wire
- d) Transistor

**Answer:** c) Copper wire

☐ A 12 V battery is connected to a 6  $\Omega$  resistor. What is the current?

- a) 1 A
- b) 2 A
- c) 6 A
- d) 12 A

**Answer:** b) 2 A

☐ A circuit contains a 10  $\Omega$  resistor and a 2 A current. What is the voltage?

- a) 5 V
- b) 10 V
- c) 20 V
- d) 200 V

**Answer:** c) 20 V

☐ The power consumed in an electrical circuit is given by:

- a)  $P=VI$
- b)  $P=IR$
- c)  $P=VR$
- d)  $P=I^2V$

**Answer:** a)  $P=VI$

☐ If the resistance of a wire is 4  $\Omega$  and the current flowing through it is 3 A, the power dissipated is:

- a) 9 W
- b) 12 W

- c) 36 W
  - d) 48 W
- Answer:** c) 36 W

☐ The heating effect of current is used in:

- a) Electric bulbs
- b) Electric heaters
- c) Geysers
- d) All of the above

**Answer:** d) All of the above

☐ If a wire's length is doubled, its resistance:

- a) Remains the same
- b) Doubles
- c) Halves
- d) Increases four times

**Answer:** b) Doubles

☐ The SI unit of charge is:

- a) Ampere
- b) Volt
- c) Coulomb
- d) Newton

**Answer:** c) Coulomb

☐ The charge of one electron is:

- a)  $9.1 \times 10^{-31}$  C
- b)  $1.6 \times 10^{-19}$  C
- c)  $6.63 \times 10^{-34}$  C
- d)  $3.0 \times 10^8$  C

**Answer:** b)  $1.6 \times 10^{-19}$  C

☐ According to Coulomb's Law, the force between two charges is:

- a) Inversely proportional to the square of the distance between them
- b) Directly proportional to the square of the distance
- c) Independent of distance
- d) Inversely proportional to distance

**Answer:** a) Inversely proportional to the square of the distance between them

☐ If the distance between two charges is halved, the force between them:

- a) Becomes one-fourth
- b) Becomes one-half
- c) Doubles
- d) Increases four times

**Answer:** d) Increases four times

☐ The value of Coulomb's constant k is:

- a)  $9 \times 10^9 \text{ N} \cdot \text{m}^2 / \text{C}^2$
- b)  $8.99 \times 10^9 \text{ N} \cdot \text{m}^2 / \text{C}^2$
- c)  $1.6 \times 10^{-19} \text{ N} \cdot \text{m}^2 / \text{C}^2$

d)  $6.63 \times 10^{-34} \text{ N} \cdot \text{m}^2 / \text{C}^2$

**Answer:** a)  $9 \times 10^9 \text{ N} \cdot \text{m}^2 / \text{C}^2$

☐ What happens when two like charges are placed close together?

a) They attract

b) They repel

c) They combine

d) They do nothing

**Answer:** b) They repel

☐ If two charges of  $+2\text{C}$  and  $-3\text{C}$  are placed close to each other, the force is:

a) Attractive

b) Repulsive

c) Zero

d) None of the above

**Answer:** a) Attractive

☐ Two charges of  $1 \text{ C}$  each are placed  $1 \text{ m}$  apart. What is the force between them?

a)  $9 \times 10^9 \text{ N}$

b)  $9 \times 10^8 \text{ N}$

c)  $9 \times 10^6 \text{ N}$

d)  $9 \times 10^3 \text{ N}$

**Answer:** a)  $9 \times 10^9 \text{ N}$

☐ If a body loses electrons, it becomes:

a) Positively charged

b) Negatively charged

c) Neutral

d) Unaffected

**Answer:** a) Positively charged

☐ The force between two charges increases when:

a) The distance between them increases

b) The distance between them decreases

c) One charge is removed

d) The charges are neutralized

**Answer:** b) The distance between them decreases

☐ Which of the following does NOT affect the electrostatic force between two charges?

a) Magnitude of charges

b) Distance between charges

c) Medium between charges

d) Shape of the charges

**Answer:** d) Shape of the charges

☐ What happens when a charged rod is brought close to a neutral conducting sphere?

a) The sphere gets charged by induction

b) The sphere gets charged by conduction

c) The sphere remains neutral

d) The sphere moves away

**Answer:** a) The sphere gets charged by induction

☐ If the charge of both objects is doubled while keeping the distance the same, the force:

- a) Becomes half
- b) Remains the same
- c) Doubles
- d) Increases four times

**Answer:** d) Increases four times

☐ The charge on an electron is:

- a) Positive
- b) Negative
- c) Neutral
- d) Varies with conditions

**Answer:** b) Negative

☐ The SI unit of electric field is:

- a) Volt
- b) Volt/meter
- c) Newton/Coulomb
- d) Both b and c

**Answer:** d) Both b and c

☐ The direction of the electric field is:

- a) Always toward a positive charge
- b) Away from a negative charge
- c) Away from a positive charge and toward a negative charge
- d) Circular around the charge

**Answer:** c) Away from a positive charge and toward a negative charge

☐ The electric field due to a point charge varies with distance as:

- a)  $1/r$
- b)  $1/r^2$
- c)  $1/r^3$
- d) Constant

**Answer:** b)  $1/r^2$

☐ The SI unit of electric potential is:

- a) Coulomb
- b) Ampere
- c) Volt
- d) Ohm

**Answer:** c) Volt

☐ If work done in moving a charge is zero, then the two points are at:

- a) The same potential
- b) Different potentials
- c) Infinite potential
- d) Zero potential

**Answer:** a) The same potential

☐ Electric potential is a:

- a) Scalar quantity

- b) Vector quantity
- c) Depends on charge
- d) None of the above

**Answer:** a) Scalar quantity

☐ If the electric flux through a closed surface is zero, then:

- a) No charge is enclosed
- b) The field is uniform
- c) Charge is outside the surface
- d) Both a and c

**Answer:** d) Both a and c

☐ The SI unit of electric flux is:

- a)  $\text{N}\cdot\text{m}^2/\text{C}$
- b) Volt/m
- c) Newton/Coulomb
- d) None of these

**Answer:** a)  $\text{N}\cdot\text{m}^2/\text{C}$

☐ The electric current is a:

- a) Scalar quantity
- b) Vector quantity
- c) Can be both
- d) None of the above

**Answer:** a) Scalar quantity

☐ If charge flows for a longer time, the current:

- a) Increases
- b) Decreases
- c) Remains the same
- d) Becomes zero

**Answer:** c) Remains the same

☐ The SI unit of electric charge is:

- a) Coulomb
- b) Ampere
- c) Volt
- d) Newton

**Answer:** a) Coulomb

☐ Which of the following quantities is NOT required to calculate electric current?

- a) Charge
- b) Time
- c) Resistance
- d) None of these

**Answer:** c) Resistance

☐ The charge of an electron is:

- a)  $+1.6\times 10^{-19}\text{ C}$
- b)  $-1.6\times 10^{-19}\text{ C}$
- c)  $+9.1\times 10^{-31}\text{ C}$

d)  $-9.1 \times 10^{-31} \text{ C}$

**Answer:** b)  $-1.6 \times 10^{-19} \text{ C}$

☐ The net electric flux through a closed surface enclosing a net charge is given by:

a) Gauss's Law

b) Coulomb's Law

c) Ohm's Law

d) Kirchhoff's Law

**Answer:** a) Gauss's Law

☐ A charge of 2C is placed in an electric field of  $5 \times 10^3 \text{ N/C}$ . Find the force on the charge.

**Answer:**  $F = 10^4 \text{ N}$

☐ A charge of 3C is moved from a point at 10V to another at 20V. Find the work done.

**Answer:**  $W = 30 \text{ J}$

1. The SI unit of resistance is:

a) Volt

b) Ampere

c) Ohm

d) Siemens

**Answer:** c) Ohm

2. The SI unit of conductance is:

a) Ohm

b) Volt

c) Siemens

d) Coulomb

**Answer:** c) Siemens

3. If the length of a wire is doubled, its resistance:

a) Doubles

b) Halves

c) Remains the same

d) Becomes one-fourth

**Answer:** a) Doubles

4. If the cross-sectional area of a wire is doubled, its resistance:

a) Doubles

b) Halves

c) Remains the same

d) Becomes four times

**Answer:** b) Halves

5. The resistivity of a material depends on:

a) Length of the conductor

b) Cross-sectional area

c) Nature of the material

d) Both a and b

**Answer:** c) Nature of the material



6. Which material has the lowest resistivity?

- a) Silver
- b) Copper
- c) Iron
- d) Aluminum

**Answer:** a) Silver

7. The reciprocal of resistivity is:

- a) Conductance
- b) Conductivity
- c) Resistance
- d) Voltage

**Answer:** b) Conductivity

8. Which of the following is a good conductor?

- a) Rubber
- b) Glass
- c) Copper
- d) Wood

**Answer:** c) Copper

9. When resistors are connected in series, the total resistance is:

- a) Less than the smallest resistor
- b) Equal to the smallest resistor
- c) Sum of all resistances
- d) Product of all resistances

**Answer:** c) Sum of all resistances

10. When resistors are connected in parallel, the total resistance is:

- a) Less than the smallest resistor
- b) Equal to the smallest resistor
- c) Sum of all resistances
- d) Product of all resistances

**Answer:** a) Less than the smallest resistor

11. The unit of resistivity is:

- a) Ohm-meter
- b) Ohm/cm
- c) Siemens
- d) Volt/Ampere

**Answer:** a) Ohm-meter

12. If the temperature of a metallic conductor increases, its resistance:

- a) Increases
- b) Decreases
- c) Remains constant
- d) Becomes zero

**Answer:** a) Increases

13. The SI unit of electrical conductivity is:

- a) Ohm-meter

- b) Siemens per meter
- c) Coulomb
- d) Ampere

**Answer:** b) Siemens per meter

14. The resistance of an ideal conductor is:

- a) Infinite
- b) Zero
- c) Very high
- d) Very low but not zero

**Answer:** b) Zero

15. A wire has a resistance of  $5\Omega$ . If its length is doubled and its area is halved, what is the new resistance?

- a)  $5\Omega$
- b)  $10\Omega$
- c)  $20\Omega$
- d)  $40\Omega$

**Answer:** d)  $40\Omega$

16. Three resistors of  $6\Omega$ ,  $3\Omega$ , and  $2\Omega$  are connected in parallel. Find the total resistance.

- a)  $1\Omega$
- b)  $2\Omega$
- c)  $3\Omega$
- d)  $4\Omega$

**Answer:** a)  $1\Omega$

1. The SI unit of capacitance is:

- a) Coulomb
- b) Farad
- c) Henry
- d) Ohm

**Answer:** b) Farad

2. The capacitance of a capacitor depends on:

- a) Charge stored
- b) Voltage applied
- c) Geometry and material of the capacitor
- d) Resistance of the circuit

**Answer:** c) Geometry and material of the capacitor

3. The capacitance of a parallel plate capacitor is directly proportional to:

- a) Distance between the plates
- b) Plate area
- c) Charge stored
- d) Voltage applied

**Answer:** b) Plate area

4. If the separation between capacitor plates is increased, the capacitance:

- a) Increases
- b) Decreases

- c) Remains the same
- d) First increases, then decreases

**Answer:** b) Decreases

5. The presence of a dielectric in a capacitor:

- a) Increases capacitance
- b) Decreases capacitance
- c) Does not affect capacitance
- d) Reduces charge stored

**Answer:** a) Increases capacitance

6. The capacitance of a parallel plate capacitor is given by:

- a)  $C=Q/V$
- b)  $C=\epsilon_0\epsilon_r A/d$
- c)  $C=V/Q$
- d)  $C=d/A$

**Answer:** b)  $C=\epsilon_0\epsilon_r A/d$

7. The unit of permittivity ( $\epsilon_0\backslash\text{varepsilonpsilon}$ ) is:

- a) F/m
- b)  $C/m^2$
- c) V/m
- d) A/m

**Answer:** a) F/m

8. Which of the following statements is true for a parallel combination of capacitors?

- a) The total capacitance is less than the smallest capacitance.
- b) The total capacitance is the sum of all capacitances.
- c) The total charge is the same for all capacitors.
- d) The total voltage is different across each capacitor.

**Answer:** b) The total capacitance is the sum of all capacitances.

9. In a series combination of capacitors, the total capacitance is:

- a) Equal to the smallest capacitance
- b) Less than the smallest capacitance
- c) Equal to the largest capacitance
- d) More than the largest capacitance

**Answer:** b) Less than the smallest capacitance

10. The charge stored in capacitors connected in series is:

- a) The same for each capacitor
- b) Different for each capacitor
- c) Maximum for the smallest capacitor
- d) Minimum for the largest capacitor

**Answer:** a) The same for each capacitor

11. The dielectric constant of vacuum is:

- a) 1
- b) 8.85
- c) Zero

d) Infinity

**Answer:** a) 1

12. A capacitor stores energy in the form of:

- a) Magnetic field
- b) Electric field
- c) Mechanical energy
- d) Chemical energy

**Answer:** b) Electric field

13. If the voltage across a capacitor is doubled, the charge stored will:

- a) Remain the same
- b) Double
- c) Half
- d) Become four times

**Answer:** b) Double

14. What is the function of a capacitor in an AC circuit?

- a) To store charge
- b) To store energy
- c) To block DC and allow AC
- d) All of the above

**Answer:** d) All of the above

15. Three capacitors of  $6\mu\text{F}$ ,  $3\mu\text{F}$ , and  $2\mu\text{F}$  are connected in series. What is the total capacitance?

- a)  $1\mu\text{F}$
- b)  $2\mu\text{F}$
- c)  $3\mu\text{F}$
- d)  $4\mu\text{F}$

**Answer:** a)  $1\mu\text{F}$

16. Two capacitors of  $5\mu\text{F}$  and  $10\mu\text{F}$  are connected in parallel. What is their total capacitance?

- a)  $3.33\mu\text{F}$
- b)  $15\mu\text{F}$
- c)  $5\mu\text{F}$
- d)  $10\mu\text{F}$

**Answer:** b)  $15\mu\text{F}$

## HEAT AND THERMOMETRY

1. The SI unit of heat is:

- a) Newton
- b) Joule
- c) Watt

d) Kelvin

**Answer:** b) Joule

2. Which mode of heat transfer requires direct contact between particles?

a) Conduction

b) Convection

c) Radiation

d) None of the above

**Answer:** a) Conduction

3. Which mode of heat transfer occurs only in fluids?

a) Conduction

b) Convection

c) Radiation

d) Reflection

**Answer:** b) Convection

4. Heat transfer by convection occurs due to:

a) Molecular collisions

b) Free electron movement

c) Density differences

d) Electromagnetic waves

**Answer:** c) Density differences

5. The Sun's heat reaches the Earth by:

a) Conduction

b) Convection

c) Radiation

d) Reflection

**Answer:** c) Radiation

6. Which of the following is the best conductor of heat?

a) Wood

b) Copper

c) Plastic

d) Water

**Answer:** b) Copper

7. Which surface is the best absorber of heat?

a) Shiny and smooth

b) Black and rough

c) White and smooth

d) Transparent glass

**Answer:** b) Black and rough

8. Heat transfer through a vacuum occurs by:

a) Conduction

b) Convection

c) Radiation

d) None of these

**Answer:** c) Radiation

9. The thermal conductivity of a perfect insulator is:

- a) Infinite
- b) Zero
- c) 1
- d) Very high

**Answer:** b) Zero

10. Cooking pots are made of metal because:

- a) Metals are poor conductors
- b) Metals are good conductors of heat
- c) Metals do not expand when heated
- d) Metals reduce heat transfer

**Answer:** b) Metals are good conductors of heat

11. The transfer of heat in a metal rod is an example of:

- a) Conduction
- b) Convection
- c) Radiation
- d) None of the above

**Answer:** a) Conduction

12. Why do black surfaces absorb more heat?

- a) They reflect radiation
- b) They have high emissivity
- c) They are poor absorbers
- d) They do not conduct heat

**Answer:** b) They have high emissivity

13. The greenhouse effect is due to:

- a) Conduction
- b) Convection
- c) Radiation
- d) None of the above

**Answer:** c) Radiation

14. Land and sea breezes are caused by:

- a) Conduction
- b) Convection
- c) Radiation
- d) Reflection

**Answer:** b) Convection

15. A metal rod is heated at one end. If the rod's length is doubled, what happens to the rate of heat transfer?

- a) Doubles
- b) Halves
- c) Remains the same
- d) Becomes one-fourth

**Answer:** b) Halves

16. A body at 300 K radiates energy. If the temperature increases to 600 K, how much more energy will it emit?

- a) 2 times
- b) 4 times
- c) 8 times
- d) 16 times

**Answer:** d) 16 times

1. What is the freezing point of water in the Celsius scale?

- a) 100°C
- b) 0°C
- c) 273°C
- d) 32°C

**Answer:** b) 0°C

2. The SI unit of temperature is:

- a) Celsius
- b) Fahrenheit
- c) Kelvin
- d) Rankine

**Answer:** c) Kelvin

3. What is the value of absolute zero in Celsius?

- a) -273.15°C
- b) 0°C
- c) -100°C
- d) 273.15°C

**Answer:** a) -273.15°C

4. The boiling point of water in Fahrenheit is:

- a) 100°F
- b) 32°F
- c) 373.15°F
- d) 212°F

**Answer:** d) 212°F

5. Which of the following is an absolute temperature scale?

- a) Celsius
- b) Fahrenheit
- c) Kelvin
- d) Centigrade

**Answer:** c) Kelvin

6. The relation between Kelvin and Celsius is:

- a)  $K = ^\circ C + 273.15$
- b)  $K = ^\circ C - 273.15$
- c)  $K = 1.8 \times ^\circ C + 32$
- d) None of these

**Answer:** a)  $K = ^\circ C + 273.15$

7. If the temperature of an object is  $0^{\circ}\text{C}$ , what is its temperature in Kelvin?

- a) 0 K
- b) 100 K
- c) 273.15 K
- d)  $-273.15\text{ K}$

**Answer:** c) 273.15 K

8. The Fahrenheit equivalent of  $0^{\circ}\text{C}$  is:

- a)  $32^{\circ}\text{F}$
- b)  $0^{\circ}\text{F}$
- c)  $-32^{\circ}\text{F}$
- d)  $100^{\circ}\text{F}$

**Answer:** a)  $32^{\circ}\text{F}$

9. The unit of absolute temperature is:

- a) Degree Celsius
- b) Kelvin
- c) Fahrenheit
- d) Rankine

**Answer:** b) Kelvin

10. What is the Fahrenheit equivalent of 273.15 K?

- a)  $0^{\circ}\text{F}$
- b)  $32^{\circ}\text{F}$
- c)  $100^{\circ}\text{F}$
- d)  $212^{\circ}\text{F}$

**Answer:** b)  $32^{\circ}\text{F}$

11. What is the boiling point of water in Kelvin?

- a) 100 K
- b) 212 K
- c) 273.15 K
- d) 373.15 K

**Answer:** d) 373.15 K

12. Who developed the Fahrenheit scale?

- a) Lord Kelvin
- b) Daniel Gabriel Fahrenheit
- c) Anders Celsius
- d) James Joule

**Answer:** b) Daniel Gabriel Fahrenheit

13. Absolute zero is defined as:

- a) The lowest temperature theoretically possible
- b) The temperature of boiling water
- c) The freezing point of water
- d) The standard room temperature

**Answer:** a) The lowest temperature theoretically possible

14. Which temperature scale is used in scientific calculations?

- a) Celsius



- b) Fahrenheit
- c) Kelvin
- d) Rankine

**Answer:** c) Kelvin

15. Convert  $50^{\circ}\text{C}$  to Fahrenheit.

- a)  $100^{\circ}\text{F}$
- b)  $122^{\circ}\text{F}$
- c)  $212^{\circ}\text{F}$
- d)  $150^{\circ}\text{F}$

**Answer:** b)  $122^{\circ}\text{F}$

16. Convert 400 K to Celsius.

- a)  $100^{\circ}\text{C}$
- b)  $126.85^{\circ}\text{C}$
- c)  $150^{\circ}\text{C}$
- d)  $200^{\circ}\text{C}$

**Answer:** b)  $126.85^{\circ}\text{C}$

1. The SI unit of heat capacity is:

- a) J/kg
- b) J/K
- c) J/kg·K
- d) cal/ $^{\circ}\text{C}$

**Answer:** b) J/K

2. The SI unit of specific heat capacity is:

- a) J/K
- b) J/kg·K
- c) cal/g
- d) cal/ $^{\circ}\text{C}$

**Answer:** b) J/kg·K

3. Which substance has the highest specific heat capacity?

- a) Copper
- b) Water
- c) Mercury
- d) Iron

**Answer:** b) Water

4. Heat capacity depends on:

- a) Only the mass of the object
- b) Only the type of material
- c) Both mass and material of the object
- d) Neither mass nor material

**Answer:** c) Both mass and material of the object

5. The heat energy required to raise the temperature of 1 kg of a substance by 1 K is called:

- a) Heat capacity
- b) Specific heat capacity
- c) Latent heat

d) Thermal conductivity

**Answer:** b) Specific heat capacity

6. If a substance has a high specific heat capacity, it:

a) Heats up quickly

b) Heats up slowly

c) Does not absorb heat

d) Cools down very fast

**Answer:** b) Heats up slowly

7. If a 500 g block of metal and a 500 g of water absorb the same heat, which will show a greater temperature change?

a) Metal

b) Water

c) Both will show the same change

d) Cannot be determined

**Answer:** a) Metal

8. What is the specific heat capacity of water?

a) 1000 J/kg·K

b) 4200 J/kg·K

c) 500 J/kg·K

d) 900 J/kg·K

**Answer:** b) 4200 J/kg·K

9. If the heat energy supplied to a substance is doubled, what happens to the temperature change?

a) It remains the same

b) It is halved

c) It is doubled

d) It becomes zero

**Answer:** c) It is doubled

10. A substance with **high heat capacity** will:

a) Heat up quickly

b) Cool down quickly

c) Heat up and cool down slowly

d) Not absorb heat

**Answer:** c) Heat up and cool down slowly

11. What is the formula for heat energy?

a)  $Q=mcT$

b)  $Q=mc\Delta T$

c)  $Q=T/mc$

d)  $Q=\Delta T/m$

**Answer:** b)  $Q=mc\Delta T$

12. The amount of heat required to raise the temperature of 1 g of water by 1°C is:

a) 1 J

b) 4.186 J

c) 10 J

d) 100 J

**Answer:** b) 4.186 J

13. A substance with a low specific heat capacity will:

- a) Require more heat to change temperature
- b) Heat up and cool down quickly
- c) Heat up and cool down slowly
- d) Absorb no heat

**Answer:** b) Heat up and cool down quickly

14. Which of the following has the lowest specific heat capacity?

- a) Water
- b) Iron
- c) Aluminum
- d) Copper

**Answer:** d) Copper

15. A **2 kg** block of iron with **specific heat capacity 450 J/kg·K** is heated from **20°C to 70°C**. Find the heat required.

- a) 10,000 J
- b) 20,000 J
- c) 45,000 J
- d) 50,000 J

**Answer:** b) 20,000 J

**Solution:**  $Q = mc\Delta T = (2)(450)(70 - 20) = 20,000 \text{ J}$

16. A **1 kg** metal block absorbs **5000 J** of heat and its temperature rises by **25°C**. What is its specific heat capacity?

- a) 200 J/kg·K
- b) 300 J/kg·K
- c) 400 J/kg·K
- d) 500 J/kg·K

**Answer:** d) 500 J/kg·K

**Solution:**  $c = Q/m\Delta T = 5000/1 \times 25 = 500 \text{ J/kg·K}$

1. Thermal conductivity is the property of a material to:

- a) Absorb heat
- b) Transfer heat
- c) Expand when heated
- d) Change state

**Answer:** b) Transfer heat

2. The SI unit of thermal conductivity is:

- a) J/kg·K
- b) W/mK
- c) J/m<sup>2</sup>K
- d) N/m<sup>2</sup>

**Answer:** b) W/mK

3. Which of the following has the highest thermal conductivity?

- a) Copper
- b) Glass
- c) Rubber
- d) Water

**Answer:** a) Copper

4. What happens to the thermal conductivity of metals when temperature increases?

- a) Increases
- b) Decreases
- c) Remains constant
- d) First increases, then decreases

**Answer:** b) Decreases

5. Which of the following is a poor conductor of heat?

- a) Silver
- b) Copper
- c) Wood
- d) Iron

**Answer:** c) Wood

6. What is the physical significance of thermal conductivity?

- a) Ability to store heat
- b) Ability to conduct electricity
- c) Ability to transfer heat
- d) Ability to expand when heated

**Answer:** c) Ability to transfer heat

7. Which of the following materials is the best insulator?

- a) Aluminum
- b) Copper
- c) Air
- d) Steel

**Answer:** c) Air

8. What is the relation between heat transfer and thermal conductivity?

- a) Directly proportional
- b) Inversely proportional
- c) No relation
- d) Exponential relation

**Answer:** a) Directly proportional

9. Linear expansion occurs in:

- a) Liquids
- b) Solids
- c) Gases
- d) Plasma

**Answer:** b) Solids

10. The coefficient of linear expansion is measured in:

- a) Joules

- b) Kelvin
- c) 1/K
- d)  $\text{m}^2$

**Answer:** c) 1/K

11. The change in length of a rod when heated depends on:

- a) Its original length
- b) Change in temperature
- c) Coefficient of linear expansion
- d) All of the above

**Answer:** d) All of the above

12. Which material expands the most when heated?

- a) Steel
- b) Water
- c) Copper
- d) Rubber

**Answer:** c) Copper

13. Why are expansion joints provided in railway tracks?

- a) To allow contraction in winter
- b) To allow expansion in summer
- c) To maintain constant track length
- d) To improve electrical conductivity

**Answer:** b) To allow expansion in summer

14. Which metal is most suitable for making cooking utensils due to its high thermal conductivity?

- a) Silver
- b) Copper
- c) Aluminum
- d) Iron

**Answer:** b) Copper

15. A **1.5 m** long aluminum rod ( $\alpha = 24 \times 10^{-6} \text{ K}^{-1}$ ) is heated from **20°C to 80°C**. Find its increase in length.

- a) 0.002 m
- b) 0.0025 m
- c) 0.0036 m
- d) 0.0045 m

**Answer:** c) 0.0036 m

**Solution:**

$$\Delta L = (24 \times 10^{-6}) \times 1.5 \times (80 - 20) = 0.0036 \text{ m}$$

16. A **copper rod** ( $k = 385 \text{ W/mK}$ ) conducts **2000 J** of heat in **10 s**. The rod has a cross-sectional area of **0.01 m<sup>2</sup>** and thickness of **0.02 m**. If the temperature difference is **50°C**, find the rate of heat transfer.

- a) 1925 W
- b) 1975 W
- c) 2000 W

d) 2025 W

**Answer:** c) 2000 W

## ❖ WAVE MOTION, OPTICS AND ACOUSTICS

1. Which of the following waves require a medium to propagate?

- a) Light waves
- b) Radio waves
- c) Sound waves
- d) X-rays

**Answer:** c) Sound waves

2. Which of the following is a transverse wave?

- a) Sound wave
- b) Water wave
- c) Seismic P-wave
- d) Ultrasound wave

**Answer:** b) Water wave

3. In a longitudinal wave, the particles of the medium move:

- a) Perpendicular to the wave motion
- b) Parallel to the wave motion
- c) In a circular motion
- d) At an angle of  $45^\circ$

**Answer:** b) Parallel to the wave motion

4. Which of the following is an example of a mechanical wave?

- a) Radio waves
- b) X-rays
- c) Sound waves
- d) Gamma rays

**Answer:** c) Sound waves

5. The regions of high pressure in a longitudinal wave are called:

- a) Troughs
- b) Crests
- c) Rarefactions
- d) Compressions

**Answer:** d) Compressions

6. In which type of wave do the particles vibrate perpendicular to the direction of wave propagation?

- a) Longitudinal waves
- b) Transverse waves
- c) Electromagnetic waves
- d) Standing waves

**Answer:** b) Transverse waves

7. Which of the following is an example of a standing wave?

- a) Water wave
- b) Sound wave in open air
- c) Vibrations in a stretched string
- d) Light wave

**Answer:** c) Vibrations in a stretched string

8. Sound waves in air are:

- a) Transverse waves
- b) Longitudinal waves
- c) Electromagnetic waves
- d) Standing waves

**Answer:** b) Longitudinal waves

9. Which of the following waves can travel through a vacuum?

- a) Sound waves
- b) Seismic waves
- c) Light waves
- d) Water waves

**Answer:** c) Light waves

10. Which of the following is an example of a progressive wave?

- a) Water waves
- b) Standing waves
- c) String vibration
- d) Oscillations in a pendulum

**Answer:** a) Water waves

11. Which of the following is NOT a mechanical wave?

- a) Sound wave
- b) Water wave
- c) Light wave
- d) Seismic wave

**Answer:** c) Light wave

12. The points of maximum displacement in a standing wave are called:

- a) Nodes
- b) Antinodes
- c) Crests
- d) Troughs

**Answer:** b) Antinodes

13. Which type of wave has both electric and magnetic components?

- a) Sound wave
- b) Electromagnetic wave
- c) Longitudinal wave
- d) Mechanical wave

**Answer:** b) Electromagnetic wave

14. The speed of a wave depends on:

- a) Its frequency only

- b) The medium in which it travels
- c) The amplitude of the wave
- d) The color of the wave

**Answer:** b) The medium in which it travels

15. A sound wave has a wavelength of **0.5 m** and a frequency of **660 Hz**. What is the speed of the wave?

- a) 330 m/s
- b) 1320 m/s
- c) 660 m/s
- d) 165 m/s

**Answer:** a) 330 m/s

**Solution:**

$$v = f\lambda = (660)(0.5) = 330 \text{ m/s}$$

16. If the frequency of a transverse wave is **50 Hz** and its speed is **200 m/s**, what is its wavelength?

- a) 0.25 m
- b) 4 m
- c) 50 m
- d) 100 m

**Answer:** b) 4 m

**Solution:**

$$\lambda (\text{lambd}a) = v/f = 200/50 = 4 \text{ m}$$

1. The unit of frequency is:

- a) Second
- b) Meter
- c) Hertz
- d) Joule

**Answer:** c) Hertz

2. Wavelength is measured in:

- a) Hertz
- b) Meter
- c) Second
- d) Newton

**Answer:** b) Meter

3. The time taken to complete one oscillation is called:

- a) Frequency
- b) Wavelength
- c) Amplitude
- d) Time period

**Answer:** d) Time period

4. If the frequency of a wave increases, its wavelength:

- a) Increases
- b) Decreases



- c) Remains constant
- d) Becomes infinite
- Answer:** b) Decreases

5. The relation between velocity  $v$  frequency  $f$ , and wavelength  $\lambda$  is:

- a)  $v=f \times \lambda$
- b)  $v=\lambda/f$
- c)  $v=f^2 \lambda$
- d)  $v=f/\lambda$

**Answer:** a)  $v=f \times \lambda$

6. The frequency of a wave is 5 Hz. Its time period is:

- a) 0.5 s
- b) 0.2 s
- c) 2 s
- d) 5 s

**Answer:** b) 0.2 s

**Solution:**  $T=1/f=1/5=0.2$  s

7. If the time period of a wave is 0.01 s, what is its frequency?

- a) 10 Hz
- b) 100 Hz
- c) 0.01 Hz
- d) 1000 Hz

**Answer:** b) 100 Hz

8. The distance between two consecutive compressions in a longitudinal wave is called:

- a) Amplitude
- b) Wavelength
- c) Frequency
- d) Time period

**Answer:** b) Wavelength

9. What happens to the frequency of a wave if its time period doubles?

- a) Doubles
- b) Halves
- c) Remains the same
- d) Becomes zero

**Answer:** b) Halves

10. If the wavelength of a wave is **10 m** and its velocity is **200 m/s**, what is its frequency?

- a) 10 Hz
- b) 20 Hz
- c) 2000 Hz
- d) 2 Hz

**Answer:** b) 20 Hz

**Solution:**  $f=v/\lambda=200/10=20$

11. If the frequency of a sound wave is **256 Hz**, what is its time period?

- a) 0.004 s
- b) 0.01 s

- c) 4 s
- d) 256 s

**Answer:** a) 0.004 s

**Solution:**  $T = 1/f = 1/256 = 0.0039 \approx 0.004$  s

12. What happens to the speed of a wave if both its frequency and wavelength are doubled?

- a) Remains the same
- b) Doubles
- c) Quadruples
- d) Halves

**Answer:** c) Quadruples

**Solution:** Since  $v = f\lambda$ , if both  $f$  and  $\lambda$  double, then  $v$  becomes  $4v$ .

13. The SI unit of time period is:

- a) Hertz
- b) Meter
- c) Second
- d) Joule

**Answer:** c) Second

14. If the speed of sound in air is **340 m/s** and the frequency is **170 Hz**, what is its wavelength?

- a) 1 m
- b) 2 m
- c) 0.5 m
- d) 5 m

**Answer:** b) 2 m

**Solution:**  $\lambda = v/f = 340/170 = 2$  m

15. A wave moves with a velocity of **300 m/s** and has a frequency of **100 Hz**. What is its wavelength?

- a) 3 m
- b) 30 m
- c) 0.3 m
- d) 300 m

**Answer:** a) 3 m

**Solution:**  $\lambda = v/f = 300/100 = 3$  m

16. A water wave has a wavelength of **5 m** and a frequency of **2 Hz**. What is its speed?

- a) 2 m/s
- b) 5 m/s
- c) 10 m/s
- d) 20 m/s

**Answer:** c) 10 m/s

**Solution:**  $v = f\lambda = (2)(5) = 10$  m/s

1. Electromagnetic waves can travel through:

- a) Solids only
- b) Liquids only
- c) Gases only

d) Vacuum

**Answer:** d) Vacuum

2. Which of the following waves requires a medium to propagate?

a) Radio waves

b) Sound waves

c) X-rays

d) Visible light

**Answer:** b) Sound waves

3. The speed of electromagnetic waves in a vacuum is approximately:

a)  $3 \times 10^6$  m/s

b)  $3 \times 10^8$  m/s

c)  $3 \times 10^4$  m/s

d)  $3 \times 10^2$  m/s

**Answer:** b)  $3 \times 10^8$  m/s

4. The frequency range of audible sound waves is:

a) 2 Hz – 200 Hz

b) 20 Hz – 20,000 Hz

c) 200 Hz – 200,000 Hz

d) 2,000 Hz – 20,000 Hz

**Answer:** b) 20 Hz – 20,000 Hz

5. Which of the following is **not** an application of LASER?

a) Surgery

b) Barcode scanning

c) Cooking food

d) Optical fiber communication

**Answer:** c) Cooking food

6. The **wavelength range** of visible light is:

a) 100-200 nm

b) 400-700 nm

c) 700-1000 nm

d) 2000-4000 nm

**Answer:** b) 400-700 nm

7. What is the main property of LASER light?

a) It is incoherent

b) It has multiple wavelengths

c) It is highly directional and monochromatic

d) It cannot travel through air

**Answer:** c) It is highly directional and monochromatic

8. What is the principle of SONAR?

a) Reflection of light

b) Refraction of light

c) Reflection of ultrasonic waves

d) Refraction of ultrasonic waves

**Answer:** c) Reflection of ultrasonic waves

9. Which of the following devices use ultrasonic waves?

- a) Microwave oven
- b) X-ray machine
- c) Ultrasound scanner
- d) CFL bulb

**Answer:** c) Ultrasound scanner

10. The electromagnetic wave with the **highest frequency** is:

- a) Radio waves
- b) Infrared rays
- c) X-rays
- d) Gamma rays

**Answer:** d) Gamma rays

11. The property that distinguishes sound waves from electromagnetic waves is:

- a) Sound waves travel faster than electromagnetic waves
- b) Sound waves require a medium to propagate
- c) Sound waves are transverse in nature
- d) Sound waves do not follow the laws of wave motion

**Answer:** b) Sound waves require a medium to propagate

12. Ultrasonic waves are used in:

- a) UV radiation therapy
- b) Satellite communication
- c) Blood flow measurement
- d) Optical fiber communication

**Answer:** c) Blood flow measurement

13. What happens to the speed of sound when it moves from air to water?

- a) Increases
- b) Decreases
- c) Remains the same
- d) First increases, then decreases

**Answer:** a) Increases

14. The fundamental principle of ultrasound scanning in the medical field is:

- a) Light reflection
- b) Infrared radiation
- c) Ultrasonic wave reflection
- d) UV ray absorption

**Answer:** c) Ultrasonic wave reflection

15. If a LASER beam has a wavelength of **500 nm**, what is its frequency?

(Speed of light =  $3 \times 10^8$  m/s)

- a)  $6 \times 10^{14}$  Hz
- b)  $5 \times 10^{14}$  Hz
- c)  $3 \times 10^{14}$  Hz
- d)  $4 \times 10^{14}$  Hz

**Answer:** b)  $5 \times 10^{14}$  Hz

**Solution:**  $f = c/\lambda = 3 \times 10^8 / 500 \times 10^{-9} = 6 \times 10^{14}$  Hz

16. A sonar wave travels with a velocity of **1500 m/s** in water and is reflected back after **2 seconds**. What is the depth of the object?

- a) 1500 m
- b) 3000 m
- c) 750 m
- d) 6000 m

**Answer:** b) 1500 m

**Solution:**  $\text{Depth} = \text{velocity} \times \text{time} / 2 = 1500 \times 2 / 2 = 1500 \text{m}$

1. The amplitude of a wave represents:

- a) The speed of the wave
- b) The frequency of the wave
- c) The maximum displacement from equilibrium
- d) The phase of the wave

**Answer:** c) The maximum displacement from equilibrium

2. Intensity of a wave is proportional to:

- a) A
- b)  $A^2$
- c)  $1/A$
- d)  $1/A^2$

**Answer:** b)  $A^2$

3. What is the SI unit of intensity?

- a) Joule
- b) Watt
- c) Watt per square meter
- d) Newton

**Answer:** c) Watt per square meter

4. If the amplitude of a wave is tripled, the intensity increases by:

- a) 3 times
- b) 6 times
- c) 9 times
- d) 12 times

**Answer:** c) 9 times

5. Phase difference between two completely out-of-phase waves is:

- a)  $0^\circ$
- b)  $90^\circ$
- c)  $180^\circ$
- d)  $360^\circ$

**Answer:** c)  $180^\circ$

6. Constructive interference occurs when the phase difference is:

- a)  $0^\circ$
- b)  $90^\circ$
- c)  $180^\circ$
- d)  $270^\circ$

**Answer:** a)  $0^\circ$

7. The wave equation  $y = A \sin(kx - \omega t)$  represents:

- a) A stationary wave
- b) A progressive wave
- c) A longitudinal wave
- d) A circular wave

**Answer:** b) A progressive wave

8. What is the phase difference between a crest and a trough of a wave?

- a)  $0^\circ$
- b)  $90^\circ$
- c)  $180^\circ$
- d)  $360^\circ$

**Answer:** c)  $180^\circ$

9. Which of the following parameters does not change when a wave moves from one medium to another?

- a) Frequency
- b) Wavelength
- c) Speed
- d) Amplitude

**Answer:** a) Frequency

10. The wave equation  $y = 5 \sin(2x - 3t)$  represents a wave with an amplitude of:

- a) 5 units
- b) 2 units
- c) 3 units
- d) 10 units

**Answer:** a) 5 units

11. A sound wave travels from air to water. What happens to its speed?

- a) Increases
- b) Decreases
- c) Remains constant
- d) First increases, then decreases

**Answer:** a) Increases

12. A phase difference of  $0^\circ$  means the waves are:

- a) Out of phase
- b) In phase
- c) Perpendicular
- d) Traveling in different directions

**Answer:** b) In phase

13. What is the unit of wave number  $k$ ?

- a) Hz
- b) m
- c)  $\text{m}^{-1}$
- d)  $\text{s}^{-1}$

**Answer:** c)  $\text{m}^{-1}$

14. If the time period of a wave is **0.02 s**, its frequency is:

- a) 2 Hz
- b) 10 Hz
- c) 50 Hz
- d) 100 Hz

**Answer:** c) 50 Hz

15. A wave has a wavelength of **4 m** and a speed of **8 m/s**. What is its frequency?

- a) 2 Hz
- b) 4 Hz
- c) 8 Hz
- d) 16 Hz

**Answer:** a) 2 Hz

**Solution:**  $f = v/\lambda = 8/4 = 2$  Hz

16. A wave equation is given by  **$y = 3\sin(4x - 6t)$** . Find its angular frequency  $\omega$ .

- a) 4 rad/s
- b) 6 rad/s
- c) 8 rad/s
- d) 10 rad/s

**Answer:** b) 6 rad/s

1. The angle of incidence and angle of reflection are:

- a) Always equal
- b) Sometimes equal
- c) Independent of each other
- d) Always different

**Answer:** a) Always equal

2. Refraction occurs because of a change in:

- a) Frequency
- b) Speed
- c) Wavelength
- d) Both b and c

**Answer:** d) Both b and c

3. The refractive index of a medium is given by:

- a)  $v/c$
- b)  $c/v$
- c)  $\sin i / \sin r$
- d) Both b and c

**Answer:** d) Both b and c

4. If a ray of light travels from air to water, it bends:

- a) Toward the normal
- b) Away from the normal
- c) Does not bend
- d) Back into air

**Answer:** a) Toward the normal

5. Which of the following materials has the highest refractive index?

- a) Water
- b) Air
- c) Glass
- d) Diamond

**Answer:** d) Diamond

6. Total internal reflection occurs when light travels from:

- a) Rarer to denser medium
- b) Denser to rarer medium
- c) Denser to denser medium
- d) Rarer to rarer medium

**Answer:** b) Denser to rarer medium

7. The critical angle for water ( $n = 1.33$ ) is approximately:

- a)  $30^\circ$
- b)  $42^\circ$
- c)  $48^\circ$
- d)  $60^\circ$

**Answer:** c)  $48^\circ$

8. Which condition is necessary for total internal reflection?

- a)  $i > C$
- b)  $i < C$
- c)  $i = C$
- d)  $i = 90^\circ$

**Answer:** a)  $i > C$

9. Optical fibers use:

- a) Reflection
- b) Refraction
- c) Total internal reflection
- d) Dispersion

**Answer:** c) Total internal reflection

10. Which part of an optical fiber has a lower refractive index?

- a) Core
- b) Cladding
- c) Buffer coating
- d) Glass layer

**Answer:** b) Cladding

11. If the speed of light in a medium is  $2 \times 10^8$  m/s, what is its refractive index?

- a) 1.5
- b) 1.33
- c) 2.0
- d) 1.25

**Answer:** a) 1.5

**Solution:**  $n = c/v = (3 \times 10^8)/(2 \times 10^8) = 1.5$



12. A light ray passes from glass ( $n=1.5$ ) to water ( $n=1.33$ ). If the incident angle is  $50^\circ$ , what is the refracted angle?

- a)  $40^\circ$
- b)  $45^\circ$
- c)  $60^\circ$
- d)  $30^\circ$

**Answer:** a)  $40^\circ$

1. Reverberation is caused due to:

- a) Absorption of sound
- b) Reflection of sound
- c) Refraction of sound
- d) Diffraction of sound

**Answer:** b) Reflection of sound

2. Reverberation time is defined as:

- a) Time taken for sound to become inaudible
- b) Time taken for sound to reduce by 10 dB
- c) Time taken for sound to decrease by 60 dB
- d) Time taken for sound to travel a certain distance

**Answer:** c) Time taken for sound to decrease by 60 dB

3. The reverberation time of a hall depends on:

- a) Volume of the hall
- b) Total absorption in the hall
- c) Both (a) and (b)
- d) Neither (a) nor (b)

**Answer:** c) Both (a) and (b)

4. Sabine's formula is used to calculate:

- a) Speed of sound
- b) Reverberation time
- c) Wavelength of sound
- d) Sound intensity

**Answer:** b) Reverberation time

5. The ideal reverberation time for speech auditoriums is:

- a) 0.1 to 0.3 sec
- b) 0.5 to 1.0 sec
- c) 1.5 to 2.0 sec
- d) 2.5 to 3.0 sec

**Answer:** b) 0.5 to 1.0 sec

6. An echo occurs when the reflected sound reaches the listener after at least:

- a) 0.01 sec
- b) 0.1 sec
- c) 1 sec
- d) 2 sec

**Answer:** b) 0.1 sec

7. The minimum distance required to hear an echo in air is:

- a) 10 meters
- b) 17.2 meters
- c) 30 meters
- d) 50 meters

**Answer:** b) 17.2 meters

8. The absorption coefficient ( $\alpha$ ) of a perfect absorber is:

- a) 0
- b) 0.5
- c) 1
- d)  $\infty$

**Answer:** c) 1

9. Which of the following materials is best for soundproofing?

- a) Glass
- b) Carpet
- c) Concrete
- d) Metal

**Answer:** b) Carpet

10. A room with excessive reverberation will have:

- a) Clear sound
- b) Echoing and unclear sound
- c) No sound reflection
- d) Low intensity sound

**Answer:** b) Echoing and unclear sound

11. What happens if reverberation time is too high in a concert hall?

- a) Sound becomes more clear
- b) Sound gets distorted and unclear
- c) Sound travels faster
- d) Music sounds sharper

**Answer:** b) Sound gets distorted and unclear

12. Which of the following reduces reverberation?

- a) Adding soft materials
- b) Using hard surfaces
- c) Increasing the volume of the room
- d) Reducing the size of the room

**Answer:** a) Adding soft materials

13. If a room has a volume of  $500 \text{ m}^3$  and an absorption of  $50 \text{ m}^2$ , what will be the approximate reverberation time?

- a) 0.5 sec
- b) 1.61 sec
- c) 2.5 sec
- d) 3.2 sec

**Answer:** b) 1.61 sec

14. Which of the following best describes reverberation?

- a) Prolonged sound due to repeated reflection
- b) Sound completely absorbed by walls
- c) Sound traveling in a straight line
- d) Sound losing intensity immediately

**Answer:** a) Prolonged sound due to repeated reflection

15. A hall has a volume of **400 m<sup>3</sup>** and an absorption of **80 m<sup>2</sup>**. What is the reverberation time?

**Answer:**

$$TR = 0.161 \times 400 / 80 = 0.805 \text{ sec}$$

16. If the absorption coefficient of curtains is **0.6**, how much sound is absorbed by **10 m<sup>2</sup>** of curtains?

**Answer:**

$$10 \times 0.6 = 6 \text{ m}^2$$

## ❖ CHEMICAL REACTIONS AND EQUATIONS

1. What does a chemical equation represent?

- a) Number of molecules in a reaction
- b) Reactants and products of a reaction
- c) Speed of the reaction
- d) Only products of a reaction

**Answer:** b) Reactants and products of a reaction

2. Which law is used to balance a chemical equation?

- a) Law of Multiple Proportions
- b) Law of Conservation of Mass
- c) Avogadro's Law
- d) Law of Constant Proportions

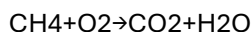
**Answer:** b) Law of Conservation of Mass

3. What is the correct chemical equation for the reaction of iron with oxygen?

- a)  $\text{Fe} + \text{O}_2 \rightarrow \text{FeO}$
- b)  $4\text{Fe} + 3\text{O}_2 \rightarrow 2\text{Fe}_2\text{O}_3$
- c)  $2\text{Fe} + \text{O}_2 \rightarrow 2\text{FeO}$
- d)  $\text{Fe} + \text{O}_2 \rightarrow \text{Fe}_2\text{O}_3$

**Answer:** b)  $4\text{Fe} + 3\text{O}_2 \rightarrow 2\text{Fe}_2\text{O}_3$

4. What is the coefficient of oxygen in the balanced equation for the combustion of methane?



- a) 1
- b) 2
- c) 3
- d) 4

**Answer:** b) 2

5. The reaction  $2\text{H}_2\text{O}_2 \rightarrow 2\text{H}_2\text{O} + \text{O}_2$  is an example of:

- a) Combination reaction
- b) Decomposition reaction
- c) Displacement reaction
- d) Double displacement reaction

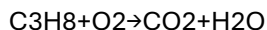
**Answer:** b) Decomposition reaction

6. Which of the following represents a **balanced equation**?

- a)  $\text{Na} + \text{H}_2\text{O} \rightarrow \text{NaOH} + \text{H}_2$
- b)  $2\text{Na} + 2\text{H}_2\text{O} \rightarrow 2\text{NaOH} + \text{H}_2$
- c)  $\text{Na} + \text{H}_2\text{O} \rightarrow \text{NaOH}$
- d)  $\text{Na} + \text{H}_2\text{O} \rightarrow \text{H}_2\text{O} + \text{NaOH}$

**Answer:** b)  $2\text{Na} + 2\text{H}_2\text{O} \rightarrow 2\text{NaOH} + \text{H}_2$

7. What is the missing coefficient in the balanced equation?



- a) 3
- b) 5
- c) 4
- d) 2

**Answer:** b) 5

8. The reaction  $2\text{KClO}_3 \rightarrow 2\text{KCl} + 3\text{O}_2$  is an example of:

- a) Combination reaction
- b) Decomposition reaction
- c) Displacement reaction
- d) Redox reaction

**Answer:** b) Decomposition reaction

9. Which of the following is a **correctly balanced equation**?

- a)  $2\text{H}_2 + \text{O}_2 \rightarrow \text{H}_2\text{O}$
- b)  $\text{H}_2 + \text{O}_2 \rightarrow 2\text{H}_2\text{O}$
- c)  $2\text{H}_2 + \text{O}_2 \rightarrow 2\text{H}_2\text{O}$
- d)  $\text{H}_2 + \text{O}_2 \rightarrow \text{H}_2\text{O}_2$

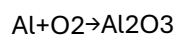
**Answer:** c)  $2\text{H}_2 + \text{O}_2 \rightarrow 2\text{H}_2\text{O}$

10. The sum of coefficients in the balanced equation for rust formation ( $4\text{Fe} + 3\text{O}_2 \rightarrow 2\text{Fe}_2\text{O}_3$ ) is:

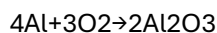
- a) 7
- b) 9
- c) 10
- d) 5

**Answer:** b) 9

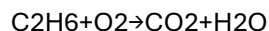
21. Balance the equation:



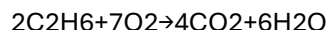
**Answer:**



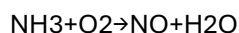
22. Balance the equation:



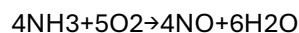
**Answer:**



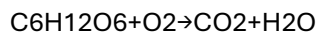
23. Balance the reaction for the reaction of ammonia and oxygen:



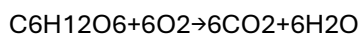
**Answer:**



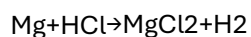
24. What are the missing coefficients in the balanced equation?



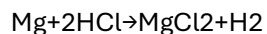
**Answer:**



25. Find the coefficient of HCl in the reaction:



**Answer:**



1. What is the product in the combination reaction of hydrogen and oxygen?

- a)  $\text{H}_2\text{O}_2$
- b)  $\text{H}_2\text{O}$
- c)  $\text{O}_2$
- d)  $\text{H}_2$

**Answer:** b)  $\text{H}_2\text{O}$

2. Which of the following is a **combination reaction**?

- a)  $2\text{H}_2\text{O} \rightarrow 2\text{H}_2 + \text{O}_2$
- b)  $2\text{H}_2 + \text{O}_2 \rightarrow 2\text{H}_2\text{O}$
- c)  $\text{Fe} + \text{CuSO}_4 \rightarrow \text{FeSO}_4 + \text{Cu}$
- d)  $\text{AgNO}_3 + \text{NaCl} \rightarrow \text{AgCl} + \text{NaNO}_3$

**Answer:** b)  $2\text{H}_2 + \text{O}_2 \rightarrow 2\text{H}_2\text{O}$

3. The reaction  $2\text{KClO}_3 \rightarrow 2\text{KCl} + 3\text{O}_2$  is an example of:

- a) Combination reaction

- b) Decomposition reaction
- c) Displacement reaction
- d) Double displacement reaction

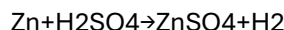
**Answer:** b) Decomposition reaction

4. Which type of reaction occurs when **calcium carbonate** decomposes?

- a) Combination
- b) Decomposition
- c) Displacement
- d) Double displacement

**Answer:** b) Decomposition

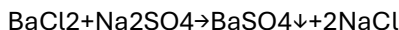
5. What type of reaction is this?



- a) Combination
- b) Decomposition
- c) Displacement
- d) Double displacement

**Answer:** c) Displacement

6. Which type of reaction is represented by the equation?



- a) Combination
- b) Decomposition
- c) Displacement
- d) Double displacement

**Answer:** d) Double displacement

7. A reaction where a single compound breaks into simpler substances is called:

- a) Combination
- b) Decomposition
- c) Displacement
- d) Double displacement

**Answer:** b) Decomposition

8. What type of reaction is **neutralization**?

- a) Combination
- b) Decomposition
- c) Displacement
- d) Double displacement

**Answer:** d) Double displacement

9. Which reaction type follows the **reactivity series**?

- a) Combination
- b) Decomposition
- c) Displacement
- d) Double displacement

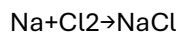
**Answer:** c) Displacement

10. Identify the **double displacement** reaction:

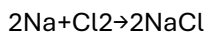
- a)  $\text{CuSO}_4 + \text{Zn} \rightarrow \text{ZnSO}_4 + \text{Cu}$
- b)  $2\text{H}_2\text{O}_2 \rightarrow 2\text{H}_2\text{O} + \text{O}_2$
- c)  $\text{HCl} + \text{NaOH} \rightarrow \text{NaCl} + \text{H}_2\text{O}$
- d)  $\text{C} + \text{O}_2 \rightarrow \text{CO}_2$

**Answer:** c)  $\text{HCl} + \text{NaOH} \rightarrow \text{NaCl} + \text{H}_2\text{O}$

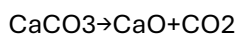
21. Balance the reaction:



**Answer:**

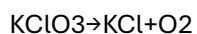


22. Balance the reaction:

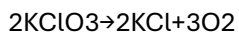


**Answer:** Balanced equation is already correct.

23. Balance the reaction:



**Answer:**

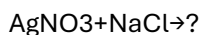


24. Identify the **product** of:



**Answer:**  $\text{FeSO}_4 + \text{Cu}$

25. Predict the reaction:



**Answer:**  $\text{AgCl} \downarrow + \text{NaNO}_3$

### ❖ ACIDS, BASES AND SALTS

1. Which of the following is a **strong acid**?

- a)  $\text{H}_2\text{O}$
- b)  $\text{HCl}$
- c)  $\text{NH}_3$
- d)  $\text{NaOH}$

**Answer:** b)  $\text{HCl}$

2. What gas is released when an acid reacts with a metal?

- a) Oxygen
- b) Nitrogen
- c) Hydrogen
- d) Carbon dioxide

**Answer:** c) Hydrogen

3. What happens when blue litmus paper is dipped in acid?
- a) Turns red
  - b) Turns blue
  - c) Turns yellow
  - d) No change

**Answer:** a) Turns red

4. What happens when red litmus paper is dipped in a base?
- a) Turns red
  - b) Turns blue
  - c) Turns green
  - d) No change

**Answer:** b) Turns blue

5. Which of the following is a **neutralization reaction**?

- a)  $\text{NaOH} + \text{HCl} \rightarrow \text{NaCl} + \text{H}_2\text{O}$
- b)  $\text{NaOH} + \text{Zn} \rightarrow \text{Na}_2\text{ZnO}_2 + \text{H}_2$
- c)  $\text{H}_2\text{SO}_4 + \text{Zn} \rightarrow \text{ZnSO}_4 + \text{H}_2$
- d)  $\text{CaCO}_3 + \text{HCl} \rightarrow \text{CaCl}_2 + \text{CO}_2 + \text{H}_2\text{O}$

**Answer:** a)  $\text{NaOH} + \text{HCl} \rightarrow \text{NaCl} + \text{H}_2\text{O}$

6. What product is formed when **acids react with metal carbonates**?

- a) Hydrogen gas
- b) Oxygen gas
- c) Carbon dioxide gas
- d) Ammonia gas

**Answer:** c) Carbon dioxide gas

7. What is the **nature of soap solution**?

- a) Acidic
- b) Basic
- c) Neutral
- d) Amphoteric

**Answer:** b) Basic

8. Which of the following bases is **soluble in water**?

- a)  $\text{Fe}(\text{OH})_3$
- b)  $\text{NaOH}$
- c)  $\text{Cu}(\text{OH})_2$
- d)  $\text{Zn}(\text{OH})_2$

**Answer:** b)  $\text{NaOH}$

9. Which of the following **metal oxides** forms a **base** when dissolved in water?

- a)  $\text{CO}_2$
- b)  $\text{SO}_2$
- c)  $\text{Na}_2\text{O}$
- d)  $\text{NO}_2$

**Answer:** c)  $\text{Na}_2\text{O}$

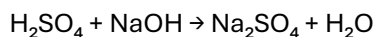
10. What are the **products of the reaction** between calcium carbonate and hydrochloric acid?



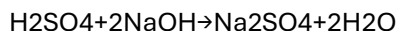
- a) Calcium chloride, carbon dioxide, and water
- b) Calcium hydroxide, oxygen, and water
- c) Calcium sulfate, hydrogen, and water
- d) Calcium bicarbonate and carbon monoxide

**Answer:** a) Calcium chloride, carbon dioxide, and water

11. Balance the equation:



**Answer:**



12. Balance the equation:



**Answer:** Balanced equation is already correct.

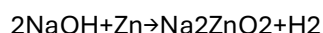
13. Which gas is evolved when Zn reacts with HCl?

**Answer: Hydrogen gas (H<sub>2</sub>)**

14. Predict the color change when litmus paper is added to vinegar.

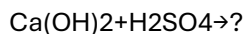
**Answer: Blue litmus turns red (acidic solution).**

15. Identify the reaction:



**Answer: Reaction of a base with metal.**

16. Predict the reaction:



**Answer: CaSO<sub>4</sub> + H<sub>2</sub>O (Neutralization reaction).**

1. What is the nature of metallic oxides?

- a) Acidic
- b) Basic
- c) Neutral
- d) Amphoteric

**Answer:** b) Basic

2. What is formed when a metallic oxide reacts with an acid?

- a) Hydrogen gas
- b) Salt and water
- c) Carbon dioxide
- d) Oxygen gas

**Answer:** b) Salt and water

3. Which of the following is a metallic oxide?

- a) SO<sub>2</sub>

- b)  $\text{CO}_2$
- c)  $\text{MgO}$
- d)  $\text{H}_2\text{O}$

**Answer:** c)  $\text{MgO}$

4. What happens when calcium oxide ( $\text{CaO}$ ) reacts with nitric acid ( $\text{HNO}_3$ )?

- a) Calcium hydroxide is formed
- b) Calcium nitrate and water are formed
- c) Calcium carbonate is formed
- d) Hydrogen gas is released

**Answer:** b) Calcium nitrate and water are formed

5. What is the **color of copper sulfate ( $\text{CuSO}_4$ )** formed in the reaction of  $\text{CuO}$  with  $\text{H}_2\text{SO}_4$ ?

- a) White
- b) Green
- c) Blue
- d) Yellow

**Answer:** c) Blue

6. Which gas is produced when metal oxides react with acids?

- a) Hydrogen
- b) Carbon dioxide
- c) Oxygen
- d) No gas is produced

**Answer:** d) No gas is produced

7. Which of the following reactions is correct?

- a)  $\text{Na}_2\text{O} + \text{HCl} \rightarrow \text{NaCl} + \text{H}_2\text{O}$
- b)  $\text{MgO} + \text{H}_2\text{SO}_4 \rightarrow \text{MgSO}_4 + \text{H}_2\text{O}$
- c)  $\text{CuO} + \text{HNO}_3 \rightarrow \text{Cu}(\text{NO}_3)_2 + \text{CO}_2$
- d)  $\text{CaO} + \text{H}_2\text{O} \rightarrow \text{Ca}(\text{OH})_2$

**Answer:** b)  $\text{MgO} + \text{H}_2\text{SO}_4 \rightarrow \text{MgSO}_4 + \text{H}_2\text{O}$

8. What type of reaction occurs when metallic oxides react with acids?

- a) Oxidation
- b) Reduction
- c) Neutralization
- d) Decomposition

**Answer:** c) Neutralization

9. What is the formula of zinc oxide?

- a)  $\text{ZnO}$
- b)  $\text{Zn}_2\text{O}_3$
- c)  $\text{Zn}(\text{OH})_2$
- d)  $\text{ZnCl}_2$

**Answer:** a)  $\text{ZnO}$

10. Which of the following metal oxides will react with acid to form sodium chloride?

- a)  $\text{CuO}$
- b)  $\text{Na}_2\text{O}$
- c)  $\text{ZnO}$

d)  $\text{Fe}_2\text{O}_3$

**Answer:** b)  $\text{Na}_2\text{O}$

11. What happens to the pH when a metallic oxide is added to an acid?

- a) Increases
- b) Decreases
- c) Stays the same
- d) Becomes neutral

**Answer:** d) Becomes neutral

12. The reaction between  $\text{CuO}$  and  $\text{H}_2\text{SO}_4$  produces a blue solution. What is the blue compound?

- a)  $\text{Cu}(\text{OH})_2$
- b)  $\text{CuO}$
- c)  $\text{CuSO}_4$
- d)  $\text{CuCl}_2$

**Answer:** c)  $\text{CuSO}_4$

13. What is the common name for  $\text{CaO}$ ?

- a) Quicklime
- b) Slaked lime
- c) Limestone
- d) Gypsum

**Answer:** a) Quicklime

14. Which metallic oxide is used to neutralize acidic soil?

- a)  $\text{Fe}_2\text{O}_3$
- b)  $\text{ZnO}$
- c)  $\text{CaO}$
- d)  $\text{Na}_2\text{O}$

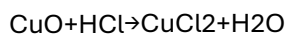
**Answer:** c)  $\text{CaO}$

15. What will be the product when  $\text{Fe}_2\text{O}_3$  reacts with  $\text{HCl}$ ?

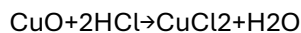
- a)  $\text{FeCl}_3$  and  $\text{H}_2\text{O}$
- b)  $\text{FeCl}_2$  and  $\text{H}_2$
- c)  $\text{Fe}(\text{OH})_3$  and  $\text{H}_2\text{O}$
- d)  $\text{FeSO}_4$  and  $\text{H}_2\text{O}$

**Answer:** a)  $\text{FeCl}_3$  and  $\text{H}_2\text{O}$

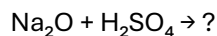
16. Balance the following reaction:



**Answer:**



17. Predict the products of the reaction:



**Answer:**  $\text{Na}_2\text{SO}_4 + \text{H}_2\text{O}$

18. Which oxide reacts with acid to form  $\text{FeCl}_3$ ?

**Answer:  $\text{Fe}_2\text{O}_3$**

19. Which metallic oxide will react with  $\text{H}_2\text{SO}_4$  to form  $\text{ZnSO}_4$ ?

**Answer:  $\text{ZnO}$**

20. What will happen if  $\text{MgO}$  is added to  $\text{HCl}$ ?

**Answer:  $\text{MgCl}_2$  and  $\text{H}_2\text{O}$  will be formed.**

1. What happens when  $\text{HCl}$  is dissolved in water?

- a) It forms solid  $\text{HCl}$
- b) It produces  $\text{H}^+$  and  $\text{Cl}^-$  ions
- c) It forms a gas
- d) It remains unchanged

**Answer: b) It produces  $\text{H}^+$  and  $\text{Cl}^-$  ions**

2. What ion is responsible for the acidic nature of a solution?

- a)  $\text{OH}^-$
- b)  $\text{Na}^+$
- c)  $\text{H}_3\text{O}^+$
- d)  $\text{Cl}^-$

**Answer: c)  $\text{H}_3\text{O}^+$**

3. Which of the following is a strong acid?

- a)  $\text{CH}_3\text{COOH}$
- b)  $\text{HF}$
- c)  $\text{HCl}$
- d)  $\text{NH}_3$

**Answer: c)  $\text{HCl}$**

4. Which of the following bases does not fully dissociate in water?

- a)  $\text{NaOH}$
- b)  $\text{KOH}$
- c)  $\text{NH}_3$
- d)  $\text{Ca}(\text{OH})_2$

**Answer: c)  $\text{NH}_3$**

5. What happens when  $\text{NaOH}$  dissolves in water?

- a) It forms  $\text{Na}^+$  and  $\text{OH}^-$  ions
- b) It releases  $\text{H}^+$  ions
- c) It remains neutral
- d) It forms  $\text{NaCl}$

**Answer: a) It forms  $\text{Na}^+$  and  $\text{OH}^-$  ions**

6. What is the pH of a **strong acid solution**?

- a) Greater than 7
- b) Exactly 7
- c) Less than 7
- d) Cannot be determined

**Answer: c) Less than 7**

7. What is the pH of a **strong base solution**?
- a) Less than 7
  - b) Exactly 7
  - c) Greater than 7
  - d) Cannot be determined
- Answer:** c) Greater than 7
8. Which of the following acids **partially dissociates** in water?
- a)  $\text{H}_2\text{SO}_4$
  - b)  $\text{HNO}_3$
  - c)  $\text{HCl}$
  - d)  $\text{CH}_3\text{COOH}$
- Answer:** d)  $\text{CH}_3\text{COOH}$
9. Which of the following solutions will conduct electricity best?
- a) Distilled water
  - b) A weak acid solution
  - c) A strong acid solution
  - d) Pure ethanol
- Answer:** c) A strong acid solution
10. When  $\text{NH}_3$  dissolves in water, what ion does it produce?
- a)  $\text{NH}_4^+$
  - b)  $\text{OH}^-$
  - c)  $\text{H}_3\text{O}^+$
  - d) Both  $\text{NH}_4^+$  and  $\text{OH}^-$
- Answer:** d) Both  $\text{NH}_4^+$  and  $\text{OH}^-$
11. What type of bond is broken when  $\text{NaOH}$  dissolves in water?
- a) Covalent bond
  - b) Hydrogen bond
  - c) Ionic bond
  - d) Metallic bond
- Answer:** c) Ionic bond
12. Which of the following acids is a **monoprotic acid**?
- a)  $\text{H}_2\text{SO}_4$
  - b)  $\text{HCl}$
  - c)  $\text{H}_3\text{PO}_4$
  - d)  $\text{H}_2\text{CO}_3$
- Answer:** b)  $\text{HCl}$
13. What happens to the pH when a **strong base** is added to water?
- a) It increases
  - b) It decreases
  - c) It remains the same
  - d) It becomes neutral
- Answer:** a) It increases
14. What ion makes a solution basic?
- a)  $\text{Cl}^-$

- b)  $\text{H}^+$
- c)  $\text{OH}^-$
- d)  $\text{NO}_3^-$

**Answer:** c)  $\text{OH}^-$

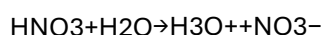
15. What type of reaction occurs when an acid and a base are mixed?

- a) Oxidation
- b) Reduction
- c) Neutralization
- d) Decomposition

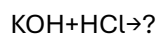
**Answer:** c) Neutralization

16. Write the balanced chemical equation for the dissociation of  $\text{HNO}_3$  in water.

**Answer:**



17. Predict the products of the reaction:



**Answer:**  $\text{KCl} + \text{H}_2\text{O}$

18. What happens when  $\text{NaOH}$  is added to an acidic solution?

**Answer:** The solution becomes neutralized.

19. Name one weak acid and one weak base.

**Answer:** Acetic acid ( $\text{CH}_3\text{COOH}$ ), Ammonia ( $\text{NH}_3$ ).

20. What is the pH range for acidic solutions?

**Answer:** 0 to 6.9

1. What is the pH range of acidic substances?

- a) 0 - 7
- b) 7 - 14
- c) Exactly 7
- d) 6 - 10

**Answer:** a) 0 - 7

2. What is the normal pH of blood?

- a) 5.5
- b) 6.5
- c) 7.4
- d) 9.0

**Answer:** c) 7.4

3. Which of the following substances has the lowest pH?

- a) Lemon juice
- b) Milk
- c) Pure water
- d) Baking soda

**Answer:** a) Lemon juice

4. Why is the pH of the stomach so low?

- a) To digest food
- b) To neutralize acids
- c) To make food alkaline
- d) To increase blood pH

**Answer:** a) To digest food

5. What is the pH range of neutral substances?

- a) 0 - 7
- b) 7 - 14
- c) Exactly 7
- d) 6 - 10

**Answer:** c) Exactly 7

6. What happens when the pH of saliva is lower than 5.5?

- a) Tooth enamel dissolves
- b) It becomes more basic
- c) It helps digestion
- d) Nothing happens

**Answer:** a) Tooth enamel dissolves

7. Which acid is commonly used in food preservation?

- a) Sulfuric acid
- b) Hydrochloric acid
- c) Acetic acid
- d) Nitric acid

**Answer:** c) Acetic acid

8. How can acidic soil be neutralized?

- a) By adding gypsum
- b) By adding lime ( $\text{CaCO}_3$ )
- c) By adding more acid
- d) By adding water

**Answer:** b) By adding lime ( $\text{CaCO}_3$ )

9. What is the pH of acid rain?

- a) Above 7
- b) Exactly 7
- c) Below 5
- d) Between 6 and 7

**Answer:** c) Below 5

10. What is the approximate pH of milk?

- a) 2
- b) 4
- c) 6.5
- d) 10

**Answer:** c) 6.5

11. What is the main cause of acid rain?

- a)  $\text{SO}_2$  and  $\text{NO}_2$  gases

- b) CO<sub>2</sub> from plants
- c) Dust in the air
- d) Ozone layer depletion

**Answer:** a) SO<sub>2</sub> and NO<sub>2</sub> gases

12. Which of the following liquids is **most basic**?

- a) Vinegar
- b) Lemon juice
- c) Soap water
- d) Milk

**Answer:** c) Soap water

13. Which factor does NOT affect soil pH?

- a) Rainfall
- b) Fertilizers
- c) Temperature
- d) Color of the soil

**Answer:** d) Color of the soil

14. What is the ideal pH of **drinking water**?

- a) 4 - 5
- b) 6.5 - 8.5
- c) 9 - 10
- d) 1 - 2

**Answer:** b) 6.5 - 8.5

15. How does **antacid** work in the stomach?

- a) It increases stomach acid
- b) It neutralizes excess acid
- c) It dissolves food
- d) It makes acid stronger

**Answer:** b) It neutralizes excess acid

16. A student tested a liquid and found its pH to be 3. Is the liquid acidic, basic, or neutral?

**Answer: Acidic**

17. A farmer finds that his soil is too acidic. What should he add to neutralize it?

**Answer: Lime (CaCO<sub>3</sub>)**

18. If a cleaning product has a pH of 11, is it acidic or basic?

**Answer: Basic**

19. If soap has a pH of 9, what type of solution is it?

**Answer: Mildly basic**

20. What happens to the pH of rainwater when SO<sub>2</sub> and NO<sub>2</sub> mix with it?

**Answer: It decreases, leading to acid rain.**

1. What is a salt?

- a) A type of acid
- b) A type of base



- c) A compound formed from an acid and a base
- d) A metal oxide

**Answer:** c) A compound formed from an acid and a base

2. Which of the following salts is neutral?

- a) NaCl
- b)  $\text{NH}_4\text{Cl}$
- c)  $\text{Na}_2\text{CO}_3$
- d)  $\text{CuSO}_4$

**Answer:** a) NaCl

3. The pH of a neutral salt is:

- a) Less than 7
- b) Exactly 7
- c) More than 7
- d) Depends on concentration

**Answer:** b) Exactly 7

4. What is the pH of ammonium chloride ( $\text{NH}_4\text{Cl}$ ) solution?

- a) 7
- b) Less than 7
- c) More than 7
- d) None of these

**Answer:** b) Less than 7

5. Which type of salt is formed from a strong acid and a weak base?

- a) Neutral
- b) Acidic
- c) Basic
- d) Double salt

**Answer:** b) Acidic

6. Which salt is commonly known as **baking soda**?

- a) NaCl
- b)  $\text{KNO}_3$
- c)  $\text{NaHCO}_3$
- d)  $\text{CuSO}_4$

**Answer:** c)  $\text{NaHCO}_3$

7. Which acid forms **nitrate salts**?

- a) Hydrochloric acid
- b) Sulfuric acid
- c) Nitric acid
- d) Carbonic acid

**Answer:** c) Nitric acid

8. The pH of a **basic salt solution** is:

- a) Less than 7
- b) Equal to 7
- c) Greater than 7

d) Exactly 5

**Answer:** c) Greater than 7

9. Which of the following is an example of an acidic salt?

a) NaCl

b)  $\text{NH}_4\text{Cl}$

c)  $\text{Na}_2\text{SO}_4$

d)  $\text{KNO}_3$

**Answer:** b)  $\text{NH}_4\text{Cl}$

10. Which acid reacts with sodium hydroxide to form sodium sulfate?

a) Hydrochloric acid

b) Sulfuric acid

c) Nitric acid

d) Acetic acid

**Answer:** b) Sulfuric acid

11. What type of salt is formed when a **weak acid reacts with a strong base**?

a) Neutral

b) Acidic

c) Basic

d) None

**Answer:** c) Basic

12. What is the formula of **potassium nitrate**?

a)  $\text{K}_2\text{CO}_3$

b)  $\text{KNO}_3$

c)  $\text{K}_2\text{SO}_4$

d) KCl

**Answer:** b)  $\text{KNO}_3$

13. Which salt is commonly used in fertilizers?

a) NaCl

b)  $\text{NH}_4\text{NO}_3$

c)  $\text{Na}_2\text{CO}_3$

d) KOH

**Answer:** b)  $\text{NH}_4\text{NO}_3$

14. Which compound is commonly used to **neutralize acidic soil**?

a) NaCl

b) HCl

c)  $\text{CaCO}_3$

d) KOH

**Answer:** c)  $\text{CaCO}_3$

15. What is the general formula for **carbonates**?

a)  $\text{CO}_3^{2-}$

b)  $\text{NO}_3^-$

c)  $\text{SO}_4^{2-}$

d)  $\text{PO}_4^{3-}$

**Answer:** a)  $\text{CO}_3^{2-}$

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### Practice Questions (10%)

16. A salt solution has a pH of 9. Is it acidic, basic, or neutral?

**Answer: Basic**

17. Which acid is used to make **potassium chloride (KCl)**?

**Answer: Hydrochloric acid (HCl)**

### ❖ METALS AND NON-METAL

1. Which of the following is a metal?

- a) Oxygen
- b) Carbon
- c) Iron
- d) Sulfur

**Answer: c) Iron**

2. Which metal is liquid at room temperature?

- a) Sodium
- b) Mercury
- c) Copper
- d) Zinc

**Answer: b) Mercury**

3. Which of the following is NOT a property of metals?

- a) Malleability
- b) Ductility
- c) Poor conductor of electricity
- d) High melting point

**Answer: c) Poor conductor of electricity**

4. Which of the following metals is soft and can be cut with a knife?

- a) Iron
- b) Sodium
- c) Copper
- d) Gold

**Answer: b) Sodium**

5. Non-metals are generally:

- a) Malleable
- b) Ductile
- c) Poor conductors of electricity
- d) Sonorous

**Answer: c) Poor conductors of electricity**

6. Which non-metal is a **good conductor** of electricity?

- a) Sulfur

- b) Graphite
- c) Phosphorus
- d) Bromine

**Answer:** b) Graphite

7. Which non-metal is **lustrous**?

- a) Oxygen
- b) Iodine
- c) Sulfur
- d) Nitrogen

**Answer:** b) Iodine

8. Metals are:

- a) Poor conductors of electricity
- b) Brittle
- c) Good conductors of heat and electricity
- d) Found only in solid state

**Answer:** c) Good conductors of heat and electricity

9. The property of **being drawn into thin wires** is called:

- a) Malleability
- b) Conductivity
- c) Ductility
- d) Sonority

**Answer:** c) Ductility

10. Which non-metal is liquid at room temperature?

- a) Iodine
- b) Bromine
- c) Carbon
- d) Oxygen

**Answer:** b) Bromine

11. The property of **metals producing a ringing sound** is called:

- a) Ductility
- b) Sonority
- c) Conductivity
- d) Brittleness

**Answer:** b) Sonority

12. Which of the following metals is the best conductor of electricity?

- a) Iron
- b) Copper
- c) Zinc
- d) Aluminum

**Answer:** b) Copper

13. Which of the following is a poor conductor of electricity?

- a) Silver
- b) Copper
- c) Lead

d) Aluminum

**Answer:** c) Lead

14. Which metal is the most **malleable and ductile**?

a) Iron

b) Gold

c) Zinc

d) Aluminum

**Answer:** b) Gold

15. Which non-metal exists in all three states (solid, liquid, gas)?

a) Oxygen

b) Sulfur

c) Carbon

d) Phosphorus

**Answer:** d) Phosphorus

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### Practice Questions (10%)

16. Identify the metal from the following: **Na, O<sub>2</sub>, S, Cl<sub>2</sub>**

**Answer:** Na (Sodium)

17. Which property helps metals to be used in **electrical wiring**?

**Answer:** Ductility and high conductivity

18. Name a metal that does not corrode easily.

**Answer:** Gold or Platinum

19. Why is aluminum used to make aircraft?

**Answer:** It is lightweight and strong.

20. What is the main reason for using iron in construction?

**Answer:** It has high strength and durability.

1. When a metal reacts with oxygen, it forms:

a) Acidic oxide

b) Basic oxide

c) Neutral oxide

d) None of these

**Answer:** b) Basic oxide

2. Which of the following metals reacts violently with cold water?

a) Magnesium

b) Sodium

c) Copper

d) Zinc

**Answer:** b) Sodium

3. The reaction of iron with steam produces:

a) Fe(OH)<sub>3</sub>

b) Fe<sub>3</sub>O<sub>4</sub>

c) FeO

d) Fe<sub>2</sub>O<sub>3</sub>

**Answer:** b) Fe<sub>3</sub>O<sub>4</sub>

4. When a metal reacts with an acid, which gas is released?

a) Oxygen

b) Hydrogen

c) Nitrogen

d) Carbon dioxide

**Answer:** b) Hydrogen

5. Which of the following metals does **not** react with acid?

a) Magnesium

b) Zinc

c) Copper

d) Iron

**Answer:** c) Copper

6. Which of the following metals reacts with **both acids and bases**?

a) Zinc

b) Copper

c) Sodium

d) Gold

**Answer:** a) Zinc

7. Metal oxides are generally:

a) Acidic

b) Basic

c) Neutral

d) Amphoteric

**Answer:** b) Basic

8. The rusting of iron is a reaction between iron, oxygen, and:

a) Acid

b) Water

c) Base

d) Salt

**Answer:** b) Water

9. Which metal does not react with oxygen?

a) Copper

b) Silver

c) Gold

d) Iron

**Answer:** c) Gold

10. The reaction of aluminum with sodium hydroxide produces:

a) Hydrogen gas

b) Oxygen gas

c) Carbon dioxide gas

d) Nitrogen gas

**Answer:** a) Hydrogen gas

11. When calcium reacts with water, the gas produced is:

a) Oxygen

b) Hydrogen

c) Carbon dioxide

d) Nitrogen

**Answer:** b) Hydrogen

12. Which of the following metal oxides is amphoteric?

a)  $\text{Na}_2\text{O}$

b)  $\text{Al}_2\text{O}_3$

c)  $\text{CuO}$

d)  $\text{Fe}_2\text{O}_3$

**Answer:** b)  $\text{Al}_2\text{O}_3$

13. The reaction of sodium with water is:

a) Slow

b) Moderate

c) Violent

d) No reaction

**Answer:** c) Violent

14. Which of the following metal does not react with either acid or base?

a) Zinc

b) Copper

c) Aluminum

d) Magnesium

**Answer:** b) Copper

15. Which gas is formed when zinc reacts with  $\text{NaOH}$ ?

a) Oxygen

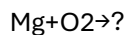
b) Hydrogen

c) Nitrogen

d) Carbon dioxide

**Answer:** b) Hydrogen

16. Complete the equation:



**Answer:**  $2\text{MgO}$

1. Ionic bonds are formed between:

a) Two metals

b) Two non-metals

c) A metal and a non-metal

d) None of these

**Answer:** c) A metal and a non-metal

2. When a metal reacts with a non-metal, it forms:
- a) Covalent compound
  - b) Ionic compound
  - c) Metallic compound
  - d) None of these

**Answer:** b) Ionic compound

3. Sodium forms an ionic bond with chlorine by:
- a) Gaining an electron
  - b) Losing an electron
  - c) Sharing electrons
  - d) No reaction

**Answer:** b) Losing an electron

4. What is the charge on a sodium ion in NaCl?
- a) -1
  - b) +1
  - c) -2
  - d) +2

**Answer:** b) +1

5. Ionic compounds are generally:
- a) Good conductors of electricity in solid state
  - b) Poor conductors of electricity in solid state
  - c) Poor conductors of electricity in liquid state
  - d) Always conductors of electricity

**Answer:** b) Poor conductors of electricity in solid state

6. Which of the following is an ionic compound?
- a)  $\text{CO}_2$
  - b)  $\text{H}_2\text{O}$
  - c) NaCl
  - d)  $\text{CH}_4$

**Answer:** c) NaCl

7. Ionic compounds are soluble in:
- a) Water
  - b) Kerosene
  - c) Alcohol
  - d) Petrol

**Answer:** a) Water

8. Why do ionic compounds have high melting points?
- a) Weak forces between molecules
  - b) Strong electrostatic forces between ions
  - c) High number of protons
  - d) Presence of covalent bonds

**Answer:** b) Strong electrostatic forces between ions

9. What happens when NaCl is dissolved in water?
- a) It does not conduct electricity



- b) Sodium and chloride ions move freely
- c) It forms a solid lump
- d) It becomes a covalent compound

**Answer:** b) Sodium and chloride ions move freely

10. The ions in an ionic compound are held together by:

- a) Covalent bonds
- b) Weak Van der Waals forces
- c) Electrostatic forces
- d) Hydrogen bonding

**Answer:** c) Electrostatic forces

11. Which of the following is not a property of ionic compounds?

- a) High melting point
- b) Brittle nature
- c) Good electrical conductivity in solid form
- d) Solubility in water

**Answer:** c) Good electrical conductivity in solid form

12. What is the name of the force that holds ionic compounds together?

- a) Gravitational force
- b) Electrostatic force
- c) Magnetic force
- d) Nuclear force

**Answer:** b) Electrostatic force

13. Which metal will form an ionic bond with chlorine?

- a) Oxygen
- b) Sodium
- c) Carbon
- d) Nitrogen

**Answer:** b) Sodium

14. In which state do ionic compounds conduct electricity?

- a) Solid
- b) Liquid and aqueous
- c) Gaseous
- d) None of these

**Answer:** b) Liquid and aqueous

15. Which of the following is **not** an ionic compound?

- a) KCl
- b) HCl
- c) MgO
- d) CaF<sub>2</sub>

**Answer:** b) HCl

---

### Practice Questions (10%)

16. Fill in the blanks:

- An ionic bond is formed when a metal \_\_\_\_ electrons and a non-metal \_\_\_\_ electrons.  
**Answer: loses, gains**

17. Write the electron transfer for the formation of MgO.

**Answer:**

- **Magnesium loses 2 electrons:**  $\text{Mg} \rightarrow \text{Mg}^{2+} + 2\text{e}^-$
- **Oxygen gains 2 electrons:**  $\text{O} + 2\text{e}^- \rightarrow \text{O}^{2-}$
- **Ionic bond forms:**  $\text{Mg}^{2+} + \text{O}^{2-} \rightarrow \text{MgO}$

1. What is corrosion?

- A method of metal extraction
- A process of metal deterioration
- A type of metal alloying
- A way to strengthen metals

**Answer:** b) A process of metal deterioration

2. The rusting of iron is an example of:

- Physical change
- Chemical change
- Reversible change
- None of the above

**Answer:** b) Chemical change

3. Which of the following metals does not rust but still corrodes?

- Iron
- Copper
- Aluminum
- Zinc

**Answer:** c) Aluminum

4. The chemical formula of rust is:

- FeO
- $\text{Fe}_2\text{O}_3$
- $\text{Fe}_3\text{O}_4$
- $\text{Fe}_2\text{O}_3 \cdot x\text{H}_2\text{O}$

**Answer:** d)  $\text{Fe}_2\text{O}_3 \cdot x\text{H}_2\text{O}$

5. Which metal forms a greenish layer due to corrosion?

- Iron
- Silver
- Copper
- Gold

**Answer:** c) Copper

6. Which gas in the air is mainly responsible for corrosion?

- Hydrogen
- Oxygen
- Carbon dioxide

d) Nitrogen

**Answer:** b) Oxygen

7. The process of coating iron with zinc to prevent rusting is called:

a) Electroplating

b) Galvanization

c) Alloying

d) Painting

**Answer:** b) Galvanization

8. Why does aluminum not corrode easily?

a) It does not react with oxygen

b) It is a non-metal

c) It forms a protective oxide layer

d) It is a noble gas

**Answer:** c) It forms a protective oxide layer

9. What prevents stainless steel from rusting?

a) Zinc coating

b) Protective paint

c) Chromium content

d) Carbon content

**Answer:** c) Chromium content

10. Which of the following metals does not corrode easily?

a) Iron

b) Copper

c) Gold

d) Silver

**Answer:** c) Gold

11. Which metal is used as a sacrificial anode to protect underground pipelines?

a) Copper

b) Magnesium

c) Iron

d) Gold

**Answer:** b) Magnesium

12. What is the black coating on silver due to corrosion?

a) Silver nitrate

b) Silver sulfide

c) Silver chloride

d) Silver oxide

**Answer:** b) Silver sulfide

13. Why does salt water accelerate corrosion?

a) It reacts with oxygen

b) It increases electrical conductivity

c) It removes rust

d) It prevents oxidation

**Answer:** b) It increases electrical conductivity

14. What is the main reason iron corrodes in moist air?

- a) Reaction with hydrogen
- b) Reaction with carbon dioxide
- c) Reaction with oxygen and water
- d) Reaction with nitrogen

**Answer:** c) Reaction with oxygen and water

15. Electroplating is mainly used to:

- a) Increase corrosion
- b) Improve appearance and prevent rusting
- c) Reduce metal weight
- d) Increase reactivity

**Answer:** b) Improve appearance and prevent rusting

16. Fill in the blanks:

- The process of protecting iron from rusting by coating it with zinc is called \_\_\_\_.

**Answer: Galvanization**

### ❖ COMPUTER PRACTICE

1. Which of the following is the brain of a computer?

- a) Hard Disk
- b) Monitor
- c) CPU
- d) Keyboard

**Answer:** c) CPU

2. What is the full form of CPU?

- a) Central Process Unit
- b) Central Processing Unit
- c) Central Programming Unit
- d) Computer Processing Unit

**Answer:** b) Central Processing Unit

3. Which of the following is a volatile memory?

- a) Hard Disk
- b) ROM
- c) RAM
- d) SSD

**Answer:** c) RAM

4. Which part of the CPU is responsible for performing calculations?

- a) Control Unit
- b) Arithmetic Logic Unit (ALU)
- c) Memory Unit
- d) Registers

**Answer:** b) Arithmetic Logic Unit (ALU)

5. Which device is used to provide input to the computer?

- a) Monitor

- b) Printer
- c) Keyboard
- d) Speaker

**Answer:** c) Keyboard

6. What type of software is an operating system?

- a) Application Software
- b) System Software
- c) Utility Software
- d) Malware

**Answer:** b) System Software

7. What is the function of ROM?

- a) Temporary storage
- b) Permanent storage of system instructions
- c) Data processing
- d) Displaying output

**Answer:** b) Permanent storage of system instructions

8. Which is an example of an output device?

- a) Keyboard
- b) Mouse
- c) Monitor
- d) Scanner

**Answer:** c) Monitor

9. Which type of computer is the most powerful?

- a) Minicomputer
- b) Microcomputer
- c) Supercomputer
- d) Mainframe Computer

**Answer:** c) Supercomputer

10. Which of the following is NOT a storage device?

- a) Hard Disk
- b) RAM
- c) Scanner
- d) SSD

**Answer:** c) Scanner

11. The basic operations performed by a computer follow which cycle?

- a) Input-Process-Output
- b) Save-Edit-Print
- c) Boot-Load-Execute
- d) Read-Write-Delete

**Answer:** a) Input-Process-Output

12. What is the smallest unit of data in a computer?

- a) Byte
- b) Bit
- c) Kilobyte
- d) Megabyte

**Answer:** b) Bit

13. Which number system do computers use for processing?

- a) Decimal

- b) Octal
- c) Binary
- d) Hexadecimal

**Answer:** c) Binary

14. What does GUI stand for?
- a) Graphical User Interaction
  - b) General Utility Interface
  - c) Graphical User Interface
  - d) General User Integration

**Answer:** c) Graphical User Interface

15. What is an example of application software?
- a) Windows 10
  - b) MS Word
  - c) Linux
  - d) BIOS

**Answer:** b) MS Word

16. **Fill in the blank:** The two main components of a computer system are \_\_\_\_ and \_\_\_\_.

**Answer:** Hardware, Software

1. What does HTML stand for?
- a) HyperText Making Language
  - b) HyperText Markup Language
  - c) HighText Machine Language
  - d) Hyper Transfer Markup Language
2. Which tag is used to define a paragraph in HTML?
- a) <p>
  - b) <para>
  - c) <paragraph>
  - d) <pg>

**Answer:** a) <p>

3. What is the function of a web browser?
- a) To write HTML code
  - b) To store data permanently
  - c) To display web pages
  - d) To convert images into text

**Answer:** c) To display web pages

4. What is the purpose of the <title> tag?
- a) To create a heading
  - b) To set the title of the webpage
  - c) To define a paragraph
  - d) To insert an image

**Answer:** b) To set the title of the webpage

5. Which protocol is used for secure communication on the internet?
- a) FTP
  - b) HTTP
  - c) HTTPS
  - d) SMTP

**Answer:** c) HTTPS

6. What does URL stand for?
- a) Universal Resource Locator
  - b) Uniform Resource Locator
  - c) Unified Resource Locator
  - d) Unique Resource Locator

**Answer:** b) Uniform Resource Locator

7. Which HTML tag is used to insert an image?
- a) <img>
  - b) <image>
  - c) <pic>
  - d) <src>

**Answer:** a) <img>

8. What is the function of the <a> tag in HTML?
- a) To display images
  - b) To create hyperlinks
  - c) To define tables
  - d) To add background color

**Answer:** b) To create hyperlinks

9. What is the full form of HTTP?
- a) Hyper Transfer Text Protocol
  - b) Hyper Text Transfer Protocol
  - c) Hyperlink Text Transfer Protocol
  - d) Hyper Text Transaction Process

**Answer:** b) Hyper Text Transfer Protocol

10. Which tag is used to create an ordered list?
- a) <ul>
  - b) <ol>
  - c) <li>
  - d) <list>

**Answer:** b) <ol>

11. What does CSS stand for in web development?
- a) Computer Style Sheet
  - b) Cascading Style Sheet
  - c) Creative Style Sheet
  - d) Color Style Sheet

**Answer:** b) Cascading Style Sheet

12. Which HTML element is used to insert a table row?
- a) <row>

- b) <td>
- c) <tr>
- d) <table>

**Answer:** c) <tr>

13. What is an IP address?

- a) Internet Protocol Address
- b) Internal Process Address
- c) Integrated Program Address
- d) Internet Page Address

**Answer:** a) Internet Protocol Address

14. What is the function of <form> in HTML?

- a) To create a table
- b) To create a form for user input
- c) To create a hyperlink
- d) To display an image

**Answer:** b) To create a form for user input

15. What is the purpose of <meta> tag in HTML?

- a) To add metadata to a webpage
- b) To display images
- c) To create tables
- d) To insert lists

**Answer:** a) To add metadata to a webpage

16. Which of the following is NOT a search engine?

- a) Google
- b) Yahoo
- c) Bing
- d) Windows

**Answer:** d) Windows

17. Which company developed the first web browser?

- a) Microsoft
- b) Netscape
- c) Google
- d) CERN

**Answer:** d) CERN

18. Which HTML tag is used to display the largest heading?

- a) <h1>
- b) <h6>
- c) <h3>
- d) <heading>

**Answer:** a) <h1>

19. What is the default extension of an HTML file?

- a) .txt
- b) .doc
- c) .html



d) .htm

**Answer:** c) .html

20. Which application is used for creating and editing documents?

- a) MS Excel
- b) MS PowerPoint
- c) MS Word
- d) MS Paint

**Answer:** c) MS Word

21. In MS Word, which tab contains font and paragraph formatting options?

- a) Home
- b) Insert
- c) Layout
- d) Review

**Answer:** a) Home

22. Which function is used to sum a range of values in MS Excel?

- a) =ADD ()
- b) =SUM ()
- c) =TOTAL ()
- d) =COUNT ()

**Answer:** b) =SUM ()

23. Which MS Office application is best suited for making presentations?

- a) MS Word
- b) MS Excel
- c) MS PowerPoint
- d) MS Access

**Answer:** c) MS PowerPoint

24. Which feature in MS Word allows you to combine a letter with a mailing list?

- a) Find and Replace
- b) Mail Merge
- c) Spell Check
- d) Grammar Check

**Answer:** b) Mail Merge

25. In MS Excel, which symbol is used to begin a formula?

- a) +
- b) =
- c) -
- d) \*

**Answer:** b) =

26. Which view in PowerPoint is used to add speaker notes?

- a) Slide Show View
- b) Slide Sorter View
- c) Notes Page View
- d) Reading View

**Answer:** c) Notes Page View

27. Which chart type is NOT available in MS Excel?

- a) Pie Chart
- b) Column Chart
- c) Flow Chart

d) Line Chart

**Answer:** c) Flow Chart

28. What does "CTRL + B" do in MS Word?

a) Italicizes text

b) Makes text bold

c) Underlines text

d) Copies text

**Answer:** b) Makes text bold

29. What is the shortcut key for saving a document in MS Word?

a) CTRL + S

b) CTRL + C

c) CTRL + V

d) CTRL + P

**Answer:** a) CTRL + S

30. What feature in MS Excel allows filtering data?

a) Sorting

b) Data Validation

c) Filter

d) Pivot Table

**Answer:** c) Filter

31. What is the default extension for an MS PowerPoint file?

a) .docx

b) .xlsx

c) .pptx

d) .pdf

**Answer:** c) .pptx

32. In PowerPoint, what is used to add visual movement to elements on a slide?

a) Animation

b) Transition

c) Hyperlink

d) Slide Master

**Answer:** a) Animation

33. What does "CTRL + Z" do in MS Word?

a) Save

b) Undo

c) Redo

d) Paste

**Answer:** b) Undo

34. What is the purpose of a Pivot Table in Excel?

a) Data entry

b) Data summarization

c) Formatting cells

d) Writing formulas

**Answer:** b) Data summarization

35. In PowerPoint, which view displays slides as thumbnails?

a) Slide Show View

b) Normal View

c) Slide Sorter View

d) Outline View

**Answer:** c) Slide Sorter View

36. Which feature in MS Word automatically corrects common spelling errors?

- a) Find and Replace
- b) AutoCorrect
- c) Spell Check
- d) Grammar Check

**Answer:** b) AutoCorrect

37. Which key is used to start a PowerPoint presentation?

- a) F2
- b) F5
- c) F8
- d) F10

**Answer:** b) F5

38. What is the function of "Merge & Center" in MS Excel?

- a) Joins and centers selected cells
- b) Aligns text to the right
- c) Deletes data
- d) Filters data

**Answer:** a) Joins and centers selected cells

## ❖ ENVIRONMENTAL SCIENCES

1. What is an ecosystem?

- a) A community of organisms
- b) The physical environment
- c) Interaction between living and non-living components
- d) Only plants and animals in a region

**Answer:** c) Interaction between living and non-living components

2. Which of the following is a biotic component of an ecosystem?

- a) Water
- b) Sunlight
- c) Soil
- d) Bacteria

**Answer:** d) Bacteria

3. Which of the following is NOT an example of an abiotic factor?

- a) Wind
- b) Temperature
- c) Trees
- d) Minerals

**Answer:** c) Trees

4. Which organisms are known as primary producers?

- a) Herbivores
- b) Carnivores
- c) Plants
- d) Decomposers

**Answer:** c) Plants

5. In a food chain, what do herbivores feed on?

- a) Other herbivores
- b) Plants
- c) Carnivores
- d) Fungi

**Answer:** b) Plants

6. Which of the following is an artificial ecosystem?

- a) Desert
- b) Forest
- c) Aquarium
- d) Ocean

**Answer:** c) Aquarium

7. What is the role of decomposers in an ecosystem?

- a) Capture sunlight
- b) Break down dead organisms
- c) Convert oxygen into carbon dioxide
- d) Consume herbivores

**Answer:** b) Break down dead organisms

8. Which of the following is a terrestrial ecosystem?

- a) Ocean
- b) Lake
- c) Desert
- d) Pond

**Answer:** c) Desert

9. Which ecosystem has the highest biodiversity?

- a) Desert
- b) Rainforest
- c) Arctic tundra
- d) Grassland

**Answer:** b) Rainforest

10. The top predator in a food chain is also known as:

- a) Primary producer
- b) Primary consumer
- c) Tertiary consumer
- d) Decomposer

**Answer:** c) Tertiary consumer

11. What percentage of energy is passed from one trophic level to the next?

- a) 90%
- b) 10%
- c) 50%
- d) 1%

**Answer:** b) 10%

12. The term "food web" refers to:

- a) A simple linear food chain

- b) A network of interconnected food chains
  - c) A single producer feeding many consumers
  - d) A system with no energy loss
- Answer:** b) A network of interconnected food chains

13. Which factor is NOT a threat to ecosystems?

- a) Deforestation
- b) Pollution
- c) Sustainable agriculture
- d) Overfishing

**Answer:** c) Sustainable agriculture

14. What is the primary source of energy in most ecosystems?

- a) Water
- b) Sunlight
- c) Soil
- d) Wind

**Answer:** b) Sunlight

15. Which of the following best describes a biome?

- a) A small pond ecosystem
- b) A large geographical area with similar ecosystems
- c) A population of the same species
- d) A group of decomposers

**Answer:** b) A large geographical area with similar ecosystems

16. What is the main function of photosynthesis in an ecosystem?

- a) Convert oxygen into carbon dioxide
- b) Store energy in organic molecules
- c) Break down dead organisms
- d) Absorb heat from the sun

**Answer:** b) Store energy in organic molecules

### **Practice Questions (20%)**

17. If an ecosystem receives 1000 kcal of energy from sunlight, how much energy will be available at the tertiary consumer level?

**Answer:** 1 kcal (as per 10% energy transfer rule)

18. Name two decomposers found in an ecosystem.

**Answer:** Bacteria, Fungi

19. Explain the difference between a food chain and a food web.

**Answer:** A food chain is a linear sequence of organisms where each is eaten by the next. A food web consists of multiple interconnected food chains.

20. Why are rainforests considered important for biodiversity?

**Answer:** They provide habitat for a vast number of species and regulate global climate.

1. Which of the following is a major cause of air pollution?

- a) Planting trees

- b) Burning fossil fuels
  - c) Using solar energy
  - d) Drinking bottled water
- Answer:** b) Burning fossil fuels

2. What is the main pollutant responsible for acid rain?
- a) Oxygen
  - b) Nitrogen gas
  - c) Sulfur dioxide
  - d) Water vapor

**Answer:** c) Sulfur dioxide

3. Eutrophication is caused by excessive amounts of:
- a) Oxygen
  - b) Heavy metals
  - c) Nutrients like nitrogen and phosphorus
  - d) Carbon dioxide

**Answer:** c) Nutrients like nitrogen and phosphorus

4. Which pollutant is a major contributor to global warming?
- a) Sulfur dioxide
  - b) Carbon dioxide
  - c) Lead
  - d) Mercury

**Answer:** b) Carbon dioxide

5. Which type of pollution is mainly caused by industrial waste disposal?
- a) Air pollution
  - b) Soil pollution
  - c) Noise pollution
  - d) Thermal pollution

**Answer:** b) Soil pollution

6. What type of pollution is caused by excessive use of loudspeakers?
- a) Noise pollution
  - b) Thermal pollution
  - c) Air pollution
  - d) Radioactive pollution

**Answer:** a) Noise pollution

7. Oil spills primarily cause:
- a) Soil pollution
  - b) Water pollution
  - c) Noise pollution
  - d) Radioactive pollution

**Answer:** b) Water pollution

8. What is a major effect of thermal pollution?
- a) Reduced oxygen levels in water
  - b) Increased crop growth
  - c) Improved air quality

d) Reduced global warming

**Answer:** a) Reduced oxygen levels in water

9. The main cause of radioactive pollution is:

a) Use of fertilizers

b) Burning fossil fuels

c) Nuclear waste disposal

d) Excessive use of plastic

**Answer:** c) Nuclear waste disposal

10. Which of the following is an example of biodegradable waste?

a) Plastic bags

b) Glass bottles

c) Banana peels

d) Aluminum cans

**Answer:** c) Banana peels

11. Which law in India regulates air pollution?

a) Wildlife Protection Act

b) Air (Prevention and Control of Pollution) Act

c) Indian Penal Code

d) Motor Vehicles Act

**Answer:** b) Air (Prevention and Control of Pollution) Act

12. The major source of noise pollution in urban areas is:

a) Factories

b) Road traffic

c) Water pollution

d) Radiation

**Answer:** b) Road traffic

13. What is the best way to reduce plastic pollution?

a) Burning plastic

b) Dumping plastic in landfills

c) Recycling and reusing plastic

d) Increasing plastic production

**Answer:** c) Recycling and reusing plastic

14. Which pollution is caused by excessive pesticide use?

a) Noise pollution

b) Soil pollution

c) Water pollution

d) Air pollution

**Answer:** b) Soil pollution

15. The contamination of groundwater is mainly due to:

a) Air pollution

b) Overuse of fossil fuels

c) Dumping of industrial waste

d) Noise pollution

**Answer:** c) Dumping of industrial waste

16. Name two gases responsible for acid rain.

**Answer:** Sulfur dioxide (SO<sub>2</sub>), Nitrogen oxides (NO<sub>x</sub>).

17. How does deforestation contribute to air pollution?

**Answer:** It reduces oxygen production and increases carbon dioxide levels.

18. Explain how noise pollution affects human health.

**Answer:** It causes stress, hearing loss, and sleep disturbances.

19. Why is plastic pollution harmful to marine life?

**Answer:** Marine animals ingest plastic, leading to death and ecosystem imbalance.

20. Suggest two ways to reduce air pollution.

**Answer:** Use of public transport, switching to renewable energy.

1. What is the primary cause of climate change?

- a) Ocean currents
- b) Solar radiation changes
- c) Greenhouse gas emissions from human activities
- d) Volcanic eruptions

**Answer:** c) Greenhouse gas emissions from human activities

2. Which of the following is a greenhouse gas?

- a) Oxygen
- b) Carbon dioxide
- c) Nitrogen
- d) Helium

**Answer:** b) Carbon dioxide

3. What is the main contributor to global warming?

- a) Increased oxygen levels
- b) Burning fossil fuels
- c) Solar radiation decrease
- d) Increased nitrogen levels

**Answer:** b) Burning fossil fuels

4. The phenomenon of Earth's temperature rise due to greenhouse gases is called:

- a) Acid rain
- b) Global warming
- c) Ozone depletion
- d) Photosynthesis

**Answer:** b) Global warming

5. Which gas is NOT a greenhouse gas?

- a) Methane
- b) Water vapor
- c) Carbon dioxide
- d) Nitrogen

**Answer:** d) Nitrogen

6. Deforestation contributes to climate change by:

- a) Increasing oxygen levels



- b) Decreasing carbon dioxide levels
- c) Reducing carbon absorption
- d) Increasing nitrogen levels

**Answer:** c) Reducing carbon absorption

7. Rising global temperatures have led to:
- a) Decreased sea levels
  - b) Increased glacier formation
  - c) More frequent extreme weather events
  - d) Fewer wildfires

**Answer:** c) More frequent extreme weather events

8. The Paris Agreement aims to:
- a) Promote deforestation
  - b) Reduce global carbon emissions
  - c) Increase greenhouse gas emissions
  - d) Encourage fossil fuel use

**Answer:** b) Reduce global carbon emissions

9. Which of the following is an adaptation strategy for climate change?
- a) Increasing industrial emissions
  - b) Building flood barriers
  - c) Burning more fossil fuels
  - d) Cutting down trees

**Answer:** b) Building flood barriers

10. Melting glaciers lead to:
- a) Decrease in ocean levels
  - b) Rise in sea levels
  - c) Reduction in atmospheric CO<sub>2</sub>
  - d) Increase in land area

**Answer:** b) Rise in sea levels

11. The primary cause of ocean acidification is:
- a) Excess oxygen absorption
  - b) Carbon dioxide absorption
  - c) Overfishing
  - d) Oil spills

**Answer:** b) Carbon dioxide absorption

12. The process of converting fossil fuels into energy releases:
- a) Nitrogen
  - b) Oxygen
  - c) Carbon dioxide
  - d) Water vapor

**Answer:** c) Carbon dioxide

13. Which of the following contributes to global warming the most?
- a) Hydroelectric power
  - b) Burning coal
  - c) Using solar panels

d) Wind energy

**Answer:** b) Burning coal

14. What is an example of renewable energy?

a) Coal

b) Solar power

c) Natural gas

d) Petroleum

**Answer:** b) Solar power

15. The Kyoto Protocol focused on:

a) Reducing noise pollution

b) Controlling greenhouse gas emissions

c) Encouraging deforestation

d) Banning the use of plastic

**Answer:** b) Controlling greenhouse gas emissions

16. Name two greenhouse gases.

**Answer:** Carbon dioxide (CO<sub>2</sub>), Methane (CH<sub>4</sub>).

17. What is the main effect of melting glaciers?

**Answer:** Rising sea levels.

18. Suggest one way to reduce carbon footprint.

**Answer:** Using public transportation.

19. How does deforestation affect climate change?

**Answer:** Increases CO<sub>2</sub> levels in the atmosphere.

20. What is the role of the Paris Agreement?

**Answer:** To limit global warming to below 2°C.

1. What is the primary advantage of renewable energy sources?

a) They never run out

b) They are cheaper than fossil fuels

c) They do not require any infrastructure

d) They produce more pollution than coal

**Answer:** a) They never run out

2. Which of the following is NOT a renewable energy source?

a) Wind energy

b) Biomass energy

c) Natural gas

d) Tidal energy

**Answer:** c) Natural gas

3. Hydropower plants generate electricity using:

a) Solar panels

b) Wind turbines

c) Moving water

d) Geothermal heat

**Answer:** c) Moving water

4. What is the major drawback of solar energy?

- a) It causes pollution
- b) It does not work at night
- c) It requires fossil fuels
- d) It releases harmful gases

**Answer:** b) It does not work at night

5. Wind energy is most suitable in:

- a) Forested areas
- b) Coastal regions and open plains
- c) Desert regions
- d) Underground caves

**Answer:** b) Coastal regions and open plains

6. What is a major limitation of tidal energy?

- a) It depends on wind speed
- b) It releases CO<sub>2</sub> emissions
- c) It is limited to certain coastal locations
- d) It requires fossil fuels

**Answer:** c) It is limited to certain coastal locations

7. Biomass energy is obtained from:

- a) Nuclear reactions
- b) Burning organic materials
- c) Hydroelectric dams
- d) Solar panels

**Answer:** b) Burning organic materials

8. Which country is known for its geothermal energy production?

- a) India
- b) Iceland
- c) Brazil
- d) Saudi Arabia

**Answer:** b) Iceland

9. Which of the following does NOT produce greenhouse gases?

- a) Coal power plants
- b) Hydropower plants
- c) Biomass combustion
- d) Petroleum-based engines

**Answer:** b) Hydropower plants

10. What is the main disadvantage of geothermal energy?

- a) It is highly polluting
- b) It is available everywhere
- c) It has high initial costs
- d) It requires fossil fuels

**Answer:** c) It has high initial costs

11. Name two sources of renewable energy.

**Answer:** Solar energy, wind energy.

12. Which energy source uses underground heat?  
**Answer:** Geothermal energy.
13. What is the main reason solar energy is not widely used at night?  
**Answer:** It requires sunlight to generate power.
14. What type of energy is generated from high and low tides?  
**Answer:** Tidal energy.
15. Which country produces the most wind energy?  
**Answer:** China.
16. Which region in India is best for hydropower generation?  
**Answer:** The Himalayan region.
17. What is the major environmental impact of wind turbines?  
**Answer:** They can affect birds and create noise pollution.
18. How does biomass energy contribute to reducing waste?  
**Answer:** It uses agricultural and organic waste as fuel.
19. Which form of energy is harnessed using dams?  
**Answer:** Hydropower.
20. Why is geothermal energy limited to specific locations?  
**Answer:** It requires underground heat sources, usually near volcanic regions.