

EMRS KIRMIRA
AUTUMN HOLIDAY HOMEWORK-2026-2027
SUBJECT-COMPUTER SCIENCE
CLASS-12 SCIENCE

1. Predict the output.

(a)

```
python
x = 15
y = 4
print(x // y)
print(x % y)
print(x ** 2)
```

(b)

```
python
L = [10, 20, 30, 40, 50]
print(L[1:4])
print(L[-1])
print(L[::-1])
```

(c)

```
python
s = "COMPUTER"
print(s[2:6])
print(s[-3:])
print(len(s))
```

(d)

```
python
for i in range(2, 11, 2):
    print(i, end=" ")
```

(e)

```
python
d = {"A": 10, "B": 20, "C": 30}
d["B"] = 50
1. "COMPUTER"
2. print(s[1:6:2])
3. print(s[::-1])
```

(f)

```
L = [10, 20, 30, 40]
L.append(50)
L.insert(2, 25)
L.remove(40)
print(L)
```

(g)

```
d = {"A": 10, "B": 20, "C": 30}
d["B"] = 50
d["D"] = 40
print(d)
print(len(d))
```

2. Write a Python program to count the number of lines in a text file named story.txt.
3. Write a function CountWords() to count the number of words in a text file named article.txt.
4. Write a program to store student records (roll number and name) in a binary file using pickle. Also write a program to read and display those records.
5. Check whether a number is prime.
6. Count the number of vowels in a string.
7. Find the sum and average of elements in a list.
8. Remove duplicate elements from a list.
9. Find the largest and smallest elements in a list.
10. Write a Python program to count the occurrences of the word "Python" in a text file.
11. Write a function to display all lines that start with the letter A.
12. Write a program to copy the contents of one text file into another file.
13. Write a Python program to remove blank lines from a text file.
14. A company connects all its computers to a central switch. If one computer's connecting cable fails, the other computers continue working normally. However, if the central switch fails, communication between computers is disrupted.
 1. Identify the network topology.
 2. Which device is located at the centre?
 3. State one advantage of this topology.
 4. State one disadvantage of this topology.
15. Rahul opens a website using the URL <https://www.example.com>. His browser contacts a DNS server to find the website's IP address and then establishes a secure connection.

Answer the following questions:

1. What is the full form of URL?
2. What is the function of DNS?
3. Which protocol is indicated by https?
4. Why is HTTPS preferred over HTTP for sensitive information?

16. ABC International School has four departments: Administration, Science Lab, Computer Lab, and Library. The school has 40 computers in the Computer Lab, 15 computers in the Administration Department, 20 computers in the Science Lab, and 10 computers in the Library. The school management wants to connect all computers so that teachers and students can share files, printers, and Internet access. The Computer Lab computers are connected through a central switch. The school plans to connect its departments using suitable networking devices. The school also wants to connect its campus network to another branch located in a different city.

Answer the following questions:

1. Which type of network should be used to connect computers within the school campus?
2. Identify the topology used in the Computer Lab.
3. Which device is suitable for connecting computers within a LAN efficiently?
4. Which device is used to connect different networks?
5. Which type of network may be used to connect the school branches in different cities?
6. State one advantage of connecting computers through a network.
7. Give one advantage of IPv6 over IPv4.

EMRS KIRMIRA**Department of Physics**

Autumn Break Holiday Homework – Session 2026–27

Class: XII Science**Subject: Physics****Total Questions: 100****Name:** _____**Roll No.:** _____**Instructions**

1. Attempt all 100 numerical problems. Each question carries either 2 or 3 marks, as indicated.
2. Show the formula, substitution, calculation and final answer with SI units.
3. Use $k = 9.0 \times 10^9 \text{ N m}^2 \text{ C}^{-2}$, $\epsilon_0 = 8.85 \times 10^{-12} \text{ F m}^{-1}$, $\mu_0 = 4\pi \times 10^{-7} \text{ T m A}^{-1}$, $e = 1.6 \times 10^{-19} \text{ C}$, and $c = 3.0 \times 10^8 \text{ m s}^{-1}$, wherever required.
4. Questions cover NCERT Physics Part I, Chapters 1–8, aligned to the CBSE 2026–27 syllabus. The assignment is numerical/calculation-based; no answer key is included.

A. Electric Charges and Fields**(Questions 1–14)**

1. [2 marks] Two point charges $+2 \mu\text{C}$ and $+3 \mu\text{C}$ are separated by 30 cm in vacuum. Calculate the electrostatic force between them.
2. [2 marks] Charges $+4 \mu\text{C}$ and $-2 \mu\text{C}$ are separated by 20 cm. Find the magnitude and nature of the force between them.
3. [3 marks] Three charges $+2 \mu\text{C}$, $+2 \mu\text{C}$ and $-2 \mu\text{C}$ are at the vertices of an equilateral triangle of side 20 cm. Find the magnitude and direction of the net force on the negative charge.
4. [2 marks] Find the electric field at a point 20 cm from an isolated charge of $+5 \mu\text{C}$.
5. [3 marks] An electric dipole consists of charges $\pm 3 \mu\text{C}$ separated by 4 mm. Calculate its dipole moment and maximum torque in a uniform field of $2 \times 10^5 \text{ N C}^{-1}$.
6. [2 marks] A uniform electric field of 500 N C^{-1} passes through a flat surface of area 0.04 m^2 . Find the electric flux when the field makes 60° with the surface normal.
7. [3 marks] An infinitely long straight wire has linear charge density $2 \times 10^{-6} \text{ C m}^{-1}$. Calculate the electric field at perpendicular distance 10 cm, using $E = \lambda / (2\pi\epsilon_0 r)$.
8. [2 marks] Two equal charges of $+3 \mu\text{C}$ are placed 40 cm apart. Calculate the electric field at the midpoint.
9. [3 marks] Two charges $+4 \mu\text{C}$ and $+1 \mu\text{C}$ are 30 cm apart. Find the point on the line joining them where the net electric field is zero.
10. [2 marks] A charge of $2 \mu\text{C}$ experiences a force of 0.06 N in an electric field. Calculate the field strength.
11. [3 marks] An electric dipole of moment $6 \times 10^{-8} \text{ C m}$ is placed at 30° to a uniform electric field of $4 \times 10^5 \text{ N C}^{-1}$. Calculate the torque.
12. [2 marks] A plane surface of area 0.15 m^2 is placed perpendicular to a uniform electric field of 200 N C^{-1} . Calculate the electric flux.
13. [3 marks] A thin spherical shell has charge $+8 \mu\text{C}$ and radius 10 cm. Calculate the electric field at a point 20 cm from its centre.
14. [3 marks] A uniformly charged infinite plane sheet has surface charge density $4 \times 10^{-8} \text{ C m}^{-2}$. Calculate the magnitude of the electric field near the sheet using $E = \sigma / (2\epsilon_0)$.

B. Electrostatic Potential and Capacitance**(Questions 15–28)**

15. [2 marks] Calculate the electric potential at a point 30 cm from a point charge of $+6 \mu\text{C}$.
16. [2 marks] Two charges $+4 \mu\text{C}$ and $-2 \mu\text{C}$ are separated by 20 cm. Calculate the electrostatic potential energy of the system.

17. [3 marks] A charge of $5\ \mu\text{C}$ is moved through a potential difference of $120\ \text{V}$. Calculate the work done by the electric field in magnitude and the change in potential energy.
18. [2 marks] A parallel-plate capacitor has plate area $0.02\ \text{m}^2$ and separation $1\ \text{mm}$. Calculate its capacitance in air. Take $\epsilon_0 = 8.85 \times 10^{-12}\ \text{F m}^{-1}$.
19. [3 marks] A capacitor has capacitance $4\ \mu\text{F}$. A dielectric of relative permittivity 3 completely fills the space between its plates. Find the new capacitance and the charge stored when connected to a $12\ \text{V}$ battery.
20. [2 marks] A $10\ \mu\text{F}$ capacitor is connected to a $100\ \text{V}$ supply. Calculate the charge stored.
21. [3 marks] A $5\ \mu\text{F}$ capacitor is charged to $200\ \text{V}$. Calculate the energy stored.
22. [3 marks] Capacitors of $3\ \mu\text{F}$ and $6\ \mu\text{F}$ are connected in series across $18\ \text{V}$. Calculate equivalent capacitance and charge on each capacitor.
23. [3 marks] Capacitors of $2\ \mu\text{F}$, $4\ \mu\text{F}$ and $6\ \mu\text{F}$ are connected in parallel across $12\ \text{V}$. Find equivalent capacitance and total charge.
24. [2 marks] Calculate the potential at a point due to a charge of $-8\ \text{nC}$ situated $4\ \text{cm}$ away.
25. [3 marks] Two charges $+2\ \mu\text{C}$ and $+6\ \mu\text{C}$ are $40\ \text{cm}$ apart. Calculate the potential energy of the system.
26. [2 marks] A $4\ \mu\text{F}$ capacitor is connected across $50\ \text{V}$. Find the charge and energy stored.
27. [3 marks] A $6\ \mu\text{F}$ capacitor charged to $100\ \text{V}$ is disconnected from the battery. A dielectric of constant 2 is inserted fully. Find the new capacitance and potential difference.
28. [3 marks] A $4\ \mu\text{F}$ capacitor and a $12\ \mu\text{F}$ capacitor are connected in series across $24\ \text{V}$. Calculate the equivalent capacitance and potential difference across each capacitor.

C. Current Electricity

(Questions 29–42)

29. [2 marks] A charge of $240\ \text{C}$ passes through a conductor in 2 minutes. Calculate the current.
30. [3 marks] A copper wire has area $1.0 \times 10^{-6}\ \text{m}^2$, electron number density $8.0 \times 10^{28}\ \text{m}^{-3}$, and current $3.2\ \text{A}$. Calculate drift velocity using $I = neAv_d$.
31. [2 marks] A conductor carries $2\ \text{A}$ when $12\ \text{V}$ is applied. Find its resistance and electrical power.
32. [2 marks] A $60\ \text{W}$ lamp operates at $240\ \text{V}$. Calculate the current drawn and its operating resistance.
33. [3 marks] A wire has resistance $8\ \Omega$ at 20°C . If $\alpha = 4.0 \times 10^{-3}\ ^\circ\text{C}^{-1}$, calculate its resistance at 70°C .
34. [2 marks] A cell of emf $1.5\ \text{V}$ and internal resistance $0.5\ \Omega$ supplies $1\ \text{A}$. Calculate its terminal potential difference while delivering current.
35. [3 marks] A cell of emf $2.0\ \text{V}$ and internal resistance $0.4\ \Omega$ is connected to an external resistance of $3.6\ \Omega$. Find the current and terminal voltage.
36. [3 marks] Two identical cells, each of emf $1.5\ \text{V}$ and internal resistance $0.5\ \Omega$, are connected in series to an external resistance of $2\ \Omega$. Calculate the circuit current.
37. [3 marks] In a balanced Wheatstone bridge, $P = 10\ \Omega$, $Q = 15\ \Omega$, and $R = 8\ \Omega$. Find S using $P/Q = R/S$.
38. [2 marks] A wire of resistance $12\ \Omega$ is stretched to twice its original length without change in volume. Find its new resistance.
39. [3 marks] Three resistors $2\ \Omega$, $3\ \Omega$ and $6\ \Omega$ are connected in parallel across $6\ \text{V}$. Calculate equivalent resistance and total current.
40. [3 marks] Resistors $4\ \Omega$ and $8\ \Omega$ are connected in series across $24\ \text{V}$. Find the current and potential difference across each resistor.
41. [2 marks] A wire of resistivity $1.7 \times 10^{-8}\ \Omega\text{m}$, length $5\ \text{m}$ and area $1.0 \times 10^{-6}\ \text{m}^2$ is given. Calculate its resistance.
42. [3 marks] Two cells of emfs $2\ \text{V}$ and $1\ \text{V}$, with internal resistances $0.5\ \Omega$ each, are connected in series aiding to a $5\ \Omega$ resistor. Calculate the current.

D. Moving Charges and Magnetism**(Questions 43–58)**

43. [2 marks] An electron moves at $3 \times 10^6 \text{ m s}^{-1}$ perpendicular to a magnetic field of 0.02 T. Calculate the magnitude of the magnetic force.
44. [3 marks] A proton enters a 0.5 T magnetic field perpendicular to the field at $2 \times 10^6 \text{ m s}^{-1}$. Calculate the radius of its circular path. Take $m_p = 1.67 \times 10^{-27} \text{ kg}$.
45. [2 marks] A straight conductor of length 0.4 m carries 5 A in a 0.3 T field. If perpendicular to the field, find the force.
46. [3 marks] A circular coil of 20 turns and radius 10 cm carries 2 A. Calculate the magnetic field at its centre using $B = \mu_0 NI / (2R)$.
47. [2 marks] Calculate the magnetic field 5 cm from a long straight wire carrying 10 A.
48. [3 marks] Two long parallel wires separated by 10 cm carry currents of 5 A and 8 A in the same direction. Calculate force per unit length and state whether it is attractive or repulsive.
49. [3 marks] A rectangular coil of 50 turns, area 0.02 m^2 , and current 0.5 A is in a uniform field of 0.4 T. Calculate the maximum torque.
50. [3 marks] A galvanometer has resistance 50Ω and full-scale current 2 mA. Calculate the shunt resistance needed to convert it into a 2 A ammeter.
51. [2 marks] A charge of $4 \mu\text{C}$ moves at $5 \times 10^4 \text{ m s}^{-1}$ perpendicular to a 0.2 T field. Calculate the magnetic force.
52. [3 marks] A proton moves perpendicular to a magnetic field of 0.2 T in a circular path of radius 0.1 m. Calculate its speed.
53. [2 marks] A wire 0.25 m long carrying 3 A makes an angle of 30° with a magnetic field of 0.8 T. Calculate the magnetic force.
54. [3 marks] A galvanometer has resistance 100Ω and full-scale current 1 mA. Calculate the series resistance required to convert it into a voltmeter of range 10 V.
55. [3 marks] A solenoid has 1000 turns per metre and carries 2 A. Calculate the magnetic field inside it using $B = \mu_0 nI$.
56. [3 marks] A circular coil of radius 5 cm carries 4 A. Calculate the magnetic field at its centre for a single turn.
57. [2 marks] A charged particle with charge magnitude $1.6 \times 10^{-19} \text{ C}$ moves at $2 \times 10^6 \text{ m s}^{-1}$ perpendicular to a 0.1 T field. Find the magnitude of the force.
58. [3 marks] A galvanometer of resistance 40Ω gives full-scale deflection at 5 mA. Find the resistance to be connected in series to make a 3 V voltmeter.

E. Magnetism and Matter**(Questions 59–66)**

59. [2 marks] A material has magnetisation $M = 800 \text{ A m}^{-1}$ in a field intensity $H = 2.0 \times 10^4 \text{ A m}^{-1}$. Calculate its magnetic susceptibility.
60. [2 marks] The magnetic susceptibility of a material is 3.5×10^{-4} . Calculate its magnetisation when $H = 1.2 \times 10^5 \text{ A m}^{-1}$.
61. [3 marks] A bar magnet has magnetic dipole moment 0.8 A m^2 . Calculate the torque when placed at 30° to a uniform magnetic field of 0.25 T.
62. [2 marks] A magnetic dipole of moment 0.5 A m^2 is aligned parallel to a uniform field of 0.4 T. Calculate its potential energy using $U = -MB \cos \theta$.
63. [3 marks] A bar magnet of magnetic moment 1.2 A m^2 is placed antiparallel to a uniform field of 0.3 T. Calculate its potential energy and the work needed to rotate it to the parallel orientation.
64. [2 marks] A magnetic material has $M = 1500 \text{ A m}^{-1}$ and $\chi_m = 0.05$. Calculate the corresponding magnetic field intensity H .

65. [3 marks] A magnetic dipole of moment 0.2 A m^2 is placed perpendicular to a 0.5 T field. Calculate the torque and potential energy.
66. [2 marks] The magnetic moment of a bar magnet is 0.6 A m^2 . Find the torque in a 0.2 T field when the angle between the moment and field is 90° .

F. Electromagnetic Induction

(Questions 67–78)

67. [2 marks] Magnetic flux linked with a single-turn coil changes from 0.02 Wb to 0.08 Wb in 0.3 s . Calculate average induced emf.
68. [3 marks] A coil of 200 turns experiences a change in flux per turn of $5 \times 10^{-4} \text{ Wb}$ in 0.02 s . Calculate average induced emf.
69. [2 marks] The current in an inductor of inductance 0.4 H changes at 5 A s^{-1} . Calculate the magnitude of induced emf.
70. [3 marks] Current through a 2 H inductor increases from 1 A to 4 A in 0.5 s . Calculate induced emf and energy stored at the final current.
71. [3 marks] Flux through each turn of a 100-turn coil changes from $3 \times 10^{-3} \text{ Wb}$ to $1 \times 10^{-3} \text{ Wb}$ in 0.04 s . Calculate average induced emf.
72. [2 marks] Mutual inductance of two coils is 0.25 H . If current in the primary changes at 12 A s^{-1} , calculate induced emf in the secondary.
73. [3 marks] A coil of 150 turns and area 0.02 m^2 is placed with its plane perpendicular to a 0.4 T field. The field falls uniformly to zero in 0.1 s . Calculate average induced emf.
74. [2 marks] An inductor of 3 H carries a current of 2 A . Calculate the energy stored in its magnetic field.
75. [3 marks] The current in a 0.5 H inductor falls from 8 A to 2 A in 0.03 s . Calculate the magnitude of the average induced emf.
76. [3 marks] A 250-turn coil experiences a flux change per turn of $8 \times 10^{-4} \text{ Wb}$ over 0.05 s . Calculate the magnitude of the average induced emf.
77. [2 marks] The magnetic flux linked with a coil changes at a rate of 0.06 Wb s^{-1} . If the induced emf is 3 V , calculate the number of turns.
78. [3 marks] An inductor stores 18 J of energy when carrying a current of 3 A . Calculate its inductance.

G. Alternating Current

(Questions 79–94)

79. [2 marks] An AC source has peak voltage 311 V . Calculate its rms voltage.
80. [2 marks] An alternating current is $i = 5 \sin(100\pi t) \text{ A}$. Find its peak current and frequency.
81. [2 marks] A 50 Hz AC supply is connected to a 0.2 H inductor. Calculate inductive reactance.
82. [2 marks] A $100 \mu\text{F}$ capacitor is connected to a 50 Hz AC supply. Calculate capacitive reactance.
83. [3 marks] A series LCR circuit has $R = 30 \Omega$, $X_L = 50 \Omega$, and $X_C = 10 \Omega$. Calculate impedance and current on a 120 V rms source.
84. [3 marks] A series LCR circuit has $L = 0.2 \text{ H}$ and $C = 50 \mu\text{F}$. Calculate resonant angular frequency and resonant frequency.
85. [2 marks] An AC circuit draws 4 A at 220 V with power factor 0.8 . Calculate average power.
86. [3 marks] An ideal transformer has 1,000 primary turns and 200 secondary turns. If primary voltage is 220 V , calculate secondary voltage. If secondary current is 2 A , find primary current.
87. [3 marks] A 100Ω resistor is connected to a 220 V rms AC source. Calculate rms current and average power.

88. [2 marks] An AC voltage is given by $v = 200 \sin(314t)$ V. Find its rms voltage and frequency.
89. [3 marks] A series circuit has $R = 40 \Omega$ and $X_L = 30 \Omega$. If connected to 100 V rms AC, calculate impedance and current.
90. [3 marks] A $20 \mu\text{F}$ capacitor is connected to a 100 Hz supply of 200 V rms. Calculate capacitive reactance and rms current.
91. [3 marks] A series LCR circuit has $R = 20 \Omega$, $X_L = 60 \Omega$, and $X_C = 30 \Omega$. Calculate the phase angle and power factor.
92. [2 marks] A transformer reduces 240 V to 12 V. If the primary has 1,200 turns, calculate the number of secondary turns.
93. [3 marks] An ideal transformer supplies 24 V at 5 A from a 240 V primary. Calculate the primary current.
94. [3 marks] A 0.1 H inductor is connected to a 220 V, 50 Hz supply. Calculate inductive reactance and rms current, assuming ideal inductance.

H. Electromagnetic Waves

(Questions 95–100)

95. [2 marks] An electromagnetic wave has frequency 6.0×10^{14} Hz. Calculate its wavelength in vacuum. Take $c = 3.0 \times 10^8 \text{ m s}^{-1}$.
96. [2 marks] A radio wave has wavelength 150 m. Calculate its frequency in vacuum.
97. [3 marks] In an electromagnetic wave travelling in vacuum, electric field amplitude is 120 V m^{-1} . Calculate magnetic field amplitude using $E_0 = cB_0$.
98. [2 marks] An electromagnetic wave has wavelength 3.0 m. Calculate its frequency in vacuum.
99. [3 marks] The electric field amplitude of an electromagnetic wave in vacuum is 90 V m^{-1} . Calculate its magnetic field amplitude and state the ratio E_0/B_0 .
100. [2 marks] An electromagnetic wave has frequency 1.5×10^8 Hz. Calculate its wavelength in vacuum.

Submitted By: _____

Teacher's Sign: _____

EKLAVYA MODEL RESIDENTIAL SCHOOL, KIRMIRA
AUTUMN BREAK HOLIDAY HOMEWORK
CLASS XII – CHEMISTRY

Name: _____

Roll No.: _____

Academic Session: 2026–27**Maximum Marks:** 50**Syllabus:** Selected Physical Chemistry and Organic Chemistry topics prescribed in the CBSE/NCERT Class XII Chemistry syllabus for 2026–27.**General Instructions**

1. All questions are compulsory.
2. Section A: 10 MCQs $\times$ 1 mark = 10; Section B: 10 very-short-answer questions $\times$ 1 mark = 10; Section C: 15 short-answer questions $\times$ 2 marks = 30.
3. Show formulae, substitutions, calculations and units clearly in numerical problems.
4. For organic reactions, write reagents and conditions along with equations wherever applicable.
5. Questions are original practice questions framed in a CBSE previous-year-question style, including application-based and competency-based items; they are not verbatim past-paper reproductions.

Section A: 10 marks Section B: 10 marks Section C: 30 marks**Section A: Multiple-Choice Questions****[10 $\times$ 1 = 10 marks]***Choose the most appropriate option.*

1. For a dilute solution of a non-volatile solute, the relative lowering of vapour pressure is equal to the:
(a) molarity of solution
(b) mole fraction of solute
(c) molality of solution
(d) mass fraction of solvent
2. A solution contains 0.5 mol solute dissolved in 2 kg solvent. Its molality is:
(a) 0.25 mol kg^{-1}
(b) 0.50 mol kg^{-1}
(c) 1.0 mol kg^{-1}
(d) 4.0 mol kg^{-1}
3. For a galvanic cell, the relationship between standard Gibbs energy change and standard cell potential is:
(a) $\Delta G^\circ = nFE^\circ_{\text{cell}}$
(b) $\Delta G^\circ = -nFE^\circ_{\text{cell}}$
(c) $\Delta G^\circ = FE^\circ_{\text{cell}}/n$
(d) $\Delta G^\circ = 0$ for every cell
4. The unit of the rate constant for a first-order reaction is:
(a) $\text{mol L}^{-1} \text{ s}^{-1}$
(b) $\text{L mol}^{-1} \text{ s}^{-1}$
(c) s^{-1}
(d) $\text{mol}^{-1} \text{ L s}^{-1}$

5. Which compound is expected to undergo an S_N1 reaction most readily under suitable conditions?
- (a) CH_3Cl
 - (b) $\text{CH}_3\text{CH}_2\text{Cl}$
 - (c) $(\text{CH}_3)_3\text{CCl}$
 - (d) $\text{CH}_2=\text{CHCl}$
6. Phenol is more acidic than ethanol mainly because:
- (a) phenol has a higher molar mass
 - (b) phenoxide ion is resonance-stabilised
 - (c) ethanol is aromatic
 - (d) ethanol has no O–H bond
7. Which reagent is commonly used to distinguish an aldehyde from a ketone?
- (a) Tollens' reagent
 - (b) sodium chloride solution
 - (c) dilute hydrochloric acid
 - (d) distilled water
8. Which compound gives the carbylamine test?
- (a) Primary amine
 - (b) Secondary amine
 - (c) Tertiary amine
 - (d) Amide only
9. The linkage joining two monosaccharide units in maltose is a:
- (a) peptide linkage
 - (b) glycosidic linkage
 - (c) phosphodiester linkage
 - (d) disulphide linkage
10. Which statement about a catalyst is correct?
- (a) It changes the equilibrium constant.
 - (b) It increases equilibrium yield in every reaction.
 - (c) It provides an alternative pathway with lower activation energy.
 - (d) It is consumed completely during the reaction.

Section B: Very-Short-Answer Questions

[10 × 1 = 10 marks]

11. Define an ideal solution. Give one characteristic of its enthalpy of mixing.
12. Write the SI unit of molar conductivity.
13. Write the half-life of a first-order reaction in terms of its rate constant k .
14. State one function of a salt bridge in a galvanic cell.
15. Write the IUPAC name of $\text{CH}_3\text{CHBrCH}_3$.
16. Write the product formed when bromoethane is heated with aqueous KOH.
17. Give one reason why phenol reacts with aqueous NaOH but ethanol does not.

18. Name the product formed when propanone is reduced with NaBH_4 .
19. What is a zwitterion? Name one biomolecule that commonly exists as a zwitterion.
20. Name the interaction that stabilises the α -helix structure of proteins.

Section C: Short-Answer Questions

[15 × 2 = 30 marks]

21. **(Solutions – numerical)** 5.85 g of NaCl is dissolved in 500 g of water. Calculate molality. (Molar mass of NaCl = 58.5 g mol^{-1} .)
22. **(Solutions – competency-based)** Two solutions contain equal moles of glucose but different masses of water. Identify the solution with higher molality and explain why molality is independent of temperature.
23. **(Electrochemistry – numerical)** A current of 2.0 A passes through an electrolytic cell for 30 minutes. Calculate the charge passed and moles of electrons transferred. Use $F = 96500 \text{ C mol}^{-1}$.
24. **(Electrochemistry – application)** For a cell reaction, $E^\circ_{\text{cell}} = +1.10 \text{ V}$ and $n = 2$. Calculate ΔG° using $F = 96500 \text{ C mol}^{-1}$. Is the reaction spontaneous under standard conditions?
25. **(Chemical Kinetics – numerical)** A first-order reaction has rate constant $2.31 \times 10^{-3} \text{ s}^{-1}$. Calculate its half-life using $t_{1/2} = 0.693/k$.
26. **(Chemical Kinetics – competency-based)** Doubling the concentration of reactant A doubles the rate, while doubling B has no effect. Write a suitable rate law and identify the overall order.
27. **(Haloalkanes – reasoning)** Explain why tert-butyl chloride undergoes nucleophilic substitution by the $\text{S}_{\text{N}}1$ mechanism more readily than ethyl chloride. Mention carbocation stability.
28. **(Haloalkanes – reaction)** Write equations for conversion of bromoethane into (i) ethanol using aqueous KOH and (ii) ethene using alcoholic KOH . State the key difference in conditions.
29. **(Alcohols and Phenols – competency-based)** Phenol reacts with aqueous sodium hydroxide, whereas cyclohexanol does not react appreciably under the same conditions. Explain using the stability of their conjugate bases.
30. **(Alcohols and Ethers – reaction)** Write the equation for dehydration of ethanol to ethene. Mention a suitable reagent/condition and temperature.
31. **(Aldehydes and Ketones – reasoning)** An organic compound gives a positive Tollens' test but a negative iodoform test. What functional group is most likely present? Explain what each test indicates.
32. **(Carboxylic Acids – reaction)** Write the equation for reaction of ethanoic acid with ethanol in presence of concentrated H_2SO_4 . Name the organic product and reaction type.
33. **(Amines – competency-based)** Aniline is less basic than ethylamine. Explain this difference with reference to the availability of the nitrogen lone pair.
34. **(Amines – reaction)** Write the equation for diazotisation of aniline using nitrous acid generated in situ. State the required temperature range.
35. **(Biomolecules – application)** A protein loses biological activity when heated strongly, although its primary structure may remain intact. Name the process and explain which levels of protein structure are mainly affected.

End of Homework

Show complete working in numerical problems and write reagents/conditions for organic conversions.

Holiday Homework

Class-XII(Mathematics

1. Write and remember all formula from all chapter
2. Complete all exercise of NCERT Textbook
3. If $A = \begin{bmatrix} 1 & 2 \\ 3 & 4 \end{bmatrix}$, $B = \begin{bmatrix} 2 & 1 \\ 0 & 5 \end{bmatrix}$ then find $A + B$
4. Show that the matrix $A = \begin{bmatrix} 0 & 3 \\ -3 & 0 \end{bmatrix}$ is skew-symmetric.
5. find AB if $A = \begin{bmatrix} 1 & 2 \\ 0 & 1 \end{bmatrix}$, $B = \begin{bmatrix} 3 & 1 \\ 2 & 4 \end{bmatrix}$.
6. Evaluate: $\begin{vmatrix} 3 & 1 & 0 \\ 0 & 2 & 0 \\ 0 & 0 & 5 \end{vmatrix}$
7. If $\begin{vmatrix} a & b \\ c & d \end{vmatrix} = 12$, find $\begin{vmatrix} 2a & 2b \\ c & d \end{vmatrix}$.
8. If $A = \begin{bmatrix} 1 & 2 \\ 3 & 4 \end{bmatrix}$, $B = \begin{bmatrix} 2 & -1 \\ 0 & 3 \end{bmatrix}$ find $A + B$, $A - B$, and AB .
9. If $A = \begin{bmatrix} 1 & 2 \\ 0 & 1 \end{bmatrix}$, find A^2 and A^3 .
10. Show that: $\begin{vmatrix} a+b & b & b \\ b & a+b & b \\ b & b & a+b \end{vmatrix} = a^2(a+3b)$
11. Find the area of the triangle with co-ordinate (9, 11), (-3, 4), (6, -7)
12. Find x if: $\begin{vmatrix} x & 2 \\ 3 & 4 \end{vmatrix} = 10$
13. Find $\int \frac{\cos x}{(4+\sin^2 x)(5-4\cos^2 x)} dx$
14. Evaluate $\int_0^\pi \frac{dx}{a^2 \cos^2 x + b^2 \sin^2 x}$
15. Evaluate $\int \frac{x^2+1}{(x-1)^2(x+3)} dx$
16. Evaluate $\int_0^{\frac{\pi}{4}} \frac{\sin x + \cos x}{9+16 \sin 2x} dx$
17. Evaluate $\int_0^{\frac{\pi}{2}} \frac{x}{\sin x + \cos x} dx$
18. Find $\int \frac{x^2+1}{(x^2+2)(2x^2+1)} dx$
19. Evaluate $\int_0^\pi \frac{x \tan x}{\sec x + \tan x} dx$
20. Evaluate $\int_0^\pi \frac{x \sin x}{1+3 \cos^2 x} dx$
21. Evaluate $\int_0^{\frac{3}{2}} |x \cos \pi x| dx$
22. Evaluate $\int_0^\pi \frac{x}{1+\sin \alpha \sin x} dx$
23. Find $\int_{-\frac{\pi}{2}}^{\frac{\pi}{2}} \frac{\cos x}{1+e^x} dx$
24. Evaluate $\int_0^\pi \frac{x \tan x}{\sec x + \tan x} dx$
25. Evaluate $\int_0^1 \frac{e^x}{1+e^{2x}} dx$
26. Evaluate $\int_0^1 \frac{x \log x}{1+x^2} dx$
27. Evaluate $\int_0^{\frac{\pi}{2}} \frac{\sin x}{\sin x + \cos x} dx$
28. Evaluate $\int_0^1 \frac{|x|}{1+x^2} dx$

29. Evaluate $\int \frac{(2x-5)e^{2x}}{(2x-3)^2} dx$
30. Evaluate $\int e^x \left(\frac{1-x}{1+x}\right)^2 dx$
31. Evaluate $\int \frac{2\cos x + 3\sin x}{4\sin^2 x + 6\cos x} dx$
32. Evaluate $\int_0^\pi |x^3 - x| dx$
33. Find the interval in which the function $f(x)$ given by $f(x) = 2x^3 - 3x^2 - 36x + 7$ is increasing and decreasing.
34. A ladder 5 m long is leaning against a wall. The bottom of the ladder is pulled along the ground, away from the wall, at the rate of 2cm/s. How fast is its height on the wall decreasing when the foot of the ladder is 4 m away from the wall?
35. A kite is flying at a height of 3m and 5m of string is out. If the kite is moving away horizontally at the rate of 200 cm/s, find the rate at which the string is being released.
36. According to a psychologist, the ability of a person to understand spatial concepts is given by $A = \frac{1}{3}\sqrt{t}$, where t is the age in years, $t \in [5, 18]$. Show that the rate of increase of the ability to understand spatial concepts decreases with age in between 5 and 18.
37. Show that the right circular cone of the least curved surface and given volume has an altitude equal to $\sqrt{2}$ time the radius of the base.
38. Find two positive numbers x and y such that their sum is 35 and the product x^3y^5 is a maximum.
39. An Apache helicopter of enemy is flying along the curve given by $y = x^2 + 7$. A soldier, placed at (3,7), wants to shoot down the helicopter when it is nearest to him. Find the nearest distance.
40. A ballon, which always remains spherical, has a variable diameter $\frac{3}{2}(2x + 1)$. Find the rate of change of its volume with respect to x .
41. The length x of a rectangle is decreasing at the rate 3cm/minute and the width y is increasing at the rate of 2cm/minute. When $x=15$ cm and $y=8$ cm, find the rate of change of the perimeter and the area of the rectangle.

TOPIC- ECOSYSTEM, BIODIVERSITY AND CONSERVATION

MCQ QUESTIONS:

1. The Atlantic cod is a fish which lays about 5000000 eggs in its lifetime. On average, only two of these eggs survive to become an adult cod. How does this promote evolution?

- A. All offsprings are genetically identical, so become better adapted
- B. Laying many eggs provides food for other species to survive and become better adapted
- C. Some young cod change to become adapted to the environment and survive and pass on their genes.
- D. Offsprings with favourable variation survive and pass on their genes..

2. In a pond ecosystem, phytoplankton are eaten by zooplankton, which are consumed by small fish. If phytoplankton are suddenly reduced, what is the most likely immediate effect?

- A. Increase in zooplankton
- B. Decrease in zooplankton
- C. Increase in large fish
- D. No change in the food chain

3. A farmer applies a large amount of pesticide to control insects. After some time, fish-eating birds in a nearby lake show a high concentration of the pesticide. This phenomenon is best explained by:

- A. Ecological succession
- B. Biomagnification
- C. Decomposition
- D. Primary productivity

4. Which of the following statements is correct regarding the zonation in a biosphere reserve?

- (a) Natural zone surrounds the core area and limited human activities like resource use, strategies, research and education are allowed.
- (b) Manipulation zone is the outermost part of biosphere reserve where an active cooperation is present between reserve management and local people.
- (c) Restoration region is the most protected area of biosphere reserve meant for the conservation of biological diversity and the monitoring of little disturbed ecosystems.
- (d) Transition zone area remains undisturbed and is legally protected ecosystem.

5. Read the following statements and select the correct option stating which ones are true (T) and which ones are false (F).

- (i) In National Parks private ownership is permitted.
- (ii) Bamboos and tree cotton originated in India.
- (iii) Orthodox seeds are those seeds which get killed on reduction of moisture and exposure to low temperature.
- (iv) In *ex-situ* conservation, endangered species are protected from all adverse factors.

(i) (ii) (iii) (iv)

- (a) T F F T
- (b) F T T F
- (c) T F T F
- (d) F F T F

6. India relishes a history of religious and cultural traditions which emphasised the protection of nature. In many cultures, tracts of forest were set aside, all the trees and wildlife within were venerated and given total protection. Such areas are referred to as

- a) HOTSPOTS
- b) Ethical groves
- c) Sacred groves
- d) Protected areas

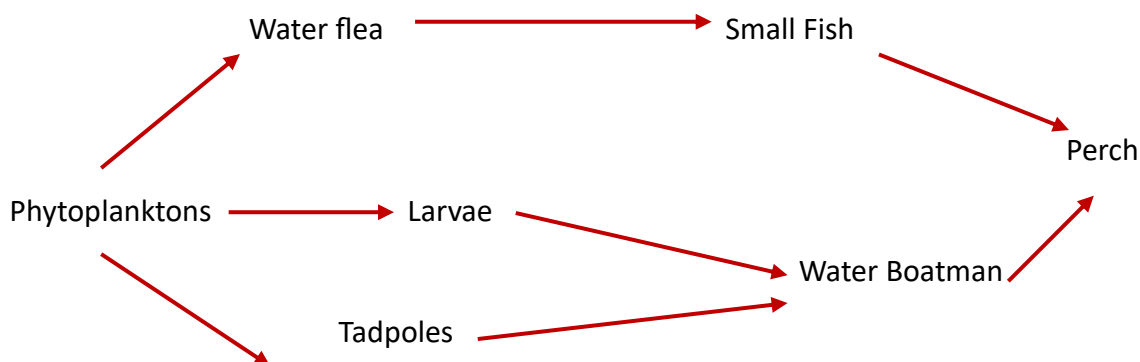
7. . Read the given statements and select the correct option regarding this.

- (i) Ecosystem services are provided by nature to human beings, such as oxygen for respiration, aesthetic value, etc.
- (ii) Direct economic benefits are derived from nature by human beings such as food, medicines, etc.
- (iii) Every species has an intrinsic value, even if it is not of any economic use to us.

With respect to above given codes (i), (ii) and (iii) choose the correct option.

Options	Narrowly utilitarian	Broadly utilitarian	Ethical
(a)	(iii)	(ii)	(i)
(b)	(ii)	(i)	(iii)
(c)	(i)	(ii)	(iii)
(d)	(ii)	(iii)	(i)

8.



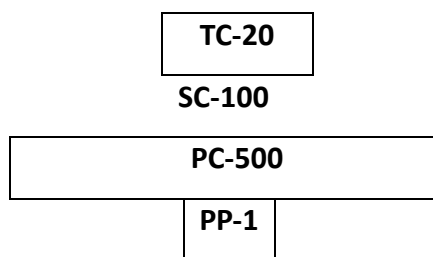
Study the given food web.

Select the incorrect statement regarding it.

- (a) Small fish and water boatman act as both predator and prey.
- (b) Phytoplanktons belong to the level of primary consumer.
- (c) Small fish is a secondary consumer and perch is a tertiary consumer.

(d) All of these

9.. Given is an imaginary pyramid of number representing number of organisms at each trophic level



What could be one of the possibilities about organisms present at different trophic levels of the pyramid?

- (a) Insects could be at level PC whereas small insectivorous birds could be at level SC.
- (b) In sea, phytoplanktons could be at level PP whereas whale could be at TC level.
- (c) Banyan tree could be at level PP and giraffe could be at level SC.
- (d) Rat could be at level PC whereas deer could be at level SC.

10. Consider the given statements and identify A and B. (Page 207)

'A' is the rate of production of organic matter during photosynthesis in an ecosystem. 'B' is the weight of the organic matter stored by the producers in unit area or volume per unit time.

- (a) A-Gross Primary Productivity ; B-Net Primary Productivity
- (b) A-Net Primary Productivity ; B-Gross Primary Productivity
- (c) A-Community Productivity ; B-Net Primary Productivity
- (d) A-Gross Primary Productivity ; B-Community Productivity

ASSERTION REASON

Directions: In the following questions, a statement of assertion is followed by a statement of reason. Mark the correct choice:

- (a) Both assertion and reason are true, and the reason is the correct explanation of the assertion.
- (b) Both assertion and reason are true, but the reason is not the correct explanation of the assertion.
- (c) Assertion is true, but reason is false.
- (d) Both assertion and reason are false.

1. Assertion(A): The number of trophic levels in a grazing food chain is strictly limited, rarely exceeding 4 to 5 levels

Reason(R): Only about 10% of the energy is transferred to each trophic level, and the rest is lost mostly as metabolic heat.

2. Assertion (A): Energy flow in an ecosystem is unidirectional.

Reason (R): Energy captured by producers is transferred to consumers and ultimately lost as heat.

3. Assertion(A): Amount of organic matter synthesized by producers per unit time and per unit area during the process of photosynthesis is referred to as net primary productivity
Reason(R): Primary productivity is usually high and sustained throughout the year in tropical areas due to advanced of sunlight
4. Assertion(A) : If the species-area relationships are analysed among very large areas like the entire continent, the value of Z, i.e., slope of line lies in the range of 0.1 to 0.2.
Reason(R) : The value of Z, i.e., slope of line of species area relationships lies in the range of 0.1 to 0.2 when analysis is done among small areas.
5. Assertion(A) : The Nile perch introduced into lake Victoria in east Africa led to the extinction of an ecologically unique assemblage of more than 200 species of cichlid fish in the lake.
Reason(R) : When alien species are introduced deliberately, or unintentionally for economic or other uses, they often become invasive and cause extinction of indigenous species
6. Assertion(A): One of the most important traditional uses of sacred groves was that they acted as a repository for various ayurvedic medicine
Reason(R): In modern times, sacred groves have become biodiversity rich areas, as they provide refuge to various plant and animal species of conservation significance
7. Assertion(A): Offsite collections can be used to restock depleted populations, reintroduce species in the wild and restore degraded habitats.
Reason(R): IN SITU conservation refers to the conservation of endangered species in their natural habitats.
8. Assertion (A): Detritus rich in lignin and chitin undergoes a significantly slower rate of decomposition compared to detritus rich in nitrogen and water-soluble substances like sugars.
Reason (R): Decomposition is an predominantly anaerobic process where environmental factors such as high soil moisture and low temperatures enhance microbial enzymatic breakdown.
9. Assertion (A): The standing crop of an ecosystem can be measured directly as the biomass or number of living organisms per unit area, whereas standing state refers to the total amount of inorganic nutrients present in the soil at a given time.
Reason (R): Both standing crop and standing state remain completely constant across different seasons in a stable climax community.
10. Assertion (A): Biological diversity varies uniformly across the globe and usually decreases as we move away from the equator towards the poles.
Reason (R): Tropical regions remain relatively undisturbed by periodic glaciations and have a more constant, predictable climate, promoting species richness.