

HOLIDAY HOMEWORK

PHYSICS

Q1. What is the force between two small charged spheres having charges of $2 \times 10^{-7} \text{C}$ and $3 \times 10^{-7} \text{C}$ placed 30 cm apart in the air?

Q2 Consider a uniform electric field $E = 3 \times 10^3 \hat{i} \text{ N/C}$.

(a) What is the flux of this field through a square of 10 cm on a side whose plane is parallel to the yz – plane?

(b) What is the flux through the same square if the normal to its plane makes a 60° angle with the x -axis?

Q3. Find electric field due to an infinite charged sheet.

Q4. A uniformly charged conducting sphere of 2.4 m diameter has a surface charge density of $80.0 \mu\text{C}/\text{m}^2$

(a) Find the charge on the sphere.

(b) What is the total electric flux leaving the surface of the sphere?

Q5. Two charges $5 \times 10^{-8} \text{C}$ and $-3 \times 10^{-8} \text{C}$ are located 16 cm apart from each other. At what point (s) on the line joining the two charges is the electric potential zero? Take the potential at infinity to be zero.

Q6. Three capacitors connected in series have a capacitance of 9pF each.

(1) What is the total capacitance of the combination?

(2) What is the potential difference across each capacitor if the combination is connected to a 120 V supply?

Q7. A battery of EMF 10 V and internal resistance 3Ω is connected to a resistor. If the current in the circuit is 0.5 A, what is the resistance of the resistor? What is the terminal voltage of the battery when the circuit is closed?

Q8. a) Three resistors 2Ω , 4Ω and 5Ω are combined in parallel. What is the total resistance of the combination?

b) If the combination is connected to a battery of emf 20 V and negligible internal resistance, determine the current through each resistor, and the total current drawn from the battery.

Q9. At room temperature (27.0°C) the resistance of a heating element is 100Ω . What is the temperature of the element if the resistance is found to be 117Ω , given that the temperature coefficient of the material of the resistor is $1.70 \times 10^{-4} \text{ }^\circ\text{C}^{-1}$.

Q10. Two long and parallel straight wires, A and B, carrying currents of 8.0 A and 5.0 A in the same direction, are separated by a distance of 4.0 cm. Estimate the force on a 10 cm section of wire A

CHEMISTRY

Q1. Write down the electronic configuration of

1. Cr^{3+}
2. Pm^{3+}
3. Cu^+
4. Ce^{4+}
5. CO^{2+}
6. Lu^{2+}
7. Mn^{2+}
8. Th^{4+}

Q2. What may be the stable oxidation state of the transition element with the following d-electron configurations in the ground state of their atoms: $3d^3$, $3d^5$, $3d^8$ and $3d^4$?

Q3. What are the characteristics of the transition elements and why are they called transition elements? Which of the d-block elements may not be regarded as the transition elements?

1. Define artificial insemination.
2. Why typical angiosperm embryo sac at maturity considered 8 nucleated and 7 celled ?
3. Trace the development of male gametophyte from microspore mother cell in the microsporangium in flowering plants.
4. Trace the development of female gametophyte from megaspore mother cell in a flower.
5. Explain what is double fertilisation?
6. What is apomixis and what is its importance?
7. what is triple fusion?
Where and how does it take place?
8. Draw a well labelled diagram of the following-
 - a. Male reproduction system
 - b. Female reproductive system
 - c. Human egg (ovum)
 - d. Human sperm (spermatozoa)
 - e. Mammary gland
 - f. LS of an anatropous ovule
 - g. LS of pistil showing stages of pollen germination
 - h. Sectional view of mature pollen grain angiosperm
 - i. Dicot embryo
 - j. Structure of ovary with different stages of oogenesis.
9. Explain in detail the various developmental stages of the zygote until implantation with suitable diagrams.
10. What is the menstrual cycle? Name the Hormones which control the menstrual cycle.
11. What is parturition? Discuss hormones responsible for parturition.
12. What is the main objective of “Assisted Reproductive Technology” programme?
13. Explain any two sexually transmitted diseases and suggest ways to prevent them.
14. Justify the ban of amniocentesis in our country.
15. Discuss the role of RCH and need of family planning in our country.