ENGLISH

1. Why was Bama first amused at the scene of the old man carrying a food packet by its string without touching it? Why was she filled with anger, dismay and revolt later.

2. Sophie's dreams and disappointment were all in her mind. Elaborate.

3. What is theme of the novel, 'The Invisible Man'?

4. Griffin talks casually about attacking people and stealing from his father. He feels that all this is for the greater good, the betterment of science. Justify.

5. Who is Griffin and how does he become the Invisible Man?

6. How was Griffin finally caught?

PHYSICS

1. Consider two hollow concentric spheres S_1 and S_2 enclosing charges 20 and 40 respectively, as shown in the figure, (i) Find out the ratio of the electric flux through them, (ii) How will the electric flux through the spheres S_1 change if a medium of dielectric constant e_r is introduced in the space inside S_1 in place of air? Deduce the necessary expression.

2. (i) Can two equipotential surfaces intersect each other? Give reasons, (ii) Two charges $+ q$ and $– q$ are located at points A(0, 0, – 2) and B (0, 0, 2) respectively. How much work will be done in moving a test charge from point P{7,0,0) to Q (- 3, 0, 0)?

3. Describe briefly with the help of a circuit diagram, how a potentiometer is used to determine the internal resistance of a cell.

4. A long solenoid of length L having N turns carries a current I. Deduce the expression for the magnetic field in the interior of the solenoid.

5. Deduce the expression for the magnetic dipole moment of an electron orbiting around the central nucleus.

6. (i) A rod of length / is moved horizontally with a uniform velocity v in a direction perpendicular to its length through a region in which a uniform magnetic field is acting vertically downward. Derive the expression for the emf induced across the ends of the rod.
    (ii) How does one understand this motional emf by invoking the Lorentz force acting on the free charge carriers of the conductor? Explain.

7. A voltage $V = V_0$ sin wt is applied to a series L-C-R Derive the expression for the average power dissipated over a cycle.
    Under what condition is (i) no power dissipated even though the current flows through the circuit (ii) maximum power dissipated in the circuit?

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9. In a Young's double slit experiment, the two slits are kept 2 mm apart and the screen is positioned 140 cm away from the plane of the slits. The slits are illuminated with light of wavelength 600 nm. Find the distance of the third bright fringe from the central maximum, in the interference pattern obtained on the screen. If the wavelength of the incident light were changed to 480 nm, then find out the shift in the position of third bright fringe from the central maximum

10. Draw the circuit diagram showing how a p-n junction diode is
    (i)forward biased

(ii)reverse biased.

How is the width of depletion layer affected in the two cases?

11. Draw the transfer characteristic curve of a base-biased transistor in CE Explain clearly how the active region of the V_0 versus Vi. curve, in a transistor is used as an amplifier?

12. Assuming the nuclei to be spherical in shape, how does the surface area of a nucleus of mass number A1 compare with that of a nucleus of mass number A_2 ?

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14. State Bohr's quantisation condition for defining stationary orbits.

15. A parallel plate capacitor is charged to a potential difference V by a DC source. The capacitor is then disconnected from the source. If the distance between the plates is doubled, state with reason, how the following will change?

(i)Electric field between the plates

(ii)Capacitance

(iii)Energy stored in the capacitor

MATHS

1.   Suppose a girl throws a die. If she gets 1 or 2, she tosses a coin three times and notes the number of tails. If she gets 3, 4, 5 or 6, she tosses a coin once and notes whether a 'head' or 'tail' is obtained. If she obtained exactly one 'tail', what is the probability that she threw 3, 4, 5 or 6 with the die?

2.   An open tank with a square base and vertical sides is to be constructed from a metal sheet so as to hold a given quantity of water. Show that the cost of material will be least when depth of the tank is half of its width.

3.   Two numbers are selected at random (without replacement) from the first five positive integers. Let X denote the larger of the two numbers obtained. Find the mean and variance of X.

4.   Using integration, find the area of the region in the first quadrant enclosed by the x-axis, the line y = x and the circle $x^2 + y^2 = 32$.

5.   A factory manufactures two types of screws A and B, each type requiring the use of two machines, an automatic and a hand-operated. It takes 4 minutes on the automatic and 6 minutes on the hand-operated machines to manufacture a packet of screws 'A' while it takes 6 minutes on the automatic and 3 minutes on the hand-operated machine to manufacture a packet of screws 'B'. Each machine is available for at most 4 hours on any day. The manufacturer can sell a packet of screws 'A' at a profit of 70 paise and screws 'B' at a profit of Rs 1. Assuming that he can sell all the screws he manufactures, how many packets of each type should the factory owner produce in a day in order to maximize his profit ? Formulate the above LPP and solve it graphically and find the maximum profit.

CHEMISTRY

1.   How do you convert Ethanal to Propanone?

2.   How do you convert Toluene to Benzoic acid?

3.   Give reasons for the following:

a. Measurement of osmotic pressure method is preferred for the determination of molar masses of macromolecules such as proteins and polymers.

b. Aquatic animals are more comfortable in cold water than in warm water.

c. Elevation of boiling point of 1 M KCl solution is nearly double than that of 1 M sugar solution.

4.   Give reasons :

a. Eo value for Mn3+/Mn2+ couple is much more positive than that for Fe3+/Fe2+.

b. Iron has higher enthalpy of atomization than that of copper.

c. Sc3+ is colourless in aqueous solution whereas Ti3+ is coloured.

5.   (A), (B) and (C) are three non-cyclic functional isomers of a carbonyl compound with molecular formula C4H8O. Isomers (A) and (C) give positive Tollens' test whereas isomer (B) does not give Tollens' test but gives positive Iodoform test. Isomers (A) and (B) on reduction with Zn(Hg)/conc. HCl give the same product (D).

a. Write the structures of (A), (B), (C) and (D).

b. Out of (A), (B) and (C) isomers, which one is least reactive towards addition of

HCN?

BIOLOGY

1. Distinguish between asexual and sexual reproduction. Why is vegetative reproduction also considered as a type of asexual reproduction?
2. Define:
   (a)Juvenile phase
   (b)Reproductive phase
   (c)Senescent phase.
3. Differentiate between:
   (a)hy pocotyl and epicotyl;
   (b)coleoptile and coleorrhiza;
   (c)integument and testa;
   (d)perisperm and pericarp
4. What is apomixis and what is its importance?
5. What is spermatogenesis? Briefly describe the process of spermatogenesis.
6. What is oogenesis? Give a brief account of oogenesis.
7. Suggest some methods to assist infertile couples to have children
8. Two heterozygous parents are crossed. If the two loci are linked what would be the distribution of phenotypic features in F1 generation for a dihybrid cross?
9. Explain the following terms with example
   (a)Co-dominance
   (b)Incomplete dominance
10. Define'ecological pyramids and describe with examples, pyramids of number and biomass.
11. Differentiate the following and give examples of each
    (a)Innate and acquired immunity
    (b)Active and passive immunity
12. When a cross is made between tall plant with yellow seeds (TtYy) and tall plant with green seed (Ttyy), what proportions of phenotype in the offspring could be expected to be
    (a)tali and green.
    (b)dwarf and green.
13. Describe briefly the followings:
    (a)Origin of replication
    (b)Bioreactors
    (c)Downstream processing
14. Explain briefly
    (a)PCR
    (b)Restriction enzymes and DNA
    (c)Chitinase
15. Distinguish between the following:
    (a)Hibernation and Aestivation
    (b) Ectotherms and Endotherms

COMPUTER SCIENCE

Q1.   Differentiate between DDL and DML commands.
Q2.   State and verify Demorgan's laws.
Q3.   Explain the purpose of seekp, seekg, tellg and tellp functions in C++.
Q4.   Differentiate between UNDERFLOW and OVERFLOW in data structures.
Q5.   Make a chart on different network protocols.

PHYSICAL EDUCATION

Q.1-   How is friction not required in various games and sports. Explain with examples.
Q.2-   Height of projection influences projectile movement. Explain.
Q.3-   How does air resistance influences projectile movement?
Q.4-   Movement is inherent part of all sports. Explain.
Q.5-   Describe major muscles involved in running, jumping and throwing.
Q.6-   Learn and write Question and answers of Chapter- 1 to 12.