Applied Physics – I
Assam Polytechnic | 3rd Semester | Final Examination
Important Questions & Answers

UNIT–1: UNITS AND DIMENSIONS (5 Marks)

Q1. Define fundamental and derived physical quantities with examples.
Ans:
Fundamental quantities are basic quantities independent of others, e.g. length, mass, time.
Derived quantities are obtained from fundamental quantities, e.g. velocity, force, energy.

Q2. What is SI system of units? Mention any four SI units.
Ans:
SI system is the internationally accepted system of measurement.
Examples:
Length – metre (m)
Mass – kilogram (kg)
Time – second (s)
Electric current – ampere (A)

Q3. Define absolute error, relative error and percentage error.
Ans:
Absolute error is the difference between measured value and true value.
Relative error is the ratio of absolute error to true value.
Percentage error is relative error multiplied by 100.

Q4. State principle of dimensional homogeneity.
Ans:
According to the principle of dimensional homogeneity, the dimensions of all terms in a physical equation must be the same.

Q5. Write any two applications and two limitations of dimensional analysis.
Ans:
Applications:
• Checking correctness of equations
• Conversion of units

Limitations:
• Cannot derive numerical constants
• Not applicable to trigonometric equations

UNIT–2: BASIC MECHANICS (FORCE & MOTION) (12 Marks)

Q6. Define scalar and vector quantities with examples.
Ans:
Scalar quantities have magnitude only, e.g. mass, temperature.
Vector quantities have both magnitude and direction, e.g. velocity, force.

Q7. State parallelogram law of vector addition.
Ans:
If two vectors acting at a point are represented by two adjacent sides of a parallelogram, then the diagonal represents their resultant.

Q8. Write equations of motion for uniformly accelerated motion.
Ans:

$v = u + at$

$s = ut + \frac{1}{2}at^2$

$v^2 = u^2 + 2as$

Q9. State Newton's three laws of motion.
Ans:
First law: A body remains at rest or uniform motion unless acted upon by external force.
Second law: Rate of change of momentum is proportional to applied force.
Third law: For every action, there is an equal and opposite reaction.

Q10. Define linear momentum and impulse.
Ans:
Linear momentum is the product of mass and velocity ($p = mv$).
Impulse is the product of force and time and equals change in momentum.

Q11. Define centripetal force. Give its expression.
Ans:
Centripetal force keeps a body in circular motion and acts towards the center.
$F = mv^2 / r$

Q12. Define torque and angular momentum.
Ans:
Torque is the turning effect of force.
Angular momentum is the product of moment of inertia and angular velocity.

UNIT–3: WORK, POWER & ENERGY (4 Marks)

Q13. Define work, power and energy with SI units.
Ans:
Work is force × displacement (unit: joule).
Power is rate of doing work (unit: watt).
Energy is capacity to do work (unit: joule).

Q14. State work–energy theorem.
Ans:
Work done by a force is equal to the change in kinetic energy of the body.

Q15. State law of conservation of energy.
Ans:
Energy can neither be created nor destroyed; it only changes from one form to another.

UNIT–4: GRAVITY & GRAVITATION (4 Marks)

Q16. State Newton's law of gravitation.
Ans:
Every two masses attract each other with a force directly proportional to the product of their masses and inversely proportional to the square of the distance between them.

Q17. Define acceleration due to gravity. Write its value.
Ans:
Acceleration due to gravity is the acceleration of a freely falling body.
Value of $g = 9.8$ m/s².

Q18. Define escape velocity.
Ans:

Escape velocity is the minimum velocity required by a body to escape from Earth's gravitational field.

Q19. What is geostationary satellite?
Ans:
A satellite that revolves around Earth with same angular velocity as Earth and appears stationary.

UNIT–5: ELECTROSTATICS (7 Marks)

Q20. Define electric charge and electric field.
Ans:
Electric charge is a property that causes electrical interaction.
Electric field is the region around a charge where force is experienced.

Q21. State Coulomb's inverse square law.
Ans:
Force between two charges is directly proportional to product of charges and inversely proportional to square of distance.

Q22. Define electric potential and its unit.
Ans:
Electric potential is work done per unit charge.
Unit: volt (V).

Q23. What is capacitance? Write its unit.
Ans:
Capacitance is the ability to store electric charge.
Unit: farad (F).

Q24. Write expression for capacitance of parallel plate capacitor.
Ans:
$C = \varepsilon\blacksquare A / d$

UNIT–6: CURRENT ELECTRICITY (10 Marks)

Q25. Define electric current and potential difference.
Ans:
Electric current is rate of flow of charge.
Potential difference is work done per unit charge.

Q26. State Ohm's law.
Ans:
At constant temperature, current through a conductor is directly proportional to applied voltage.

Q27. Define resistance and resistivity.
Ans:
Resistance opposes current flow.
Resistivity is resistance of unit length and unit area conductor.

Q28. State Kirchhoff's laws.
Ans:
KCL: Algebraic sum of currents at a junction is zero.
KVL: Algebraic sum of voltages in a closed loop is zero.

Q29. State Joule's law of heating.
Ans:

Heat produced is proportional to square of current, resistance and time.

UNIT–7: ELECTROMAGNETISM (12 Marks)

Q30. Define magnetic field and magnetic flux density.
Ans:
Magnetic field is the region around a magnet where force acts.
Magnetic flux density is magnetic field strength.

Q31. State Biot–Savart law.
Ans:
Magnetic field due to current element is directly proportional to current and inversely proportional to square of distance.

Q32. State Fleming's left-hand rule.
Ans:
It gives direction of force on current carrying conductor in magnetic field.

Q33. State Faraday's laws of electromagnetic induction.
Ans:
First law: Induced emf is produced when magnetic flux changes.
Second law: Induced emf is proportional to rate of change of flux.

Q34. Define transformer and its types.
Ans:
Transformer transfers AC power from one circuit to another.
Types: Step-up and Step-down.

UNIT–8: ELECTRONICS & SEMICONDUCTOR (6 Marks)

Q35. Define semiconductor with examples.
Ans:
Semiconductor has conductivity between conductor and insulator.
Examples: Silicon, Germanium.

Q36. Explain P-type and N-type semiconductor.
Ans:
P-type: Trivalent impurity, holes majority carriers.
N-type: Pentavalent impurity, electrons majority carriers.

Q37. Explain P-N junction diode.
Ans:
A P-N junction diode allows current in forward bias and blocks in reverse bias.

Q38. What is LED?
Ans:
LED is a light emitting diode that emits light when forward biased.