MOST IMPORTANT PASSING PACKAGE QUESTIONS:
CHAPTER – 1: ELECTRICAL CHARGES AND FIELDS

1. State and explain Coulomb's Law. Give the vector form of Coulomb's Law.
2. Give any three properties of electric charge.
3. Give any three properties of electric field lines.
4. Derive the expression of electric field due to a dipole at any point on its axis.
5. Derive the expression of electric field due to a dipole at any point on its equatorial plane.
6. Define the following and give their SI units
   (a) Linear charge density   (ii) Surface charge density   (iii) Volume charge density.
7. Using Gauss's law in electrostatics, obtain the expression for electric field due to infinitely long straight charged wire.
8. Using Gauss's law, obtain the expression for electric field due to an infinitely large charged plane sheet.
9. Using Gauss's law in electrostatics, obtain the expression for electric field due to a uniformly charged thin spherical shell at a point. (i) Outside the shell and (ii) Inside the shell

CHAPTER – 2: ELECTROSTATIC POTENTIAL AND CAPACITANCE

10. Define electrostatic potential. Mention the expression for electric potential due to an isolated point charge.
11. Define equipotential surface. Give an example.
12. Mention the three properties of equipotential surface.
13. What are polar and non-polar molecules? Give one example for each.
14. Name the three factors on which capacitance of a parallel plate capacitor depends.
15. Mention the expression for the energy stored in a capacitor with air as the medium between its plates and explain the terms.

CHAPTER – 3: CURRENT ELECTRICITY

16. Derive the relation between current density, conductivity and electric field.
17. Derive the expression for drift velocity.
18. Derive the relation between current and drift velocity
19. Write three limitations of Ohm's law.
20. What is equivalent resistance? Derive an expression for equivalent resistance
 a. When two resistors are in series
 b. When two resistors are in parallel
21. Derive an expression for equivalent internal resistance and equivalent emf of 2 cells in series combination.
22. Derive an expression for equivalent internal resistance and equivalent emf of 2 cells in parallel combination
23. State and explain Kirchhoff's laws andention there significance
24. Derive an expression for the balancing condition of Whetstone's bridge.
25. What is a potentiometer? Give the principle and two uses/applications of potentiometer.

CHAPTER – 4: MOVING CHARGES AND MAGNETISM

26. What is Lorentz force? Write the expression for Lorentz force.
27. (a) What is a cyclotron? Draw a diagram.(b) State the principle of cyclotron. (c) Give the application of cyclotron.
28. State and explain Biot-savart's law.
29. Derive an expression for the magnetic field at any point on the axis of a circular current loop.
30. State & explain Ampere's circuital law.
31. Using Ampere's circuital law derive an expression for magnetic field at a point due to a long straight wire carrying current.
32. What is a solenoid? Mention the expression for magnetic field at a point inside the solenoid.

33. Derive the expression for force per unit length between two straight parallel current carrying conductors of infinite length. Hence define "ampere".

34. How can a moving coil galvanometer be converted into voltmeter? Explain with a diagram and expression.

35. How can a moving coil galvanometer be converted into ammeter? Explain with a diagram and expression.

CHAPTER – 5 : MAGNETISM AND MATTER

36. State and explain Gauss's Law in magnetism.

37. Mention any three properties of magnetic field lines.

38. Define magnetic elements of Earth (OR Define declination, dip and horizontal component of Earth's field).

39. Write any three differences of (a) Diamagnetic materials (b) Paramagnetic materials (c) Ferromagnetic materials.

40. State and explain Curies Law for paramagnetic materials.

41. Define the terms: (i) Retentivity   (ii) Coercivity.

CHAPTER – 6: ELECTROMAGNETIC INDUCTION

42. State and explain Faraday's law of electromagnetic induction.

43. State Lenz's law in electromagnetic induction. What is the significance of Lenz's law?

44. Mention any two factors on which (a) self-inductance of a coil depends (b) mutual inductance of a coil depend.

45. What is AC generator? State the principle of AC Generator.

46. What are eddy currents? Give any three applications/uses of eddy currents.

47. Obtain an expression for motional emf.

48. Obtain an expression for energy stored in an inductor.

CHAPTER – 7: ALTERNATING CURRENT

49. Write the relation connected to rms value and peak value of alternating current and explain the terms

50. Mention the expression for the resonant frequency and explain the terms

51. (a) What is a transformer? (b) State the principle of transformer.

52. Mention three sources of power loss in a transformer.

CHAPTER – 8: ELECTROMAGNETIC WAVES

53. (a) What is displacement current? Give the expression for it. (b) Mention the need for displacement current.

54. (a) What is the source of electromagnetic waves?(b) What is the nature of electromagnetic waves?

55. Mention any three properties of electromagnetic waves.

56. Give any two applications/uses of (a) Microwaves (b) Infra-red waves (c) Ultraviolet radiations (d) X-rays (e) gamma rays.

CHAPTER – 9 : RAY OPTICS AND OPTICAL INSTRUMENTS

57. Derive f = R/2 for a concave mirror.

58. State and explain Snell's law of refraction. And mention its limitation.

59. (a) Mention three applications of total internal reflection.

60. Write the principle and two uses of optical fibers.

99.   Obtain the relation between u, v, R and n for spherical surface.

100. Derive Lens-maker's formula.

101. Derive the expression for effective focal length of two thin lenses kept in contact.

99. Obtain an expression for the refractive index of the material of the prism in terms of the angle of the prism andangle of minimum deviation.

100.   Draw a neat-labelled ray diagram (with arrow marks) of a simple microscope for the image

formation and write the expression for its magnification when the image is at near point.

101. Draw a neat labelled ray diagram (with arrow marks) of a compound microscope for the image formation and write the expression for its magnification when the image is at near point.

CHAPTER – 10: WAVE OPTICS

102. Define wavefront. What type of wavefront obtained from (i) a point source (ii) a line source (iii) a star?
103. Define resolving power (RP) of microscope. Write the expression for it. Mention two methods to increase RP.
104. Define resolving power (RP) of telescope. Give the expression for it. Mention two methods to increase RP.
105. What are Polaroid's? Mention any 3 uses of it.
106. State and explain Malus Law.
107. State & explain Brewster's law.

CHAPTER – 11 : DUAL NATURE OF RADIATION AND MATTER

108. Define (i) Work function of a metal (ii) electron volt (eV) (iii) Threshold frequency and (iv) Stopping potential.
109. Mention three types of electron emission.
110. Write five experimental observations of photoelectric effect.
111. Write Einstein's photoelectric equation and explain the terms.
112. Mention any three characteristic properties of photon/particle nature of light.
113. What are matter waves? Write the de-Broglie relation for de-Broglie wavelength.

CHAPTER – 12 : ATOMS

114. State the postulates of Bohr's atom model.
115. Mention two limitations of Bohr atom model.
116. Using Bohr's postulates, derive the expression for radius of electron in n^{th} stationary orbit of hydrogen atom. Hence write the expression for Bohr radius.

CHAPTER – 13: NUCLEI

117. Define isotopes/isobars/isotones. Give examples to each.
118. Mention three characteristics/properties of nucleus.
119. Define mass defect and binding energy of a nucleus.
120. What is nuclear force? Mention any four characteristics/properties of nuclear force.
121. State and explain the law of radioactive decay.
122. Define half-life and mention its expression
123. Define mean life of a radioactive sample. And mention the relation between mean life and half life period.
124. Define activity. And mention its SI unit.
125. Mention any 2 differences between nuclear fission and nuclear fusion.

CHAPTER – 14 : SEMICONDUCTOR ELECTRONICS

126. Classify the conductors, semiconductors and insulators on the basis of energy bands (band theory of solids).
127. Give three differences between n-type and p-type semiconductors
128. Give three differences between intrinsic and extrinsic semiconductors.
129. What is a rectifier? Describe the working of a p-n junction diode as a half wave rectifier with the help of a circuit diagram. Draw input and output waveforms.
130. What is full wave rectifier? Describe the working of a p-n junction diode as a as a full wave rectifier, with the help of a circuit diagram. Draw input and output waveforms.
131. What are optoelectronic devices? Name two optoelectronic devices.
132. Give two uses of (a) Photodiode (b) LED (c) solar cell.
133. Give circuit symbol and truth table for each gates : NOT, OR, AND, NAND and NOR.
134. How does a Zener diode work as a voltage regulator? Explain with a circuit diagram.