

CLASS - XII
PHYSICS – SQP-1
BLUE PRINT

Unit no.	Unit	Chapters	MARKS				Total
			1	2	3	5	
1	Electrostatic & current electricity	Electric charge and field	2	1	1		16
		Electric potential and capacitance		1	1		
		Current electricity	2	1			
2	Magnetic effects of current & magnetism	Magnetic effects of electric currents	2			1	17
		Magnetism	1	1			
		Electro magnetic induction	1		1		
		Alternating currents			1		
3	EM waves & optics	Electromagnetic waves	1	1			18
		Ray optics & optical instruments	2		1	1	
		Wave optics	2		1		
4	Dual nature of radiation and matter, Atoms & Nuclei	Dual nature of radiation and matter	1	1			12
		Atoms	2				
		Nuclei	2	1	1		
5	Semiconductor electronics	Semiconductor electronics	2		1		7

SAMPLE QUESTION PAPER-1
CLASS: XII

TIME: 03 Hours

MM: 70

SUBJECT: PHYSICS

General Instructions:

1. All questions are compulsory
2. There are 37 questions in this paper. Question 1 to 20 are very short answer type(MCQs) questions and carry 1 mark each, question 21 to 27 carry 2 marks each, question 28 to 34 carry 3 marks each and, question 35 to 37 carry 5 marks each.
3. Each question from Question No. 1 to 20 has four alternatives - (A), (B), (C) and (D) out of which one is most appropriate. Choose the correct answer among the four alternatives and write it in your answer-book along with the question number. There is no negative marking for wrong answer in MCQs.
4. There is no overall choice. However, an internal choice has been provided in two questions of two marks, two questions of three marks and all three questions of five marks each.
5. Use of calculators is not permitted however you may use log tables, if necessary.
6. You may use the following values of physical constants wherever necessary:

$$c = 3 \times 10^8 \text{ms}^{-1}$$

$$h = 6.6 \times 10^{-34} \text{Js}$$

$$1. e = 1.6 \times 10^{-19} \text{C}$$

$$\mu_0 = 4\pi \times 10^{-7} \text{T m A}^{-1}$$

$$\text{Boltzmann constant } k = 1.38 \times 10^{-23} \text{JK}^{-1}$$

$$\text{Avogadro's number } N_A = 6.023 \times 10^{23} / \text{mole}$$

$$\text{Mass of neutron } m_n = 1.6 \times 10^{-27} \text{kg}$$

$$\text{Mass of electron } m_e = 9 \times 10^{-31} \text{kg}$$

SECTION: A

Q1. The group 13 & 15 elements are preferred for doping semiconductors due to their

- a. Comparable size to group 14
- b. Greater size to group 14
- c. Lesser size to group 14
- d. None of these

Q2. An ideal PN-junction diode works as an insulator, if connected

- a. to alternating current
- b. In forward biasing
- c. In reverse biasing
- d. None of these

Q3. SI unit of permittivity is

a) $\text{C}^2\text{m}^2\text{N}^2$

b) $\text{C}^2\text{m}^{-2}\text{N}^{-1}$

c) $\text{C}^2\text{m}^2\text{N}^{-1}$

d) $\text{C}^{-1}\text{m}^2\text{N}^{-2}$

Q4. Four point charges $q_1=2\mu\text{C}$, $q_2=-5\mu\text{C}$, $q_3=2\mu\text{C}$ and $q_4=-5\mu\text{C}$ are placed at the corners of a square ABCD of side 10 cm. The force on a charge of $1\mu\text{C}$ placed at the centre of the square will be:

- a) 0 b) 1N c) 2 N d) 3N

Q5. The Kirchhoff's first law and second law are respectively based on:

- a) Conservation of momentum, conservation of charge
b) Conservation of charge, conservation of energy
c) Conservation of charge, conservation of momentum
d) Conservation of energy, conservation of charge

Q6. The drift velocity of electrons varies with temperature as:

- a) Directly proportional to temperature
b) Directly proportional to square of temperature
c) Inversely proportional to temperature
d) Inversely proportional to square of temperature

Q7. Two parallel beams of protons moving in opposite direction will:

- a) Attract each other
b) Repel each other
c) Will not interact each other
d) Deflect normal to the plane containing two beams

Q8. The magnetic field on an Amperian loop will be:

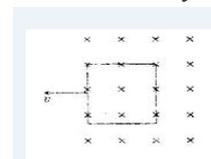
- a. Tangential to the loop and non zero
b. Normal to the loop
c. Parallel to the plane
d. Both a and b.

Q9. A magnetic substance on freely suspending in an external magnetic field aligns perpendicular to the magnetic field the type of the magnetic material will be:

- a. Diamagnetism
b. Para magnetism
c. Ferromagnetism
d. None of these

Q10. In given figure a rectangular loop of wire is slowly moved with uniform velocity across the field towards left. The direction of induced current will be:

- a) Clockwise



- b) Anticlockwise
- c) Sometimes Clockwise and Sometimes Anticlockwise
- d) None of these

Q11. When a radioactive substance emits an α particle, its position in the periodic table is lowered by:

- a. 1 place
- b. 2 place
- c. 4 place
- d. 3 place

Q12. The part of electromagnetic spectrum to which waves of wavelength 1A^0 belongs to

- a. Microwaves
- b. X-Ray
- c. Gama Rays
- d. Radio Waves

Q13. A magician during a show makes a glass lens of refractive index 1.47 disappear in a trough of liquid. The refractive index of liquid is:

- a. 1.33
- b. 1.51
- c. 1.47
- d. 2.42

Q14. Two lenses of powers +5D and -7.5 D are kept in contact with each other. The focal length of combination is:

- a. -40 cm
- b. + 40 cm
- c. -4 cm
- d. 4 cm

Q15. In a diffraction pattern the intensity of central maximum is I . When width of slit is doubled then what will be its intensity:

- a. $2I$
- b. I
- c. $4I$
- d. $I/2$

Q16. Which one of the following phenomenon is not explained by Huygens Principle:

- a. Refraction
- b. Origin of Spectra
- c. Diffraction
- d. Reflection

Q17. The momentum of a photon of wavelength λ is :

- a. Zero
- b. $h\nu/c$
- c. $h\lambda/c$
- d. $h\lambda/c^2$

Q18.If an alpha particle collides head on with a nucleus, the impact parameter is

- a. Zero
- b. Infinite
- c. 10^{-10} m
- d. 10^{10} m

Q19.Bohr's theory of hydrogen atom did not explain fully:

- a. Diameter of Hydrogen atom
- b. Emission spectrum
- c. Ionization Energy
- d. The fine structure of even H-spectrum

Q20.The mass number of a nucleus is:

- a. Always less than its atomic Number
- b. Always more than its atomic Number
- c. Some times more than atomic number
- d. Sometimes equal to its atomic number

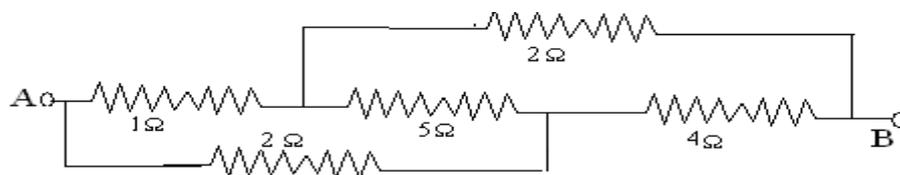
SECTION:B

Q21. What will be the effect of inserting a dielectric in a parallel plate capacitor on the following?

- (a) Capacitance (b) Charge on the plates of the capacitor

Q22. Find the expression for the energy stored in a parallel plate capacitor.

Q23. Calculate the equivalent resistance of the following network between A and B.



OR

A uniformly charged conducting sphere of diameter 2.4 m and surface charge density $80\mu\text{C}/\text{m}^2$.

- a. What is the charge on sphere.
- b. What is total electric flux leaving the surface of sphere.

Q24. In a magnetic meridian of a central place the horizontal component of earth's magnetic field is 0.26G and the dip angle is 60° . What is the magnetic field of the earth at the location?

Q25. The magnetic field in a plane EM wave is given by

$$B_y = 2 \times 10^{-7} \sin(0.5 \times 10^3 z + 1.5 \times 10^{11} t) \text{ T.}$$

- (i) What is the frequency of the wave?
- (ii) Write an expression for the electric field.

Q26. In an experiment on photoelectric effect, the slope of the cut-off voltage versus frequency of incident light is found to be $4.12 \times 10^{-15} \text{ V s}$. Calculate the value of Planck's constant.

Q27. Bismuth has a half life of 5 days. What is the time taken by $\left(\frac{7}{8}\right)$ th part of the sample to decay?

OR

Write two properties of nuclear force. Draw the variation of potential energy of a pair of nucleon as a function of their separation.

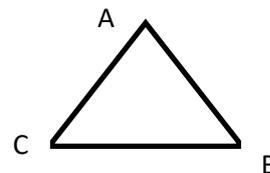
SECTION: C

Q28. State Gauss's theorem in electrostatics? Using this theorem find electric field intensity at a point outside the spherical shell?

OR

Define drift velocity and relaxation time. Obtain an expression showing relationship between them.

Q29. Calculate the work done to dissociate the system of three equal charges, $q = 1.6 \times 10^{-10} \text{ C}$ placed on the vertices of an equilateral triangle ABC of side 10 cm as shown in fig.



Q30. Explain with the help of labeled diagram, the principle and working of an AC generator.

Q31. Define Displacement current. Show that displacement current is equal to conduction current. Why is the quantity $\epsilon_0 d\phi_E/dt$ called the displacement current?

Q32. Draw a graph to show the variation of angle of Deviation δ_m with that of the angle of incidence i for a monochromatic ray of light passing through a glass prism of

refracting angle A. Hence deduce relation.
$$\mu = \frac{\sin \frac{A+\delta_m}{2}}{\sin \frac{A}{2}}$$

Q33. Derive an expression for fringe width in Young's double slit interference experiment.

OR

Define polarization of light. How we can obtain the plain polarized light by scattering method.

Q34. Draw the graph to show the variation of binding energy per nucleon with mass number of different nuclei. Give the reason for the consistency of binding energy between the mass number 30 and 170.

SECTION: D

Q35. What is energy bands? How are they formed? Explain conductors, semiconductors & insulators on the basis of energy band diagrams.

Or

State the principle and explain the working of full wave rectifier by giving its suitable circuit diagram. Draw the Input & Output Waveform of a full wave rectifier.

Q36. Derive lens maker's formula for a biconvex lens.

Double convex lenses are to be manufactured from a glass of refractive index 1.55 with both faces of the same radius of curvature. What is the radius of curvature required if focal length is to be 20 cm?

OR

Draw the ray diagram of image formation by a telescope when final image is formed at infinity. Write the formula for its magnifying power. A small telescope has an objective lens of focal length 144 cm and an eyepiece of focal length of 6 cm. Calculate its magnifying power and separation between both lenses.

Q37. Explain the working of a cyclotron by giving its principle and suitable diagram. Show that cyclotron frequency does not depend on the radius of path and velocity of accelerated charged particle.

OR

Explain the working of transformer by giving its principle and suitable diagram. How the eddy current loss is minimized in the transformer. Which transformer is used in long distance transmission of electricity?

MARKING SCHEME

1. A
2. B
3. B
4. C
5. B
6. C
7. B
8. D
9. A
10. A
11. B
12. B
13. C
14. A
15. D
16. B
17. B
18. A
19. D
20. B
21. One Marks for each Part
22. Correct derivation- 02 marks
23. Checking of balance Wheatstone Bridge- 01 Marks &
Equivalent resistance – 01 Marks
OR
Each Part – 01 Marks
24. Correct formula -1/2 Marks
Putting Value in Formula-01 Mark
Correct Result- ½ Marks
25. One Marks for each correct part
26. Correct formula -1/2 Marks
Putting Value in Formula-01 Mark
Correct Result- ½ Marks
27. Correct formula -1/2 Marks
Putting Value in Formula-01 Mark
Correct Result- ½ Marks
- OR
- Properties-1/2 + ½ Marks
Correct Graph- 1 Mark
28. Statement- 1 Marks
Correct derivation- 2 Marks

OR

Definition- $\frac{1}{2} + \frac{1}{2}$ Marks
Correct derivation- 2 Marks

29. Correct formula -1 Marks
Substitution of Values- 1 Marks
Correct Result- 1 Marks
30. Diagram- 1 Marks
Principle- $\frac{1}{2}$ Marks
Working- $1\frac{1}{2}$ Marks
31. Definition- 1 Marks
Correct derivation- 1 Marks
Correct Reason- 1 Marks
32. Graph -1/2 Marks
Ray diagram- 1 Marks
Derivation- $1\frac{1}{2}$ Marks
Ray diagram – 1 Marks
Derivation – 2 Marks

OR

- Definition – 1 Marks
Method – 2 Marks
33. Correct BE per nucleon Curve- $1\frac{1}{2}$ Marks
Two inference- $1\frac{1}{2}$ Marks
34. Definition- 1 Mark
Band formation- 2 Marks
Correct Explanation- 2 Marks

Or

- Principle-1 Marks
Circuit Diagram-1 Marks
Working- 2 Marks
Input & Output Waveform-1 Marks
35. Ray Diagram -1 Marks
Correct Derivation - 2 Marks
Correct solution radius of curvature - 2 Marks

Or

- Ray Diagram-2 Marks
Formula- 1 Mark
Correct Solution of Numerical - 1+1
36. Principle -1 Marks
Diagram -1 Marks
Working - 1 Marks

Proof - 2 Marks

37. Principle-1/2 Marks

Diagram-1 Marks

Working- 2 Marks

Loss -1 /2 +1/2 Marks

Name of Transformer- 1/2