



**SRI BHAGAWAN MAHAVEER JAIN COLLEGE**

Vishweshwarapuram, Bangalore 560004

**Mock Examination Question Paper-2 (January 2019)**

<b>Course:</b>	II PUC
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<b>Subject:</b>	Physics
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<b>Max. Marks:</b>	70
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<b>Duration:</b>	3:15 hrs.
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**PART-A**

**I. Answer all the following questions. 10 x 1 = 10**

- Two point charges  $q_1$  and  $q_2$  are placed close to each other. What is the nature of the force between the charges when  $q_1 q_2 < 0$ ?
- What is the electric field at a point between two uniformly charged plane sheets of surface charge densities  $+\sigma$  and  $-\sigma$ ?
- Write any one use of potentiometer.
- Give the nature of the path traced by a charged particle in a uniform magnetic field, when it enters the field at an acute angle with the field.
- What is Meissner effect?
- Write an expression for magnetic potential energy of a dipole, when placed in a uniform magnetic field.
- Define wavefront.
- How does the mass number of an atomic nucleus change, when it undergoes  $\beta$ -decay?
- Which region of a transistor has maximum doping concentration?
- Name the device which converts sound signal into electrical signal.

**PART-B**

**II. Answer any Five of the following questions. 5 x 2 = 10**

- Mention any two properties of electric field lines.
- Define mobility of electrons. How is mobility of electrons in a conductor related to relaxation time?
- State Kirchhoff's laws of electrical network.
- What will be the magnitude of induced emf in a 10H inductor in which current changes from 10A to 7A in 9ms?
- Write the expression for Ampere-Maxwell law and explain the terms.
- What is diffraction of light? Give the condition for secondary maxima in terms of path difference.
- Write any two observations of Geiger-Marsden experiment
- What is amplitude modulation? Draw the waveform of amplitude modulated carrier wave.

**PART-C**

**III. Answer any Five of the following questions. 5 x 3 = 15**

- Derive an expression for the energy stored in a capacitor.
- Obtain the expression for effective resistance of two resistors connected in series.
- State and explain Lenz's law.
- Obtain the expression for the coefficient of mutual inductance between two coaxial solenoids.
- Show that current lags voltage by  $90^\circ$  in a AC circuit containing an inductor.
- Draw a neat labelled diagram of simple microscope when image is formed at least distance of distinct vision. Write the expression for the linear magnification.
- Derive an expression for the radius of  $n^{\text{th}}$  orbit of an electron in a hydrogen atom, using Bohr's postulates.
- With a neat circuit diagram, explain the working of a photodiode.

**PART-D**

- IV. Answer any Two of the following questions. 2 x 5 = 10**
27. Obtain an expression for the electric potential at a point due to an isolated point charge.
28. Using Biot-savart's law, derive an expression for the magnetic field at a point on the axis of a circular current loop.
29. (a) What are ferromagnetic materials? Give an example for it.  
(b) Write any three properties of ferromagnetic materials.
- V. Answer any Two of the following questions. 2 x 5 = 10**
30. Using Huygen's wave theory of light, derive the law of refraction of light when light travels from rarer to denser medium.
31. Define half-life and decay constant of a radioactive substance. Obtain the relation between them.
32. With a neat circuit diagram, explain the input and output characteristics of npn transistor in CE mode. Draw the relevant graphs.
- VI. Answer any Three of the following questions. 3 x 5 = 15**
33. Calculate the charge on each of a pair of pith balls suspended in air from the same point by strings 0.1m long if they repel each other to a separation of 0.1m. Mass of each pith ball is 100 mg.
34. Two resistors of  $8\Omega$  and  $12\Omega$  are connected in series across a battery of potential difference 10V. Calculate the current in the circuit. When another unknown resistance is connected in parallel with two resistors across the same battery, the current in the circuit changes to 2.5A. Calculate the unknown resistance.
35. A bulb marked 60W, 60V is connected in series with a choke to a 220V, 50Hz ac supply. The bulb is found to operate under normal voltage. Calculate the value of the inductance of the choke.
36. A glass prism has a refracting angle of  $60^\circ$ . The angle of minimum deviation is  $40^\circ$ . If the velocity of light in vacuum is  $3 \times 10^8 \text{ ms}^{-1}$ , calculate the velocity of light in glass. At what angle the ray should be incident?
37. The threshold wavelength of photosensitive metal is  $5000 \text{ \AA}$ . Find the velocity of the photoelectrons emitted by it when radiation of wavelength  $4000 \text{ \AA}$  is incident on it. Given:  $h = 6.625 \times 10^{-34} \text{ Js}$   
 $e = 1.6 \times 10^{-19} \text{ C}$ ,  $m_e = 9.1 \times 10^{-31} \text{ kg}$ .

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