SRI BHAGAWAN MAHAVEER JAIN COLLEGE

Vishweshwarapuram, Bangalore 560004

Mock Examination Question Paper-1 (January 2019)

Course:	II PUC	**Subject:**	Physics
Max. Marks:	70	**Duration:**	3:15 hrs.

PART-A

I. Answer ALL the following questions. **10x1=10**

1. 10^9 electrons are added to a uncharged conductor. What is the charge on it?
2. How does the resistance of a conductor vary with temperature?
3. What is the magnetic force experienced by a stationary proton in a magnetic field?
4. Write the expression for the time period of oscillations of small magnetic needle in a uniform magnetic field.
5. Give any one use of eddy currents.
6. Define power of a lens.
7. What are coherent sources of light?
8. Is linear momentum conserved, when a photon collides with a particle?
9. In the following nuclear reaction identify the particle X:
   $p \rightarrow n + e^{+} + X$
10. Give the circuit symbol of LED.

PART-B

II. Answer any FIVE of the following questions. **5x2=10**

11. What is surface charge density? Write the expression for electric field in terms of surface charge density.
12. Write any two limitations of Ohm's law.
13. Which are the two properties required for a material to be used as a core of electromagnets.
14. AC is represented by an equation $I=I_0\sin(314)t$. Find the value of frequency of AC.
15. What is the maximum value of power factor? When does it occur?
16. Which electromagnetic wave has lowest frequency? How are they produced?
17. Mention any two applications of polaroids.
18. Draw a neat labelled diagram of Davisson and Germer experiment.

PART-C

III. Answer any FIVE of the following questions. **5x3=15**

19. Show that $E = -\frac{dv}{dx}$, where symbols have their usual meaning.
20. Explain with circuit diagram how to convert a galvanometer into a voltmeter.
21. Distinguish between diamagnetic and paramagnetic substances.
22. What is a transformer? Give any two sources of energy loss in it.
23. What is myopia? How is it caused and corrected?
24. Obtain an expression for de-Broglie wavelength in terms of accelerating potential of an electron.
25. With a neat labelled diagram, explain the working of half-wave rectifier.
26. What is line of sight communication? Write an expression for maximum line of sight distance between two antennas for space wave propagation.

PART-D

IV. Answer any TWO of the following questions: 2x5=10

27. Obtain an expression for electric field at a point just outside a uniformly charged thin spherical shell, using Gauss' law.
28. Derive an expression for conductivity of a material in terms of relaxation time.
29. Using Ampere's circuital law, derive an expression for magnetic field due to a current carrying solenoid.

V. Answer any TWO of the following questions. 2x5=10

30. Derive the expression for the refractive index of the material of a prism in terms of the angle of the prism and angle of minimum deviation.
31. Assuming the expression for radius, derive an expression for the total energy of an electron in stationary state of hydrogen atom.
32. With the help of circuit diagram, explain the working of npn transistor as a switch.

VI. Answer any THREE of the following questions. 3x5=15

33. A 600pF capacitor is charged by a 200V supply. It is then disconnected from the supply and is connected to another uncharged 600pF capacitor. How much electrostatic energy is lost in the process?

34. A battery of internal resistance 3Ω is connected to 20Ω resistor and potential difference across the resistor is 10V. If another resistor of 30Ω is connected in series with the first resistor and battery is again connected to the combination, calculate the emf and terminal potential difference across the combination.

35. A circular coil of radius 10cm, 500 turns and resistance 2Ω is placed with its plane perpendicular to the horizontal component of the earth's magnetic field. It is rotated about its vertical diameter through 180^0 in 0.25s. Estimate the magnitudes of the emf and current induced in the coil. Horizontal component of the earth's magnetic field at the place is 3×10^{-5} T.

36. In a Young's double slit experiment, the separation between the slits is 0.6mm. Interference pattern is obtained on a screen at a distance of 0.9m from the plane of the slits. Slits are illuminated with lights consisting of two wavelengths 4800 $\mathring{A}$ and 5800 $\mathring{A}$ one after the other. What is the linear separation on the screen between the 4^{th} dark fringes of two different patterns produced by the two wavelengths?

37. The activity of a radioactive substance is 4700 counts per minute. Five minutes later the activity is 2700 counts per minute. Find the (a) decay constant (b) half-life of the radioactive substance.

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