

Old Question Paper of Physics (New Course)

For: Science Grade XII

Year : 2070 B.S. (2013) | Subject Code: 210 'D'

It is for those students whose first two digit of registration number starts from 66 or greater than.

Candidates are required to give their answer in their own words as far as practicable. The figures in the margin indicate full marks.

Time: 3 Hrs | Full Marks: 75 | Pass Marks: 27

Group 'A'

1. Answer, in brief, any four questions: [4 X 2 = 8]

- a) When the ends of a wire are connected to a battery, initially the current is slightly larger, but soon it decrease slowly and becomes steady at a lower value although the emf of the battery remains unchanged. Explain.
- b) We prefer a potentiometer to measure emf of a cell rather than a voltmeter. Why?
- c) The magnetic susceptibility of a paramagnetic material is quite strongly temperature dependent, but that of diamagnetic material is nearly independent of temperature. Why?
- d) A copper ring is held horizontally and a bar magnet is dropped through the ring with its length along the axis of the ring. Will the acceleration of the falling magnet be equal to the acceleration of the falling magnet be equal to the acceleration due to gravity? Explain.
- e) State and explain Faraday's laws of electrolysis.
- f) Fluorescent lights often use an inductor, to limit the current through the tubes. Why is it better to use an inductor rather than a resistor for this purpose?

2. Answer, in brief, any four questions: [4 X 2 = 8]

- a) A charged particle moves through a region of space with constant velocity. If the external magnetic field is zero in this region, can we conclude that the external electric field in the region is also zero? Explain.
- b) The wave nature of particles is not observable in daily life. Why?
- c) What is a logic gate? Give logic symbol and truth table for a two-input AND gate.
- d) Does a nucleus contain electrons? Explain.
- e) What is global warming? Explain.
- f) Show that a proton contains three quarks: up, up and down (uud).

3. Answer, in brief, any one questions: [2]

- a) When the tension in a given string is increased by four times, by what factor does the velocity of wave in the string change?
- b) An empty vessel sounds more than a filled one when it is struck Why?

4. Answer, in brief, any one questions: [2]

- a) Radio waves diffract around buildings but not light waves, why?
- b) What is polarizing angle? Does it depend on the wavelength of light used?

Group 'B'

5. Answer any three questions: [3 X 4 = 12]

- a) What is Wheatstone bridge? Use Krichhoff's laws of current and voltage to obtain balance condition of it.
- b) Define Seebeck effect. Discuss the variation of thermoelectric emf in a thermocouple with the increase of temperature of hot junction.
- c) Find an expression for the force per unit length between two long parallel conductors carrying currents and hence define one ampere.
- d) An ac passes through a circuit containing a resistor and an inductor in series. Derive an expression for the current and phase relation between the current and voltage.

6. Answer any three questions: [3 X 4 = 12]

- a) What is a p-n junction diode? Explain the characteristics of it in the forward and reversed biased condition.
- b) Describe the construction and working of a Helium-Neon laser.
- c) State the laws of radioactivity and derive the decay equation.
- d) What is nuclear fusion? Discuss the sources of the energy released during fusion.

7. Answer any one questions: [4]

- a) How is a progressive wave different from a stationary wave? Derive a progressive wave equation.
- b) What are beats? Show that the number of beats heard per second is equal to the difference between the frequencies of two superposing waves.

8. Answer any one questions: [4]

- a) State and explain Huygen's principle. Use it to prove Snell's law.
- b) What are coherent sources of light? Deduce an expression for the fringe width in Young's double slits experiment.

Group 'C'

9. Answer any two numerical questions: [2 X 4 = 8]

- a) A voltmeter coil has resistance 50Ω and a resistor of $1.15K\Omega$ is connected in series. It can read potential differences upto 12 volts. If the same coil is used to construct an ammeter which can measure currents upto 2A, what should be the resistance of the shunt used?
- b) A slab of copper, 2mm thick and 1.50cm wide, is placed in a uniform magnetic field of flux density 0.40T, so that maximum flux pass through the slab. When a current of 75A flows through it, a potential difference of $0.81\mu V$ is developed between the edges of the slab. Find the concentration of the mobile electrons in copper.
- c) A rectangular coil of 100 turns has dimension 15×10 cm. it is rotated at the rate of 300 revolutions per minute in a uniform magnetic field of flux density 0.6T. Calculate the maximum emf induced in it.

10. Answer any two numerical questions: [2 X 4 = 8]

- a) A beam of electrons, moving with a velocity of 10^7 m/s, enters midway between two horizontal parallel plates in a direction parallel to the plates. Each plate is 5cm long. These plates are kept 2cm apart and a potential difference of 90V is applied between them. Calculate the velocity of the electron-beam with which it just grazes the edge of the positive plate. ($e/m = 1.8 \times 10^{11}$ C/kg).
- b) When ultraviolet light with a wavelength of 400 nm falls on a certain metal surface, the maximum kinetic energy of the emitted electron is 1.10 eV. What is the maximum kinetic energy of the photoelectrons when light of wavelength 300nm falls on the same surface?
- c) Calculate the binding energy per nucleon of ${}^{56}_{26}\text{Fe}$
Given: mass of proton: 1.007825 amu
Mass of neutron = 1.008665 amu
Mass of ${}^{56}_{26}\text{Fe} = 55.934939$ amu.

11. In a resonance tube experiment the first and the second resonance positions were observed respectively at 17 cm and 52.6 cm with a tuning fork of frequency 512 Hz at 27°C . Calculate the velocity of sound in air at 0°C and the end correction of the tube. [4]

12. Calculate the polarizing angle for the light travelling from water of refractive index 1.33 to glass of refractive index 1.53. [3]