

D 41993

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Name.....

Reg. No.....

FOURTH SEMESTER B.Sc. DEGREE EXAMINATION, APRIL 2018

(CUCBCSS-UG)

Complementary Course

PHY 4C 04—ELECTRICITY MAGNETISM AND NUCLEAR PHYSICS

Time : Three Hours

Maximum : 64 Marks

I. Answer *all* questions, each question carries 1 mark :

- 1 A hollow sphere of copper is negatively charged. Then the electric field inside the sphere is _____.
- 2 Small drops of the same size are charged to V volts each. If n such drops coalesce to form a single large drop, then its potential will be _____.
- 3 Two charges of $1C$ and $5C$ are placed at some distance in air. The ratio of the forces acting on them is _____.
- 4 A voltmeter has a range of $1 V$ and resistance 1000Ω . To extend the range to $10 V$, the additional series resistance required is _____.
- 5 The carrier density in metallic conductors is of the order of _____.
- 6 Tesla is the unit for measuring _____.
- 7 Name one ferromagnetic material.
- 8 The spin angular momentum of the an electron is equal to _____.
- 9 Antiparticle of electron is _____.
- 10 Energy equivalent to 1 a.m.u. is _____ MeV.

(10 × 1 = 10 marks)

II. Answer *all* seven questions, each question carries 2 marks :

- 11 How is work and energy related in electrostatics ?
- 12 Define Farad.
- 13 What is potentiometer ?
- 14 What is TAN A position in deflection magnetometer ?
- 15 Discuss the properties of nuclear force.
- 16 What is hysteresis ?
- 17 What is Milky Way ?

(7 × 2 = 14 marks)

Turn over

III. Answer any *two* questions, each question carries 4 marks :

- 18 Apply Gauss's theorem to find intensity of electric field at any point due to sheet of charge.
- 19 Define electric current and current density. Establish the relation between the current density and the velocity of the charge carriers.
- 20 Explain how deflection magnetometer can be used to determine moment of the magnet.
- 21 Give the principle and working of any particle accelerator. Give its merits over other type.
- 22 Explain why quarks in a hadrons have different colours. What are strange particles ?

(2 × 4 = 8 marks)

IV. Answer any *three* questions, each question carries 4 marks :

- 23 Calculate the force between the plates of a parallel plate capacitor, when the area of the plate is 300 cm^2 each, the separation is 0.5 cm. and they are charged to PD 1000 volts.
- 24 An iron rod of 0.2 m. long 10 mm. in diameter and of relative permeability 1000 is placed inside a long solenoid wound with 300 turns/metre. If a current of 0.5 ampere is passed through the rod, find the magnetic moment of the rod.
- 25 How long does it take for 60 % of a sample of radon to decay ? Half life of radon = 3.8 days.
- 26 The volume of the core of the transformer is 1000 cm^3 . It is fed with A.C. of 50 Hz. If the loss of energy due to hysteresis per hour is 36 Joules, calculate the area of B-H loop.
- 27 1 MeV positron encounters a 1 MeV electron travelling in opposite direction. What are the wavelengths of the photons produced ? Given, rest mass energy of electron or positron = 0.512 MeV.

(3 × 4 = 12 marks)

V. Answer any *two* questions, each question carries 10 marks :

- 28 What is line charge density ? Derive an expression for the electric field due to an infinitely long uniformly charged straight wire using Coulomb's law.
- 29 Define "temperature coefficient of resistance". How is it determined using the Carey-Foster Bridge ?
- 30 Write an essay on elementary particles.

(2 × 10 = 20 marks)