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DA-003-001502 Seat No. _____

B. Sc. (Sem. V) (CBCS) Examination

March – 2022

Physics : Paper - 502

(Electricity, Magnetism And Solid State Electronics)

(Old Course)

Faculty Code : 003

Subject Code : 001502

Time : $2\frac{1}{2}$ Hours] [Total Marks : **70**

Instructions : (1) Symbols and notations have their usual meaning.
(2) Total Marks of the question is indicated on the right side of the question.
(3) Attempt as many questions as instructed in the main question.

1 Write short answers to the following questions : **20**
(1 Mark each)

(1) Write the differential form of the Gauss's law

(2) Write the integral form of Ampere's law

(3) Write the Maxwell's equation derived from Faraday's law in terms of electric and magnetic field in electrodynamics.

(4) Write Laplace's equation for electrostatics.

(5) What is the divergence of magnetic field in Electrodynamics?

(6) Write Faraday's law relating electromotive force and flux of magnetic field.

(7) What is the value of the permeability of free space?

(8) Write the equation of the Lorentz force law in terms of magnetic and electric field.

(9) Write the type of inductance on which the transformer works.

(10) Write the value of the permittivity of free space.

(11) Fossil fuels are used in which type of power plant?

(12) In frequency response curve of amplifier, the region of uniform response is known by which term?

(13) Write the relation between the capacitive reactance χ_C and capacitance C and frequency of signal f.

(14) Write the relation between the inductive reactance χ_L and inductance L and frequency of signal f.

(15) What is the full form of the word CRO?

(16) What is the relation between voltage amplification, output voltage and input voltage of the given circuit.

(17) Define collector efficiency in power amplifier.

(18) In CRO how the x and y plates are placed with respect to each other

(19) What is the ratio of the frequencies fed to X and Y plates of CRO if it produces the Lissajous figure of a one perfect circle?

(20) In the term TC type of amplifier the term TC stands for?

2 (A) Write short answers to any three of the followings : **6**
(2 Marks each)

(1) Write and explain the equation of the Coulomb's law for the force between two charges q_1 and q_2 r, distance apart in free space.

(2) Explain the Biot-Savart law in brief.

(3) Give the statement of Gauss's law in electrostatics.

(4) Explain Potential in brief.

(5) Give the differential equation by which the magnetic potential is defined and explain briefly.

(6) What is Calorific value? Give example of Calorific values of different substances.

(B) Write answers to any three of the followings : **9**
(3 Marks each)

(1) Derive equation for the magnetic field around a steady current.

(2) Explain in detail different forms of charge and current densities.

(3) How did Maxwell correct the Ampere's law for the case of electrodynamics ?

(4) Explain scalar and vector potentials.

(5) Write any three ways to treat Nuclear waste.

(6) Write advantages of Hydro power plant.

(C) Write answer to any two of the followings : **10**
(5 Marks each)

(1) Write detail note on the Maxwell's equations of electrodynamics for free space.

(2) Write detailed note on a thermal power plant.

(3) Write detailed note on the Poynting's theorem.

(4) Discuss the charge particle in uniform magnetic field.

(5) Give detailed comparison of Electrostatics and Magnetostatics.

3 (A) Write short answers to any three of the followings : **6**
(2 Marks each)

(1) Give two advantages of TC coupled amplifier.

(2) Explain in brief Audio Power Amplifier.

(3) Write the classifications of power amplifiers.

(4) Calculate the percentage voltage regulation for a power supply which has a no-load voltage 40V and full-load voltage 30V ?

(5) Explain briefly digital and analogue circuits.

(6) Give names of the CRO controls.

(B) Write answers to any three of the followings : **9**
(3 Marks each)

(1) Write a short note on Direct Coupled Amplifier.

(2) Write short note on Electronic versus Electrical functions of instruments.

(3) Explain Transistor shunt voltage regulator.

(4) Explain different Lissajous figures with diagrams.

(5) Explain Heat sink.

(6) Write short note on the Thermal Run away.

(C) Write answer to any two of the followings : **10**
(5 Marks each)

(1) Write detailed note on Digital Voltmeter.

(2) Write detailed note on complementary-symmetry amplifier

(3) Explain in detail the Push-Pull amplifier

(4) Write detailed note on Regulated Power Supply

(5) Write detailed note on CRO.
