



RO-003-001502

Seat No. _____

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

February - 2019

Physics : P - 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 marks each)

- (1) Write the integral form of the Gauss's law
- (2) Write the differential form of Ampere's law
- (3) $\vec{\nabla} \times \vec{E} = 0$ is a condition for Electrostatic field. Is this statement true or false?
- (4) Write Poisson's equation for electrostatics.
- (5) $\vec{\nabla} \cdot \vec{B} = 0$ in Electrodynamics. Is this statement true or false?
- (6) Write Faraday's equation in terms of electric field and magnetic field.
- (7) What is the value of the permeability of free space?
- (8) Write Ampere's equation with Maxwell modification term.
- (9) Write the value of the permittivity of free space.

- (10) Give the equation for the reactance (χ_L) of the AC circuit in terms of the inductance (L) of the circuit.
- (11) Fossil fuels are used in which type of power plant?
- (12) Direct coupling is a type of multistage amplifier circuit. Is it true or false?
- (13) In complementary-symmetry amplifier if one transistor is of NPN type, what would be type of the second transistor?
- (14) Which type of coupling in multistage amplifier is best suited for the impedance matching?
- (15) What is the full form of the word CRO?
- (16) The efficiency of the Class-A amplifier is 87.5%. Is it true or false?
- (17) Give the equation for the reactance (χ_C) of the AC circuit in terms of the capacitance (C) of the circuit.
- (18) To demonstrate any signal on CRO the signal is fed to the Y - plates. How do the voltages fed to the X - plates vary with time in one cycle of the signal? linear or sinusoidal?
- (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 RC type of coupling of amplifier the term RC stands for?

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

(2 marks each)

- (1) Write the Poisson's and Laplace equations for electrostatics.
- (2) Explain why $\vec{\nabla} \times \vec{E} = 0$ condition is essential in showing the electrostatic field in terms of scalar potentials?
- (3) Write the equation of Gauss's law and explain it.
- (4) Write the equations of Electrostatic potential and Magnetostatic potential in terms of electrostatic and Magnetostatic fields.

- (5) Explain Lorentz force law and give equation depicting the same for the charged particle moving in the electric and magnetic field.
- (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) Explain Faraday's experiment.
- (2) If a charged particle enters a uniform magnetic field at angle 45° with the speed of 1 m/s and if the magnetic field is of 1 Tesla and the pitch of the Helical motion of the it is 0.1 m Then what would be the q/m ratio of the particle?
- (3) How did Maxwell correct the Ampere's law for the case of electrodynamics.
- (4) Derive the expression for the pitch in the helical motion of charged particle when applied \vec{B} magnetic field is neither parallel nor perpendicular to velocity of the charged particle
- (5) Write any three ways to treat Nuclear waste.
- (6) Write short-note on the steam generating plant

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

(5 Marks each)

- (1) Describe the motion of charged particle in different conditions of applied electric field and magnetic fields deriving necessary equations of motion.
- (2) Discuss in detail the Hydroelectric power station.
- (3) Discuss in detail the Poynting's vector and Poynting's theorem in Electrodynamics.
- (4) Discuss in detail the Divergence and Curl of the Magnetostatic field.
- (5) Discuss the three dimension Dirac Delta function.

- 3 (A) Write short answers to any **three** of the followings : **6**
(2 Marks each)
- (1) Give two advantages of *RC* coupled amplifier
 - (2) Define the collector efficiency of amplifier.
 - (3) Give the equation showing the dependence of the total dissipated power from within the transistor
 - (4) A power amplifier has zero signal power dissipation of $2W$. If power of output signal is $1W$ then what is its collector efficiency?
 - (5) The full loaded output voltage of a power supply is $100V$ and the maximum rated current is $1A$ then what is the lowest value of load it can handle safely?
 - (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 *RC* coupled amplifier.
 - (2) Compare the different types of transistor amplifier couplings.
 - (3) Write short note on different classes of amplifiers.
 - (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 Transformer Coupled amplifier.
 - (2) Write detailed note on collector efficiency of amplifier
 - (3) Explain in detail the Push-Pull amplifier
 - (4) Write detailed note on Voltage regulators
 - (5) Write detailed note on *CRO*