



**MCQ-003-001502**

Seat No. \_\_\_\_\_

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

**May / June - 2018**

**Physics : P - 502**

**(Electricity, Magnetism & Solid State Electronics)**

**(New 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 value of permittivity of free space  $\epsilon_0$  along with its unit in SI system.
- (2) Write the value of permeability of free space  $\mu_0$  along with its unit in SI system.
- (3) Write the equation showing the integral and differential form of Gauss's law.
- (4) Write the equation showing the integral and differential form of Ampere's law.
- (5) Write the equation showing the Maxwell's correction of Ampere's law.
- (6) Write the equation of Biot-Savart law for the magnetic field of an infinite straight current carrying wire, at any point outside the wire.
- (7) Write the equation of Farade's law in differential form.
- (8) The Divergence of magnetic field is always zero. Is this statement true or false ?
- (9) What would be the nature of trajectory of the charge particle if the motion of the charged particle and applied magnetic field is neither in the same direction nor in the perpendicular direction.

- (10) Which type of power plant is used for the production of electric energy worldwide ?
- (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) Give the equation for the reactance ( $\chi_L$ ) of the AC circuit in terms of the inductance (L) of the circuit.
- (14) Give the equation for the reactance ( $\chi_C$ ) of the AC circuit in terms of the capacitance (C) of the circuit.
- (15) Which type of coupling in multistage amplifier is best suited for the impedance matching ?
- (16) The efficiency of the Class-A amplifier is 87.5%. Is it true or false ?
- (17) In complementary- symmetry amplifier if one transistor is of NPN type, what would be-type of the second transistor ?
- (18) What is the full form of the word CRO ?
- (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) 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 ?

- 2 (a) Write short answers to any **three** of the followings : **6**  
(2 Marks each)
- (1) Define Electrostatic field and Magnetostatic field.
  - (2) Write the Poisson's and Laplace's equation for the Electrostatic field.
  - (3) Define the Electrostatic potential showing its differential form and define Magnetostatic potential showing its differential form
  - (4) Write the equation showing Coulomb's law for the electric field of a given charge and also Write the equation of the Biot-Savart law for the magnetic field of the given current segment.
  - (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) Suppose an electric field is given as  $3x\hat{i} + 5y\hat{j} - 4z\hat{k} \text{ N/C}$  calculate the work done in electron volt (eV) bringing one electron from origin of the coordinate system to the point (5m, 5m, 5m).
- (2) A wire carrying current of 1 A has length 2m, what is the value of the magnetic field produced at the point at 1m normal distance from the midpoint of the wire ?
- (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 advantages of the solid fuels over liquid fuels.
- (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 Nuclear power plant.
- (3) Discuss in detail the work-energy theorem in the case of electrodynamics deriving the Poynting's vector.
- (4) Discuss Scalar and Vector potential formulations in the case of electrodynamics,,
- (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 disadvantages of Direct coupled amplifier.
- (2) Give different Classes of Power amplifier and arrange them in the increasing level of distortion in the output signal.

- (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 4W. If power of output signal is 2W 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) Briefly compare Voltage and Power amplifiers.
- (2) Briefly compare the different types of couplings in transistor amplifiers.
- (3) Briefly explain the Class-A, Class-B and Class-C amplifiers.
- (4) Write short note on the Thermal Runaway in transistor amplifier,
- (5) Write short note on the important terms of a power supply.
- (6) Write short note on Lissajous figures.
- (c) Write answer to any **two** of the followings : **10**  
(5 Marks each)
- (1) Write detailed note on the Digital Voltmeter.
- (2) Write detailed note on Transformer coupled amplifier.
- (3) Explain in detail the Push-Pull amplifier.
- (4) Write detailed note on Voltage regulators specifically explaining series feedback voltage regulator.
- (5) Write detailed note on CRO.