



HCW-003-1013002 Seat No. _____

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

October / November - 2017

Physics : Paper - 301

(Electricity, Magnetism & Semiconductor Electronics)

(New Course)

Faculty Code : 003

Subject Code : 1013002

Time : $2\frac{1}{2}$ Hours]

[Total Marks : 70

Instructions :

- (1) All questions are **compulsory**.
- (2) Symbols have their usual meaning.
- (3) **Right** side indicates marks.

- 1 (A) Give the correct answers of following questions : 4
- (i) Define vectors quantity.
 - (ii) Write formula for vector operator.
 - (iii) State the fundamental theorem for divergence.
 - (iv) Write an equation for curl of vector.
- (B) Answer in brief : (answer any one) 2
- (i) Explain the scalar product of two vector.
 - (ii) Discuss the term divergence.
- (C) Answer in details : (answer any one) 3
- (i) Discuss, scalar triple product.
 - (ii) Explain the curl of vector and its geometrical interpretation.

- (D) Write a answer on : (answer any one) 5
- (i) Explain the vector transform for two and three dimensional case.
 - (ii) Write note on fundamental theorem of gradient.
- 2 (A) Give the correct answers of following questions : 4
- (i) Write the unit of electric field.
 - (ii) Give the relation between electric field and electric potential.
 - (iii) Write the value and unit of permittivity of free space (ϵ_0).
 - (iv) Write the value of electric charge on electron.
- (B) Answer in brief : (answer any one) 2
- (i) Explain : Electric field due to several point charges.
 - (ii) Explain : Electric field due to point charge.
- (C) Answer in details : (answer any one) 3
- (i) Describe the electric potential.
 - (ii) Explain the Poisson's and Laplace's equation.
- (D) Write a note on : (answer any one) 5
- (i) Derive the Gauss law in differential and integral form.
 - (ii) Explain in details : Electric field due to uniformly charged sphere.
- 3 (A) Give the correct answers of following questions : 4
- (i) What is the relation of Lorentz force law ?
 - (ii) Write cyclotron formula.
 - (iii) State Biot-Savart's law.
 - (iv) What is μ_0 and its value ?

- (B) Answer in brief : (answer any one) 2
- (i) What is the radius of an electron moving at the speed of 3×10^6 m/s in magnetic field 6×10^{-5} T [q = 1.6×10^{-19} C and m = 9.1×10^{-31} kg] ?
 - (ii) Explain the Ampere's law for differential and integral form.
- (C) Answer in details : (answer any one) 3
- (i) Explain : Divergence of a magnetic field \vec{B} .
 - (ii) Explain : Curl of magnetic field \vec{B} .
- (D) Write a answer on : (answer any one) 5
- (i) Discuss the magnetic field along straight wire carrying steady current.
 - (ii) Explain the cycloid motion with qualitative explanation.
- 4 (A) Give the correct answers of following questions : 4
- (i) Define atomic polarizability.
 - (ii) What is insulator ?
 - (iii) Give the types of magnetic materials.
 - (iv) Define : Magnetization \vec{M} .
- (B) Answer in brief : (answer any one) 2
- (i) Explain : Induced dipole.
 - (ii) Explain : Magnetic susceptibility.
- (C) Answer in details : (answer any one) 3
- (i) Explain : Dielectrics.
 - (ii) Explain : Diamagnetic, paramagnetic and ferromagnetic materials.
- (D) Write a answer on : (answer any one) 5
- (i) Discuss the physical interpretation of bound charges.
 - (ii) Derive an expression for torque and force acting on magnetic dipole placed in a magnetic field.

- 5 (A) Give the correct answers of following questions : 4
- (i) Operating point 'Q' indicate a possible values of....
 - (ii) Write the formula for collector current in CE configuration of transistor.
 - (iii) Write the general formula for stability factor.
 - (iv) What is phase difference between input and output voltage in CE amplifier ?
- (B) Answer in brief : (answer any one) 2
- (i) Find the value of stability factor for base resistor biasing circuit. [Given $\beta = 50$].
 - (ii) What is transistor biasing and give it's types.
- (C) Answer in details : (answer any one) 3
- (i) Derive the general equation of stability factor.
 - (ii) Explain: Biasing with feedback resistor method.
- (D) Write a answer on : (answer any one) 5
- (i) Explain in detail voltage divider biasing method for transistor.
 - (ii) What is phase reversal ? Explain in detail, phase reversal in CE amplifier.
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