

F.Y.B.SC. SEM – II (2014 COURSE) : WINTER - 2017

SUBJECT : PHYSICS : ELECTRICITY & MAGNETISM

Day : Monday
Date : 30/10/2017

Time : 03.00 PM TO 05.00 PM
Max. Marks : 40

W-2017-0602

N.B.:

- 1) All questions are **COMPULSORY**.
- 2) Figures to the right indicate **FULL** marks.
- 3) Draw neat and labeled diagrams **WHEREVER** necessary.

Q.1 Attempt **ANY TWO** of the following: [10]

- a) State and prove Gauss's law in dielectrics.
- b) Obtain an expression for magnetic induction at a point due to straight conductor carrying current.
- c) With neat circuit diagram explain the action of diode as a full wave rectifier.

Q.2 Attempt **ANY TWO** of the following: [10]

- a) Define current density. Derive the expression for current density.
- b) Obtain expression for impedance in an AC circuit containing an inductor, resistor and capacitor in series.
- c) The parallel plate capacitor of plate area 0.01m^2 is filled with dielectric of dielectric constant 5. Its capacitance is 2×10^{-10} farad and it has been charged to 50 volts. Find electric intensity in dielectric. [$\epsilon_0 = 8.85 \times 10^{-12} \text{C}^2 / \text{Nm}^2$]

Q.3 Attempt **ANY TWO** of the following: [10]

- a) Obtain expression for current at any instant during growth of current in LR circuit.
- b) A coil of 20 cm radius has 15 turns and carries a current of 3 A. Find the magnetic induction at the center of coil. [$\mu_0 = 4\pi \times 10^{-7} \text{Wb} / \text{Am}$].
- c) With neat circuit diagram, explain the action of transistor as common emitter amplifier.

Q.4 Attempt **ANY FIVE** of the following: [10]

- a) Define electric power. State its SI unit.
- b) Distinguish between polar molecules and non-polar molecules.
- c) Write note on 'π filter'.
- d) Current through conductor is 160 mA. Calculate how many electrons pass through the conductor in one minute. [$e = 1.6 \times 10^{-19}\text{C}$].
- e) Write the S.I. unit of:
 - i) Magnetic dipole moment
 - ii) Magnetization
- f) A circuit has a resistance and reactance, each equal to 100Ω . Find its power factor.
- g) Draw neat and labeled circuit diagram of bridge rectifier.

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