

Roll No. ....

21192

**B. Sc. (Pass Course) 2nd Semester  
Examination – May, 2019**

**(ELECTRO-MAGNETIC INDUCTION AND ELECTRONIC  
DEVICES**

**Paper : Phy-202**

**Time : Three hours ] [ Maximum Marks : 45**

*Before answering the questions, candidates should ensure that they have been supplied the correct and complete question paper. No complaint in this regard, will be entertained after examination.*

**Note :** Attempt *five* questions in all, selecting at least *one* question from each Unit. All questions carry equal marks.

**UNIT – I**

- 1. (a) Derive and expression for impedance of a series LCR circuit. Discuss the resonance condition and then find the resonance frequency. 6

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- (b) A coil of inductance 4 mH and resistance 10 Ω is connected in parallel with a capacitor of 0.001 μF. Calculate : 3
  - (i) the frequency at which the current from an a.c. supply to this circuit is minimum.
  - (ii) r.m.s. value of current.
  - (iii) the current magnification.

- 2. (a) Derive and expression for admittance of a parallel LCR circuit. Discuss the resonance condition and then find the resonance frequency. 5
- (b) Discuss the phenomenon of growth and decay of current in R-C circuit. Find its time constant. 4

**UNIT – II**

- 3. (a) Show that the conductivity of a semiconductor is minimum when it is lightly doped with p-type impurity such that

$$p = n_i \left( \frac{\mu_n}{\mu_p} \right)^{1/2}$$

Also show that the minimum conductivity is  $2n_i(\mu_n \cdot \mu_p)^{1/2} q$ . 5

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(b) Draw the input and output characteristics of a transistor in common base configuration. Explain their nature and shape. What does their slope represent ?

4. What is Hall coefficient ? Show that for a p-type semiconductor the Hall coefficient  $R_H$  is given by  $R_H = 1/ep$ . Describe an experimental set up for measurement of Hall voltage  $V_H$ .

5. Explain the working of a full wave rectifier having an inductor filter. Derive necessary relation for the ripple factor. When such filter is useful ? What is the output voltage in this case ?

**UNIT - III**

6. Draw the circuit diagram of a tuned collector oscillator. Explain how the oscillations start in the circuit ? Give the necessary condition for maintaining the oscillations. Draw the input and output characteristics of a transistor in common base configuration. Explain their nature and shape. What does their slope represent ?

7. Draw the circuit of Colpitt's oscillator. Explain its working. Give the necessary condition for sustained oscillations. What are its advantages over other oscillators ? 9

8. Draw the circuit diagram and frequency response curve of an R-C coupled amplifier. Why does the gain fall in the low and high frequency range of an amplifier ? 9

