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Register Number:

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**ST. JOSEPH’S COLLEGE (AUTONOMOUS), BENGALURU-27**

**B.Sc. PHYSICS: IV SEMESTER**

**SEMESTER EXAMINATION: APRIL 2017**

**PH 415 Optics, Electricity and Semiconductor Diodes**

**Time: 1½ Hrs. Max.Marks:35**

This paper contains **one** printed page and **three** parts.

**PART- A**

Answer any **three** of the following: (**3 x 8 = 24)**

1. Derive an expression for the growth of current in L-R circuit. Define time constant.

2 .With a neat circuit diagram explain the working of a semiconductor diode as a half

   wave rectifier. Derive expressions for its efficiency and ripple factor.

3. Derive an expression for an acceptance angle and numerical aperture for an

 optical fibre with a neat diagram.

4. An alternating e.m.f. is applied to a circuit containing an inductance, capacitance

 and resistance in series. Obtain expressions for the current, impedance and phase

 of current.

**PART- B**

Answer any **two** of the following: (**2 x 4 =8)**

5. Over what range of input voltage will zener regulating circuit will maintain 30V across

 2 kΩ resistor? Assuming that Rs =200Ω and the maximum zener current is 25 mA.

6. The wavelength of He- Ne laser is 632.8 nm. Its output power is 3.147mW.

 How many photons are emitted at each minute when it is in operation?

7. An electric lamp which runs at 40V consumes 10A current. It is connected to ac mains

 at 100v-50Hz. Calculate the inductance of the choke used.

**PART –C**

Answer any **three** of the following: (**3 x 1 =3)**

8. a) How one can decrease the time constant of a CR circuit?

 b) In a circuit containing an inductance or capacitance the power consumed is

 zero even though a current passes. Explain

 c) Why stimulated emissions are necessary for using lasing action?

 d) How fibres are used as a sensor?

 e) What is the advantage of a bridge rectifier over a center tap full wave rectifier?

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