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

**B.Sc. PHYSICS - IV SEMESTER**

**SEMESTER EXAMINATION: APRIL 2017**

**PH415: Optics, Electricity and Semiconductor Diodes**

**Time - 1 ½ 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. With a neat diagram explain the construction and working of ruby laser.
2. Obtain an expression for the growth of current in a circuit with Inductance and resistance connected in series. Define time constant of a LR circuit.
3. a) What is an optical fibre? Explain the principle involved in its working.

b) Give any four differences between Step Index and Graded Index fibre. (4 + 4)

4. a) Describe the working of a full wave rectifier.

b) Derive expressions for ripple factor and efficiency of the full wave rectifier. (4 + 4)

**PART- B**

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

1. A lamp rated 24V, 48W is to be connected in series with a choke to 230V,

50Hz mains. Calculate the Self Inductance of the choke.

1. An optical fibre has a numerical aperture of 0.35 the refractive index of cladding is 1.443. Calculate the refractive index of the core and acceptance angle of the fibre.
2. In a Zener diode voltage regulator, the breakdown voltage of the diode used was 9V and the series resistance was 150Ω. If the minimum Zener current is almost zero and the maximum is 25mA, calculate the operating range of the input voltage.

Given RL=1000Ω.

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

1. a) Why ac is preferred for long distance communication?

b) Why metastable state is necessary for lasing action to take place?

c) What is the condition for critically damped in the case LCR connected in series?

d) Why power consumed in inductance or capacitance is zero?

e) Why intrinsic semiconductor is not much in use?

PH-415-A-17