

Roll No.

Exam Code : J-22

Subject Code—55566

B. Sc. EXAMINATION

(Batch 2018 Onwards) (Main/Re-appear)

(Third Semester)

PHYSICS

CPL-303 (Course VI)

Semiconductor Devices

Time : 3 Hours

Maximum Marks : 80

Note : Attempt *Five* questions in all, selecting *one* question from each Unit. Q. No. 1 is compulsory. All questions carry equal marks.

Compulsory Question

1. (a) How the light emitting diode is different from ordinary diode ?
(b) The current gain of a transistor in CB configuration is 0.96. Calculate its emitter current if base current is 200 mA.

- (c) What are the characteristics of Ideal OPAMP.
- (d) Using energy band diagram explain why a semiconductor acts as an insulator at OK and why its conductivity increases with increasing temperature.
- (e) What is net charge on a p-type semiconductor ? Explain.
- (f) What type of feedback is used in oscillators and why ?
- (g) What is difference between A and B class amplifiers ?
- (h) What do you understand by static and dynamic resistance of a diode, differentiate between the two. $2 \times 8 = 16$

Unit I

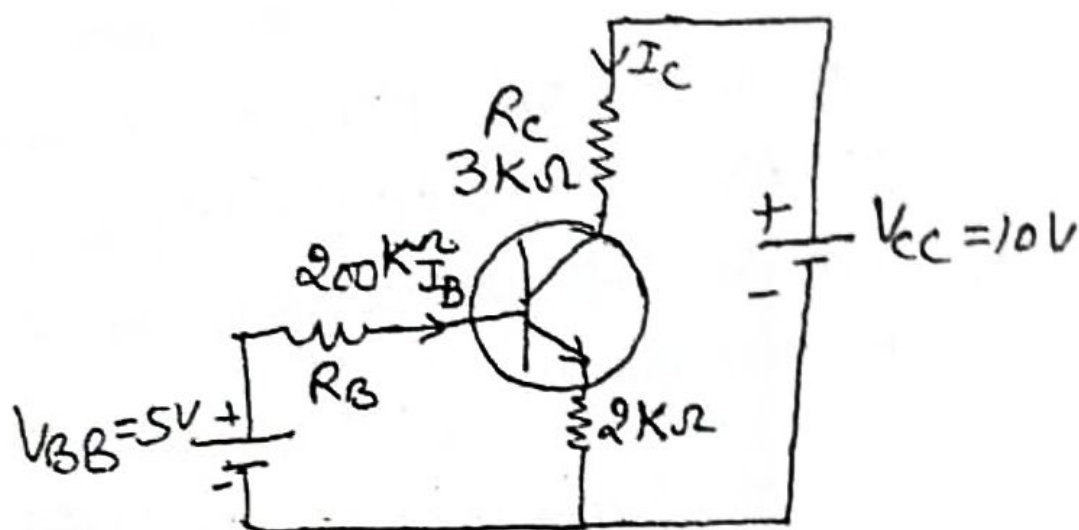
2. (a) What is rectifier ? Explain the working of Central tap and Bridge rectifier. Derive expression for ripple factor and efficiency of a full wave rectifier. 12

- (b) Explain the two mechanisms of breakdown in a junction diode. 4
3. (a) Describe Zener Diode. Discuss how is it used as a constant voltage device. 8
- (b) Explain how the depletion region width is affected by the external biasing. 4
- (c) Explain V-I characteristics of P-N Junction diode. 4

Unit II

4. (a) Explain the circuit configuration of CE transistor for studying the characteristics. Define its current amplification factor β . Derive the relation between collector current and base current in terms of β . 8
- (b) What is D.C. load line ? Explain it by using common emitter circuit. 8
5. (a) Explain input and output characteristics of common base configuration. Explain the shape of the curves qualitatively. 8

- (b) Find the transistor current in the circuit shown below which contains a silicon transistor with $\beta = 100$ and $I_{CO} = 20$ nA. 8



Unit III

6. (a) What is RC coupled amplifier ? Draw circuit diagram and discuss its operation. Also explain frequency response curve. 10
- (b) Explain voltage divider Biasing. 6
7. (a) Explain the circuit and working of Colpitt oscillator. 6

- (b) What is feedback ? Explain feedback amplifier using diagram. Also explain how negative feedback in amplifiers help in improving gain stability, reduction of non-linear distortion and frequency response. 10

Unit IV

8. (a) What is an operational amplifier ? Describe an inverting configuration of an OPAMP. 6
- (b) Draw the schematic diagram and derive the expression for output voltage for differential amplifier 6
- (c) Explain the concept of virtual ground in an OPAMP. 4
9. (a) Explain the non-inverting amplifier in detail with its circuit diagram. 6
- (b) Discuss the application of OPAMP as an integrator. Also derive output expression for it. 6