

EASTERN UNIVERSITY, SRI LANKA

SECOND EXAMINATION IN SCIENCE - 2016/2017

FIRST SEMESTER (PROPER/REPEAT)

(Nov/Dec 2018)

PH 202 ELECTRONICS I

Time: 01 hour.

Answer ALL Questions

1. (i) Semiconductors can be classified as intrinsic semiconductors and extrinsic semiconductors. Explain about intrinsic semiconductors, extrinsic semiconductors, p-type and n-type semiconductors using appropriate energy band diagrams.
- (ii) Describe about the transport mechanisms of charge carriers in semiconducting materials.
- (iii) Explain about the formation of a p-n junction, p-n junction under forward biasing and reverse biasing using energy band diagrams. State the dominant transport mechanism of electrons under forward biasing and reverse biasing.
- (iv) Zener diodes are used for voltage regulations. For a Zener regulator shown in figure 1, calculate the range of input voltage for which the output remain constant given that: $V_Z = 6.3 \text{ V}$, $(I_Z)_{min} = 2.5 \text{ mA}$, $(I_Z)_{max} = 25 \text{ mA}$, and the internal resistance of the Zener diode $r_Z = 0$.

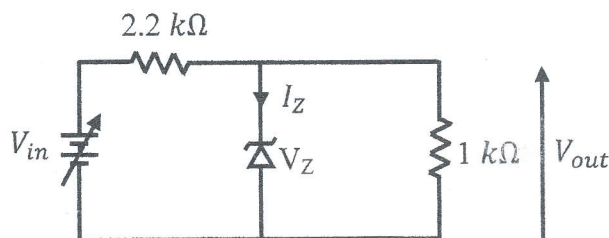


Figure 1

2. (i) Explain the working principle of an NPN transistor as an amplifier using appropriate diagrams. Briefly explain the origin of different currents in an NPN transistor amplifier and write the relation between them.
- (ii) Using a common-emitter transistor configuration circuit discuss the input, output and transfer characteristics and about the dc load line and quiescent point.
- (iii) An NPN transistor circuit shown in figure 2 has $\alpha = 0.985$ and $V_{BE} = 0.3$ V. If $V_{CC} = 16$ V, calculate R_1 and R_C to place the Q-point at $I_C = 2$ mA, $V_{CE} = 6$ V.

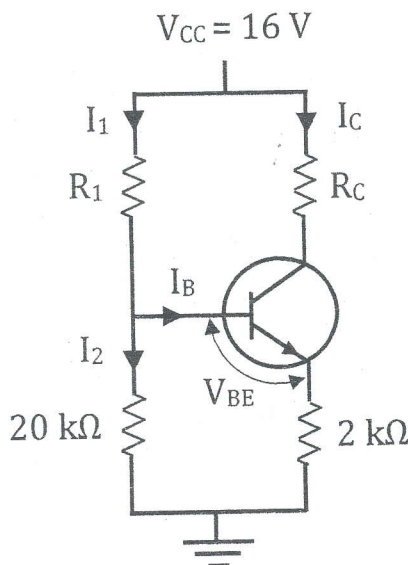


Figure 2