SH-II/Electronics-201/C3/19

B.Sc. 2nd Semester (Honours) Examination, 2019

ELECTRONICS

(Semiconductor Devices)

Paper : SH/ELC/201/C-3(T-3)

Course ID : 21711

Time: 1 Hour 15 Minutes **Full Marks: 25**

The figures in the right hand side margin indicate full marks.

Candidates are required to give their answers in their own words as far as practicable.

1. Answer *any three* of the following: 1×3=3

(a) What is reverse Saturation Current?

(b) What is doping?

(c) Size of the collector region of transistor is larger than emitter. —Why?

(d) Why is BJT called a Current Controlled Device?

(e) Write the full form of MESFET and IGBT.

(f) Give the symbol of Tunnel diode and Varactor diode.

2. Answer *any three* of the following: 2×3=6

(a) Differentiate between drift and diffusion currents.

(b) Among CB, CE and CC configuration, which one is most popular and why?

(c) Write down the Einstein relationship in Semiconductor Physics and mention its significance.

(d) Differentiate between *n* and *p*-channel JFETs.

(e) What is Tunneling phenomenon? Mention two applications of Tunnel diode.

(f) What is Zener breakdown?

3. Answer *any two* of the following: 5×2=10

(a) A transistor has $I_E = 10mA$ and $\alpha = 0{\cdot}98$. Find the value of base and collector currents. The symbols have their usual meanings. 2½+2½=5

(b) Show with a diagram, the different current components in a p-n-p transistor with emitter-base junction forward biased and collector-base junction reverse biased. 2+3=5

(c) Explain the construction and V—I characteristics of a DIAC. 2+3=5

(d) Define mobility, current density and conductivity of a semiconductor. Establish the relation between mobility and conductivity. 3+2=5

4. Answer *any one* of the following: 6×1=6

(a) Draw the circuit diagram of an n-p-n transistor in CE configuration and explain its input and output characteristics. 2+(2+2)=6

(b) Derive ideal diode current equation. 6

(c) What is Hall effect? Show that Hall coefficient, $R_H = \frac{1}{Pe}$, where P signifies concentration of charge carrier and e is the charge. 1+5=6

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