H Roll No. .....

TEC–201

B. TECH. (SECOND SEMESTER) END SEMESTER EXAMINATION, 2019

(ALL BRANCHES)

BASIC ELECTRONICS ENGINEERING

Time : Three Hours

Maximum Marks : 100

Note : (i) This question paper contains five questions.

(ii) All questions are compulsory.

(iii) Instructions on how to attempt a question are mentioned against it.

(iv) Total marks assigned to each question are **twenty.**

1. Attempt any *two* questions of choice from (a), (b) and (c). (2×10=20 Marks)

(a) Discuss laws of Boolean algebra in detail.

(b) Perform the following number system conversion :

(i) $(43)_{10} = (?)_2$

(ii) $(59)_{10} = (?)_{BCD}$

(iii) $(13)_8 = (?)_2$

(iv) $(11011001)_2 = (?)_{16}$

(v) $(AC)_{16} = (?)_{10}$

(c) Perform the following :

(i) $(38)_{10} - (25)_{10}$ in Binary using 1's complement

(ii) $(29)_{10} - (34)_{10}$ in Binary using 2's complement

2. Attempt any *two* questions of choice from (a), (b) and (c). (2×10=20 Marks)

(a) Derive the continuity equation for semiconductors.

(b) Differentiate between insulators, semiconductors and conductors in detail.

(c) Write short notes on the following :

(i) P type semiconductors

(ii) Current density

3. Attempt any *two* questions of choice from (a), (b) and (c). (2×10=20 Marks)

(a) What do you mean by the depletion layer of a PN junction diode ? Compare V-I characteristics of Silicon and Germanium diodes.

(b) Discuss the working of a center tapped full wave rectifier and derive its rectification efficiency.

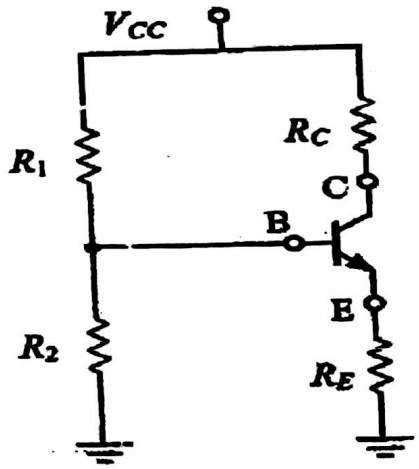
(c) The reverse saturation current at 300 K of a *p-n* junction Ge diode is 5 μA. Find voltage to be applied across the diode to obtain a forward current of 8 mA. Also determine its static and dynamic resistance.

4. Attempt any *two* questions of choice from (a), (b) and (c). (2×10=20 Marks)

(a) Derive the mathematical relation between current gains α and β of a BJT. Also discuss the leakage currents I_{CBO} and I_{CEO}.

(b) Discuss the construction, operation and characteristics of E-MOSFET.

(c) Consider the following voltage divider bias circuit of BJT. Determine the collector current I_C and collector to emitter voltage V_{CE}. Given, R_1 = 60 kΩ, R_2 = 7 kΩ, R_C = 12 kΩ, R_E = 1.7 kΩ, V_{BE} = 0.7 V, current gain β = 50 and V_{CC} = 30 V.



5. Attempt any *two* questions of choice from (a), (b) and (c). (2×10=20 Marks)

(a) Write characteristics of an ideal Op-Amp. Also discuss the concept of virtual ground.

(b) Draw neat circuit diagrams and derive the output of the following Op-Amp based circuits :

(i) Adder

(ii) Subtractor

(c) What do you mean by an inverting amplifier ? Discuss, how an Op-Amp can be used as a differentiator ?