# END TERM EXAMINATION

SECOND SEMESTER [B.Tech] MAY-JUNE 2017

| Paper Code: ETEC-106 | Subject: Electronic Devices |
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| Time: 3 Hours | Maximum Marks: 75 |

**Note: Attempt any five questions including Q.no.1 which is compulsory. Select one question from each Unit.**

Q1　(a) Differentiate between conductor, insulator and semiconductor using energy band concept.

(b) What do you understand by drift current & diffusion current? Write an equation for net electron current in a semiconductor.

(c) What is meant by Zener & Avalanche breakdown in p-n junction semiconductor diode?

(d) List the advantages of hybrid parameter. Draw the h-parameter model of a transistor in CE configuration.

(e) What are universal gates? Implement AND, OR & NOT gate using universal gates.　**(5x5=25)**

## Unit-I

Q2　(a) What is Fermi level? Show that is an intrinsic semiconductor the Fermi level is located at the middle of unallowable energy gap.　**(6.5)**

(b) Prove that the conductivity of a semiconductor is given by $\sigma = q\,(n\mu_e + p\mu_h)$.　**(6)**

Q3　(a) Explain the band structure of open circuited p-n junction.　**(6.5)**

(b) Explain how semiconductor parameters vary with temperature.　**(6)**

## Unit-II

Q4　(a) What is meant by dc & ac resistance of a diode? How these resistance can be determined from its V-I characteristics.　**(6.5)**

(b) Describe the piecewise linear approximation model of a diode.　**(6)**

Q5　(a) Write short note on:　**(6)**
(i) Tunnel Diode
(ii) Photo Diode

(b) Draw the circuit diagram of bridge rectifier. Explain its operation. Find dc and rms output voltage. Also find its ripple factor.　**(6.5)**

## Unit-III

Q6　(a) Define the following w.r.t BJT.　**(6.5)**
(i) $I_{co}$ (ii) $\alpha$ (iii) $\beta$ (iv) $I_{cbo}$ (v) $I_{ceo}$

(b) A transistor has $I_b$ = 100$\mu$A and $I_c$ = 2mA, Find (i) $\alpha$ (ii) $\beta$ (iii) $I_e$. If $I_b$ changes by +25$\mu$A and $I_c$ changes by +6mA. Find the new value of $\beta$.　**(6)**

Q7　(a) Draw Ebers-Moll model for a PNP Transistor and give the equations for emitter current and collector current.　**(6.5)**

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(b) Explain input and output characteristics of a transistor in CB configuration. Give reason why CE configuration provides large current amplification while the CB configuration does not. **(6)**

## Unit-IV

Q8 (a) Sketch the cross-sectional view of an enhancement mode MOSFET. Explain its operation and characteristics. **(6.5)**

(b) State and prove De Morgan's theorem. How is it helpful in minimizing the given Boolean expression? **(6)**

Q9 (a) What are Analog and Digital Signals? Why binary number system is preferred in digital systems. **(6.5)**

(b) Minimize the following function using the Booleans algebra: **(6)**

$$Y = \overline{A}BCD + AB\overline{C}\,\overline{D} + AB\overline{C}D + ABCD + ABC\overline{D} + A\overline{B}CD + A\overline{B}\,\overline{C}D + \overline{A}BC\overline{D}.$$

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