

GUJARAT TECHNOLOGICAL UNIVERSITY
PDDC - SEMESTER-I • EXAMINATION – SUMMER 2013

Subject Code: X11101**Date: 07-06-2013****Subject Name: Basic Electronics****Time: 02.30 pm - 05.00 pm****Total Marks: 70****Instructions:**

1. Attempt all questions.
2. Make suitable assumptions wherever necessary.
3. Figures to the right indicate full marks.

Q.1 (a) Draw and explain energy band diagram of Insulator, Semiconductor and Metal. **07**

(b) Explain the operation of a p-n junction diode in forward biased and reverse biased condition. Draw its V-I characteristics. **07**

Q.2 (a) Explain Hall effect. Derive the expression for Hall voltage. State its applications. **07**

(b) A copper wire of 2 mm diameter with conductivity of 5.8×10^7 s/m and electron mobility of $0.0032 \text{ m}^2/\text{v-s}$ is subjected to electric field of 20 mV/m. Find i>the charge density of free electrons, ii>the current density, iii>the current flowing in the wire, iv>the electron drift velocity. **07**

OR

(b) Classify different types of clippers. Differentiate between clippers and clampers. **07**

Q.3 (a) Explain the principle of operation of photodiode. List its applications. **07**

(b) Explain the tunneling phenomena and characteristics of a tunnel diode. **07**

OR

Q.3 (a) For the full wave rectifier circuit derive the expressions for dc current, dc output voltage, rms current, rectifier efficiency and ripple factor. **07**

(b) A half-wave rectifier uses a diode with a forward resistance of 100Ω . If the input ac voltage is 220V(rms) and the load resistance is of $2 \text{ k}\Omega$, determine

i> $I_{\text{max}}, I_{\text{dc}}$ and I_{rms}

ii>peak inverse voltage when the diode is ideal.

iii>load output voltage

iv>dc output power and ac input power

v>ripple factor

vi>rectification efficiency.

Q.4 (a) Draw the circuit of CE configuration of transistor. Explain input and output characteristics. Derive $\alpha = \beta / \beta + 1$. **07**

(b) i> Compare Si and Ge diode characteristics. **07**
 ii> Compare Avalanche breakdown and Zener breakdown.

OR

Q.4 (a) What is biasing? Why it is needed? Draw and explain Circuit for Emitter Stabilized biasing. **07**

- (b) For the transistor amplifier stage, derive the expression for the following in terms of its h parameters: **07**
- (i) current gain
 - (ii) Voltage gain
 - (iii) input impedance
 - (iv) voltage gain including source resistance.

Q.5 (a) Draw the basic structure of N- channel enhancement MOSFET. Also draw & explain the drain and transfer characteristics. **07**

- (b) Write short notes on **07**
- i>Push pull amplifiers
 - ii>Voltage regulator

OR

Q.5 (a) Classify the power amplifier based on the position of Q-point on the ac load line. Also explain class-C push-pull amplifier. **07**

- (b) Write short notes on **07**
- i>Varactor diode.
 - ii>Emitter follower.
