

GUJARAT TECHNOLOGICAL UNIVERSITY
PDDC - SEMESTER-I • EXAMINATION – SUMMER • 2014

Subject Code: X11101**Date: 21-06-2014****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)** 1. State Pauli's exclusion principle. **07**
 2. What is cut-in voltage?
 Write approximate value of cut-in voltage for silicon and germanium diode.
 3. Define volt-equivalent of temperature.
 4. Define peak-inverse-voltage.
 5. Define Barrier Potential.
 6. What is electron volt? Define ev unit of energy.
 7. What is mean life time of a carrier?

- (b)** Explain the concept of potential energy barrier. **07**

- Q.2 (a)** Explain Hall effect. Derive the expression for Hall voltage. State its applications. **07**
(b) Explain mobility and conductivity using electron-gas theory. Also derive the expression **07**
for current density.

OR

- Explain energy band diagram of insulators, semiconductor and conductor. Explain the **07**
(b) electrical properties of germanium and silicon.

- Q.3 (a)** Draw the circuit diagram of full wave bridge rectifier and give its input and output **07**
waveforms. Also derive the expression for the dc current.
(b) A bar of n-type silicon has length of 10 cm and circular cross section area of 20 mm^2 **07**
When it is subjected to a voltage of 4 volt along its length, the current flowing through
it is 10 mA. Calculate the concentration of free electrons and drift velocity of electrons.
Assume mobility of free electrons to be $1300 \text{ cm}^2/\text{V-s}$.

OR

- Q.3 (a)** Draw following diode circuits with input and output waveforms. **07**
 1. Voltage doubler circuit
 2. Positive clipping circuit.
 3. Positive clamper circuit.
(b) A full wave rectifier circuit is fed from a transformer with a centre tap. The rms voltage **07**
from end of secondary to centre tap is 40 volt. If the diode forward resistance is 4Ω and
that of the half secondary is 10Ω . Calculate the following for $2k\Omega$ load.
 1. Power delivered to load.
 2. Efficiency of rectification.
 3. TUF of secondary.

- Q.4 (a)** Draw the circuit of CE configuration of transistor. Explain input and output **07**
characteristics. Derive $\alpha = \beta / \beta + 1$.
(b) Determine the h-parameter for the two port network. Draw the hybrid model for CE, **07**
CB and CC configuration.

OR

- Q.4** (a) Explain the h-parameter model of CE amplifier with Bypass resistor R_E and derive the expression for A_i, A_v, R_i and R_o **07**
- (b) What is biasing? Why biasing is required for transistor? List biasing methods for transistor. Draw and explain the circuit of voltage divider biasing. **07**
- Q.5** (a) Give constructional details of JFET and give its characteristics. Why FET is called voltage controlled device? **07**
- (b) Classify the power amplifier based on the position of Q-point on the ac load line. Also explain class-B push-pull amplifier. **07**
- OR**
- Q.5** (a) State the role of voltage regulators in power supplies? Discuss working of a series voltage regulator. **07**
- (b) Explain the operation of Emitter follower amplifier. Why it is named as emitter follower. **07**
