

GUJARAT TECHNOLOGICAL UNIVERSITY

BE- SEMESTER-IV EXAMINATION – WINTER 2025

Subject Code:3142409

Date:24-11-2025

Subject Name:Basic Power Electronics Devices, Circuits And Applications

Time:02:30 PM TO 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.
4. Simple and non-programmable scientific calculators are allowed.

- Q.1** (a) List out various applications of Power Electronics **03**
(b) List ideal and practical Switch characteristics. **04**
(c) How is Power electronics distinct from linear electronics? **07**
- Q.2** (a) Write short notes on Zener Diode. **03**
(b) Explain reverse recovery characteristics of power diode. **04**
(c) What are the types of power diodes? Explain all. **07**
- OR**
- (c) Explain switching characteristics of diodes. **07**
- Q.3** (a) Define the following terms : (1) latching current (2) holding current **03**
(3) Circuit turn-off time.
(b) Discuss about the two-transistor analogy of Thyristor. **04**
(c) Draw its static V-I characteristics of SCR and explain its behavior in forward **07**
conduction, forward blocking and reverse blocking modes.
- OR**
- Q.3** (a) Explain concept of safe operating area (SOA). **03**
(b) Explain DIAC with construction and characteristics. **04**
(c) Draw symbols and V-I characteristics of (a) IGBT (b) DIAC (c) Power BJT (d) UJT **07**
(e) TRIAC (f) Power MOSFET (g) DIAC
- Q.4** (a) Explain construction of n-channel FET. **03**
(b) Explain I-V characteristics of power transistor **04**
(c) Explain construction and working of Power MOSFET **07**
- OR**
- Q.4** (a) Explain class-A commutation of Thyristor. **03**
(b) Explain Gate Driver Circuit of IGBT. **04**
(c) Give comparison between Power MOSFET and Power BJT in tabular form. **07**
- Q.5** (a) Explain soft and Hard switching of Power BJT. **03**
(b) State application of various power electronics converters. **04**
(c) List types of Thyristor protection schemes and explain dv/dt and di/dt **07**
Protection.
- OR**
- Q.5** (a) Explain Basic Principle of Operation of Rectifiers. **03**
(b) Write a short note on Snubber Circuits. **04**
(c) Explain Principle and Concept of PWM. **07**
