

GUJARAT TECHNOLOGICAL UNIVERSITY
BE – SEMESTER – V (NEW) EXAMINATION – WINTER 2015

Subject Code: 2152407**Date:05/12/ 2015****Subject Name: Power Electronics Circuits - I****Time:10:30am to 1:00pm****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 structure, symbol and characteristics of a TRIAC. Also explain its four modes of operation. **07**
- (b) Draw and explain structure, symbol of Power BJT. Also explain the operation of NPN-type Power BJT in CE-mode and draw its V-I characteristics. **07**
- Q.2** (a) Draw and explain basic structure, symbol and output characteristics of an IGBT. **07**
- (b) Discuss Safe Operating Areas for MOSFET & IGBT. **07**

OR

- (b) Give a general comparison of power semiconductor devices for Thyristor, TRIAC, Power-BJT, Power-MOSFET & IGBT. **07**
- Q.3** (a) A single phase half wave diode rectifier feeds to a resistive load R. For this circuit determine rectifier efficiency, Form Factor, Ripple Factor, Transformer Utilization Factor. **07**
- (b) Why are three phase rectifiers preferred over single phase rectifiers? A 3-phase half wave diode rectifier feeds to a resistive load R. Draw the various waveforms viz. supply voltage, output voltage, output current, input current and voltage across one of the diodes. **07**

OR

- Q.3** (a) Illustrate the various protection scheme of power circuit and gating circuit of an SCR. Also discuss on functions of various components used. **07**
- (b) What do mean by the term 'PWM'? Give a detailed technical note with circuit, its operation, response, advantages and disadvantages. **07**
- Q.4** (a) Draw the power circuit and various waveforms for single phase thyristorized full controlled bridge rectifier with RLE load. **07**
- (b) Write the principle of DC power supply. Discuss importance and requirement of DC power supply. Also give the classification based on various criteria and performance parameters. **07**

OR

- Q.4** (a) Discuss Flyback type isolated DC-DC converter. **07**
- (b) Give a comprehensive note of full bridge converter used in SMPS. **07**
- Q.5** (a) Discuss ZVS resonant converter. **07**
- (b) Discuss L-type ZCS resonant converter. **07**

OR

- Q.5** (a) Draw the power circuit for type-C chopper and explain its operation. Also draw the V_o , I_o , I_s and I_T waveforms for operation in first quadrant. **07**

- (b) Describe the working of type-D chopper with appropriate waveforms to establish its operation in first as well as fourth quadrant. Also mention the range of duty cycle for which it operates in first and fourth quadrant. **07**
