

GUJARAT TECHNOLOGICAL UNIVERSITY**BE SEM-VIII Examination May 2012****Subject code: 182405****Subject Name: Digital Control of Power Processing Circuits (D. E. - II)****Date: 08/05/2012****Time: 10.30 am – 01.00 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) Explain the progress of Modern Power Electronics. Also state giving proper reasons, the increased use of digital control in power electronics. **07**
- (b) Draw and explain in brief, the principle of operation of half bridge VSI along with the required basic components. **07**
- Q.2** (a) Elaborate the effects of switching dead times. Suggest remedies for this. **07**
- (b) Explain low level control technique of VSI using naturally sampled PWM and derive the VSI state space model. **07**
- OR**
- (b) Explain low level control technique of VSI using uniformly sampled PWM. Explain how it is better than naturally sampled PWM. **07**
- Q.3** (a) Explain in brief, linear current control by PI controller. Draw appropriate block diagram. **07**
- (b) Explain how single update, double update and multi sampled PWM work. Draw appropriate models. **07**
- OR**
- Q.3** (a) Draw the hysteresis current control hardware organization and explain in brief, the non-linear current control by hysteresis control method. **07**
- (b) Explain how synchronization between sampling and PWM switching reduces the effect of aliasing and reconstruction errors. **07**
- Q.4** (a) Draw and explain in brief, the block diagram of digital current control loop with PI regulator. **07**
- (b) Explain park's transformation with proper vector diagrams. **07**
- OR**
- Q.4** (a) Draw and explain in brief, the predictive current control implementation for VSI. **07**
- (b) Draw and explain in brief, the typical organization of 3- Φ VSI SVM based controller. **07**
- Q.5** (a) Describe the $\alpha\beta$ transformation used for the analysis and modeling of 3 Φ inverters with necessary equations and graphical representation. **07**
- (b) Describe the typical organization of single Φ UPS with digital control. **07**
- OR**
- Q.5** (a) Draw only, the 3- Φ inverter output voltage vectors and their projections on π plane. **07**
- (b) Compare predictive controller with PI controller. **07**
