

**GUJARAT TECHNOLOGICAL UNIVERSITY**  
**M. E. - SEMESTER – I • EXAMINATION – WINTER • 2014**

**Subject code: 712902N****Date: 02-12-2014****Subject Name: Power Processing Circuits****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 operation of dual converter with circulating current. **07**  
(b) Explain single phase to single phase cycloconverter with discontinuous current operation. **07**
- Q.2** (a) What are the types of commutation circuits? Explain auxiliary commutation method in detail. **07**  
(b) Explain power MOSFET in detail. **07**
- OR**
- (b) Describe the construction and working of GTO. **07**
- Q.3** (a) A single phase fully controlled bridge is operated with a resistive load  $R=10\Omega$ , the input voltage to the bridge is 230V. The firing angle is  $60^\circ$ . Determine, **07**  
1.) Average load voltage, 2.) Average output power,  
3.) Average and RMS load current, 4.) Rectifier efficiency,  
5.) Form factor and ripple factor, 6.) SCR ratings.  
(b) Explain 3- $\phi$  inverter circuit with  $120^\circ$  conduction mode. **07**
- OR**
- Q.3** (a) Explain 1- $\phi$  bridge half controlled converter with R-L load. **07**  
(b) The full bridge inverter has a source voltage  $E_{dc}=220V$ . The inverter supplies an RLC load with  $R=10\Omega$ ,  $L=10mH$  and  $C=52\mu F$ . The inverter frequency is 400Hz. Determine, **07**  
1.) the RMS load current at fundamental frequency  
2.) RMS value of load current, 3.) The power output  
4.) The average supply current.
- Q.4** (a) Explain working principle of buck converter. Discuss the operation and derive the mathematical relations. **07**  
(b) Explain the effect of source inductance on controlled converter operation. **07**
- OR**
- Q.4** (a) Explain single pulse width modulation technique for inverter circuit. **07**  
**Q.4** (b) Write note on cuk converter. **07**
- Q.5** (a) Write note on 3-phase 6-pulse controlled rectifier. **07**  
(b) Write note on class-C commutation. **07**
- OR**
- Q.5** (a) Write note on 3-phase A.C. voltage controller with R-load. **07**  
(b) Explain various triggering circuits for SCR. **07**

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