

**Total No. of Questions : 08**

**M.Tech. (EE) EI-II (2018 Batch) (Sem.-1)**  
**PWM CONVERTER AND APPLICATIONS**  
**Subject Code : MTEE-104A**  
**Paper ID : [75221]**

**Time : 3 Hrs.**

**Max. Marks : 60**

**INSTRUCTIONS TO CANDIDATES :**

- 1. Attempt any FIVE questions out of EIGHT questions.**  
**2. Each question carries TWELVE marks.**

- Q1. For a single-phase one pulse controlled converter system, sketch waveforms for load voltage and load current for (a) RL load and (b) RL load with freewheeling diode across RL. Discuss the advantages of using the freewheeling diode. Enlist any five application of AC to DC converters.
- Q2. Define the conduction power loss in converter. Explain its disadvantages. Develop the mathematical expression for evaluating the conduction power loss in practical converter.
- Q3. A single phase current source converter has the following data:  $I = 30 \text{ A}$ ,  $f = 500 \text{ Hz}$ , load capacitance = 20 micro farad, for this converter, calculate (a) the circuit turn-off time (b) the peak value of reverse voltage that appears across the thyristor.
- Q4. A single phase full bridge converter uses a uniform PWM with seven pulses per half cycle for voltage control. Plot the distortion factor, fundamental component and lower order harmonics against the modulation index.
- Q5. A single phase diode clamped converter has  $m = 5$ . Find the generalised fourier series and THD of the phase voltage.
- Q6. A three phase, 11.2 Kw, 1750rpm, 460 V, 60Hz, four-pole, star connected induction motor has the following parameters :  $R_s = 0.66 \Omega$ ,  $R_r = 0.38 \Omega$ ,  $X_s = 1.14 \Omega$ ,  $X_r = 1.71 \Omega$  and  $X_m = 33.2 \Omega$ . The motor is controlled by varying both the voltage and frequency. The volts/hertz ratio, which corresponds to the rated voltage and rated frequency, is maintained constant. Calculate the maximum torque  $T_m$  and the corresponding speed  $W_m$  for 60 and 30 Hz.
- Q7. How the harmonic elimination PWM technique is effective for high power electric drives? Explain with suitable example.
- Q8. Write short notes on the following :
  - a) Line-side converters with power factor compensation.
  - b) Harmonic current compensation.