



R17 Regulation

TKR COLLEGE OF ENGINEERING AND TECHNOLOGY

(Autonomous, Accredited by NAAC with 'A' Grade)

Subject code: 1E7BE

B.Tech IV Year I Semester Regular Examinations, February 2021

ADVANCED POWER ELECTRONICS

(Electrical and Electronics Engineering)

Maximum Marks: 70

Date: 27.02.2021 Duration: 3 hours

- Note:**
1. This question paper contains two parts A and B.
 2. Part A is compulsory which carries 20 marks. Answer all questions in Part A.
 3. Part B consists of 5 Units. Answer any one full question from each unit.
 4. Each question carries 10 marks and may have a, b, c, d as sub questions.

Part-A

All the following questions carry equal marks

(10x2M=20 Marks)

- 1 What is the gating characteristic of a GTO?
- 2 Define reverse recovery time.
- 3 What is modulation index?
- 4 What is the importance of null vectors in space vector PWM control?
- 5 List the features of diode clamped multilevel inverter.
- 6 How is the dwell time calculated?
- 7 Compare the buck-boost converter and Cuk converter.
- 8 Discuss the concept of switched mode dc power supplies.
- 9 What is the need of resonant converters?
- 10 What are the factors that affect the quality of power?

Part-B

Answer All the following questions.

(10M X 5=50Marks)

- 11 a) Explain switching characteristics of an IGBT. (6M)
b) Why are IGBTs becoming popular in their applications to controlled converters?
Enumerate some applications of IGBTs. (4M)

OR

- 12 a) Define latching and holding currents as applicable to an SCR. Show these currents on its static V-I Characteristics. (7M)
b) Discuss the necessary conditions for turning ON of an SCR. (3M)

- 13 Explain the following modulation schemes.
a) Third harmonic injection PWM (5M)
b) Space Vector Modulation (5M)

OR

- 14 a) Explain sinusoidal-pulse modulation as used in PWM inverters. (4M)
b) With neat sketch, explain the working of H-bridge inverter (6M)

15 Explain the configuration of three level inverter. Also, describe its output waveform and harmonic content. (10M)

OR

16 a) What are the causes of neutral-point voltage deviation?(3M)

b) Explain the feedback control of neutral-point voltage. (7M)

17 Discuss the operation of Buck converter in continuous and discontinuous mode. (10M)

OR

18 The buck-boost regulator has an input voltage of 12 V. The duty cycle is 0.25 and the switching frequency is 25kHz. The inductance is 150 μ H and filter capacitance is 220 μ F. The average load current is 1.25 A. Determine,

a) Average output voltage (2M)

b) Peak to peak output voltage ripple (2M)

c) Peak to peak ripple current of inductor (2M)

d) Critical values of L and C. (4M)

19 a) Explain the resonant dc-link inverter. (4M)

b) With neat diagram, explain the operation of uninterrupted power supplies.(6M)

OR

20 Explain the different modes of zero voltage switching resonant converters. (10M)