Register No.: ………………………   Name: …………………………………………………………..

SAINTGITS COLLEGE OF ENGINEERING (AUTONOMOUS)

(AFFILIATED TO APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY, THIRUVANANTHAPURAM)

FIRST SEMESTER M.TECH DEGREE EXAMINATION (Regular), FEBRUARY 2022
(Power Systems)
(2021 Scheme)

Course Code :   21PS103

Course Name: Power Electronic Circuits

Max. Marks :   **60**   **Duration: 3 Hours**

PART A
(Answer all questions. Each question carries 3 marks)

1. Draw the harmonic spectrum of a typical 6 pulse converter which is used in power system control
2. List any three sources of power system harmonics
3. What are the types of multilevel inverter
4. Discuss various PWM techniques used in inverters
5. What is the maximum efficiency of a half wave and full wave rectifier?
6. Which type of semiconductor device is used as switch in the DC chopper circuit?
7. Explain the principle of operation of push-pull topology for isolated DC-DC converters.
8. In case of three phase dual converter, one of the converter circuits is fired at an angle of 60 degree, for both the converter circuits to have equal average output voltage, what is the value of the firing angle for the other converter circuit?

PART B
(Answer one full question from each module, each question carries 6 marks)

MODULE I

9. Explain the operation of single phase fully controlled bridge converter with RLE load using suitable waveform.   (6)

OR

10. Explain the inversion mode operation of single phase rectifier using suitable waveform   (6)

MODULE II

11. Estimate an analytical expression for the average output voltage of three phase dual converter with RL load   (6)

OR

12. Derive the output voltage equation of a single phase full wave AC Voltage controller with RL load.   (6)

MODULE III

13. A DC chopper has a resistive load of 20Ω and input voltage $V_S = 220V$. When chopper is ON, its voltage drop is 1.5 volts and chopping frequency is 10 kHz. If the duty cycle is 80%, determine the average output voltage and the chopper on time.   (6)

OR

14. Explain the input and output voltage relationship of a CUK Converter with R load.   (6)

MODULE IV

15. List the merits and demerits of isolated DC Chopper.   (6)

OR

16. Explain the principle of operation of FLYBACK converter   (6)

MODULE V

17. Illustrate any two harmonic reduction techniques in an Inverter   (6)

OR

18. Explain the working of three phase bridge inverter in 180-degree mode of operation   (6)

MODULE VI

19. (a) Define the term harmonics in power system.   (2)
    (b) How harmonics are introduced in power systems?   (4)

OR

20. Describe the relevant aspects to be considered in the design of passive filters   (6)

****