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Reg. No. :

Question Paper Code: 55301

B.E./B.Tech. DEGREE EXAMINATION, APRIL 2019

Fifth Semester

Electrical and Electronics Engineering

15UEE501-POWER ELECTRONICS

(Regulation 2015)

Duration: Three hours   Maximum: 100 Marks

Answer ALL Questions

PART A - (10 x 1 = 10 Marks)

1. Which semiconductor power device out of the following is not a current   CO1- R
    triggered device?

    (a) Thyristor   (b) G.T.O   (c) Triac   (d) MOSFET

2. An SCR can be used   CO1- R

    (a) As static conductor   (b) For power control

    (c) For speed control of dc shunt motor   (d) All of these

3. A single phase CSI has capacitor C as the load. For a constant source   CO2- R
    current, the voltage across the capacitor is

    (a) Square wave   (b) Pulsed wave   (c) Triangular wave   (d) Step function

4. Single phase VSI is mainly used in   CO2- R

    (a) Power supplies   (b) UPS

    (c) Multilevel configuration   (d) All of these

5. The selection of rectifier diode depends mostly on   CO3- R

    (a) Forward voltage   (b) Reverse voltage

    (c) Fault current   (d) Average load current

6. A single-phase full wave rectifier is a   CO3- R

    (a) Single pulse rectifier   (b) Multiple pulse rectifier

    (c) Two pulse rectifier   (d) Three pulse rectifier

7. In a single phase semi converter, if output voltage has peak and average values of 325 and 133V respectively, the firing angle is CO4- R

    (a) 40°　　　　　　(b) 73.40°　　　　　　(c) 80°　　　　　　(d) 140°

8. A single phase full converter gives maximum and minimum output voltage at firing angles of CO4- R

    (a) 0 and 180° respectively　　　　　　(b) 180° and 0° respectively

    (c) 0 and 90° respectively　　　　　　(d) 90° and 0° respectively

9. A single phase voltage controller is connected to a load of resistance 10Ω. The source voltage is 200V rms, for a firing angle of 90°, the rms value of thyristor current in amperes is CO5- R

    (a) 20　　　　　　(b)15　　　　　　(c) 10　　　　　　(d) 5

10. A 3 phase ac regulator uses CO5- R

    (a) 3 thyristors　　　(b) 6 thyristors　　　(c) 9 thyristors　　　(d) 12 thyristors

PART – B (5 x 2= 10Marks)

11. Distinguish between holding current and latching current of SCR. CO1- R

12. What are the advantages of PWM inverter? CO2- R

13. Justify the functions of filter in rectifier circuit. CO3- R

14. What is the inversion mode of rectifiers? CO4 -R

15. What do you mean by integral cycle control in AC voltage regulators? CO5- R

PART – C (5 x 16= 80Marks)

16. (a) If a SCR and a MOSFET of same rating is available, which one will you prefer for building high frequency inverter circuit. Why? Also sketch and explain the switching characteristics and driver circuit of the chosen device. CO1-App (16)

    Or

    (b) With neat sketch, explain the operation of Buck converter with its waveform for the continuous current mode of operation. CO1- App (16)

17. (a) Explain the operation of 3φ VSI operating in 120º mode and analyse the same for a star connected R load. CO2- App (16)

    Or

    (b) Explain the operation of Unipolar and bipolar PWM inverters. CO2- Ana (16)

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18. (a) Examine the working of half wave voltage doublers with neat diagram.   CO3- Ana   (16)

<div align="center">Or</div>

   (b) A three phase bridge rectifier, using diodes, delivers power to a load of R=10Ω at a dc voltage of 400V. Determine the ratings of the diodes and three phase delta-star connected transformer.   CO3- Ana   (16)

19. (a) Analyse the operation of a single phase half controlled bridge converter feeding RL load giving corresponding circuit configuration and waveforms for continuous and discontinuous conduction mode.   CO4-Ana   (16)

<div align="center">Or</div>

   (b) Construct the circuit of six pulse bridge converter with RLE load using relevant waveforms.   CO4- Ana   (16)

20. (a) Discuss the principle of phase control in single phase full wave ac voltage controller. Derive expression for the rms value of its output voltage.   CO5- U   (16)

<div align="center">Or</div>

   (b) With neat sketch of voltage and current waveforms explain two stage sequence control feeding RL load.   CO5- U   (16)

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