Course B.E-EEEM

Batch B.E- EEEM-8

Semester V

Subject Code UAEE505

Subject Name **POWER ELECTRONICS**

Part A UNIT-I

1 What is meant by power electronics?

2 Name the types of power transistor.

3 Why IGBT is a voltage-controlled device?

4 Why Power BJT is a current controlled device?

5 What are the different types of power MOSFET?

6 Define circuit turn off time.

7 Why IGBT is very popular now a days?

8 What are the voltage controlled devices available in power electronics?

9 What are the current controlled devices available in power electronics?

10 What are the types of commutation?

11 What is meant by commutation?

12 What is meant by rise time?

13 What is meant by delay time?

14 What is meant by spread time?

15 Define latching current.

16 What do you understand from SCR rating?

17 What is an enhancement mode of MOSFET?

18 What is depletion mode of MOSFET?

19 Name the applications of IGBT.

20 Define holding current.

UNIT-II

21 What is the function of freewheeling diodes in controlled rectifier?

22 What are the advantages of freewheeling diodes in a controlled rectifier?

23 What is meant by delay angle?

24 What are the advantages of single phase bridge converter over single phase midpoint converter?

25 What is commutation angle or overlap angle?

26 What are the different methods of firing circuits for line commutated converter?

27 Give an expression for average voltage of single phase semiconverters.

28 What is meant by input power factor in controlled rectifier?

29 What are the advantages of six pulse converter?

30 What is meant by commutation?

31 What are the types of commutation?

32 What is meant by natural commutation?

33 What is meant by forced commutation?

34 What is meant by phase controlled rectifier?

35 Mention some of the applications of controlled rectifier.

36 Draw the power circuit diagram of half controlled thyristor rectifier.

37 Explain about the two quadrant operation.

38 Define form factor and ripple factor.

39 Explain the inversion mode of fully controlled bridge rectifier.

40 Mention the effect of source inductance in converters.

UNIT-III

41 What is meant by dc chopper?

42 What are the applications of dc chopper?

43 What are the applications of dc chopper?

44 What is meant by step-up and step-down chopper?

45 Write down the expression for average output voltage for step down chopper.

46 Write down the expression for average output voltage for step up chopper.

47 What is meant by duty-cycle?

48 What are the two types of control strategies?

49 What is meant by TRC?

50 What are the two types of TRC?

51 What is meant by FM control in a dc chopper?

52 What is meant by PWM control in dc chopper?

53 Write down the expression for the average output voltage for step down and step up chopper.

54 What are the different types of chopper with respect to commutation process?

55 What are the applications of dc chopper?

56 What is meant by load commutation?

57 What are the advantages of current commutated chopper?

58 What are the advantages of load commutated chopper?

59 What are the disadvantages of load commutated chopper?

60 Mention the methods of obtaining dc outputs.

UNIT-IV

61 What are the applications of an inverter?

62 What are the main classification of inverter?

63 Why thyristors are not preferred for inverters?

64 How output frequency is varied in case of a thyristor?

65 Give two advantages of CSI.

66 What is the main drawback of a single phase half bridge inverter?

67 Why diodes should be connected in antiparallel with the thyristors in inverter circuits?

68 What types of inverters require feedback diodes?

69 What is a series inverter?

70 What is the condition to be satisfied in the selection of L and C in a series inverter?

71 What is meant a parallel inverter?

72 What are the applications of a series inverter?

73 How is the inverter circuit classified based on commutation circuitry?

74 What is meant by McMurray inverter?

75 What are the applications of a CSI?

76 What is meant by PWM control? .

77 What are the advantages of PWM control?

78 What are the methods of reduction of harmonic content?

79 Compare CSI and VSI.

80 What are the disadvantages of PWM control?

UNIT-V

81 What is AC Voltage controller?

82 What is cycloconverter?

83 What are the applications of Cyclo converters?

84 What are the applications of ac voltage controllers? 3. What are the advantages of ac voltage controllers? 4. What are the disadvantages of ac voltage controllers? 5. What are the two methods of control in ac voltage controllers? 6. What is the difference between ON-OFF control and phase control?

85 What are the advantages of ac voltage controllers?

86 What are the disadvantages of ac voltage controllers?

87 What are the two methods of control in ac voltage controllers?

88 What is the difference between ON-OFF control and phase control?

89 What are the two types of cyclo-converters?

90 What is meant by step-up cyclo-converters?

91 What is meant by step-down cyclo-converters?

92 What is the advantage of ON-OFF control?

93 What is the duty cycle in ON-OFF control method?

94 What is meant by unidirectional or half-wave ac voltage controller?

95 What is meant by bidirectional ac voltage controller?

96 What are the disadvantages of continuous gating signal?

97 What is meant by sequence control of ac voltage regulators?

98 What is meant by positive converter group in a cyclo converter?

99 What is meant by negative converter group in a cyclo converter?

100 What type of gating signal is used in single phase ac voltage controller with RL load?

PART B UNIT-I

1 Compare Power MOSFET with BJT.

2 What are the types of triggering methods available for SCR?

3 Explain the two transistor model of SCR .

4 Explain the operation of MOSFET .

5 Distinguish between SCR and TRIAC.

6 How SCR differs from diode rectifier?

7 Explain the types of commutation.

8 Explain the operation of snubber circuit.

9 What are the various modes of Triac?Which modes are more sensitive?

10 Explain the static characteristics of SCR.

11 Compare Power MOSFET with IGBT.

12 Draw the input and output characteristics of power BJT.

13 Explain IGBTand its characteristics.

14 With a simple sketch ,explain the dv/dt protection of SCR.

15 Briefly discuss the dynamic characteristics of SCR.

UNIT II

16 Explain the principle of phase control.

17 Mention some of the applications of controlled rectifier.

18 What are the advantages of six-pulse converter?

19 What is the difference between half controlled & fully controlled Rectifier?

20 Explain about half controlled rectifier.

21 Explain about Full controlled rectifier.

22 Describe about freewheeling diode.

23 Briefly discuss the operation of dual converter.

24 Discuss the effect of source inductance and load inductance in converters

25 Explain the following:i)Average value ii)RMS value iii)power factor

26 Describe the working of 3 ϕ fully controlled bridge converter in the Rectifying mode and inversion mode.

27 Derive the expressions for average output voltage and rms output voltage of 1 ϕ full converter

28 Derive the expressions for average output voltage and rms output voltage of 3 ϕ full converter

29 Explain the effect of source inductance in the operation of single phase fully controlled converter

30 Derive an expression for ripple factor and power factor of a single phase semiconverter from the fundamental principle.

UNIT III

31 What is a chopper? Explain the two types of control strategies?

32 Describe the principle of step-up chopper

33 Explain the principle of step down chopper

34 Describe the working of two quadrant chopper

35 Describe various types of chopper configuration

36 Classify the basic topologies of switching regulators.What is boost regulator?

37 Breifly discuss the operation of buck regulator.

38 Explain about Type – E chopper.

39 Write short notes on : (ii) Boost regulator. (iii) Buck-boost regulator

40 Describe the working of four quadrant chopper

41 Breifly discuss the operation of boost regulator.

42 Breifly discuss the operation of buck- boost regulator.

43 Derive the expression for output voltage of step down DC chopper.

44 Derive the expression for output voltage of step up DC chopper.

45 Write short notes on (1) Average output voltage. (2) RMS output voltage. (3) Duty cycle.

UNIT IV

46 Draw a circuit diagram of 3 phase voltage source inverter with 180˚conduction mode.

47 Sketch the necessary waveforms of 3 phase voltage source inverter with 180˚conduction mode.

48 Obtain the expression for line to line voltage of 3 phase voltage source inverter with 180˚conduction mode.

49 Draw a circuit diagram of 3 phase voltage source inverter with 120˚conduction mode.

50 Sketch the necessary waveforms of 3 phase voltage source inverter with 120˚conduction mode.

51 Obtain the expression for line to line voltage of 3 phase voltage source inverter with 120˚conduction mode.

52 Explain the following PWM techniques used in inverter. i) Sinusoidal PWM ii) Multiple PWM.

53 Explain the operation of single phase capacitor commutated CSI with R load.

54 Describe the working of a single phase half bridge inverter supplying R, RL loads

55 Describe the working of a single phase full bridge inverter supplying R, RL loads

56 Classify the various techniques adopted to vary the inverter gain.

57 What is the need for controlling the output voltage of inverters?

58 Compare half bridge inverter and full bridge inverter.

59 Differentiate between CSI and VSI.

60 Compare 180˚conduction mode and 120˚conduction mode in inverters

UNIT V

61 Briefly discuss the operation of half-wave ac voltage controller.

62 Discuss the operation of full wave ac voltage controller.

63 Explain the operation of 1ϕ AC voltage controller with R load

64 Discuss about ON-OFF control in AC voltage controller.

65 Discuss about phase control ion AC voltage controller.

66 Briefly discuss the operation of sequence contron in AC voltage controller

67 Discuss the operation of step up cycloconverter.

68 Discuss the operation of step down cycloconverter.

69 Draw the circuit diagram of three phase to single phase cycloconverter and discuss briefly.

70 Draw the circuit diagram of three phase to three phase cycloconverter and discuss briefly.

71 Discuss the control strategies for AC to AC converters

72 Explain Power Factor Control in AC to AC converter

73 Discuss the operation of Matrix converters

74 Draw the circuit diagram of three phase AC voltage controller and discuss briefly.

75 Write short notes on :(a) ON-OFF control (b) phase control.

PART C UNIT I

1 Explain the constructions and static characteristics of power MOSFETs.

2 Explain the various types of triggering methods of SCR.

3 With neat sketch,explain the construction and operation of SCR.

4 Explain with neat diagrams, the four modes of operation of a TRIAC.

5 With neat sketches,explain the dynamic characteristics of SCR.

6 Explain the constructions and characteristics of power BJTs.

UNIT II

7 Explain the operation of 1 phase full converter with resistive load.

8 Explain the operation of 3 phase full converter with resistive load.

9 Explain the operation of three phase half wave controlled converter. Sketch the associated waveforms.

10 Explain the operation of single phase half wave controlled converter. Sketch the associated waveforms.

11 Explain the operation of single phase semi converter with RLE load. Sketch the associated waveforms

12 Explain the operation of three phase semi converter with RLE load. Sketch the associated waveforms

UNIT III

13 Draw the circuit diagram of buck regulator and explain its working principle with necessary waveforms.

14 Describe the working principle of boost converter with necessary circuit and waveforms

15 Describe the principle of step-up chopper. Derive an expression for the average output voltage in terms of input dc voltage & duty cycle

16 Describe the working of four quadrant chopper

17 Discuss the operation of step down DC chopper. Also derive the expression for its output voltage

18 What is a chopper? What are the two types of control strategies?Explain with necessary diagram

UNIT IV

19 "Explain the principle of operation of 3 phase voltage source inverter with 180˚conduction mode with necessary waveforms and circuits.

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20 Discuss the functioning of three phase voltage source inverter in 120 degree operating mode with relevant waveforms

21 Explain the following PWM techniques used in inverter. i) Sinusoidal PWM ii) Multiple PWM.

22 Explain the Operation and performance parameters of Single phase inverters

23 Draw the circuit diagram of current source inverter and explain its operation with relevant waveforms

24 Describe the working of a single phase full bridge inverter supplying R, RL loads with relevant circuit and waveforms

UNIT V

25 Explain the operation of 1ϕ AC voltage controller with RL load.

26 "Describe the operation of single phase full wave AC voltage controller with the help of voltage and current waveform.

Also derive the expression for average value of output voltage"

27 With aid of circuit diagram, explain the operation of Single phase to three phase cycloconverter .

28 Explain the principle of working of single phase to single phase step up cycloconverter

29 Explain the operation of the step down cycloconverter both bridge and midpoint configuration with necessary waveforms.

30 Write short notes on :(a) ON-OFF control (b) phase control and (c) Matrix converter

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