Register Number:……..

KUMARAGURU
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B.E DEGREE EXAMINATIONS: MAY 2018

(Regulation 2015)

Fifth Semester

ELECTRICAL AND ELECTRONICS ENGINEERING

U15EET502: Power Electronics

COURSE OUTCOMES

CO1: Describe the structure, operation and characteristics of power semi conductor devices.

CO2: Choose the protection and drives circuit for power electronic devices.

CO3: Illustrate the circuit and modes of operation of power converters.

CO4: Analyze the performance parameters of power converters.

CO5: Describe the voltage control and harmonic control strategies for power converters.

CO6: Select the power converter for specific applications.

Time: Three Hours **Maximum Marks: 100**

Answer all the Questions:-

PART A (10 x 1 = 10 Marks)

1. Matching type item with multiple choice code CO1 [K_2]

Type of Device	Characteristics
A. BJT	i. High Power
B. MOSFET	ii . Current Controlled device
C. IGBT	iii. Voltage Controlled device
D. SCR	iv. High Cost

	A	B	C	D
a)	ii	i	iii	iv
b)	iii	iv	ii	i
c)	ii	iii	iv	i
d)	iii	i	ii	iv

2. The converter that is suitable for four quadrant operation is CO6 [K_1]

a) Full converter b) Semi converter

c) Dual Converter d) SCR phase control converter

3. In which of the following devices the secondary breakdown does not occurs CO1 [K_2]

1.BJT 2.MOSFET 3.IGBT

a) 1,3 b) 1,4

c) 1,2 d) 2,3

4. Which device has low conduction loss CO2 [K_1]

a) BJT b) IGBT

c) MOSFET d) SCR

5. Assertion : MOSFET is a Voltage controlled device CO2 [K_2]

Reason: It is because MOSFET has high Input Impedance

a) Both A and R are Individually true and R is the correct explanation of A b) Both A and R are Individually true but R is not the correct explanation of A

c) A is true but R is false d) A is false but R is true

6. For an SCR , dv/dt protection is achieved the use of ____ in ____ with SCR CO2 [K_2]

a) RL, series b) RC, Parallel

c) L, Series d) L, Parallel

7. Arrange the following devices from less to high switching loss CO1 [K_2]

1. BJT 2.MOSFET 3.IGBT

a) 1-2-3 b) 1-3-2

c) 3-2-1 d) 2-3-1

8. If holding current of a SCR is 2 mA then latching current should be CO4 [K_2]

a) 0.01 A b) 0.002 A

c) 0.009 A d) 0.02

9. Assertion (A):Cycloconveters can be used for Induction motor speed control CO6 [K_2]

Reason (R): Variable Frequency output is not possible in Cycloconverters

a) Both A and R are Individually true and R is the correct explanation of A b) Both A and R are Individually true but R is not the correct explanation of A

c) A is true but R is false d) A is false but R is true

10. Which power electronic circuit is used for DC to DC conversion CO3 [K_1]

a) Chopper b) Converter

c) Inverter d) Cycloconverter

PART B (10 x 2 = 20 Marks)
(Answer not more than 40 words)

11.	Distinguish between latching and holding current in SCR.	CO1	[K_2]
12.	What is need for Electrical isolation? What are types of Isolation Circuits?	CO2	[K_2]
13.	Define Displacement factor.	CO4	[K_1]
14.	How rectification and inversion are possible in phase controlled thyristor converter?	CO5	[K_2]
15.	Differentiate between constant and variable frequency control strategies in Choppers.	CO5	[K_2]
16.	What is duty cycle in DC choppers?	CO6	[K_2]
17.	Differentiate between VSI and CSI.	CO5	[K_1]
18.	List the different methods of controlling the output voltage in inverters.	CO3	[K_1]
19.	What is the difference between on line and offline UPS?	CO6	[K_2]
20.	Give some applications of Cycloconverters.	CO6	[K_1]

Answer any FIVE Questions:-
PART C (5 x 14 = 70 Marks)
(Answer not more than 300 words)

Q.No. 21 is Compulsory

21.	Explain the operation of 3 Φ full converter and draw the waveforms of output voltage, source current, load current and firing pulses for firing angle 60^0	CO3	[K_2]
22.	Draw the basic structure of IGBT and explain its switching characteristics.	CO1	[K_2]
23.	With necessary circuit and waveforms explain the principle of operation of 1Φ Full Converter with RL load in continuous conduction mode. Derive the expressions for V_{DC} and V_{RMS} for R load.	CO4	[K_3]
24.	Explain the working of Step up chopper with circuit and waveforms. Derive the expression for average output voltage.	CO3	[K_3]
25.	Explain Various pulse width modulation techniques used to control the output voltage of inverters.	CO5	[K_2]
26.	With neat sketches explain the operation of Step down Cycloconverter.	CO6	[K_2]
27.	Explain with neat diagrams and waveforms, three phase voltage source inverter in 180^O conduction mode. Also obtain the expression for RMS value of output voltage.	CO5	[K_2]

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