



B.E DEGREE EXAMINATIONS: MAY 2017

(Regulation 2015)

Fourth Semester

MECHATRONICS ENGINEERING

U15MCT402: Industrial Electronics

COURSE OUTCOMES

- CO1** Relate the basic semiconductor physics to the properties of real power semiconductor devices and differentiate from low power devices.
- CO2** Describe the concepts of operation of AC-DC converters in steady state of both continuous and discontinuous modes.
- CO3** Identify the operation of the single phase and three phase inverter circuits.
- CO4** Design a pure sine wave inverter output.
- CO5** Identify DC equipment with changing DC voltage.
- CO6** Classify and design choppers for simple electrical application.

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 [K2]

List I	List II
A. Voltage source Inverter	i. Large source inductance
B. Current Source Inverter	ii. Poor power factor
C. Phase controlled A.C. to D.C. converter	iii. Inverter Limit
D. Cyclo converter	iv. Small source Inductance

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

2. An SCR is made of silicon and not germanium because silicon _____.

CO1 [K1]

- | | |
|------------------------------|---------------------------|
| a) is inexpensive | b) is mechanically strong |
| c) has small leakage current | d) is tetravalent |

10. The control method used for PWM DC - DC converter is CO5 [K2]
- a) Voltage mode control b) Current mode control
- c) Hysteric control d) All of these

PART B (10 x 2 = 20 Marks)

(Answer not more than 40 words)

11. Compare SCR with TRIAC. CO1 [K2]
12. Predict the reason for greater reverse breakdown voltage than forward breakdown voltage in SCR. CO1 [K2]
13. State the principle of phase control. CO2 [K1]
14. Give the function of freewheeling diodes in controlled rectifier. CO2 [K2]
15. Define duty-cycle. CO3 [K1]
16. Identify the needs for PWM control in Electric Drives. CO3 [K2]
17. Name the components used in Home UPS system. CO4 [K2]
18. Thyristors are not preferred for inverters. Justify. CO4 [K2]
19. List the applications of DC chopper. CO5 [K2]
20. What is SPWM technique? CO4 [K2]

Answer any FIVE Questions:-

PART C (5 x 14 = 70 Marks)

(Answer not more than 300 words)

Q.No. 21 is Compulsory

21. Draw the structural diagram of IGBT and explain its operation with the help of waveforms. CO1 K2
22. Construct a single phase full bridge converter with RL load and relate its operation for continuous and discontinuous load currents with waveforms. CO2 K2
23. Depict the effect of source inductance on the performance of a single phase full converter indicating clearly the conduction of various thyristors during one cycle. CO2 K3
24. Explain in detail the six step bridge inverter with neat waveform. CO3 K2
25. Categorize the various harmonics reduction methods in inverter output voltage and give further details about them. CO4 K2
26. Discuss in detail about step up and step down chopper with neat sketch. CO6 K2
27. Illustrate the Turn-on and Turn-off process of SCR during switching operation with necessary waveforms. CO1 K2
