

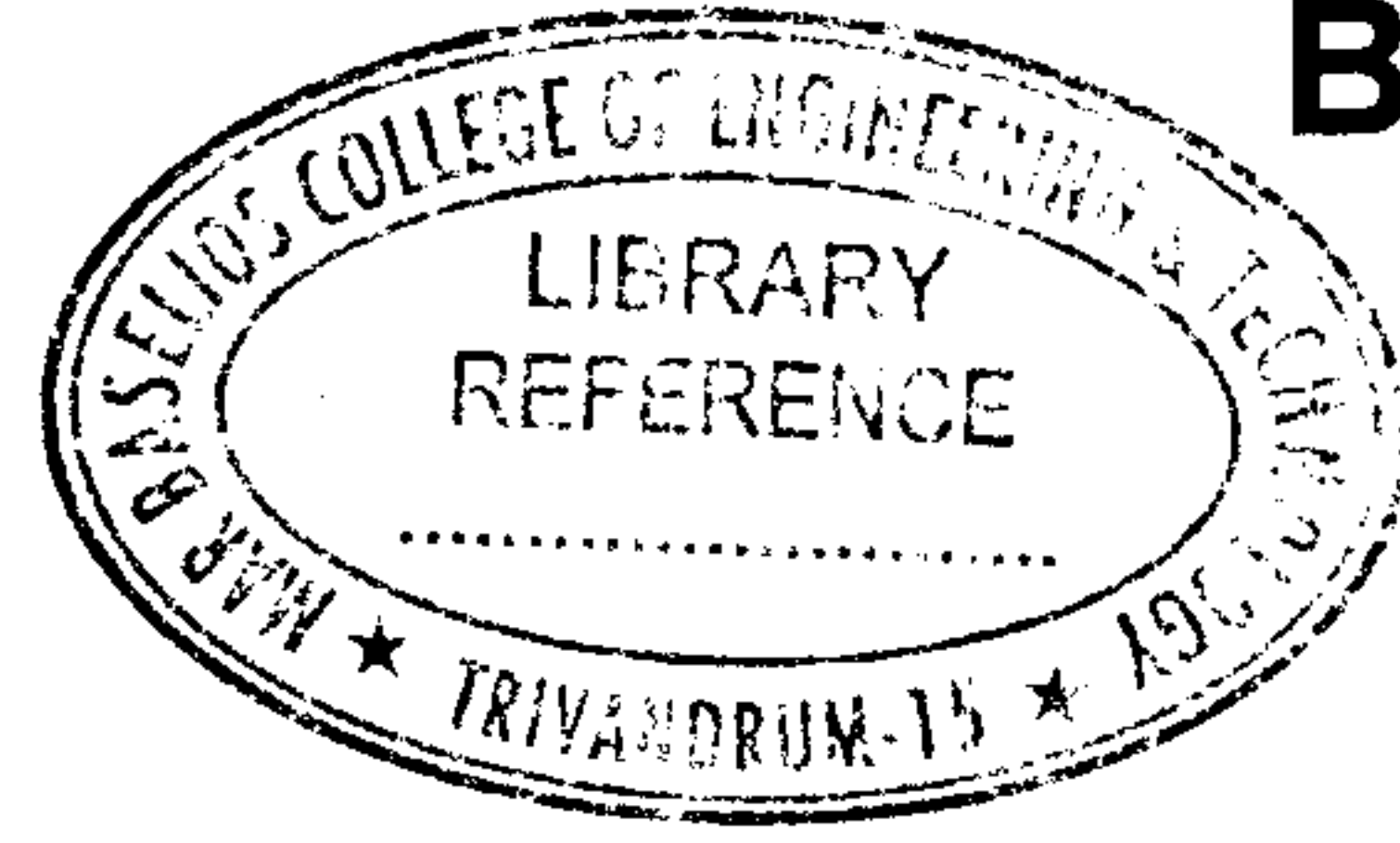


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B – 5998

Reg. No. :

Name :



Sixth Semester B.Tech. Degree Examination, April 2017
Branch : Electrical and Electronics Engineering
(2013 Scheme)

13.606.3 : SWITCHED MODE POWER CONVERTERS (E)

Time : 3 Hours

Max. Marks : 100

PART – A

Answer **all** questions :

(2×10=20 Marks)

1. Derive an expression for capacitor required for reducing output voltage ripple in a buck converter operating in continuous conduction mode.
2. Explain the control strategies used for DC-DC converters.
3. List the application of buck-boost DC-DC converter.
4. Explain why isolation transformer is required for switch mode power supply.
5. Explain the over-modulation and its effect on harmonics.
6. Explain the terms synchronous PWM and asynchronous PWM.
7. What are the limitations of basic series resonant inverter ?
8. Draw the gain verses frequency characteristics of a series loaded series resonant converter.
9. Classify DC-DC converter based on the transformer core excitation.
10. Draw the block diagram of closed loop control for switch-mode dc power supplies.

P.T.O.



PART – B

(4×20=80 Marks)

Module – I

11. a) In a boost converter, the duty ratio is adjusted to regulate the output voltage V_0 at 48 V. The input voltage varies in a wide range from 12 to 36 V. The maximum power output is 120 W. For stability reasons, it is required that the converter always operates in a discontinuous current conduction mode. The switching frequency is 50 kHz. Assuming ideal components and regulating capacitor very large, calculate the maximum value of inductance that can be used. 10
- b) With the help of relevant derivations and waveforms, analyze the discontinuous mode of operation with constant output voltage of a buck converter. Also get the boundary condition between continuous and discontinuous conduction for the buck converter. 10
- OR
- c) With neat sketch analyze the operation of a buck-boost converter and derive the expression for output voltage (V_0) operating at boundary condition. 10
- d) With neat sketch analyze the operation of a boost converter and derive the expression for output voltage (V_0) operating at boundary condition. 10

Module – II

12. a) Explain various voltage control method in single phase inverter using various PWM techniques with necessary diagrams and waveforms. 15
- b) Write short notes on tolerance band control. 5
- OR
- c) Discuss the different techniques adopted to eliminate harmonics generated by inverter circuits. 15
- d) Discuss fixed frequency control method. 5



Module – III

- 13. a) Describe the principle of ZVS resonant converter. 10
- b) Describe the principle of ZCS resonant converter. 10

OR

- c) Explain the working of a series loaded resonant converter operating in discontinuous conduction mode with waveform. 10
- d) Compare soft switching with conventional hard switching methods for converters. 10

Module – IV

- 14. a) Draw the circuit and explain the operation of a full bridge converter. Derive the expression for voltage gain of the full bridge converter. 10
- b) Draw a block schematic and explain the principle of operation of linear power supplies. What are their main shortcomings and applications ? 10

OR

- c) Draw the circuit and explain the operation of a forward converter. Derive the expression for voltage gain of the forward converter. 10
- d) Draw the circuit and explain the operation of a Push-pull converter. Derive the expression for voltage gain of the Push-pull converter. 10

