

CBCS SCHEME

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18EC36

Third Semester B.E. Degree Examination, Jan./Feb. 2021 Power Electronics and Instrumentation

Time: 3 hrs.

Max. Marks: 100

Note: Answer any FIVE full questions, choosing ONE full question from each module.

Module-1

- 1 a. Discuss various power converter circuits with necessary sketches and applications of each. (07 Marks)
b. With necessary sketches, explain the static V-I characteristics of SCR and its operation. (08 Marks)
c. List different turn-on methods, explain all in brief. (05 Marks)

OR

- 2 a. Explain turn-ON/turn-OFF dynamic characteristics of SCR with neat diagram. (07 Marks)
b. With suitable diagram and waveform, explain the working of RC full wave firing circuit. (08 Marks)
c. Describe the operation of UJT with neat sketches. (05 Marks)

Module-2

- 3 a. Explain the working of 1ϕ full wave center tapped controlled rectifier for resistive load with necessary sketches and also develop mathematical model to evaluate performance parameter of same (V_{dc} , V_{rms} , Efficiency). (10 Marks)
b. Evaluate performance parameter of 1ϕ half controlled rectifier with resistive load, has a transformer secondary voltage of 230V, 50Hz with $R = 10\Omega$ and firing angle $\alpha = 60^\circ$. Determine:
i) Average voltage and current
ii) Rms value of voltage and current
iii) Efficiency
iv) Ripple factor
v) Form factor. (10 Marks)

OR

- 4 a. Input to the step-up chopper is 200V the output required is 600V, if the conduction time of thyristor is $200\mu\text{sec}$. Compute:
i) Chopping frequency
ii) If the pulse width is halved for constant frequency operation, find the new output voltage. (07 Marks)
b. Explain the operation step-up chopper with neat diagram and derive an expression for output voltage. (08 Marks)
c. Elaborate on the control techniques used in choppers and also give detailed classification of choppers. (05 Marks)

Important Note : 1. On completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages.
2. Any revealing of identification, appeal to evaluator and/or equations written eg, $42+8 = 50$, will be treated as malpractice.

Module-3

- 5 a. With neat circuit diagram and waveforms. Explain the operation of 1ϕ full bridge inverter for RL load. (07 Marks)
- b. Design a multi range ammeter with range 0-1A, 0-5A and 0-10A employing individual shunt in each a D'Arsonval movement with an internal resistance of 500Ω and full scale deflection of 10mA is available. (08 Marks)
- c. What are the errors encountered in measurement process? Explain all with suitable example. (05 Marks)

OR

- 6 a. Design modified multirange voltmeter with basic D'Arsonval movement with an internal resistance of 50Ω and full scale deflection of 2mA, with voltage ranges of 0-10V, 0-50V, 0-100V and 0-250V. Draw the schematic diagram and show all values after design. (07 Marks)
- b. Explain the various static characteristics of measuring instruments. (08 Marks)
- c. With neat diagram, explain the operation of isolated flyback converter. (05 Marks)

Module-4

- 7 a. With neat block diagram, explain the operation of Ramp type Digital voltmeter. (07 Marks)
- b. Explain the operation of Time measurement with neat block diagram. (08 Marks)
- c. Draw the schematic diagram of Wheatstone's bridge and derive an expression for calculating unknown resistance and explain. (05 Marks)

OR

- 8 a. Explain the operation inductance comparison bridge with necessary equations. (07 Marks)
- b. Discuss the operation of successive approximation type DVM with necessary diagram. (08 Marks)
- c. An unbalanced Wheatstone bridge shown in Fig.Q.8(c), calculate the current through the galvanometer. (05 Marks)

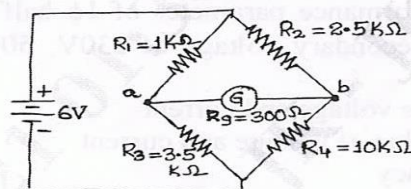


Fig.Q.8(c)

Module-5

- 9 a. Draw the schematic diagram to measure displacement using resistive transducer and explain. (07 Marks)
- b. Explain the operation of PLC with neat block diagram. (05 Marks)
- c. Explain the operation of Instrumentation amplifier using transducer bridge and derive equation for output voltage. (08 Marks)

OR

- 10 a. Explain the construction and working principle of LVDT with characteristic curve. (07 Marks)
- b. What are factors to be considered for selecting the transducer? (08 Marks)
- c. Illustrate working of analog weight scale. (05 Marks)
