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 = 10Ω and firing angle α = 60°. 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 200μsec. 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)**

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 comparision bridge with necessary equations. **(07 Marks)**

b. Discuss the operation of successive approximation type DVM with necessary diagram. **(08 Marks)**

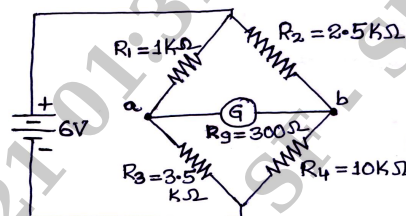c. An unbalanced Wheatstone bridge shown in Fig.Q.8(c), calculate the current through the galvanometer. **(05 Marks)**

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)**

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