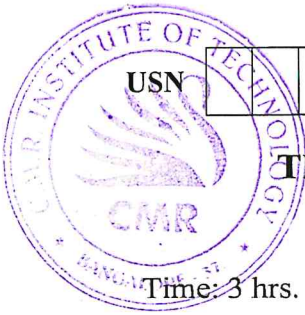


CBCS SCHEME



18EC36

Third Semester B.E. Degree Examination, Aug./Sept.2020 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. Define power electronics. Mention the different power electronic circuits. (04 Marks)
- b. With the help of the static V-I characteristics, explain the three modes of operation of the SCR. (10 Marks)
- c. Explain class-B commutation with necessary circuit diagram and waveforms. (06 Marks)

OR

- 2 a. Define commutation. Differentiate between natural and forced commutation. (06 Marks)
- b. Explain the gate characteristics of the SCR. (04 Marks)
- c. Explain the working of a UJT fixing circuit for a full wave rectifier using SCR with necessary circuit diagram and waveforms. (10 Marks)

Module-2

- 3 a. Differentiate between uncontrolled and controlled rectifier. (04 Marks)
- b. Explain the operation of single-phase full converter with resistive load with necessary circuit diagram and waveforms. Derive the expression for the average and rms output voltage. (10 Marks)
- c. Explain the operation of step-up chopper. (06 Marks)

OR

- 4 a. With necessary circuit diagram and waveforms, explain the working of single phase half wave converter with inductive load. (10 Marks)
- b. Explain the working of step-down chopper. (06 Marks)
- c. Explain the effect of freewheeling diode. (04 Marks)

Module-3

- 5 a. Explain the working of single phase full bridge inverter with necessary circuit diagram and waveforms. (08 Marks)
- b. Define the following terms as applied to an electronic instrument:
 - i) Accuracy
 - ii) Precision
 - iii) Resolution
- c. Sketch and explain the operation of a multirange ammeter. (06 Marks)

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OR

- 6 a. Explain the working of isolated forward SMPS with necessary circuit diagram. (08 Marks)
- b. Calculate series connected multiplier resistance with D'Arsonval movement with an internal resistance of 50Ω and full scale deflection current of 2mA when converted into a multirange d.c. voltmeter with ranges from $0\text{-}20\text{V}$, $0\text{-}40\text{V}$, $0\text{-}150\text{V}$ and $0\text{-}200\text{V}$. (08 Marks)
- c. Briefly explain the Gross error and absolute error with an example. (04 Marks)

Module-4

- 7 a. Discuss the operation of dual slope integrating type DVM with the help of block diagram. (08 Marks)
- b. Explain an unbalanced Wheatstone bridge circuit. Determine the amount of deflection due to unbalance of Wheatstone bridge. (08 Marks)
- c. An inductance comparison bridge is used to measure inductive impedance at a frequency of 5Hz. The bridge constants at balance are $L_3 = 10\text{mH}$, $R_1 = 10\text{K}\Omega$, $R_2 = 40\text{K}\Omega$, $R_3 = 100\text{K}\Omega$. Find the equivalent series circuit of an unknown impedance. (04 Marks)

OR

- 8 a. Explain the working of a digital frequency meter with the help of a block diagram. (10 Marks)
- b. Explain the operation of the Wein's bridge with a neat circuit diagram. Derive an expression for the frequency. (07 Marks)
- c. If the three arms of a Wheatstone's bridge have the resistances $R_1 = 2\text{K}\Omega$, $R_2 = 10\text{K}\Omega$ and $R_3 = 40\text{K}\Omega$. Find the unknown resistance. (03 Marks)

Module-5

- 9 a. Explain the construction, working principle and operation of LVDT. Show the characteristics curve. (10 Marks)
- b. Mention the advantages and limitations of thermistor. (04 Marks)
- c. Briefly explain the analog weight scale. (06 Marks)

OR

- 10 a. Explain the structure and operation of programmable logic controller. (07 Marks)
- b. Explain the operation of resistive position transducer. (05 Marks)
- c. Derive an expression for the gauge factor of bonded resistance wire strain gauge. (08 Marks)
