



USN

18EC36

Third Semester B.E./B.Tech. Degree Examination, Dec.2025/Jan.2026 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. What is power electronic converter system? Mention any four application of such system. (04 Marks)
- b. Explain different types of power electronic converter system. Draw their input/output characteristics. (08 Marks)
- c. Explain the operation of self commutation by LC circuit (Class B) with relevant circuit and waveforms. (08 Marks)

OR

- 2 a. Using two transistor model, explain the operation of SCR and device anode current and gate relation. (08 Marks)
- b. With a neat circuit and waveforms, explain the operation of RC full wave firing circuit. (08 Marks)
- c. Mention different thyristor turn – ON method. Mention the advantages of gate triggering. (04 Marks)

Module-2

- 3 a. Explain the effect of free wheeling Diode used in controlled rectifier. (04 Marks)
- b. With a neat circuit diagram and waveform, explain the principle operation of step down chopper. Derive the expression for average and R.M.S output voltage. (08 Marks)
- c. Explain with the help of neat circuit diagram, the operation of single phase full converter with resistive load. Draw the associated waveform. Derive expression for r. m .s and average output voltage. (08 Marks)

OR

- 4 a. A step up chopper is used to deliver load voltage of 500V from a 220V dc source of the blocking period of the thyristor is 80 μ F compute the required pulse width. (04 Marks)
- b. A single phase half wave controlled rectifier has purely resistive load of R and the delay angle is $\alpha = \pi/3$. Determine efficiency, form factor, Transformer utilization factor and Ripple factor. (08 Marks)
- c. With a neat circuit diagram and wave form. Explain the step up/down choppers. Derive the expression for average output voltage. (08 Marks)

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Module-3

- 5 a. Define the terms : i) Measurement ii) Resolution iii) Precision iv) Sensitivity (04 Marks)
- b. What are static errors? Explain turn in details. (08 Marks)
- c. Explain multirange Ammeter and multirange voltmeter. (08 Marks)

OR

- 6 a. Define Inverters, classify the inverter according to the source. (04 Marks)
- b. Explain the operation of single phase half bridge inverter connected to resistive load with the help of circuit diagram and waveforms. Derive the R.M.S output voltage. (08 Marks)
- c. Explain with a neat circuit and waveforms, the operation of Flyback converter. (08 Marks)

Module-4

- 7 a. The Wheatstone's bridge consists of following parameters $R_1 = 10K\Omega$, $R_2 = 15K\Omega$ and $R_3 = 40 K\Omega$, find the unknown resistance R_x . (04 Marks)
- b. Explain with a neat block diagram, the operation of successive Approximations type DVM. (08 Marks)
- c. With a neat block diagram, explain the working of function generator. (08 Marks)

OR

- 8 a. Explain with a block diagram, the operating principle of Ramp type DVM. (08 Marks)
- b. Explain with a neat circuit induction. Comparison bridge, Also find the equivalent series circuit off the unknown impedance. An inductance comparison bridge is used to measure inductive impedance at a frequency of 5 KHz. The bridge constant at balance are $L_s = 10mA$, $R_1 = 10K\Omega$, $R_2 = 40K\Omega$ and $R_3 = 10 K\Omega$ (08 Marks)
- c. A wein bridge circuit consists of the following: $R_1 = 4.7K\Omega$, $C_1 = 5nf$, $R_2 = 20K\Omega$, $C_2 = 10nf$, $R_3 = 10K\Omega$, $R_4 = 100K\Omega$. Determine the frequency of the circuit. (04 Marks)

Module-5

- 9 a. Define Transducers, list the important parameters of Electrical Transducers. (04 Marks)
- b. Explain construction and principle operation of LVDT. (08 Marks)
- c. Explain the operation of a resistance thermometer and mention its advantages. (08 Marks)

OR

- 10 a. What are features of instrumentation amplifiers? How it differs from the ordinary Op-Amp? (04 Marks)
- b. Explain instrumentation amplifier using transducer bridge with the help of circuit diagram. (08 Marks)
- c. Explain with neat diagram the PLC structure. (08 Marks)

* * 2 of 2 * * *

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.

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