

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY, WAKNAGHAT

TEST -3 EXAMINATION- 2025

B.Tech- II Semester (BI/BT)

COURSE CODE (CREDITS): 24B11EC212 (4)

MAX. MARKS: 35

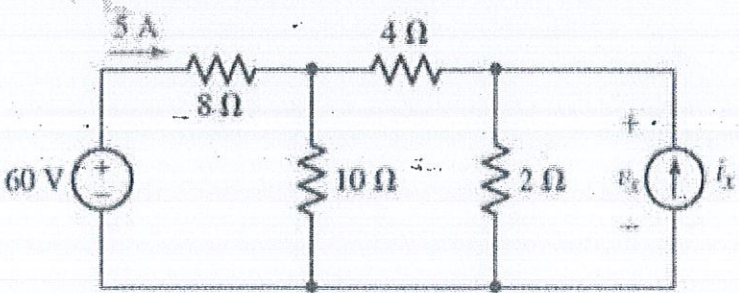
COURSE NAME: Basic Electrical Engineering for Life Sciences

COURSE INSTRUCTORS: Dr. Alok Kumar

MAX. TIME: 2 Hours

Note: (a) All questions are compulsory.

(b) The candidate is allowed to make Suitable numeric assumptions wherever required for solving problems

Q.No	Question	CO	Marks
Q1	What is a transformer? Define its working principle. A 1 kVA step-down transformer reduces voltage from 1000 V to 100 V. Find the full-load current on the secondary side.	4	5
Q2	Explain the process of acquiring a biomedical signal. What are the challenges involved in biomedical signal acquisition? What is signal preprocessing in biomedical systems?	5	3
Q3	Differentiate between step-up and step-down transformers with examples. a) A transformer has 100 turns on the primary and 1000 turns on the secondary. If the primary voltage is 230 V, what is the secondary voltage? What type of transformer is this? b) A 500 W step-up transformer increases voltage from 110 V to 220 V. Assuming 100% efficiency, calculate the primary and secondary currents.	4	3
Q4	Determine v_x in the circuit of Fig.1  <p style="text-align: center;">Fig.1</p>	1	4
Q5	What is the role of EMG in fatigue analysis? Discuss any one clinical case where EMG plays a crucial role.	5	4
Q6	Explain the principle of X-ray imaging. Compare X-ray with CT and MRI in terms of resolution and radiation.	5	4
Q7	Explain the process of ultrasound wave generation and detection. List major clinical applications of ultrasound imaging.	5	4

Q8	Describe the principle of SPECT imaging with a labeled diagram. Differentiate between PET and SPECT.	5	4
Q9	Draw a typical ECG waveform and label the P, QRS, and T waves. How is ECG used to detect heart abnormalities? What is the clinical significance of ST segment and T wave in ECG?	5	4

JUIT TEST-3 EXAMINATION- May-2025