JHARKHAND Rai University
RANCHI

PRACTICE SET
End Semester Examination, May 2026

Program: BMLT
Semester: IV

Subject: Digital Electronics system and Instrumentation
Subject Code: 42ABMT402

Course Outcome:
After the successful completion of the course, the students will be able to:

CO	Description
CO1	Develop the essential skills for understanding the digital circuits.
CO2	Define logic algebra, explain the postulates and theorems of Boolean algebra, and apply them to simplify logical expressions.
CO3	Exemplify the elements of instruments and measurement systems and interpret the performance characteristics of measurements.
CO4	Demonstrate the working of digital instruments using the block diagram approach.
CO5	Organize sensors and switches for the measurement of given physical variables.

Section - A (30 × 10 = 300 Marks)

1. Define Boolean algebra. Explain the basic features of Boolean algebra with examples.
   [Module I, CO2, Remember, LOT]
2. State the postulates of Boolean algebra and explain their significance in digital circuits.
   [Module I, CO2, Understand, LOT]
3. Describe the basic logic gates (AND, OR, NOT) with their symbols and truth tables.
   [Module I, CO1, Understand, LOT]
4. Define switching functions and explain Sum of Products (SOP) and Product of Sums (POS) forms.
   [Module II, CO2, Understand, LOT]
5. Explain the method of algebraic simplification of Boolean expressions.
   [Module II, CO2, Analyze, HOT]
6. Describe Karnaugh Map (K-map) technique for simplification of Boolean expressions with examples.
   [Module II, CO2, Analyze, HOT]
7. Define measurement and measurement systems. Explain the elements of a generalized measurement system.
   [Module III, CO3, Understand, LOT]

8. Explain the concepts of sensitivity, linearity, and resolution in measurement systems.
   [Module III, CO3, Understand, LOT]
9. Compare hysteresis and drift in instrumentation systems and discuss their effects on measurement accuracy.
   [Module III, CO3, Analyze, HOT]
10. Explain threshold, dead time, and dead zone in measurement systems with examples.
    [Module III, CO3, Analyze, HOT]
11. Discuss the advantages of digital instruments over analog instruments.
    [Module IV, CO4, Understand, LOT]
12. Describe the working principle of Digital to Analog Converter (DAC).
    [Module IV, CO4, Understand, LOT]
13. Explain the function of Analog to Digital Converter (ADC) in digital instruments.
    [Module IV, CO4, Understand, LOT]
14. Compare ADC and DAC in terms of working principle and applications.
    [Module IV, CO4, Analyze, HOT]
15. Explain the block diagram of a Digital Multimeter with functions of each block.
    [Module IV, CO4, Evaluate, HOT]
16. Discuss the importance of sensors in biomedical measurement systems.
    [Module V, CO5, Analyze, HOT]
17. Explain how switches and sensors are integrated in modern digital instrumentation systems.
    [Module V, CO5, Analyze, HOT]
18. Compare and contrast the different types of logic gates and explain their applications in digital electronics.
    [Module I, CO1, Analyze, HOT]
19. Explain the postulates and theorems of Boolean algebra with suitable examples and applications in logic simplification.
    [Module I, CO2, Understand, LOT]
20. Simplify Boolean expressions using algebraic method and Karnaugh Map up to four variables.
    [Module II, CO2, Analyze, HOT]
21. Explain the representation of switching functions using SOP and POS forms with suitable examples.
    [Module II, CO2, Understand, LOT]
22. Describe the elements of a generalized instrumentation system and explain their functions.
    [Module III, CO3, Understand, LOT]
23. Enumerate the performance characteristics of measurement systems and explain their significance in instrumentation.
    [Module III, CO3, Understand, LOT]
24. Explain the advantages of digital instruments over analog instruments with suitable examples.
    [Module IV, CO4, Analyze, HOT]

25. Describe the block diagram and working principle of a digital multimeter.
    [Module IV, CO4, Understand, LOT]

26. Explain the concept of data acquisition system and its importance in digital instrumentation.
    [Module IV, CO4, Remember, LOT]

27. Explain the structure and working of the nephron in relation to measurement systems.
    (Correction replaced)
    Explain the working principle of ADC and DAC with suitable block diagrams.
    [Module IV, CO4, Analyze, HOT]

28. Compare different types of sensors used for measuring physical parameters in biomedical systems.
    [Module V, CO5, Analyze, HOT]

29. Classify sensors and describe resistive, capacitive, and inductive sensors with examples.
    [Module V, CO5, Remember, LOT]

30. Explain the working and applications of proximity switches and photoelectric switches.
    [Module V, CO5, Remember, LOT]

Section – B (10 × 20 = 200 Marks)

31. Explain Boolean algebra and logic gates in detail, highlighting their role in the design and operation of digital circuits.
    [Module I, CO1, Understand, LOT]

32. Describe minimization techniques of Boolean expressions using algebraic methods and Karnaugh Maps with suitable examples.
    [Module II, CO2, Understand, LOT]

33. Explain the elements of instrumentation systems and analyze the performance characteristics of measurement systems.
    [Module III, CO3, Analyze, HOT]

34. Describe the working principles and block diagrams of digital instruments including ADC, DAC, and digital multimeter.
    [Module IV, CO4, Evaluate, HOT]

35. Explain the classification, working principles, and applications of sensors and switches used in biomedical instrumentation systems.
    [Module V, CO5, Analyze, HOT]

36. Evaluate the impact of errors such as hysteresis, drift, and non-linearity on measurement reliability in biomedical instruments.
    [Module III, CO3, Evaluate, HOT]

37. Design a measurement system for monitoring a physiological parameter (e.g., temperature or blood pressure), justifying the selection of each component.
    [Module III, CO3, Create, HOT]

38. Design a basic data acquisition system for recording biomedical signals, explaining the function of each stage.
    (Module IV, CO4, Create, HOT)

39. Design a smart sensor-based system for patient monitoring, incorporating appropriate sensors and switching mechanisms.
(Module V, CO5, Create, HOT)

40. Analyze the advantages of digital instruments over analog instruments in terms of accuracy, noise immunity, and data processing.
(Module IV, CO4, Analyze, HOT)

Summary Sheet

CO Wise

CO	Q. No	Marks
CO1	3,18,31	40
CO2	1,2,4,5,6,19,20,21,32	100
CO3	7,8,9,10,22,23,33,36,37	120
CO4	11,12,13,14,15,24,25,26,27,34,38,40	150
CO5	16,17,28,29,30,35,39	90
Total		**500**

Unit Wise

Unit	Q. No	Marks
Module 1	3,18,31	40
Module 2	1,2,4,5,6,19,20,21,32	100
Module 3	7,8,9,10,22,23,33,36,37	120
Module 4	11,12,13,14,15,24,25,26,27,34,38,40	150
Module 5	16,17,28,29,30,35,39	90
Total		**500**

Blooms Taxonomy Level (BTL) Wise

BTL	Q. No	Marks
LOT	1,2,3,4,7,8,11,12,13,19,21,22,23,25,26,29,30,31,32	210
HOT	5,6,9,10,14,15,16,17,18,20,24,27,28,33,34,35,36,37,38,39,40	290
Total		**500**

Prepared By: Mr. Rahul Kumar

Disclaimer: -This is a Practice set. The Question in End term examination will differ from the Practice set. This Practice set is meant for practice only.