Register No.: ..... Name: .....

SAINTGITS COLLEGE OF ENGINEERING (AUTONOMOUS)

(AFFILIATED TO APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY, THIRUVANANTHAPURAM)

THIRD SEMESTERM.TECH DEGREE EXAMINATION (Regular), FEBRUARY 2022

ROBOTICS AND AUTOMATION

(2020 Scheme)

Course Code: **20ECRAT241**

Course Name: **Advanced Instrumentation**

Max. Marks: **60** **Duration: 3 Hours**

PART A

(Answer all questions. Each question carries 3 marks)

1. Explain why Calibration is so important. Name the classifications of Calibration.
2. Describe the following terms a) Maximum Peak Over Shoot b) Rise Time.
3. Illustrate the following terms a) ISE method b) ITAE method.
4. List the different application domains where WSN can be very useful.
5. Describe the architecture of VI and indicate the parts.
6. Virtual Instrumentation is very necessary in Engineering applications. Justify.
7. Illustrate what you mean by G programming.
8. Describe a module or a Sub VI.

PART B

(Answer one full question from each module, each question carries 6 marks)

MODULE I

9. a) Differentiate between backlash and dead zone of an instrument. (3)
   b) Andrew used a thermometer to measure the temperature in the laboratory. The thermometer shows a temperature of 43.5 degrees Fahrenheit when the actual temperature is 45 degrees Fahrenheit. Help Andrew to determine the Absolute Error, Relative Error, and Percentage Error. (3)

OR

10. a) Differentiate between Threshold and Resolution of an instrument. (3)
    b) The level of a liquid is 26 L. An operator measures the level and finds it to be 26.2 L, 26.1 L, 25.9 L, and 26.3 L in the first, second, third, and fourth trial, respectively. Analyze the accuracy and precision of this measurement. (3)

MODULE II

11. Determine the response of a first order system for the following input signals a) Unit Step b) Ramp. (6)

OR

12. Determine the response of a second order under damped system for the Unit Step input. (6)

MODULE III

13. Illustrate the functions and purposes of P & ID diagrams with sketches. (6)

OR

14. Demonstrate an automation pyramid and point out the plant level automation. (6)

MODULE IV

15. Illustrate the critical factors in the design of wireless sensor networks and routing protocols. (6)

OR

16. a) What are smart sensors? Illustrate. (2)
    b) Illustrate in detail about the different types of PetriNet structures. (4)

MODULE V

17. a) List the three parts of Lab VIEW with the applications. (3)
    b) Discuss any three advantages and disadvantages of Lab VIEW. (3)

OR

18. a) Define local and global variables in a VI. (3)
    b) Illustrate the role of a software in VI. (3)

MODULE VI

19. a) Design a VI to setup full adder logic using half adder logic as a sub VI. (3)
    b) Illustrate the use of File I/O in Lab VIEW. (3)

OR

20. a) Describe the various functions available in structure. (2)
    b) Design a VI to find the factorial of a number using for loops and shift registers. (4)

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