| Question Paper Code | 12604 |
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# B.E. / B.Tech. - DEGREE EXAMINATIONS, APRIL / MAY 2024
Seventh Semester
## Instrumentation and Control Engineering
## 20ICPW701 - INSTRUMENTATION SYSTEM DESIGN WITH LABORATORY
Regulations - 2020

Duration: 3 Hours          Max. Marks: 100

## PART - A (10 × 2 = 20 Marks)
### Answer ALL Questions

| | | Marks | K-Level | CO |
|---|---|---|---|---|
| 1. | Mention any two merits of an Orifice meter. | 2 | K1 | CO1 |
| 2. | Illustrate about the materials used for making linearly between Temperature vs. Resistance in RTD. | 2 | K2 | CO1 |
| 3. | List the types of Valve bodies. | 2 | K1 | CO2 |
| 4. | Quote the important parameters of a bourdon tube. | 2 | K1 | CO2 |
| 5. | Define Pump efficiency with expression. | 2 | K2 | CO3 |
| 6. | Mention some of the methods used in selection Pumps. | 2 | K1 | CO3 |
| 7. | Differentiate between Timer & counter in a Microcontroller. | 2 | K | CO4 |
| 8. | Draw the oscillator circuitry required for microcontroller operation. | 2 | K1 | CO4 |
| 9. | Draw the simplified PI control circuit using OP-AMP. | 2 | K1 | CO5 |
| 10. | Differentiate between P, PI and PID controllers. | 2 | K2 | CO5 |

## PART - B (5 × 13 = 65 Marks)
### Answer ALL Questions

| | | | Marks | K-Level | CO |
|---|---|---|---|---|---|
| 11. | a) | Highlight the design consideration for thermocouple using RTD with cold junction compensation circuit. | 13 | K2 | CO1 |
| | | **OR** | | | |
| | b) | Explain the working of D/P transmitters and temperature transmitters and compare their calibration results. | 13 | K2 | CO1 |
| 12. | a) | Describe the working of Bourdon gauges with neat diagram. | 13 | K2 | CO2 |
| | | **OR** | | | |
| | b) | Mentions the steps involved in Sizing of Control valve & Compare the linear and exponential curve at control valve sizing. | 13 | K2 | CO2 |
| 13. | a) | Mention the types of Pumps. Explain any two types of pumps and compare their dynamic and positive displacement operation. | 13 | K2 | CO3 |
| | | **OR** | | | |
| | b) | With a neat diagram explain the instruments used in pumping practice and illustrate about the reduction of noise in them. | 13 | K2 | CO3 |

*K1 – Remember; K2 – Understand; K3 – Apply; K4 – Analyze; K5 – Evaluate; K6 – Create*

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14. a) Discuss in detail about the working modes of 8051 Timers and their Special Function registers.  *13  K3  CO4*

<div align="center">**OR**</div>

   b) Develop PID control algorithm to control the temperature process.  *13  K3  CO4*

15. a) Explain Electronic PI control algorithm & mention its controller settings.  *13  K2  CO5*

<div align="center">**OR**</div>

   b) Illustrate about Electronic PD control algorithm & mention its controller settings.  *13  K2  CO5*

<div align="center">**PART - C (1 × 15 = 15 Marks)**</div>

16. a) With the help of LM335, explain how data is acquired in a microcontroller.  *15  K2  CO4*

<div align="center">**OR**</div>

   b) Explain in detail about Electronic PI & Electronic PID control algorithms and compare them.  *15  K2  CO5*