**18ME703**

**Hall Ticket Number:**

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| **IV/IV B.Tech (Regular) DEGREE EXAMINATION** | | | |
| **December, 2021** | **Mechanical Engineering** | | |
| **Seventh Semester** | **Instrumentation and Control Systems** | | |
| **Time:** Three Hours | | **Maximum:** 50 Marks | |
| *Answer Question No.1 compulsorily.* | | | (10X1 = 10 Marks) |
| *Answer ONE question from each unit.* | | | (4X10=40 Marks) |
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| 1. | a) | Differentiate between accuracy and precision | CO1 |  |
|  | b) | Differentiate measurement and measurand. | CO1 |  |
|  | c) | Define Strain rosette. How it is used for strain measurement? | CO1 |  |
|  | d) | Classify temperature measurement techniques | CO2 |  |
|  | e) | State the characteristics of manometer fluid | CO2 |  |
|  | f) | Write short notes on ionization pressure gauge | CO2 |  |
|  | g) | Differentiate cryogenic fuel and bubbler level indicators | CO3 |  |
|  | h) | Write explanatory notes on Hot-wire anemometer | CO3 |  |
|  | i) | Write short notes on elastic force meters | CO4 |  |
|  | j) | What are the basic elements of a control system | CO4 |  |
| **Unit -I** | | | | |
| 2. | a) | With the help of a block diagram and suitable example, show the three stages of Generalized Measurement System. Also explain the functions of each stage. | CO1 | 5M |
|  | b) | Sketch and explain Photo electric transducer. | CO1 | 5M |
| **(OR)** | | | | |
| 3. | a) | Derive an expression for the gauge factor of a Resistance Strain gauge. | CO1 | 4M |
|  | b) | Explain the method of usage of resistance strain gauge for measuring bending, tensile and compressive strains. | CO1 | 5M |
| **Unit -II** | | | | |
| 4. | a) | Describe the construction and working of Thermocouple | CO2 | 5M |
|  | b) | Sketch and explain the disappearing filament pyrometer setup and explain its operation. | CO2 | 5M |
| **(OR)** | | | | |
| 5. | a) | Describe with a neat sketch the principle of working of bourdon tube pressure gauge and also mention its advantages and disadvantages. | CO2 | 5M |
|  | b) | Sketch & Explain thermal conductivity gauge for measurement of Vacuum. | CO2 | 5M |
| **Unit -III** | | | | |
| 6. | a) | Adapt any two inferential methods in level measurement. | CO3 | 6M |
|  | b) | Classify level measuring instruments as direct and inferential methods giving suitable examples | CO3 | 4M |
| **(OR)** | | | | |
| 7. | a) | Explain construction and the working principle of a Rotameter with a neat diagram | CO3 | 5M |
|  | b) | Explain the Construction, working and applications of Magnetic flow meter. | CO3 | 5M |
| **Unit -IV** | | | | |
| 8. | a) | How does a mechanical load cell work? Explain the principle of measuring force using strain gauge load cell? | CO4 | 5M |
|  | b) | Explain the principle of measuring shaft torques using torsion meter | CO4 | 5M |
| **(OR)** | | | | |
| 9. | a) | Summarize the essential features of open-loop and closed-loop control systems. Illustrate your answer by referring to particular example of each type of system, and sketch its relevant block diagram. | CO4 | 5M |
|  | b) | Write short notes on temperature control system with suitable block diagram. | CO4 | 5M |

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