**18EI602**

**Hall Ticket Number:**

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| **III/IV B.Tech (Regular/Supplementary) DEGREE EXAMINATION** | | | |
| **June, 2022** | **Electronics & Instrumentation Engineering** | | |
| **Sixth Semester** | **Process Control** | | |
| **Time:** Three Hours | | **Maximum: 5**0 Marks | |
| *Answer Question No. 1 Compulsorily.* | | | (10X1 = 10 Marks) |
| *Answer* ***ANY ONE*** *question from each Unit.* | | | (4X10=40 Marks) |

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| 1. | a) | Define process degrees of freedom. | CO1 | |  |
|  | b) | A proportional controller has an output *m* changing linearly from 0 to 15 psi when the deviation *e* changes from -100 to 0 to 100 degrees. Find the controller sensitivity. | CO1 | |  |
|  | c) | Sketch the input-output characteristics of a single-speed floating controller. | CO1 | |  |
|  | d) | List the applications of Flapper-Nozzle system. | CO2 | |  |
|  | e) | Differentiate feedback and feed-forward control actions. | CO3 | |  |
|  | f) | What is the significance of dead time compensation? | CO3 | |  |
|  | g) | Define control valve sizing. | CO2 | |  |
|  | h) | Define ITSE criterion? | CO3 | |  |
|  | i) | What is meant by process identification? | CO4 | |  |
|  | j) | What information must be known in applying the IMC method? | CO3 | |  |
| **Unit - I** | | | | | |
| 2. | a) | Differentiate regulatory and servo control actions. | CO1 | **5M** | |
|  | b) | Obtain the mathematical modeling of two liquids tanks interacting system. | CO1 | **5M** | |
|  |  | **(OR)** |  |  | |
| 3. | a) | Explain the proportional control action with an example and define what is offset. | CO1 | **5M** | |
|  | b) | Explain in detail about single speed floating control action. | CO1 | **5M** | |
| **Unit - II** | | | | | |
| 4. | a) | Explain the operation of Electronic PID controller and develop the expression for controller output. | CO2 | **5M** | |
|  | b) | What is hydraulic controller? Describe the hydraulic PD control action with a neat sketch. | CO2 | **5M** | |
|  |  | **(OR)** |  |  | |
| 5. | a) | Illustrate the operation of self-operated controllers. | CO2 | **5M** | |
|  | b) | Explain the operation of an amplifier type electric motor actuator with a neat diagram. | CO2 | **5M** | |
| **Unit - III** | | | | | |
| 6. | a) | With a neat block diagram discuss the operation of smith predictor control. | CO3 | **5M** | |
|  | b) | Describe the feed forward control with block diagram and a suitable example. | CO3 | **5M** | |
|  |  | **(OR)** |  |  | |
| 7. | a) | When a cascade control loop is very useful? How the inner controller can be tuned to get the maximum advantage? | CO3 | **5M** | |
|  | b) | With a neat block diagram discuss the operation of ratio control system. | CO3 | **5M** | |
| **Unit - IV** | | | | | |
| 8. | a) | Discuss the criteria for good control. Also compare the features of ISE, IAE and ISTE | CO4 | **5M** | |
|  | b) | How optimum settings for mathematically described process are determined using Z-N method. | CO4 | **5M** | |
|  |  | **(OR)** |  |  | |
| 9. | a) | Discuss in detail about process identification using step testing method. | CO4 | **5M** | |
|  | b) | Explain controller tuning by damped oscillation method. | CO4 | **5M** | |

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