**18EI602**

**Hall Ticket Number:**

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| **III/IV B. Tech (Regular) DEGREE EXAMINATION** | | | | | | | | |
| **July, 2021** | | | **Electronics & Instrumentation Engineering** | | | | | |
| **Sixth Semester** | | | **Process Control** | | | | | |
| **Time:** Three Hours | | | | **Maximum :** 50 Marks | | | | |
| *Answer Question No.1 compulsorily.* | | | | | (1X10 = 10 Marks) | | | |
| *Answer ONE question from each unit.* | | | | | (4X10=40 Marks) | | | |
| 1 | Answer all questions | | | | | (1X10=10 Marks) | |
|  | a) | Formulate the turbulent resistance in liquid process? | | | | |  |
|  | 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. | | | | |  |
|  | c) | Define offset | | | | |  |
|  | d) | Explain the function of final control element? | | | | |  |
|  | e) | What is meant by control valve sizing? | | | | |  |
|  | f) | Distinguish between displacement and force type pneumatic controllers | | | | |  |
|  | g) | What is the necessity of dead time compensation | | | | |  |
|  | h) | List the applications of ratio control. | | | | |  |
|  | i) | Which control action is preferred if disturbance is occurred near the process | | | | |  |
|  | j) | Define controller tuning | | | | |  |
|  | k) | Compare the main feature of step and pulse testing. | | | | |  |
|  | l) | What is meant by process identification | | | | |  |
| **UNIT I** | | | | | | | |
| 2 | a) | Derive the mathematical modeling of gas process | | | | | 5M |
|  | b) | Evaluate the transfer function of two capacity liquid system as shown in fig.1    Fig.1 | | | | | 5M |
| **(OR)** | | | | | | | |
| 3 | a) | Compare the features of P, PI, PD and PID control actions and mention the applications of each control action. | | | | | 5M |
|  | b) | The derivation ‘e’ of a proportional-integral controller is sinusoidal. Calculate the phase lag of the output ‘m ‘ and prove that the phase lag depends upon integral time. | | | | | 5M |
| **UNIT II** | | | | | | | |
| 4 | a) | Explain the operation of Electronic PID controller and develop the expression for controller output. Mention the merits and demerits compared to Pneumatic and Hydraulic PID controller | | | | | 5M |
|  | b) | Outline the various types of control valve characteristics and briefly explain each | | | | | 5M |
| **(OR)** | | | | | | | |
| 5 | a) | Illustrate the operation of self-operated controllers | | | | | 5M |
|  | b) | A new controller action can be synthesized by deriving system functions *G* and *H*. If *G* represents a high-gain amplifier, determine *H* to give proportional-integral action;    Fig.2 | | | | | 5M |
| **P.T.O.**  **18EI602**  **UNIT III** | | | | | | | |
| 6 | a) | With a neat block diagram discuss the operation of smith predictor control. | | | | | 5M |
|  | b) | Prove that proportional controllers with high gain are sufficient for cascade control system | | | | | 5M |
| **(OR)** | | | | | | | |
| 7 | a) | Derive the transfer function of Internal modal control system | | | | | 5M |
|  | b) | With a neat block diagram discuss the operation of ratio control system. | | | | | 5M |
| **UNIT IV** | | | | | | | |
| 8 | a) | How optimum settings for mathematically described process are determined using Z-N method. | | | | | 5M |
|  | b) | Discuss the criteria for good control. Also compare the features of ISE, IAE and ISTE | | | | | 5M |
| **(OR)** | | | | | | | |
| 9 | a) | How optimum settings for mathematically described process are determined using C-C method | | | | | 5M |
|  | b) | Briefly discuss about i) frequency testing ii) Pulse testing | | | | | 5M |

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