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PRESIDENCY UNIVERSITY BENGALURU

SCHOOL OF ENGINEERING

MAKE UP EXAMINATION - JULY 2024

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| **Semester : V** | **Date : 01/07/24** |
| **Course Code : PET226** | **Time : 9:30 AM to 12:30 PM** |
| **Course Name** : **Process Control and Instrumentation** | **Max Marks : 100** |
| **Program : B.Tech** | **Weightage : 50%** |

**Instructions:**

1. *Read all questions carefully and answer accordingly.*
2. *Question paper consists of 3 parts.*
3. *Scientific and non-programmable calculator are permitted.*
4. *Do not write any information on the question paper other than Roll Number.*

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| **PART A** | | | |
| **ANSWER ANY 5 QUESTIONS 5Q X 2M=10M** | | | |
| 1 | Define system. | (CO1) | [Knowledge] |
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| 2 | Define control system in terms of an Engineer. | (CO1) | [Knowledge] |
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| 3 | Define set point and controlled variable. | (CO2) | [Knowledge] |
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| 4 | Define the different name of feed-back system. | (CO3) | [Knowledge] |
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| 5 | Illustrate the importance of block diagram. | (CO3) | [Knowledge] |
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| 6 | Define closed-loop system. | (CO4) | [Knowledge] |
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| 7 | Justify with proper explanation thermostat is open loop system or closed loop system. | (CO4) | [Knowledge] |
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| **PART B** | | | |
| **ANSWER ANY 5 QUESTIONS 5Q X 10M=50M** | | | |
| 8 | Consider the working of an air conditioner. An operator was trying to maintain room temperature in between 18˚C temperature. It was observed that ambient temperature was 26˚C. As a control engineer   1. Which type of loop system you suggest as if room temperature can reach 18˚C temperature. 2. Why you are suggesting that particular loop system justify your answer with proper definition properties and diagram. | (CO1) | [Comprehension] |
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| 9 | The above figure indicates a block diagram of Shell Industries Limited. “R” Indicates the Crude and gas. C indicates crude only. Determine the relationship between C&R. | (CO2) | [Comprehension] |
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| 10 | Basic control algorithm for a single stage reactor is feedback loop that adjust the pump speed of agitator based on the difference between the measured level and set point. The controller calculates an error signal by subtracting the measured level from the set point and then uses error signal to adjust pump speed. With a proper diagram illustrate mass balance equation to establish the suitable model equation. | (CO2) | [Comprehension] |
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| 11 | An electric oven with a coil started for preparing food. It is observed while the switch is on, instantly it can’t use to prepare food or boiling water. Why it is happening justify in terms of time response. | (CO3) | [Comprehension] |
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| 12 | With the help of a explain, how a typical feedback control loop is implemented suitable example? Comment on negative and positive feedback. | (CO3) | [Comprehension] |
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| 13 | “Human body is a complex organism”. Based on the following statement describe different control strategies implemented in our bodies. | (CO4) | [Comprehension] |
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| 14 | You started an electric fan. How can you explain in terms of time response? | (CO4) | [Comprehension] |
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| **PART C** | | | |
| **ANSWER ANY 2 QUESTIONS 2Q X 20M=40M** | | | |
| 15 | Establish model equation of  single tank system with proper diagram and equation. | (CO2) | [Application] |
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| 16 | Describe the working principle of thermocouple. | (CO3) | [Application] |
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| 17 | An O&G industry use a batch separator to separate natural gas from the mixture of crude gas and water. They decided to install a fully closed loop system to separate natural CH4 from the above mixture. For designing the separator, residence time is one of the major important parameter. As a petroleum engineer determine residence time for   1. Zeroth order system; (b) First order system; (c) nth order system. | (CO4) | [Application] |