



**PRESIDENCY UNIVERSITY
BENGALURU**
SCHOOL OF ENGINEERING

MAKEUP EXAMINATION – JAN 2023

Course Code: PET 226

Date: 24-JAN-2023

Course Name: Process Control and Instrumentation

Time: 01.00 PM-04.00 PM

Program : B.Tech (Petroleum)

Max Marks: 100

Weightage: 50 %

Instructions:

- (i) Read the all questions carefully and answer accordingly.

Part A [Memory Recall Questions]

Answer all the Questions. Each question carries TWO marks.

(10Qx 2M= 20M)

1. Define manipulated Variable. (C.O.No.1) [Knowledge Level]
2. Define Measured Variable with an example. (C.O.No.1) [Knowledge Level]
3. What do you understand by open loop system explain (C.O.No.2) [Knowledge Level]
4. What will be the damping ratio when you throw a stone in a pond causing a ripple in the water? Identify the damping ratio and (C.O.No.2) [Knowledge Level]
5. In positive feedback system which are the conditions that will make the process come to a stop? (C.O.No.3) [Knowledge Level]
6. What will be the output of a derivative controller if the error is constant? (C.O.No.3) [Knowledge Level]
7. What will be the output of a derivative controller if the error is constant? (C.O.No.3) [Knowledge Level]
8. What do you mean by controller gain? (C.O.No.4) [Knowledge Level]
9. Among all the different types of valves write down the examples of the rotating type of valves. (C.O.No.4) [Knowledge Level]
10. What do you understand by pulse input explain? (C.O.No.4) [Knowledge Level]

Part B [Thought Provoking Questions]

Answer all the Questions. Each question carries TEN marks. (4Qx10M=40M)

- 11 Take the example of a Two Tank Non-Interacting System experiment in the lab. Identify all the process variable and explain them. (C.O.No.1) [Comprehensive Level]
12. Considering the situations given below. Advice which controllers to be used and Explain the controller in detail.
- This process requires the current of an equipment to be at 25 ampere. It was found that the error in the process was very small 0.25 ampere. Advice which controllers to be used in this process.
 - This process requires the flow rate to be 10 LPM. It was found that the error in the process was changing with time. The flowrate changes between 5 to 15 LPM with time. Advice which controllers to be used in this process. (C.O.No.3) [Comprehensive Level]
13. Take a process of heating water with the help of steam. Explain the process in detail if the process is cascade control method with the help of a diagram. What is the advantages of cascade control over feedback control? (C.O.No.2) [Comprehensive Level]
14. What are the components of process control? When controlling the Single tank system in the lab, identify which is the Final Control Element. Also explain the different types of valves including the valves used in the instruments of the Process Control Lab. (C.O.No.4) [Comprehensive Level]

Part C [Problem Solving Questions]

Answer all the Questions. Each question carries TWENTY marks. (2Qx20M=40M)

15. What do you understand by Control Valve Characteristics? Explain the different types of Control valve Characteristics in detail. Also advice which Control valve Characteristics to be used in the following situation and explain why you have selected the particular characteristics.
- Water Tap in the basin.
 - High Pressure process
 - Process in which either 100% flow or 0% flow is required.
- (C.O.No.3) [Comprehensive Level]
16. Valves can be controlled by either pneumatic, hydraulic or electric. Explain the different types pneumatic valves with the help of a diagram.
- Select which type of valves either fail open or fail closed to be used stating your reason for selecting the particular valve in the following situation
- Consider a valve used to control the water supply in the storage tank of 500 liters of a house hold. Suggest which type of valve you will consider for this operation
 - Consider a valve is used to control the supply oxygen inside the International space station. Suggest which type of valve you will consider for this operation (C.O.No.3) [Comprehensive Level]