Total number of printed pages:02 **Diploma(D)/5th/DIE501**

2024

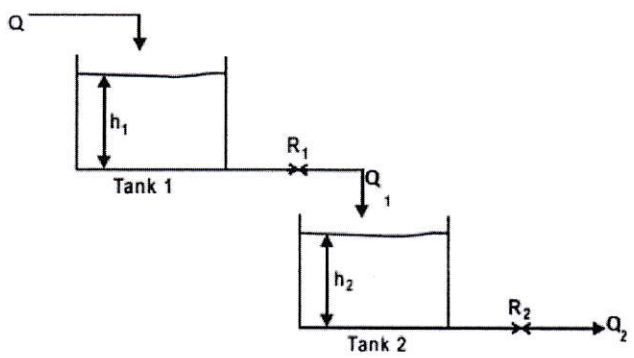
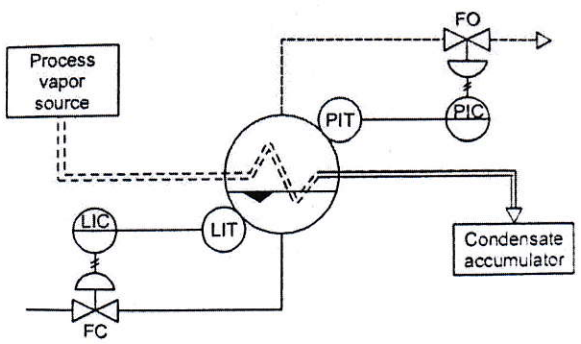
Process Control

Full Marks: 100

Time: Three hours

The figures in the margin indicate full marks for the questions.

*Answer **any five** questions.*

1.	a)	What are the process variables, explain it with a suitable example?	10
	b)	Derive the transfer function $H_2(s)/Q(s)$ of the liquid level system shown below (fig. 1).  Figure. 1	10
2.	a)	Define the term damping ration, depending on damping ration how the systems are classified. Explain how the servo operation differs from regulation operation?	6+4
	b)	Obtain P&ID representations for the below refrigerant coolant system shown below (fig. 2)?  Figure. 2	10

<table>
<tr><td>3.</td><td>a)</td><td>Design and derive the gains of Electronic P-Controller?</td><td>10</td></tr>
<tr><td></td><td>b)</td><td>The PI controller indicates an output of 10mA when the error is zero. The set point is suddenly increased to 14 mA and the controller output is recorded and is given below.
<table><tr><td>Time t, sec</td><td>0</td><td>10</td><td>20</td><td>30</td></tr><tr><td>Output mA</td><td>12</td><td>14</td><td>16</td><td>18</td></tr></table>Find Kp and Ti</td><td>10</td></tr>
<tr><td>4.</td><td>a)</td><td>Explain the performance of ON-OFF controller on any unit operation?</td><td>10</td></tr>
<tr><td></td><td>b)</td><td>Distinguish between PI and PD controller (5 points minimum)?</td><td>10</td></tr>
<tr><td>5.</td><td>a)</td><td>Explain the construction and working of pneumatic actuator?</td><td>10</td></tr>
<tr><td></td><td>b)</td><td>What are the inherent characteristics of a control valve? Explain it with a neat diagram?</td><td>10</td></tr>
<tr><td>6.</td><td>a)</td><td>What is cascade control? Explain the advantage of cascade control over feedback control system?</td><td>5+5</td></tr>
<tr><td></td><td>b)</td><td>What is override control, explain it with a neat sketch?</td><td>10</td></tr>
<tr><td>7.</td><td colspan="2">Write short notes on the following</td><td>4x5=20</td></tr>
<tr><td></td><td>a)</td><td>Final Control Element</td><td></td></tr>
<tr><td></td><td>b)</td><td>Controller</td><td></td></tr>
<tr><td></td><td>c)</td><td>Process/plant</td><td></td></tr>
<tr><td></td><td>d)</td><td>Measurement</td><td></td></tr>
</table>

END