Model Question Paper -1 with effect from 2020-21(CBCS Scheme)

USN

Fifth Semester B.E. Degree Examination
Process Control System

TIME: 03 Hours   **Max. Marks: 100**

Note: Answer any **FIVE** full questions, choosing at least **ONE** question from each **MODULE**.

Module – 1

Q.1	**(a)**	With a neat block, Describe the working of Automatic Control System.	10 Marks
	(b)	Describe the working of Nozzle Flapper system with necessy graph and sketches.	10 Marks

OR

Q.2	**(a)**	Define the following terms i) Stability ii) Transient state regulation iii) Steady state regulation iv)Minimum area Criteria v) Quarter amplitude criteria	10 Marks
	(b)	Show the necessary graph to illustrate the operation of different types of control valve operation	10 Marks

Module – 2

Q.3	**(a)**	Design a system for controlling variable in a motor speed varies from 800 to 750rpm. If the speed is controlled by 25 to 50V dc signal, calculate i) Speed produced by an input of 38V. ii) Speed calculated as a percent of span.	10 Marks
	(b)	Write and explain the analytical expression for PI controller mode.	10 Marks

OR

Q.4	**(a)**	Illustrate the working of two position controller using opamp with level change concept.	10 Marks
	(b)	A PD controller has a 0.4V to 2.0V input measurement range 0 - 5V output, $k_P = 5\%/\%$ and $k_D = 0.08\%/(\%/min)$. The period of the fastest expected signal change is 1.5s. Implement this controller with an op-amp circuit.	10 Marks

Module – 3

Q.5	**(a)**	Describe the working of supervisory computer control system with a neat diagram.	10 Marks
	(b)	Explain the digital design steps of Integral mode and PID control mode software.	10 Marks

OR

Q.6	**(a)**	With necessary diagram and equation, explain the working of proportional controller mode in pneumatic type.	10 Marks
	(b)	Explain the supervisory control/Sample data system with an example.	10 Marks

Module – 4

Q.7	**(a)**	Illustrate with a neat diagram, the interaction of two variable process control loop.	10 Marks
	(b)	Describe Ziegler-Nichols method of process loop tuning for PID controller.	10 Marks

OR

Q.8	**(a)**	Discuss about single variable control system configuration with its types.	10 Marks
	(b)	Describe open loop transient method of process loop tuning for PID controller.	10 Marks

Module – 5

Q.9 **(a)** Draw the flow chart that represents general approach followed in system modeling and explain it with respect to model evaluation and improvement.

10 Marks

(b) With the neat diagram, illustrate the operation of optimal control system.

10 Marks

OR

Q.10 **(a)** Define artificial intelligence (AI) and illustrate the difference in working of conventional systems and AI systems.

10 Marks

(b) With a neat diagram, explain the optimal design of tubular reactor for ammonium synthesis using system simulation.

10 Marks

Table showing the Bloom's Taxonomy Level, Course Outcome and Programme Outcome				
Question		**Bloom's Taxonomy Level attached**	**Course Outcome**	**Programme Outcome**
Q.1	(a)	Understanding (L_2)	CO1	PO1, PO6, PO12
	(b)	Understanding (L_2)	CO1	PO1, PO6, PO12
Q.2	(a)	Remembering (L_1)	CO1	PO1, PO6, PO12
	(b)	Understanding (L_2)	CO1	PO1, PO6, PO12
Q.3	(a)	Analysis (L_4)	CO2	PO1, PO2, PO3, PO6, PO12
	(b)	Understanding (L_2)	CO2	PO1, PO6, PO12
Q.4	(a)	Understanding (L_2)	CO2	PO1, PO6, PO12
	(b)	Analysis (L_4)	CO2	PO1, PO2, PO3, PO6, PO12
Q.5	(a)	Understanding (L_2)	CO3	PO1, PO6, PO12
	(b)	Understanding (L_2)	CO4	PO1, PO6, PO12
Q.6	(a)	Understanding (L_2)	CO3	PO1, PO6, PO12
	(b)	Understanding (L_2)	CO4	PO1, PO6, PO12
Q.7	(a)	Understanding (L_2)	CO5	PO1, PO6, PO12
	(b)	Understanding (L_2)	CO5	PO1, PO6, PO12
Q.8	(a)	Understanding (L_2)	CO5	PO1, PO6, PO12
	(b)	Understanding (L_2)	CO5	PO1, PO6, PO12
Q.9	(a)	Understanding (L_2)	CO6	PO1, PO6, PO12
	(b)	Understanding (L_2)	CO6	PO1, PO6, PO12
Q.10	(a)	Understanding (L_2)	CO6	PO1, PO6, PO12
	(b)	Understanding (L_2)	CO6	PO1, PO6, PO12

Bloom's Taxonomy Levels	**Lower order thinking skills**		
	Remembering(knowledge):L_1	Understanding Comprehension): L_2	Applying (Application): L_3
	Higher order thinking skills		
	Analyzing (Analysis): L_4	Valuating (Evaluation): L_5	Creating (Synthesis): L_6

Model Question Paper -2 with effect from 2020-21(CBCS Scheme)

USN | | | | | | | | | | |

Fifth Semester B.E. Degree Examination

PROCESS CONTROL SYSTEM

TIME: 03 Hours   **Max. Marks: 100**

Note: Answer any **FIVE** full questions, choosing at least **ONE** question from each **MODULE**.

Module – 1

Q.1 **(a)** Draw the block diagram of general purpose control system. Explain the function of each block.   **10 Marks**

(b) Illustrate the working of Reverse action pneumatic actuator with necessary equation.   **10 Marks**

OR

Q.2 **(a)** With the neat diagram, explain the working of self regulation and human control operation.   **10 Marks**

(b) Use necessary sketches to illustrate the degree of baking of crackers showing final control operation.   **10 Marks**

Module – 2

Q.3 **(a)** Discuss the working of opamp based derivative controller mode with necessary diagram and equation.   **10 Marks**

(b) Design an PI controller with a proportional band of 30% and an integration gain of $0.4 – 2V$ signal and the output is to be $0 – 10V$. Calculate values of G_p, G_I, R_2, R_1 and C.   **10 Marks**

OR

(a) Define the following terms   **10 Marks**
   i) Process Load & Control Load   ii) Process lag & Control lag
   iii) Dead time & Cycling   iv) Control Parameter range   v) Error

Q.4 **(b)** A liquid level control system linearly converts a displacement of 2 to 3m into 4 to 20mA control signal. A relay serves as the two position controller to open or close an inlet valve. The relay closes at 12mA and opens at 10mA. Find the relation between displacement level and current.   **10 Marks**

Module – 3

Q.5 **(a)** Illustrate the working of data logging system using computer.   **10 Marks**

(b) Explain the digital design steps of Derivative mode and PID control mode software.   **10 Marks**

OR

Q.6 **(a)** Describe the working of multi variable alarm system with neat diagram and necessary equation.   **10 Marks**

(b) With necessary diagram, explain the working of PI and PD controller mode in pneumatic type.   **10 Marks**

Module – 4

Q.7 **(a)** With an example, explain the working of cascade control system.   **10 Marks**

(b) Describe open loop transient response method of process loop tuning for proportional controller with necessary equation.   **10 Marks**

OR

Q.8	(a)	Explain the steps for stability of a control system in terms of transfer function and frequency dependencies. Also explain the stability criteria.	10 Marks
	(b)	Illustrate the process and instrumentation drawings (PI&D) symbols for various instruments and valves.	10 Marks

Module – 5

Q.9	(a)	With block diagram, briefly explain the following:	10 Marks

       i) Model reference adaptive control.
      ii) Model identification adaptive control.

	(b)	Describe the working of predictive control system with necessary diagram.	10 Marks

OR

Q.10	(a)	Explain how the number of degree of freedom can be reduced to zero to have a completely specified system with unique behavior.	10 Marks
	(b)	With the flow chart, illustrate the steps to build mathematical model of a plant.	10 Marks

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Q.9	(a)	Understanding (L_2)	CO6	PO1, PO6, PO12
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