

Model Question Paper-1 with effect from 2021-22 (CBCS Scheme)



Fourth Semester B.E. Degree Examination
Subject Title Bioprocess Principles, Control
&Automation + Lab

Time : 3 hours

Max marks: 100

Note : Answer any FIVE full questions, choosing ONE full questions from each module

Module-1

1	a.	Why instrumentation is required in a bioreactors? What are the parameters to be measured and controlled in a bioreactor	CO1	L1	10
	b.	With neat diagram, explain the principle and working of any two flow measuringinstrument	CO1	L2	10

Or

2	a.	With a neat sketch explain Flow injection analysis	CO1	L2	10
	b.	With neat diagram, explain the principle and working of any two pressure measuringinstrument	CO1	L2	10

Module-2

3	a.	Derive the transfer function for liquid level in tank with respect to output.	CO2	L1	10
	b.	A thermometer having at time constant of 0.1 minute is at a steady state temperature at 90°C. At time t = 0 , it is placed in a temperature bath of 100°C. Determine the time needed to read 98°C	CO2	L2	10

Or

4	a.	Derive the transfer function for two tank non interacting system.	CO3	L1	10
	b.	Derive the linear response equation for first order system	CO3	L2	10

Module-3

5	a.	Derive the transfer function for Spring damper	CO4	L2	10
	b.	Derive a Step response equation for second order system.	CO4	L3	10

Or

6	a.	Define the following terms used to describe an under damped system with the graph : i) Overshoot ii) Decay ratio iii) Response time iv) Rise time v) Period of oscillation vi) Natural period of oscillation.	CO4	L1	10
	b.	Derive the transfer function for Transportation lag.	CO4	L3	10

Module-4

7	a.	Explain with equations the principle of PI and PID controllers and derive their transferfunction.	CO5	L3	10
	b.	Derive the transfer function for regulatory problem with neat block diagram.	CO5	L4	10

Or

8	a.	Write short note on Final control element and its types.	CO5	L1	10
	b.	Explain with equations the principle of PD and P controllers and derive their transferfunction.	CO5	L3	10
Module-5					
9	a.	For the Control system described by the following characteristic equation, check the numberof roots having positive real parts $S^4 + 3S^3 + 5S^2 + 4S + 2 = 0.$	CO5	L3	10
	b.	Draw a Bode diagram for a first order system.	CO5	L4	10
Or					
10	a.	Explain the merits and demerits of Routh test.	CO5	L4	10
	b.	For the given Open loop transfer functions find out the range of K for which the system is stable. What will be the frequency of sustained oscillation? $G(s) = \frac{K}{(S+1)(50s^2+1)(2S+0.5)}$	CO5	L3	10