

RGPV (DIPLOMA WING) BHOPAL		OBE CURRICULUM FOR THE COURSE		FORMAT-3	Sheet No. 1/3
Branch	Electronics and Instrumentation		Semester	IV	
Course Code	401	Course Name	Control Systems		
Course Outcome 1	Introduction to control system And it's transfer function			Teach Hrs	Marks
Learning Outcome 1	Describe control systems and Laplace transform.(cognitive)			6	10
Contents	Open and closed loop control system and their merits and demerits , Block representation of simple systems, Differential equations representing a system definition of Laplace transform , Laplace transforms of some important functions (No derivation required)				
Method of Assessment	Internal (Mid Semester Theory Exam)				
Learning Outcome 2	Calculate the gain of a given control system. (cognitive)			9	10
Contents	Block diagram reduction technique, Signal flow graph of control systems, Mason's gain formula.				
Method of Assessment	External (End semester main Exam)				
Learning Outcome 3	Modeling a control system and it's transfer function .(cognitive)			6	10
Contents	Transfer function of electrical, mechanical and electromechanical system , pneumatic system, DC and AC Servo motor ,DC generator, Amplidyne generator, DC and AC taco generator, potentiometer error detector , synchro error detector				
Method of Assessment	External (End semester main Exam)				
Learning Outcome 4	To obtain the transfer function of various components of control system (psychomotor)			8	10
Contents	Determine the Transfer Function ac servo motor Determine the Transfer function DC taco Generator Determine the Transfer Function of given electrical network Determine the Transfer function synchro error detector				
Method of Assessment	External (End Semester Practical Exam)				

RGPV (DIPLOMA WING) BHOPAL		OBE CURRICULUM FOR THE COURSE		FORMAT-3	Sheet No. 2/3
Branch	Electronics and Instrumentation			Semester	IV
Course Code	402	Course Name	Control Systems		
Course Outcome 2	Perform time domain analysis of given control system.			Teach Hrs	Marks
Learning Outcome 5	Identify the type and order of given control system. (cognitive)			7	10
Contents	Time domain analysis- Type and order of a control system, typical test signals for time response analysis of a control system(Unit step, Unit ramp and unit impulse)				
Method of Assessment	internal (Assignment)				
Learning Outcome 6	To understand Response of first and second order control system. (cognitive)			10	10
Contents	Time response of first and second order control systems, steady state error- static and dynamic error coefficients, transient response specifications of second order control system.				
Method of Assessment	External (End semester main Exam)				
Learning Outcome 7	Explain various controllers.(cognitive)			8	10
Contents	Basic ideas of proportional, derivative and integral controllers and electronic PID controllers.				
Method of Assessment	External (End semester main Exam)				
Learning Outcome 8	Demonstrate the operation of given controllers. (psychomotor)			6	10
Contents	Demonstrate the operation of PD controller. Demonstrate the operation of PI controller. Demonstrate the operation of PID controller.				
Method of Assessment	External (End semester Practical Exam)				

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Branch	Electronics and Instrumentation			Semester	IV
Course Code	402	Course Name	Control Systems		
Course Outcome 3	Test the stability of a given control system.			Teach Hrs	Marks
Learning Outcome 9	To determine stability Use Routh Hurwitz criterion(cognitive)			10	10
Contents	Concept of stability, Routh Hurwitz criterion- different cases and conditions, numerical problems				
Method of Assessment	External (End semester main Exam)				
Learning Outcome 10	To determine stability Use root locus technique. (cognitive)			8	10
Contents	Root locus technique, basic theory and properties of root loci, procedure for construction of root loci.				
Method of Assessment	External (End semester main Exam)				
Learning Outcome 11	Explain and compare different compensator. (psychomotor)			8	10
Contents	Compensation techniques, lead compensator, lag compensator and lag lead compensator				
Method of Assessment	Internal (Mid Semester Theory Exam)				
Learning Outcome 12	Determine the response of given compensator. (psychomotor)			7	10
Contents	Determine the response of lead circuit and lag circuit. Determine the response of lag lead circuit. Plot the root locus plot of a given control system using MATLAB/Scilab				
Method of Assessment	External (End semester practical Exam)				

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Branch	Electronics and Instrumentation			Semester	IV
Course Code	402	Course Name	Control Systems		
Course Outcome 4	Perform frequency domain analysis of given control system			Teach Hrs	Marks
Learning Outcome 13	Describe frequency response and use Bode plot(cognitive)			5	10
Contents	Frequency domain analysis, frequency response, frequency domain specifications, Bode plot.				
Method of Assessment	External (End semester main Exam)				
Learning Outcome 14	Use different tools to explain the stability of a given control system(cognitive)			5	10
Contents	Nyquist stability criterion, relative stability, gain margin, phase margin				
Method of Assessment	internal (assignment)				
Learning Outcome 15	Use MATLAB/Scilab software for drawing given plot.(psychomotor)			7	10
Contents	Plot the Bode plot of a given control system using MATLAB/Scilab software Plot the Nyquist plot of a given control system using MATLAB/Scilab software				
Method of Assessment	internal (Practical Exam in laboratory)				

Suggested List of Experiments*:

S.no	Experiments	CO
1.	To determine the characteristics of a Synchro Transmitter Receiver pair	CO 401.1

	and use as a torque synchro and angular error detector.	
2.	To find the transfer function of an A.C. Servomotor	CO 401.1
3.	To find the transfer function of a D.C. Servomotor	CO 401.1
4.	To control the angular position of an AC servo motor as a carrier control system	CO 401.1
5.	Determination of the time response characteristics of a DC Servo angular position control system	CO 401.1
6.	To perform closed loop Speed control of a D.C Servomotor	CO 401.1
7.	To determine the performance characteristics of a DC motor speed control with PWM type power driver.	CO 401.1
8.	To determine the performance characteristics of a DC motor speed control with SCR type power driver.	CO 401.1
9.	To determine the performance characteristics of an angular position error detector using potentiometers Analysis of Proportional + Integrator + Derivative (PID) control actions for First and second order systems.	CO 401.1
10.	Analysis of Proportional + Integrator + Derivative (PID) control actions for First and second order systems.	CO 401.2

Ten experiments in a semester as per the discretion of the subject teacher.

The objectives include equipping students with: 1. Basic understanding of issues related to control systems such as modelling, time and frequency responses of dynamical systems, performance specifications.

2. Techniques for determining stability of systems.

3. Basic design aspects of various controllers and compensators.

4. Dynamical system analysis using state space mode

Reference Books/Tex Books :

S.NO.	Title	Author
1.	J. L. Melsa& D. G. Schultz, —Linear Control Systems , McGraw Hill, New York, 1969	J. L. Melsa& D. G. Schultz
2.	I. J. Nagrath& M. Gopal, —Control Systems Engineering , fifth edition, New Age International (P) Ltd, New Delhi, 2009.	I. J. Nagrath& M. Gopal
3.	Joseph J. DiStefano, Allen R. Stubberud, Ivan J. Williams. —Schaum's outline of theory and problems of feedback and control systems, McGraw	Joseph J. DiStefano, Allen R. Stubberud, Ivan J. Williams
4.	JStubberud, Ivan J. Williams. —Schaum's outline of theory and problems of feedback and control systems, McGraw	JStubberud, Ivan J. Williams.

