RGPV (DIPLOMA WING) BHOPAL	OBE CURRICULUM FOR THE COURSE	FORMAT-3	Sheet No. 1/5

Branch	Electrical Engineering	Semester	5
Course Code	512	Course Name	Control System & Industrial Automation

Course Outcome 1	Use control system concepts in different applications.	Teach Hrs	Marks
Learning Outcome E0151211	Explain basic concepts of control system.(Cognitive domain)	6Hr	10 Mark
Contents	• Control System: Basic concept of open loop and closed loop control system and their comparison. • Transfer function definition, Simple Mathematical problems on block diagram and signal flow graphs. • Analogy between different systems: Mechanical, Electrical, Thermal • Block diagram of Fan, AC, Automatic tank level control.		
Method of Assessment	External: End semester theory examination (Pen paper test).		
Learning Outcome E0151212	Define various terms use in time domain analysis. (Cognitive domain)	6 Hr	10 Mark
Contents	• Time Domain Analysis: First and second order control System (Without mathematical treatment). • Definition of different performance indices: delay time, rise time, peak time, percentage peak overshoot, Settling time, steady state error. • Type-0, Type -1, type-2 system definition. • Concept of stability: absolute stability, relative stability. • Necessary conditions for stability.		
Method of Assessment	Internal: Mid semester theory examination (Pen paper test)		
Learning Outcome E0151213	Identify type of control system used in different applications. (Psychomotor domain)	6 Hr	10 Mark
Contents	• To identify components used in various open loop control system and make their block diagram. • To identify components used in various close loop control system and make their block diagram. • To interpret function of automatic tank level control system with the help of block diagram.		
Method of Assessment	External: Laboratory observation and viva voce.		

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Branch	Electrical Engineering	Semester	5
Course Code	512	Course Name	Control System & Industrial Automation

Course Outcome 2	Make use of number systems and logic gates in digital circuits.	Teach Hrs	Marks
Learning Outcome E0151221	Classify number systems and their conversion. (Cognitive domain)	6 Hr	10 Mark
Contents	➢ Number Systems: decimal, binary, octal, hexadecimal and BCD; definition and inter-conversions. ➢ Compliments: 1's and 2's compliment. ➢ Binary Addition and Subtraction.		
Method of Assessment	External: End semester theory examination (Pen paper test).		
Learning Outcome E0151222	Outline operation of various logic gates used in digital circuits. (Cognitive domain)	6 Hr	10 Mark
Contents	➢ Logic Gates: truth tables and circuit symbols. AND, OR, NOT, NAND, NOR, X-OR, X-NOR;		
Method of Assessment	External: End semester theory examination (Pen paper test).		
Learning Outcome E0151223	Verify operation of various logic gates. (Psychomotor domain)	6 Hr	10 Mark
Contents	➢ To verify truth table of various logic gates.		
Method of Assessment	External: Laboratory observation and viva voce.		

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Branch	Electrical Engineering	Semester	5

Course Code	512	Course Name	Control System & Industrial Automation

Course Outcome 3	Justify the need of programmable logic controller in industrial automation.	Teach Hrs	Marks
Learning Outcome E0151231	Compare types of industrial automation systems. (Cognitive domain)	3 Hr	6 Mark
Contents	➢ Automation: Need and benefits. ➢ Types of automation system: Fixed, Programmable, Flexible ➢ Different systems used for Industrial automation: PLC, HMI, SCADA, DCS, Drives. ➢ Evolution of programmable logic controller (PLC).		
Method of Assessment	External: End semester theory examination (Pen paper test).		
Learning Outcome E0151232	Explain fundamental concepts of programmable logic controller. (Cognitive domain)	9 Hr	14 Mark
Contents	➢ Building blocks of PLC**:** CPU, Memory organization, Input-output modules (discrete and analog), Specialty I/O Modules, Power supply, Fixed and Modular PLC and their types, Redundancy in PLC module. ➢ I/O module selection criteria, Interfacing different I/O devices with appropriate I/O modules ➢ PLC I/O addressing ➢ PLC programming Instructions**:** Relay type instructions, Timer instructions: On delay, off delay, retentive. ➢ Counter instructions: Up, Down, High speed, Logical instructions, Comparison instructions, Data handling Instructions, Arithmetic instructions.		
Method of Assessment	External: End semester theory examination (Pen paper test).		
Learning Outcome E0151233	Identify various parts for given PLC. (Psychomotor domain)	6 Hr	10 Mark
Contents	➢ To identify various parts of the given PLC and front panel status indicators. ➢ Use PLC to test the START STOP logic using two inputs and one output.		
Method of Assessment	External: Laboratory observation and viva voce.		

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Branch	Electrical Engineering	Semester	5

Course Code	512	Course Name	Control System & Industrial Automation

Course Outcome 4	Utilize PLC programming for various applications.	Teach Hrs	Marks
Learning Outcome E0151241	Make use of ladder logic for PLC programming. (Cognitive domain)	6 Hr	10 Mark
Contents	➢ PLC programming language: Functional Block Diagram (FBD), Instruction List. Structured text, Sequential Function Chart (SFC), Ladder Programming. ➢ Simple Programming examples using ladder logic: Language based on relay, timer counter, ➢ Logical, comparison, arithmetic and data handling instructions.		
Method of Assessment	Internal: Mid semester theory examination (Pen paper test)		
Learning Outcome E0151242	Use PLC for various applications. (Cognitive domain)	6 Hr	10 Mark
Contents	PLC Based Applications: ➢ Traffic light control, Elevator control, Tank Level control, Conveyor system. ➢ Motor sequence control. ➢ Stepper motor control.		
Method of Assessment	External: End semester theory examination (Pen paper test).		
Learning Outcome E0151243	Develop ladder program for various applications and test it. (Psychomotor domain)	6 Hr	10 Mark
Contents	➢ Develop / test the Ladder program for sequential control application of lamps/ DC motors. ➢ Develop ladder program for Traffic light control system. ➢ Develop / test ladder program for rotating stepper motor in forward and reverse direction at constant speed. ➢ Develop /test ladder program for tank water level control.		
Method of Assessment	Internal: Laboratory observation and viva voce.		

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Branch	Electrical Engineering	Semester	5

Course Code	512	Course Name	Control System & Industrial Automation

Course Outcome 5	Make use of SCADA system for industrial automation.	Teach Hrs	Marks
Learning Outcome E0151251	Explain functioning of SCADA. (Cognitive domain)	6 Hr	10 Mark
Contents	➢ Introduction to SCADA: Typical SCADA architecture/block diagram, Benefits of SCADA ➢ Various editors of SCADA ➢ Interfacing SCADA system with PLC: Typical connection diagram, Object linking & embedding for Process Control(OPC) architecture. ➢ Steps in Creating SCADA Screen for simple object, Steps for Linking SCADA object (defining Tags and Items) with PLC ladder program using OPC.		
Method of Assessment	External: End semester theory examination (Pen paper test).		
Learning Outcome E0151252	Utilize SCADA for different control application. (Cognitive domain)	6 Hr	10 Mark
Contents	Applications of SCADA: ➢ Traffic light control. ➢ Water distribution. ➢ Pipeline control.		
Method of Assessment	Internal: Assignments/Quiz and viva voce		
Learning Outcome E0151253	Prepare a report on functioning of SCADA system. (Psychomotor and Affective domain)	6 Hr	10 Mark
Contents	➢ To prepare a report on functioning of SCADA system by visiting a SCADA deployed place.		
Method of Assessment	Internal: Observation and viva voce.		

Reference Books:

1.	Control System, Publisher: New Age International Pvt Ltd, ISBN: 9789386070111, 9789386070111	Nagrath & Gopal
2.	Linear Control Systems with MATLAB Applications, Publisher: Khanna Publishers, ISBN: 9788174093103, 9788174093103	Manke, B. S.
3	Digital Electronics, Technical Publication, Pune	Godse, A. P.
4.	Digital Design, Publisher: Prentice Hall of India Pvt. Ltd.	M. Morris Mano, Michael D. Ciletti,
5.	Digital Electronics: Principles, Devices and Applications, Publisher: Willy	Maini, A. K.
6.	Introduction to Programmable Logic Controllers, Thomson /Delmar learning, New Delhi, 2005,ISBN 13 : 9781401884260	Dunning, G.
7.	Programmable Logic Controller, Khanna publishers, New Delhi, 2017, ISBN : 9788174092281	Jadhav, V. R.
8.	Programmable Logic Controllers, McGraw Hill India, New Delhi, 2010, ISBN: 9780071067386	Petruzella, F.D.
9.	Programmable Logic Controllers, PHI Learning, New Delhi, 2003, ISBN : 9780130607188	Hackworth, John; Hackworth, Federic
10.	Industrial automation and Process control, PHI Learning, New Delhi, 2003, ISBN : 9780130618900	Stenerson Jon
11.	Programmable Logic Controllers and Industrial Automation - An introduction, Penram International Publication, 2015, ISBN: 9788187972174	Mitra, Madhuchandra; Sengupta, Samarjit,
12.	Supervisory Control and Data Acquisition, ISA Publication, USA, ISBN: 978-1936007097	Boyar, S. A.
13.	Practical SCADA for industry, Newnes (an imprint of Elsevier), UK 2003, ISBN:0750658053	Bailey David ; Wright Edwin