Course code	Course Name	L-T-P - Credits	Year of Introduction
EE488	**INDUSTRIAL AUTOMATION**	**3-0-0-3**	**2016**

Prerequisite: Nil

Course Objectives
- To explain the General function of Industrial Automation
- To identify Practical Programmable Logic Controller Applications
- To know Industrial Sensors and Robotics

Syllabus

Types of motion actuators, electrical and mechanical sensors, ladder diagrams, cascade method, Huffman method, Programmable Logic Controllers, Microcomputers: interfacing and programming, Principles of Robotics and applications

Expected outcome .

The students will
  i. Know about motion devices in automation
  ii. Know about various sensors in automation
  iii. Be able to draw ladder diagrams for applications
  iv. Be able to understand assembly language programs
  v. Know about Robotic components

Text Book:
- Pessen, Industrial Automation : Circuit Design and Components, Wiley

References:
1. Bartelt, Industrial Automated Systems, Instrumentation and Motion Control, Cengage
2. Mukhopadyay et al, Industrial Instrumentation, Control and Automation, Jaico Publishing House

Course Plan			
Module	**Contents**	**Hours**	**Sem. Exam Marks**
I	Motion Actuators: Types of Motion and Motion Conversion, Electric Linear Actuators, Electric Rotary Actuators, Fluid-Power Linear Actuators, Fluid-Power Rotating Actuators	6	15%
II	Sensors : Binary vs. analog sensors, Electric Position sensors: Limit switches, photovoltaic sensors, ultrasonic sensors, inductive and capacitive and magnetic proximity sensors, Pneumatic position sensors: limit valves, back-pressure sensors, coiled spring sensors. Level, pressure, temperature and flow switches	6	15%
FIRST INTERNAL EXAMINATION			
III	Electric Ladder Diagrams: Ladder diagrams, sequence charts, Ladder diagram design using sequence charts, cascade method,: single and multi path sequencing systems with and without sustained outputs, Huffman method: sequential systems, stable and unstable states, state assignment.	7	15%
IV	Programmable Controllers: PLC construction, Programming the PLC, constructing ladder diagrams for PLCs,	7	15%

	SECOND INTERNAL EXAMINATION		
V	Microcomputers : Microcomputers for control applications, architecture, computer interfacing, programmable interface adaptors, Ramping a step motor example.	8	20%
VI	Robotics and Numerical Control : Basic Robot Definitions, Basic manipulator configurations, Numerical Control Systems, Robot Kinematics, Robot Grippers, Robot Sensors, Robot Programming, General Considerations for Robot Applications	8	20%
	END SEMESTER EXAM		

QUESTION PAPER PATTERN:

Maximum Marks: 100   Exam Duration: 3Hourrs.

Part A: 8 compulsory questions.

One question from each module of Modules I - IV; and two each from Module V & VI.

Student has to answer all questions. (8 x5)=40

Part B: 3 questions uniformly covering Modules I & II. Student has to answer any 2 from the 3 questions: (2 x 10) =20. Each question can have maximum of 4 sub questions (a,b,c,d), if needed.

Part C: 3 questions uniformly covering Modules III & IV. Student has to answer any 2 from the 3 questions: (2 x 10) =20. Each question can have maximum of 4 sub questions (a,b,c,d), if needed.

Part D: 3 questions uniformly covering Modules V & VI. Student has to answer any 2 from the 3 questions: (2 x 10) =20. Each question can have maximum of 4 sub questions (a,b,c,d), if needed.