Academic Course Description

BHARATH University
Faculty of Engineering and Technology
Department of Electronics and Communication Engineering

BEI701- LOGIC AND DISTRIBUTED CONTROL SYSTEM

Eighth Semester, 2016-17 (even Semester)

Course (catalog) description

- To give an introductory knowledge on Programmable Logic Controller (PLC) and their Programming languages and to give adequate knowledge about applications of PLC

Compulsory/Elective course: Elective for ECE students

Credit & contact hours : 3 & 45

Course Coordinator : Ms.Kalaiselvi B Asst. Professor, Department of ECE

Instructor(s) :

Name of the instructor	Class handling	Office location	Office phone	Email (domain: @bharathuniv.ac.in)	Consultation
Ms.B.Kalaiselvi	Fourth year ECE	SA006		kalaigopal1973@gmail.com	1.00-1.30 pm

Relationship to other courses

Pre-requisites : Control system

Assumed knowledge : To give adequate knowledge about applications of PLC

Following courses : Nil

Syllabus Contents

UNIT 1 PROGRAMMABLE LOGIC CONTROLLER (9 Hours)

Evolution of PLCs – Components of PLC – Architecture of PLC – Discrete and analog I/O modules – Programming languages - Ladder diagram – Function block diagram (FBD) - Programming timers and counters

UNIT 2 APPLICATIONS OF PLC (9 Hours)

Instructions in PLC – Program control instructions, math instructions, data manipulation Instructions, sequencer and shift register instructions – Case studies in PLC

UNIT 3 COMPUTER CONTROLLED SYSTEMS (9 Hours)

Basic building blocks of computer controlled systems – Data acquisition system – Supervisory control – Direct digital control- SCADA: - Hardware and software, Remote terminal units, Master Station and Communication architectures.

UNIT 4 DISTRIBUTED CONTROL SYSTEM **(9 Hours)**

DCS – Various Architectures – Comparison – Local control unit – Process interfacing issues – Communication facilities

UNIT 5 INTERFACES IN DCS **(9 Hours)**

Operator interfaces - Low level and high level operator interfaces – Displays - Engineering interfaces – Low level and high level engineering interfaces – Factors to be considered in selecting DCS – Case studies in DCS

TOTAL 45

Text book(s) and/or required materials

TEXT BOOKS

T1. F.D. Petruzella, Programmable Logic Controllers, Tata Mc-Graw Hill, Third edition, 2010
T2. Michael P. Lukas, Distributed Control Systems: Their Evaluation and Design, Van Nostrand Reinhold Co., 1986

REFERENCES

R1 T.A. Hughes, Programmable Controllers, Fourth edition, ISA press, 2005
R2 Krishna Kant, Computer Based Industrial Control, Second edition, Prentice Hall of India, New Delhi, 2010.

Computer usage: Yes

Professional component

General	-	0%
Basic Sciences	-	0%
Engineering sciences & Technical arts	-	0%
Professional subject	-	100%

Broad area: Communication | Signal Processing | control systems|

Test Schedule

S. No.	Test	Tentative Date	Portions	Duration
1	Cycle Test-1	February 2nd week	Session 1 to 14	2 Periods
2	Cycle Test-2	March 2nd week	Session 15 to 28	2 Periods
3	Model Test	April 2nd week	Session 1 to 45	3 Hrs
5	University Examination	TBA	All sessions / Units	3 Hrs.

Mapping of Instructional Objectives with Program Outcome

• To give basic knowledge about Computer Controlled Systems and to give basic knowledge on the architecture and local control unit of Distributed Control System (DCS)	Correlates to program outcome		
	H	M	L
1. To get an introductory knowledge on PLC and Programming Languages	d	a,b,c, e,g	J,k
2. To get Adequate knowledge about application of PLC	a,d, e	b,c,g	J,k
3. To get basic knowledge about computer controlled systems	a,d, e	b,g	J,k

4. To get basic knowledge on the architecture and local control unit of Distributed Control System(DCS)	a, d,e	b,g	J,k
5. To get an adequate knowledge application of PLC	a, d,e	b,c,g	i,k
6. To understand the systems used in distributed control systems	a,d, e	g	j,k

H: high correlation, M: medium correlation, L: low correlation

Draft Lecture Schedule

Session	Topics	Problem Solving (Yes/No)	Text / Chapter
UNIT 1 PROGRAMMABLE LOGIC CONTROLLER			
1.	Evolution of PLCs	No	[T2] chapter - 5, [R1] chapter -3
2.	Components of PLC	No	
3.	Architecture of PLC	No	
4.	Discrete and analog I/O modules	No	
5.	Programming languages	No	
6.	Ladder diagram	YES	
7.	Function block diagram	No	
8.	Programming timers	No	
9.	Counters	No	
UNIT 2 APPLICATIONS OF PLC			
10.	Instructions in PLC	No	[T2] chapter – 6
11.	Program control instructions	No	
12.	math instructions	No	
13.	data manipulation	No	
14.	Instructions	No	
15.	sequencer	No	
16.	shift register	No	
17.	shift register instructions	No	
18.	Case studies in PLC	No	

Session	Topics	Problem Solving (Yes/No)	Text / Chapter
UNIT 3 COMPUTER CONTROLLED SYSTEMS			
19.	Basic building blocks of computer controlled systems	No	[T2] chapter – 6, [R1] chapter - 8
20.	Data acquisition system	No	
21.	Supervisory control	No	
22.	Direct digital control	No	
23.	SCADA	No	
24.	Hardware and software	No	
25.	Remote terminal units	No	
26.	Master Station	No	
27.	Communication architectures	No	
UNIT 4 DISTRIBUTED CONTROL SYSTEM			
28.	DCS	No	[T2] chapter– 4, [R1] chapter–2
29.	Various Architectures	No	
30.	3G-MSC	No	
31.	Comparison	No	
32.	Local control unit	No	
33.	Process interfacing issues	No	
34.	Firewall,	No	
35.	Communication facilities	No	
36.	LTE network architecture and protocol.	No	
UNIT 5 INTERFACES IN DCS			
37.	Operator interfaces	No	[T2] chapter– 5,6 [R1] chapter–7
38.	Low level operator interfaces	No	
39.	high level operator interfaces	No	
40.	Displays	No	
41.	Engineering interfaces	No	
42.	Low level engineering interfaces	No	
43.	high level engineering interfaces	No	
44.	Factors to be considered in selecting DCS	No	
45.	Case studies in DCS	No	

Teaching Strategies

The teaching in this course aims at establishing a good fundamental understanding of the areas covered using:

- Formal face-to-face lectures
- Tutorials, which allow for exercises in problem solving and allow time for students to resolve problems in understanding of lecture material.
- Laboratory sessions, which support the formal lecture material and also provide the student with practical construction, measurement and debugging skills.
- Small periodic quizzes, to enable you to assess your understanding of the concepts.

Evaluation Strategies

Cycle Test – I	-	5%
Cycle Test – II	-	5%
Model Test	-	10%
Assignments/Seminar/online test/quiz	-	5%
Attendance	-	5%
Final exam	-	70%

Prepared by: Ms Kalaiselvi B, Assistant Professor , Department of ECE **Dated :**

Addendum

ABET Outcomes expected of graduates of B.Tech / ECE / program by the time that they graduate:

a) An ability to apply knowledge of mathematics, science, and engineering
b) An ability to design and conduct experiments, as well as to analyze and interpret data
c) An ability to design a hardware and software system, component, or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability
d) An ability to function on multidisciplinary teams
e) An ability to identify, formulate, and solve engineering problems
f) An understanding of professional and ethical responsibility
g) An ability to communicate effectively
h) The broad education necessary to understand the impact of engineering solutions in a global, economic, environmental, and societal context
i) A recognition of the need for, and an ability to engage in life-long learning
j) A knowledge of contemporary issues
k) An ability to use the techniques, skills, and modern engineering tools necessary for engineering practice.

Program Educational Objectives

PEO1: PREPARATION

Electronics Engineering graduates are provided with a strong foundation to passionately apply the fundamental principles of mathematics, science, and engineering knowledge to solve technical problems and also to combine fundamental knowledge of engineering principles with modern techniques to solve realistic, unstructured problems that arise in the field of Engineering and non-engineering efficiently and cost effectively.

PEO2: CORE COMPETENCE

Electronics engineering graduates have proficiency to enhance the skills and experience to apply their engineering knowledge, critical thinking and problem solving abilities in professional engineering practice for a wide variety of technical applications, including the design and usage of modern tools for improvement in the field of Electronics and Communication Engineering.

PEO3: PROFESSIONALISM Electronics Engineering Graduates will be expected to pursue life-long learning by successfully participating in post graduate or any other professional program for continuous improvement which is a requisite for a successful engineer to become a leader in the work force or educational sector.

PEO4: SKILL

Electronics Engineering Graduates will become skilled in soft skills such as proficiency in many languages, technical communication, verbal, logical, analytical, comprehension, team building, interpersonal relationship, group discussion and leadership ability to become a better professional.

PEO5: ETHICS

Electronics Engineering Graduates are morally boosted to make decisions that are ethical, safe and environmentally responsible and also to innovate continuously for societal improvement.

Course Teacher	Signature
Ms.KALAISELVI B	

Course Coordinator **HOD/ECE**