INSTITUTE OF AERONAUTICAL ENGINEERING

(Autonomous)
Dundigal, Hyderabad -500 043

ELECTRONICS AND COMMUNICATION ENGINEERING

COURSE DESCRIPTOR

Course Title	**INSTRUMENTATION LABORATORY**				
Course Code	AEC109				
Programme	B.Tech				
Semester	VI	ECE			
Course Type	Core				
Regulation	IARE - R16				
Course Structure	**Theory**			**Practical**	
	Lectures	**Tutorials**	**Credits**	**Laboratory**	**Credits**
	-	-	-	3	2
Chief Coordinator	Ms M. Saritha, Assistant Professor				
Course Faculty	Ms. P. Annapurna , Assistant Professor Mr. U. Somanaidu , Assistant Professor Ms .M Lavanya , Assistant Professor				

I. COURSE OVERVIEW:

This course provides the basic knowledge of LABVIEW and application of knowledge to understand real time application using LABVIEW. To prepare students to perform the analysis, design and implement distribute stand alone application using Lab VIEW.

II. COURSE PRE-REQUISITES:

Level	Course Code	Semester	Prerequisites	Credits
UG	AEC002	III	Digital System Design	3

III. MARKS DISTRIBUTION:

Subject	SEE Examination	CIA Examination	Total Marks
Instrumentation Laboratory	70 Marks	30 Marks	100

IV. DELIVERY / INSTRUCTIONAL METHODOLOGIES:

✘	Chalk & Talk	✘	Quiz	✘	Assignments	✘	MOOCs
✔	LCD / PPT	✘	Seminars	✘	Mini Project	✔	Videos
✔	Open Ended Experiments						

V. EVALUATION METHODOLOGY:

Each laboratory will be evaluated for a total of 100 marks consisting of 30 marks for internal assessment and 70 marks for semester end lab examination. Out of 30 marks of internal assessment, continuous lab assessment will be done for 20 marks for the day to day performance and 10 marks for the final internal lab assessment.

Semester End Examination (SEE): The semester end lab examination for 70 marks shall be conducted by two examiners, one of them being Internal Examiner and the other being External Examiner, both nominated by the Principal from the panel of experts recommended by Chairman, BOS.

The emphasis on the experiments is broadly based on the following criteria:

20 %	To test the preparedness for the experiment.
20 %	To test the performance in the laboratory.
20 %	To test the calculations and graphs related to the concern experiment.
20 %	To test the results and the error analysis of the experiment.
20 %	To test the subject knowledge through viva – voce.

Continuous Internal Assessment (CIA):
CIA is conducted for a total of 30 marks (Table 1), with 20 marks for continuous lab assessment during day to day performance, 10 marks for final internal lab assessment.

Table 1: Assessment pattern for CIA

Component	**Laboratory**		**Total Marks**
Type of Assessment	Day to day performance	Final internal lab assessment	
CIA Marks	20	10	30

Continuous Internal Examination (CIE):
One CIE exams shall be conducted at the end of the 16th week of the semester. The CIE exam is conducted for 10 marks of 3 hours duration.

Preparation	**Performance**	**Calculations and Graph**	**Results and Error Analysis**	**Viva**	**Total**
2	2	2	2	2	10

VI. HOW PROGRAM OUTCOMES ARE ASSESSED:

Program Outcomes (POs)		Strength	Proficiency assessed by
PO 1	**Engineering knowledge**: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.	3	Lab related Exercises
PO 2	**Problem analysis**: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences	3	Lab related Exercises
PO 3	**Design/development of solutions:** Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.	2	Lab related Exercises
PO 5	**Modern tool usage** An ability to use latest hardware and software tools to solve complex engineering problems (**Software and Hardware Interface**).	2	Lab related Exercises
PO 11	**Project management and finance**: An ability to develop confidence to pursue higher education and for life-long learning(**Continuing education awareness**).	2	Lab related Exercises
PO 12	**Life-long learning**: An ability to design, implement and manage the electronic projects for real world applications with optimum financial resources**(Practical engineering analysis skills**).	2	Lab related Exercises

3 = High; 2 = Medium; 1 = Low

VII. HOW PROGRAM SPECIFIC OUTCOMES ARE ASSESSED:

Program Specific Outcomes (PSOs)		Strength	Proficiency assessed by
PSO 1	**Professional Skills:** An ability to understand the basic concepts in Electronics & Communication Engineering and to apply them to various areas, like Electronics, Communications, Signal processing, VLSI, Embedded systems etc., in the design and implementation of complex systems.	2	Lab related Exercises
PSO 2	**Problem-Solving Skills:** An ability to solve complex Electronics and communication Engineering problems, using latest hardware and software tools, along with analytical skills to arrive cost effective and appropriate solutions.	2	Lab related Exercises
PSO 3	**Successful Career and Entrepreneurship:** An understanding of social-awareness & environmental-wisdom along with ethical responsibility to have a successful career and to sustain passion and zeal for real-world applications using optimal resources as an Entrepreneur.	-	-

3 = High; 2 = Medium; 1 = Low

VIII. COURSE OBJECTIVES (COs):

The course should enable the students to:	
I	Recall the basic applications and theory of the Lab VIEW graphical programming environment.
II	Determine the basic programming concepts in Lab VIEW.
III	Understand different data acquisition system concepts.
IV	Develop real time applications using Lab VIEW.
V	Design, implement, and distribute stand-a1lone applications using Lab VIEW.
VI	Apply single and multiple-loop design patterns for application functionality.

IX. COURSE LEARNING OUTCOMES (CLOs):

CLO Code	CLO's	At the end of the course, the student will have the ability to:	PO's Mapped	Strength of Mapping
AEC109.01	CLO 1	To Open the front panel and block diagram in Lab VIEW software	PO1, PO 12	2
AEC109.02	CLO 2	Designing a program to perform Addition, Subtraction Multiplication and Division operations, and Developing a program to perform AND, OR, NOT, NAND, NOR,XOR and XNOR operations using Lab VIEW	PO1, PO2, PO 12	2
AEC109.03	CLO 3	Designing a program to find the sum of _n' numbers using FOR loop and Designing a program to perform the factorial of a given number using FOR loop	PO1, PO2, PO 12	3
AEC109.04	CLO 4	Designing a program to find the sum of 'n' natural numbers using WHILE loop and Designing a program to perform the factorial of a given number using WHILE loop.	PO1, PO5, PO 12	2
AEC109.05	CLO 5	Designing the program to convert °C to °F and Create a SubVI	PO1, PO5, PO 12	2
AEC109.06	CLO 6	Designing a program to find the maximum and minimum variable from an array.	PO1, PO5, PO 12	2
AEC109.07	CLO 7	Designing a program to analyze and logging the data	PO1, PO2, PO11	3
AEC109.08	CLO 8	Designing a program to bundle and unbundle a cluster.	PO1, PO2, PO11	2
AEC109.09	CLO 9	Designing a program to create a sine wave using formula node and to perform discrete cosine transform on the given signal.	PO1, PO5, PO 12	2
AEC109.10	CLO 10	Designing a program to perform functions using flat and stacked sequence.	PO1, PO2, PO11	2
AEC109.11	CLO 11	Acquire the data from the sensors by using MY DAQ and MY RIO	PO1, PO2, PO11	3

AEC109.12	CLO 12	Designing a program to Develop voltmeter by using DAQ CARDS .	PO1, PO2, PO11	2
AEC109.13	CLO 13	Designing a program to develop signal generator by using DAQ cards	PO1, PO2, PO11	2
AEC109.14	CLO 14	Designing a program for real time temperature control by using virtual instrumentation	PO1, PO2, PO11	2

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X. MAPPING COURSE LEARNING OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:

Cours Learning Outcomes (CLOs)	Program Outcomes (POs)												Program Specific Outcomes (PSOs)		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CLO 1	2											2	2	1	
CLO 2	2	2										2	2	1	
CLO 3	3	3										3	1	2	
CLO 4	2				2							2	1	2	
CLO 5	2				2							2	1	2	
CLO 6	2				2							2	1	2	
CLO 7	3	3									3		2	1	
CLO 8	2	2									2		2	1	
CLO 9	2				2							2	2	1	
CLO 10	2	2									2		2	1	
CLO 11	3	3									3		1	2	
CLO 12	2	2									2		2	1	
CLO 13	2	2									2		1	2	
CLO 14	2	2									2		1	2	

3 = High; 2 = Medium; 1 = Low

XI. ASSESSMENT METHODOLOGIES – DIRECT

CIE Exams	PO 1, PO 2 PO 5, PO11,PO12	SEE Exams	PO 1, PO 2 PO 5, PO11,PO12	Assignments	-	Seminars	-
Laboratory Practices	PO 1, PO 2 PO 5, PO11,PO12	Student Viva	-	Mini Project	-	Certification	-

XII. ASSESSMENT METHODOLOGIES - INDIRECT

✔	Early Semester Feedback	✔	End Semester OBE Feedback
✘	Assessment of Mini Projects by Experts		

XIII. SYLLABUS

LIST OF EXPERIMENTS

WEEK - l	**OPEN AND RUN A VIRTUAL INSTRUMENT**
Open the front panel and block diagram in Lab VIEW software	
WEEK-2	**BASIC ARITHMETIC OPERATIONS &BOOLEAN OPERATIONS**
Designing a program to perform Addition, Subtraction , Multiplication and Division operations, and Developing a program to perform AND, OR, NOT, NAND, NOR,XOR and XNOR operations using Lab VIEW	
WEEK-3	**SUM OF „n" NUMBERS USING „FOR" LOOP & FACTORIAL OF A GIVE NUMBER USING FOR LOOP**
Designing a program to find the sum of _n' numbers using FOR loop and Designing a program to perform the factorial of a given number using FOR loop.	
WEEK-4	**SUM OF „n" NATURAL NUMBERS USING WHILE LOOP & FACTORIAL OF A GIVE NUMBER USING WHILE LOOP**
Designing a program to find the sum of _n' natural numbers using WHILE loop and Designing a program to perform the factorial of a given number using WHILE loop.	
WEEK-5	**CONVERT °C TO °F, CREATE A SUBVI**
Designing the program to convert °C to °F and Create a Sub VI	
WEEK-6	**ARRAY MAXIMUM AND MINIMUM**
Designing a program to find the maximum and minimum variable from an array.	
WEEK-7	**ANALYZING AND LOGGING DATA BY USING WAVE FORM GRAPHS**
Designing a program to analyze and logging the data.	
WEEK -8	**BUNDLE AND UNBUNDLE CLUSTER**
Designing a program to bundle and unbundle a cluster.	
WEEK-9	**APPLICATION USING FORMULA NODE & DISCRETE COSINE TRANSFORM**
Designing a program to create a sine wave using formula node and to perform discrete cosine transform on the given signal.	
WEEK-l0	**FLAT AND STACKED SEQUENCE**
Designing a program to perform functions using flat and stacked sequence.	

WEEK-l1	**DATA ACQUISITION THROUGH VIRTUAL INSTRUMENTATION**
Acquire the data from the sensors by using MY DAQ and MY RIO	
WEEK-l2	**DEVELOPING VOLTMETER USING DAQ CARDS**
Designing a program to Develop voltmeter by using DAQ CARDS .	
WEEK-l3	**DEVELOPING SIGNAL GENERATOR USING DAQ CARDS**
Designing a program to develop signal generator by using DAQ cards	
WEEK-l4	**REAL TIME TEMPERATURE CONTROL USING VIRTUAL INSTRUMENTATION.**
Designing a program for real time temperature control by using virtual instrumentation	

XIV. COURSE PLAN:

The course plan is meant as a guideline. Probably there may be changes.

Week No.	Topics to be covered	Course Learning Outcomes (CLOs)	Reference
1	Open the front panel and block diagram in Lab VIEW software	CLO 1, CLO 2	T1:1.4 R1:1.2
2	Designing a program to perform Addition, Subtraction , Multiplication and Division operations, and Developing a program to perform AND, OR, NOT, NAND, NOR,XOR and XNOR operations using Lab VIEW	CLO 1, CLO 2	T1:1.5 R1:2.4
3	Designing a program to find the sum of 'n' numbers using FOR loop and Designing a program to perform the factorial of a given number using FOR loop.	CLO 1, CLO 2, CLO 3	T1:2.5 R1:2.5
4	Designing a program to find the sum of 'n' natural numbers using WHILE loop and Designing a program to perform the factorial of a given number using WHILE loop.	CLO 1, CLO 2, CLO 4	T1:2.5 R1:2.6
5	Designing the program to convert °C to °F and Create a SubVI	CLO 1, CLO 2, CLO 5	T1:22.7
6	Designing a program to find the maximum and minimum variable from an array.	CLO 1, CLO 2, CLO 6	T1:6.3 R1:5.3
7	Designing a program to analyze and logging the data.	CLO 1, CLO 2, CLO 7	T1:7.5 R1:6.3
8	Designing a program to bundle and unbundle a cluster.	CLO 1, CLO 2, CLO 8	T1:8.5 R1:6.8
9	Designing a program to create a sine wave using formula node and to perform discrete cosine transform on the given signal.	CLO 1, CLO 2, CLO 9	T1:8.5 R1:6.8
10	Designing a program to perform functions using flat and stacked sequence.	CLO 1, CLO 2, CLO 10	T1:8.5 R1:6.8
11	Acquire the data from the sensors by using MY DAQ and MY RIO	CLO 1, CLO 2, CLO 11	T1:12.2 R1:13.1
12	Designing a program to Develop voltmeter by using DAQ CARDS.	CLO 1, CLO 2, CLO 12	T1:12.3 R1:13.2
13	Designing a program to develop signal generator by using DAQ cards	CLO 1, CLO 2, CLO 13	T1:12.10 R1:13.7
14	Designing a program for real time temperature control by using virtual instrumentation	CLO 1, CLO 2, CLO 14	T1:11.2 R1:10.2

XV. GAPS IN THE SYLLABUS - TO MEET INDUSTRY / PROFESSION REQUIREMENTS:

S NO	Description	Proposed actions	Relevance with POs	Relevance with PSOs
1	To improve standards and analyze the concepts.	Lab Practices	PO 1, PO 2	PSO 1
2	Design and develop interfacing programs with advanced devices	Lab Practices / NPTEL	PO 5, PO11	PSO 1
3	Encourage students to solve real time applications and prepare towards competitive Examinations.	NPTEL	PO 11, PO 12	PSO 1

Prepared by:
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