# Teaching Plan- B.Sc. Physics, Semester 5

### Academic Year 2019-20

Course Name: PH5CRT07: DIGITAL ELECTRONICS AND PROGRAMMING

Name of FIC: Dr. Saji Joseph

Credits - 3

Lecture hours for the semester: 54

Each week 3 hrs

#### **Teaching plan**

1<sup>st</sup>Month (June)

Module I-Boolean algebra and logic gates (9 hrs), Module II Part 1 Combinational logic (3 hrs)

Objectives: By the end of the month, the student should be able to

- 1. Analyse Logic Gates
- 2. Analyse Rules and Laws of Boolean algebra
- 3. Analyse Adder circuits

### Teaching methodology:

- 1. Lectures—12 hrs
- 2. Assignment—1 (Problems to be solved)

#### Evaluation method:

- 1. Test paper—1
- 2. Q&A session—every hour

1 <sup>st</sup> week	Basic gates NOT, OR, AND. Universal Logic	3 hrs
	Gates- NOR, NAND. XOR and XNOR	
	Gates. Rules and Laws of Boolean algebra.	
2 <sup>nd</sup> week	Duality theorem -De Morgan's Theorems.	3 hrs
	analysis and simplification of logic circuits.	
3 <sup>rd</sup> week	Boolean equation and truth table - SOP and	3 hrs
	POS. Minterms and Maxterms. Standard	
	SOP and Standard POS- Conversion	
	between	
	Standard SOP & Standard POS.	

4 <sup>th</sup> week	Karnaugh Map (up to four variables). K map	3 hrs
	SOP	
	minimization. Half Adder and Full Adder,	

## 2<sup>ndt</sup>Month (July)

Module II Part 1I Combinational logic (3 hrs), Sequential logic (9 hrs) Objectives: By the end of the month, the student should be able to

- 1. Understand the failure of Classical Physics and the concepts discussed.
- 2. Solve problems related to the topics.

#### Teaching methodology:

- 1. Lectures—12 hrs
- 2. Assignment—1 (Problems to be solved)

#### Evaluation method:

- 1. Test paper—1
- 2. Q&A session—every hour

1 <sup>st</sup> week	subtractor, 4-bit parallel Adder/Subtractor. Multiplexer, De-multiplexer, Encoder & Decoder.	3 hrs
2 <sup>nd</sup> week	Flip-flops, RS, Clocked RS, Master Slave	3 hrs
3 <sup>rd</sup> week	JK FF, DFF, T Flip-flop	3 hrs
4 <sup>th</sup> week	Buffer registers- Shift register-SISO and SIPO, Counters- Binary ripple counter	3 hrs

# 3<sup>rd</sup> Month (August)

Module II Part 1II Sequential logic (4 hrs), Module III Part 1- C++ Programming (8 hrs),

Objectives: By the end of the month, the student should be able to

- 1. Understand various phenomena that could not be explained by Classical Physics and the explanation of QM.
- 2. Solve problems related to the topic.

#### Teaching methodology:

- 1. Lectures—12 hrs
- 2. Assignment—1 (Problems to be solved)

#### Evaluation method:

- 1. Test paper—1
- 2. Q&A session—every hour

1st week, 2nd week	D/A converters (Ladder type),A/D Converter (Counter type).	4 hrs
2nd week	Basic C++ program structure –comments-data types-variable types-constantsoperators( arithmetic, relational, logical and assignment operators)-	2 hrs
3rd week	if, if-else and else if	3 hrs
4th week	do while - case	3 hrs

### 4<sup>th</sup>Month (September)

# Module III Part 2- C++ Programming (12 hrs),

Objectives: By the end of the month, the student should be able to

- 1. Understand how to solve Schrodinger equation for a free particle, bound particle.
- 2. Solve problems related to the topic.

## Teaching methodology:

- 1. Lectures—12 hrs
- 2. Assignment—1 (Problems to be solved)

#### Evaluation method:

- 1. Test paper—1
- 2. Q&A session—every hour

1st week	loops(while, do-while,	3 hrs
2nd week	For loop	3 hrs
3rd week	nested loops-	3 hrs
4th week	arrays(Defining Arrays,	3 hrs

Accessing Array Elements, Initializing	
Arrays	

### 5th Month (October) 2 weeks only

# Module III Part 3- C++ Programming (6 hrs),

Objectives: By the end of the month, the student should be able to

- 1. Understand Angular momentum operator, commutation relations, rigid rotator problem.
- 2. Solve problems related to the topic.

## Teaching methodology:

- 1. Lectures—6hrs
- 2. Assignment—1 (Problems to be solved)

#### Evaluation method:

- 1. Test paper—1
- 2. Q&A session—every hour

1st week	basic ideas of	3 hrs
	functions(qualitative idea),	
	object and classes	
2nd week	Programs using loops	3 hrs