GUJARAT TECHNOLOGICAL UNIVERSITY, AHMEDABAD, GUJARAT

COURSE CURRICULUM
COURSE TITLE: SOFTWARE LAB PRACTICE
(CODE: 3351104)

Diploma Programmes in which this course is offered	Semester in which offered
Electronics and Communication Engineering	5th Semester

1.   RATIONALE

It is the era of customized solutions, where fundamental knowledge of electronics and communication principles along with software support plays important role in the prototype application development. Hence the knowledge of popular industrial software helps the Electronics and Communication Engineering diploma students to maintain systems which are based on hardware and software. Programming practices will further help the students to develop indigenous hardware and software based applications.

2.   LIST OF COMPETENCY

The course content should be taught and implemented with the aim to develop basic concepts and different types of skills so that students are able to acquire following competency:

- **Develop and test models of electronic (Analog and Digital) circuits using scientific and technology support software and simulation tools.**

3.   COURSE OUTCOMES

The practical should be carried out in such a manner that students are able to acquire different learning outcomes in cognitive, psychomotor and affective domain to demonstrate following course outcomes.
  i.   Simulate and test mathematical and functional aspects of electronics and communication engineering principles using the basic features of software tools.
  ii.   Develop script files for analog electronic circuits.
  iii. Develop model using blokset and toolboox functions.
  iv.   Simulate and test analog and digital communication circuits using available functions and toolboxes.
  v.   Simulate and test Digital electronic circuits using available functions and toolboxes.

4.   TEACHING AND EXAMINATION SCHEME

Teaching Scheme (In Hours)			Total Credits (L+T+P)	Examination Scheme				Total Marks
				Theory Marks		Practical Marks		
L	**T**	**P**	**C**	**ESE**	**PA**	**ESE**	**PA**	**50**
0	0	2	2	0	0	20	30	

Legends: L-Lecture; **T** – Tutorial/Teacher Guided Theory Practice; **P** - Practical; **C** – Credit **ESE** - End Semester Examination; **PA** - Progressive Assessment.

5.   COURSE CONTENT DETAILS

Note: There is no exclusive input sessions for theory in this course, however following theory should be discussed during practice sessions. There is no theory based exams for this course.

Unit	Major Learning Outcomes (outcomes in cognitive domain)	Topics and Sub-topics
Unit – I Introduction to scientific software(like: MATLAB or SCILAB)	1a. Explore the default window basic features, commands and of the scientific and technology support software (like: MATLAB or SCILAB) environment. 1b. Creating, saving and executing a script file	1.1Default Window view Command ,Figure ,Editor window, help window 1.2On-line help 1.3Input-output 1.4File types
	1c. Perform simple arithmetic operations. 1d. Creating and perform arrays operations. 1e. Plot the given data using various plot functions. 1f. Creating and plotting basic signals (Sine, Cosine, Square, Triangle) .	1.5Basic arithmetic and logical operations 1.6Trigonometric and exponential functions operation 1.7Plotting functions
Unit – II Analog Electronics Circuits	2a.Plot input output characteristics of diode.	2.1Plot the characteristic curves of Linear and nonlinear analog electronic devices. 2.2Simulate and test model /equivalent circuit of analog electronic devices.
	2b.Plot input output characteristics of npn Transistor	
	2c.Simulate and test model for bias stability of transistor.	
	2d.Simulate and test MOSFET equivalent circuit and plot input output characteristics.	
	2e.Plot frequency response of Common Emitter Amplifier.	
Unit – III Introduction to toolbox and blockset library (MATLAB, Simulink)	3a.Creating, saving and executing a model file. 3b.Develop model of rectifiers using blockset. 3c. Develop model of filters using blockset.	3.1Basic features of blockset library 3.2 Sources : Voltage and current sources ,power supply, RF generators, digital signal generators 3.3Sinks : Display instruments, meters, 3.4 Various functions . 3.5Toolbox related to electronic

Unit	Major Learning Outcomes (outcomes in cognitive domain)	Topics and Sub-topics
		circuits, communication ,and antenna
Unit – IV Analog and Digital Communication	4a.Develop a software program to plot amplitude modulated-DSB Waveform	4.1 Mathematical equations and functions to represent of analog modulation and demodulation principles
	4b.Develop a software program to plot amplitude modulated-SSB Waveform	
	4c.Develop a software program to plot Frequency Modulation Waveform	
	4d.Develop a software program to plot Phase Modulation Waveform	
	4e.Develop a software program to plot Low Pass, High Pass, Band Pass and Band Stop filter design and its frequency response using toolbox	4.2Mathematical equations and parameters to develop analog filter circuits : Low Pass, High Pass, Band Pass and Band Stop Filter
	4f.Develop a software program to plot ASK Modulation Waveform	4.3 Mathematical equations and functions to represent of digital modulation and demodulation principles
	4g.Develop a software program to plot FSK Modulation Waveform	
	4h.Develop a software program to plot PSK Modulation Waveform	
	4i.Develop a software program to plot QPSK Modulation Waveform	
Unit – V Digital Electronics Circuits using Toolbox and Blocksets	5a.Simulate AND, OR, NAND,NOR, XOR , NOT Gates using blocksets	5.1Digital circuit: basic gates, combinational and sequential circuits and their truth table, characteristic table, excitation table and waveforms.
	5b.Develop a model of full adder and subtractor	
	5c.Develop a model of multiplexer and demultiplexer.	
	5d.Develop a model of D, T and JK Flip-flop .	
	5e.Develop a model for a 3−bit Up / Down binary counter	

6.   SUGGESTED SPECIFICATION TABLE WITH HOURS and MARKS

Not Applicable

7.   SUGGESTED LIST OF EXERCISES/PRACTICALS
The practical/exercises should be properly designed and implemented with an attempt to develop different types of skills **(outcomes in psychomotor and affective domain)** so that students are able to acquire the competencies/programme outcomes. Following is the list of practical exercises for guidance.

*Note: Here only outcomes in psychomotor domain are listed as practical/exercises. However, if these practical/exercises are completed appropriately, they would also lead to development of certain outcomes in affective domain which would in turn lead to development of **Course Outcomes** related to affective domain. Thus over all development of **Programme Outcomes** (as given in a common list at the beginning of curriculum document for this programme) would be assured.*

Faculty should refer to that common list and should ensure that students also acquire outcomes in affective domain which are required for overall achievement of Programme Outcomes/Course Outcomes.

S. No.	Unit No.	Practical Exercises (Outcomes' in Psychomotor Domain)	Approx. Hrs. required

1	I	Explore the basic features, commands and general structure of the MATLAB environment.
		  1.Start and exit the session
		  2.MATLAB Windows: Figure, Editor and command window
		  3.On-line help
		  4.Input-output
		  5.File types
			02

2	I	Minimum MATLAB Session:
		    1.Perform arithmetic operations on scalar.
		    2.Perform arithmetic operations on arrays.
		    3.Plot and print simple plots using plot functions.
		    4.Creating, saving and executing a script file.
			04

3	I	Develop a program to plot waveforms: Sine, Cosine, Square, Triangle	01
4	II	Develop a program to plot input output characteristics of diode.	01
5	II	Develop a program to plot input output characteristics of npn Transistor.	01
6	II	Develop a program to plot bias stability of transistor.	01
7	II	Develop a program to plot Frequency response of Common Emitter Amplifier.	01
8	II	Develop a program to plot input output characteristics of MOSFET.	01
9	III	Develop model for various types of rectifiers	02
10	III	Develop model for various types of filters	02
11	IV	Develop a program to plot Amplitude Modulation (DSB) Waveform	01
12	IV	Develop a program to plot Amplitude Modulation (SSB) Waveform	01
13	IV	Develop a program to plot Frequency Modulation Waveform	01
14	IV	Develop a program to plot Phase Modulation Waveform	01
15	IV	Develop a program to plot Low Pass, High Pass, Band Pass and Band Stop Filter design and its Frequency response using toolbox	01
16	IV	Develop a program to plot ASK Modulation Waveform	01
17	IV	Develop a program to plot FSK Modulation Waveform	01
18	IV	Develop a program to plot PSK Modulation Waveform	01
19	IV	Develop a program to plot QPSK Modulation Waveform	01
20	V	Develop model of Multiplexer and Demultiplexer using blockset functions.	02
21	V	Develop model for Addition and Subtraction of 4bit binary	01
22	V	Simulate AND, OR, NAND,NOR, XOR , NOT Gates using blockset functions	01
23	V	Simulate full adder using Simulink.	01
24	V	Simulate full adder using Simulink for four bit .	01
25	V	Simulate D and JK Flip-flop using Simulink.	01
26	V	Develop a model for a 3−bit Up / Down binary counter using simulink	01
Total			**28**

8. SUGGESTED LIST OF STUDENT ACTIVITIES

Following is the list of proposed student activities such as:
  i. Revise the concept of electronics and communication from the relevant books.
  ii. Practices various features of MATLAB for developing various types of circuits from the reference books on MATLAB.

9. SPECIAL INSTRUCTIONAL STRATEGIES (if any)
  i. Expert Lecture from faculties working on MATLAB.

10. SUGGESTED LEARNING RESOURCES

A) List of Books

S. No.	Title of Book/user manual	Author	Publication
1.	Getting started with Matlab	Pratap Rudra	Oxford University Press,New Delhi(latest edition)
2.	Matlab in Engineering	Tyagi	Oxford University Press, New Delhi(latest edition)
3.	Engineering Education and Research using matlab	Assi Ali H.	Intech Publication
4.	Essential MATLAB for Engineers and Scientist	Hahn Brian D. Valentine Daniel T.	Elsevier publications Ltd., Third edition, 2007(or latest edition)

B) List of Major Equipment/ Instrument/Software with Broad Specifications
  i MATLAB
  ii SCILAB
  iii Computer terminals in networking
  iv Internet connection

C) List of Software/Learning Websites
  i www.mathworks.com
  ii www.learnerstv.com
  iiicourses.washington.edu/css457/matlab/learning_matlab.pdf
  ivwww.ngohaibac.com/how-to-learn-matlab-programming.
  vwww.matlabtips.com

11. COURSE CURRICULUM DEVELOPMENT COMMITTEE

Faculty Members from Polytechnics
  - **Prof. S. N. Sampat**, I/C Head (EC) Government Polytechnic, Gandhinagar.
  - **Prof. M. S. Dave** , Sr. Lecturer (EC) Government Polytechnic, Ahmedabad
  - **Prof. S. D. Parmar,** Lecturer (EC), Government Polytechnic, Gandhinagar
  - **Prof. K. J. Pithadiya ,** Lecturer (EC), B & B Polytechnic Vallabh Vidyanagar

Coordinator and Faculty Members from NITTTR Bhopal
  - **Prof. (Mrs.) Anjali Potnis,** Department of Electrical and Electronics Engineering