UNIVERSITY OF MUMBAI

Syllabus for Sem V & VI Program: B.Sc.

Course: Electronic Instrumentation

(Applied Component)

(Credit Based Semester and Grading System with effect from the academic year 2018 –2019)

SEMESTER V			
Theory			
USACEI501	**Analog Circuits, Instruments and Consumer Appliances.**	**No. of Credits**	**Lectures/Week**
Unit I	Transducers, Sensors and Optoelectronics Devices	02	04
Unit II	Signal conditioning, SMPS and Measuring Instruments		
Unit III	Data Acquisition and Conversion		
Unit IV	Modern Techniques and Consumer Appliances		
Practicals			
USACEI5P1	**Analog Circuits, Instruments and Consumer Appliances.**	02	04

SEMESTER VI			
Theory			
USACEI601	**Digital Electronics, Microprocessor, Microcontroller and OOP.**	**No. of Credits**	**Lectures/Week**
Unit I	Digital Electronics.	02	04
Unit II	Advanced 8085 Programming and 8255 (PPI) interfacing.		
Unit III	Introduction to Microcontrollers.		
Unit IV	Basic Concepts of Object Oriented Programming and C++.		
Practicals			
USACEI6P1	**Digital Electronics, Microprocessor, Microcontroller and OOP.**	02	04

Semester V & VI: Practical

Course Code: USACEI5P1 & USACEI6P1

The practical examination will be conducted as per the following scheme by the respective colleges and the marks will be forwarded to the University:

Sr. No	**Particulars of External Practical Examination**	**Marks**
1	Laboratory Work	80
2	Journal	10
3	Viva	10
	TOTAL	**100**

Total Marks in each semester: **100 Marks**

- Duration of each Practical paper will be of 3 Hours per semester.
- A certified Journal of Electronic Instrumentation must contain a minimum of **EIGHT** Experiments in each semester. At least TWO experiments from each sub groups, as mentioned in the syllabus, should be performed and reported in journal.
- Every candidate will be required to perform ONE experiment (from sub groups A or B or C or D) at the semester end practical examination.
- A candidate will be allowed to appear for the Practical Examination only if the candidate submits his/her certified Journal or a certificate from the Head of the Department of Physics stating that the candidate has completed the practical Course of Electronic Instrumentation of the respective semester as per requirements.

PRACTICALS (Semester V)

Course Code: USACEI5P1

1. Perform Minimum TWO Experiments from each group.
2. **Group C** experiments must be performed on Bread Boards.

GROUP - A	
Sr. No.	**Name of the Experiments**
1	Thermistor Characteristics –Thermal and electrical. (H & C)
2	Thermistor as sensor in temperature to voltage converter using OPAMP. (C&D Ch.8)
3	Study of LVDT characteristics. (K Ch. 13)
4	Study of Load Cell / Strain Guage. (K Ch. 13)
5	Study of seven segment display.
6	Characteristics of Photo diode and photo transistors.

GROUP - B	
Sr. No.	**Name of the Experiments**
1	Basic Instrumentation Amplifier using 3 Op-Amps coupled to resistance bridge. (C & D Ch. 8)
2	Temperature to frequency Conversion using 555 timer. (C & D Ch.13)
3	OPAMP D/A Converter: Binary weighted resistors.
4	OPAMP D/A Converter: Ladder network. (M & L Ch. 12)
5	Sample and hold circuit using op-amp 741. (G Ch. 8)
6	Peak detector using op-amp 741. (G Ch. 8)

GROUP – C (Must be performed on Bread Board)	
Sr. No.	**Name of the Experiments**
1	Half wave precision rectifier using precision op-amps (OPA177) (C & D Ch. 7)
2	Positive and Negative Clippers using op-amp.(G Ch. 8)
3	Positive and Negative Clampers using single power supply op-amp (124/324). (G Ch. 8)
4	Second Order active Low Pass filter (frequency response & phase relation)
5	Second Order active High Pass filter (frequency response & phase relation) (K.Ch15)
6	Active Notch Filter (frequency response & phase relation) (K.Ch.15)
7	Square and Triangular wave generator using OPAMPs with concept of duty cycle (M.Ch 23)

GROUP - D	
Sr. No.	**Name of the Experiments**
1.	Study of variable dual power supply using LM 317& LM 337 (± 3v to ± 15v). (C&D Ch.13)
2.	Constant Current source using OPAMP and PNP transistor (o/p current less than 50 mA) (C & D Ch 5)
3.	Simple microphone amplifier using a transistor.
4.	Low voltage audio amplifier using IC LM386
5.	Construction of Audio power amplifier using IC TBA 810.
6.	Making PCB for simple circuits (like rectifiers, regulators, oscillators, multivibrators, op-amp applications, single stage amplifier etc.), building and testing of the circuit.
7.	Visit to Hospital/Diagnostic Center/ Bio-medical Research Laboratory and submission of its report.

- Experiment No. 5 & 6 are Hands-on experiments. Learner have to prepare report, PPT and viva voice. Which is equivalent to 2 regular experiments.
- Visit to Hospital/Diagnostic Center/ Bio-medical Research Laboratory and submission of its report which is also equivalent to 2 regular experiments.
- Learner will be examined for Expt. No. 5, 6 and 7 on the basis of submitted report, PPT and viva, and need not perform regular experiment during the Practical Examination.

References:

1.	H & C: Modern Electronic Instrumentation & Measurement Techniques by Albert D. Helfrick & William D. Cooper PHI) Edition.
2.	C & D: OPAMPs and linear integrated circuits" by Coughlin & F. F. Driscoll (6th edition PHI)
3.	G: OPAMPs and linear integrated circuits by R.A. Gayakwad (4th edition, PHI).
4.	M: Electronic Principles by A. P. Malvino, (PHI), 6th edition.

5.	K: Electronic Instrumentation by H. S. Kalsi, (TMH) 2nd Edition
6.	M & L: Digital Principle and Applications" by Malvino and Leach, (TMH), 5th edition,
7.	RPJ: Modern Digital Electronics, R .P. Jain, (TMH), 3rd edition.

PRACTICALS (Semester VI)

Course Code: USACEI6P1

Note: Perform Minimum TWO Experiments from each group.

GROUP – A: Digital Electronics	
Sr. No.	**Name of the Experiments**
1	Study of 3:8 Decoder (74LS138), 8:3 Priority Encoder (74LS148) and their applications.
2	Study of Latch (74LS373) and its application.
3	Study of 8:1 Multiplexer (74LS151), 1: 4 De-multiplexer (74LS155) and their applications.
4	Study of unidirectional buffer (74LS244) and bidirectional buffer (74LS245).
5	Design using K –map and implement 4:1 MUX, 1:4 DEMUX, 2bit comparator, Full adder and Full subtractor. [Note: Use suitable circuit simulator for implementation]
6	Designing (using K –map) and implementation of code convertors. (any two – Binary to Gray, Gray to Binary, BCD to Excess – 3 and Excess-3 to BCD) [Note: Use suitable circuit simulator for implementation]
GROUP – B : 8085 Advanced Programming and 8255 interfacing **Note:** The students should be familiar with Keyboard and Display utilities such as READ KEYBOARD, TO DISPLAY ON ADDRESS FIELD, and TO DISPLAY ON DATA FIELD, mentioned in the 8085 µp kit's manual.	
Sr. No.	**Name of the Experiments**
8085 programming	
1	Write An ALP: a) To Evaluate simple arithmetic Expression (like Y= a x b + c x d where a, b, c and d are 8-bit HEX numbers) b) To Add parity bit to 7-bit ASCII characters.

2	Write An ALP for code conversion (any two)
3	16-bit Data manipulation (Addition, subtraction) Display result on Address field.
4	Write ALP for Addition/ Subtraction/Multiplication of two, 8-bit hex, numbers. [**Note:** Use Read Keyboard Utility for inputting the hex numbers and display the result on the Address field.]
8255 interfacing	
1.	Design a system (both Software and Hardware) that will cause 4 LEDs to flash when a push button switch is pressed. Assume persistence of vision to be 0.1 seconds.
2.	Design a system (both Software and Hardware) using 8 LED display to demonstrate: a) Binary - up, down and ring counters. b) Flashing display.
3.	Design a system (both Software and Hardware) to control ON/OFF operation of 4 electrical loads (appliances).
4.	Interfacing 8 switches and 8 LEDs to 8255: a) Write ALP to read the status of the switches and display on the LEDs. b) Write ALP so that when the first switch is made ON all the LEDs should glow and when the second switch is made OFF all the LEDs should become off.
GROUP – C: Experiments for 8031 / 8051 / 89C51	
Sr. No.	**Name of the Experiments**
1	**8031/51 assembly language programming:** a) Simple data manipulation programs. (8/16-bit addition, subtraction, multiplication, division. b) 8/16 bit data transfer, cubes of nos., to rotate a 32- bit number c) Finding greatest/smallest number from a block of data, decimal / hexadecimal counter.

2	**Study of IN and OUT port of 8031/51 by Interfacing switches, LEDs and Relays:** a) To display bit pattern on LED's b) To count the number of "ON" switches and display on LED's, c) To trip a relay depending on the logic condition of switches d) Event counter (using LDR and light source)
GROUP – D: C++ Programming	
Sr. No.	**Name of the Experiments**
1.	Program based on Input, Output Statements. (Programs to read any two numbers through keyboard and to perform simple arithmetic operations and to display the result).
2.	Program based on Control Statements a) Program based on if-else statement b) Program based on nested if statement
3.	Program based on for loop, while loop and do-while loop.
4.	Program using switch statements and if-else ladder.
5.	Program to study function declaration, function calling and function prototype.