DR. BABASAHEB AMBEDKAR MARATHWADA UNIVERSITY,
CHHATRAPATI SAMBHAJINAGAR.

CIRCULAR NO.SU/B.Sc./CBC&GS/99/2024

It is hereby inform to all concerned that, the Revised syllabi prepared by the Board of Studies/Ad-hoc Board and recommended by the Dean, Faculty of Science & Technology, **Academic Council at its meeting held on 08 April 2024 has accepted** the following Syllabi under the Faculty of Science & Technology **as per Norms of Choice Based Credit Grading System** run at the Affiliated Colleges, Dr.Babasaheb Ambedkar Marathwada University as appended herewith.

Sr.No.	Courses	Semester
1.	**B.Sc.Biotechnology (Optional)**	**Vth & VIth semester**
2.	**B.Sc.Instrumentation Practice (Optional)**	**Vth & VIth semester**

This is effective from the Academic Year 2024-25 and onwards.

All concerned are requested to note the contents of this circular and bring the notice to the students, teachers and staff for their information and necessary action.

University Campus,
Aurangabad-431 004.
REF.NO.SU/2024/ 26911-19
Date:- 15.05.2024

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Deputy Registrar,
Academic Section
O/C

Copy forwarded with compliments to :-

1] **The Principal of all concerned Colleges,**
Dr. Babasaheb Ambedkar Marathwada University,

2] **The Director, University Network & Information Centre, UNIC, with a request to upload this Circular on University Website.**

Copy to :-

1] **The Director, Board of Examinations & Evaluation,** Dr.Babasaheb Ambedkar Marathwada University, Chhatrapati Sambhajinagar.

2] The Section Officer,[B.Sc.Unit] Examination Branch, Dr.Babasaheb Ambedkar Marathwada University, Chhatrapati Sambhajinagar.

3] The Programmer [Computer Unit-1] Examinations, Dr.Babasaheb Ambedkar Marathwada University, Chhatrapati Sambhajinagar.

4] The Programmer [Computer Unit-2] Examinations, Dr.Babasaheb Ambedkar Marathwada University, Chhatrapati Sambhajinagar.

5] The In-charge,[E-Suvidha Kendra], Rajarshi Shahu Maharaj Pariksha Bhavan, Dr.Babasaheb Ambedkar Marathwada University, Chhatrapati Sambhajinagar.

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DR. BABASAHEB AMBEDKAR MARATHWADA UNIVERSITY, CHH. SAMBHAJINAGAR

Instrumentation Practice

As per

Choice Based Credit & Grading System

B. Sc. T.Y.
Semester V & VI

22/05/2024

Effective from
Academic Year: 2024-25

B.Sc. Third Year Instrumentation Practice Syllabus
Choice Based Credit System Syllabus
To be implemented from Academic Year 2024-25

Title of the Course: Instrumentation Practice

Preamble:

The curriculum for the B. Sc. (Instrumentation Practice) programme is designed to cater to the requirement of Choice Based Credit System following the University Grants Commission (UGC) guidelines. In the proposed structure, due consideration is given to Core and Elective Courses (Discipline specific Instrumentation Practice), along with Ability Enhancement (Compulsory and Skill based) Courses Furthermore, continuous assessment is an integral part of the CBCS, which will facilitate systematic and thorough learning towards better understanding of the subject. The systematic and planned curricula from first year to the third year (comprised of six semesters) shall motivate the student for pursuing higher studies in Instrumentation Practice and inculcate enough skills for becoming an entrepreneur.

Objectives:

- To foster scientific attitude, provide in-depth knowledge of scientific and technological concepts of Instrumentation Practice.
- To enrich knowledge through problem solving, minor/major projects, seminars, tutorials, review of research articles/papers, participation in scientific events, study visits, etc.
- To familiarize with recent scientific and technological developments
- To create foundation for research and development in Instrumentation and Instrumentation Practice.
- To help students to learn various experimental and computational tools thereby developing analytical abilities to address real world problems.
- To train students in skills related to research, education, industry, and market.
- To help students to build-up a progressive and successful career in Instrumentation Practice.

Dr. Babasaheb Ambedkar Marathwada University, Chh. Sambhajinagar

Choice Based Credit System (CBCS) Curriculum for instrumentation practice Under Faculty of Science and Technology

Course Structure and Scheme of Examination

B.Sc. Three Year Undergraduate Degree Program

	Course Code	Course Title	Total periods (Teaching periods/ week)	Credits	Scheme of Examination			
					Max Marks	CIA	UA	Min Marks
Semester V								
Optional I (DSC-1A) Discipline Specific Elective	IP 511	General Instrumentation	45(3/week)	2	50	10	40	20
	IP 512	Biomedical Instrumentation	45(3/week)	2	50	10	40	20
	IP 521	Practical Based on IP 511	45(3/week)	1.5	50	10	40	20
	IP 522	Practical Based on IP 512	45(3/week)	1.5	50	10	40	20
Skill Enhancement course (SEC-3)	SEC-513	SEC-3 Any one skill to be chosen out of two SEC-3(E): **Basics of Electronic Domestic Appliances** SEC-3(F): **Electromagnetism and Ac Circuits**	45(3/week)	2	50	10	40	20
			225	9	250	50	200	100
Total Credits for Semester V : 9 (Theory : 06 ; Laboratory : 03)								
Semester IV								
Optional I (DSC-1B) Discipline Specific Elective	IP 611	Analog Instrumentation	45(3/week)	2	50	10	40	20
	IP 612	Fundamentals of Instrumentation Communication	45(3/week)	2	50	10	40	20
	IP 621	Practical Based on IP 611	45(3/week)	1.5	50	10	40	20
	IP 622	Practical Based on IP 612	45(3/week)	1.5	50	10	40	20
Skill Enhancement course (SEC-4)	SEC-613	SEC-4 Any one skill to be chosen out of two SEC-4 (G): **Maintenance of Audio and Video Equipments** SEC-4 (H): **Microprocessor and its Applications**	45(3/week)	2	50	10	40	20
			225	9	250	50	200	100
Total Credits for Semester VI : 9 (Theory : 06; Laboratory : 03)								

Important Notes:

i) **Nomenclature**: DSC- Discipline Specific Core course, SEC – Skill Enhancement Course, AECC- Ability Enhancement compulsory course, DSE- Discipline Specific Elective, UA- University Assessment (Semester End), CIA-Continuous Internal Assessment.

ii) **There shall be one skill enhancement course (SEC) V to IVth Semester (any one SEC course to be chosen (any one from three optional subjects) from the basket of SEC courses for the respective semester.**

iii) **Code description**: XXX code has to be decided by BoS of the respective subject while designing their respective curriculum (e.g., for Instrumentation Practice it will be IP; for Electronics it will be ELE)

- The codes for five semester courses will start from XXX-511, Six-semester courses will start from XXX-611 and so on
- XXX-511: The first digit indicates the Semester Number; the second two digits indicate paper numbers for the five-semester courses and the same analogy is for the remaining semesters
- The codes for theory courses will start from XXX-511 (for the five semester and the same analogy is for the remaining semesters)
- The codes for practical courses will start from XXX-521 (for the five semester and the same analogy is for the remaining semesters)
- The codes for Ability Enhancement compulsory courses will start from XXX-131 (for the first semester and the same analogy is for the remaining semesters)

iv) **Assessment**: 80% for University Assessment (Semester End Examination) and 20 % for Continuous Internal Assessment (CIA)

v) **Continuous Internal Assessment (CIA): Theory** (10 Marks): Internal Test 05 Marks (Two Internal Tests of 05 marks each and average of the two tests will be considered) and 05 Marks for Assignment/tutorials.

vi) **Continuous Internal Assessment (CIA): Practical** (10 Marks): 07 Marks for Internal Practical Examination and 03 Marks for record book/submission of collection and field survey report and excursion report

vii) Practical examination: Annual examination

B. Sc. Third Year Instrumentation Practice

(Semester-V)

(General Instrumentation)

Course Code: IP-511 Theory Paper-IX

Periods 45 **Credit 02** **Marks 50 (CA=10, ESE 40)**

Learning Objectives:

- Study of Oscillators, types of sinusoidal oscillations, Oscillatory circuit
- Understand JFET Junction field effect transistor, JFET parameters
- To understand the D-MOSFET
- Study of Instrumentation Amplifiers

Course Outcomes: On successful completion of this course students will be able to:

- Show an analytic ability to solve problems relevant to General Electronics.
- Demonstrate inter-conversions between number systems, operation of simple and combinational Oscillators, Multivibrators
- Design basic circuits using analog and/or General electronic components for simple applications that include (but not limited to) power supply, water level control etc.

Unit I . Oscillators **[12 L]**

Sinusoidal oscillators, types of sinusoidal oscillations, Oscillatory circuit, essentials of transistor oscillator, Tuned collector oscillator, Hartley oscillator, Phase shift oscillator, weinbridge oscillator.

Unit II. Multivibrators **[10 L]**

Multivibrator, transistorized astable multivibrator, transistorized monostable multivibrator, transistorized bistable multivibrator. Schmitt trigger.

Unit III. Field effect transistors **[12 L]**

Junction field effect transistor (JFET), JFET as an amplifier, output characteristics of JFET, shorted gate drain current(loss), pinchoff voltage(Vp), Gate source cut off voltage [VGs(on)], expression for drain current, JFET parameters, Metal oxide semiconductor FET (MOSFET), D-MOSFET.

Unit IV. Instrumentation Amplifiers **[11 L]**

Single stage transistor amplifier, Multistage transistor amplifier, RC coupled transistor amplifier, transformer coupled amplifier, direct amplifier, Power amplifier, classification of power amplifier.

Reference Book:

1. Digital Electronics & Microcomputers : R. K. Gaur, Dhanpat rai publications.
2. Digital Electronics :- Anil K. Maini , Wiley India Pvt.Ltd.
3. Digital and Microprocessor fundamentals:- William Kleitz, Prentice Hall Internationals.
4. Electronic Devices- Thomas l. Floyd; Pearson Education, Ninth Edition, 2012, New Jersey

B. Sc. Third Year Instrumentation Practice

(Semester-V)

(Biomedical Instrumentation)

Course Code: IP-512 Theory Paper-X

Periods 45 **Credit 02** **Marks 50 (CA=10, ESE 40)**

Learning Objectives:

- Study of Medical Instrumentation, Electrocardiograph, Electroencephalograph.
- Understand Biological Stimulators and Controller
- To understand the Biomedical Recorders
- Study of LASER applications in biomedical Instrument

Course Outcomes: On successful completion of this course students will be able to:

- Explain fundamental Man Instrumentation System, Operational modes
- Design and apply medical measurement, Blood pumps.
- Determination of thermography, Heart-Lung machine, Pacemakers,

Unit I: Medical Instrumentation **[12 L]**

Introduction, Man Instrumentation System, components of man Instrumentation System, general medical Instrumentation System, Operational modes, medical measurement constraints. Instrumental Characteristics.

Unit II: Biomedical Recorders **[11 L]**

Electrocardiograph (ECG), block diagram of ECG, Electroencephalograph (EEG), block diagram of EEG, Electromyogram (EMG), Electrooculograph(EOG), Electroretinograph (ERG), Audiometers, Leakage Currents, Types of Leakage Currents.

Unit III: Biological Stimulators and Controller **[11 L]**

Electromyography, Electroneurography (ENG), Muscle and nerve stimulators, Transcutaneous Electrical Nerve Stimulation (TENS), Thermography, Heart-Lung machine, Pacemakers, Blood pumps.

Unit IV: LASER applications in biomedical Instrument **[11 L]**

LASER, principle of operation of laser, types of laser, pulsed ruby laser, helium neon laser, argon laser, co_2 laser, Applications of laser treatment, laser safety.

Reference Books:

1. Handbook of Biomedical Instrumentation by R.S.Khandpur, TMH New Delhi.
2. Biomedical Electronics & Instrumentation by Prof S.K.Venkata Ram.

B. Sc. Third Year Instrumentation Practice

(Semester-V)

Instrumentation Practice Practical: Lab Course-6

Course Code: IP-521

Credit 1.5 **Marks- 50 (CIA-10 and UA-40)**

Learning Objectives:

1. To familiarize students with experimental techniques related to Hartley Oscillator, Weinbridge Oscillator, astable multivibrator, Monostable multivibrator
2. To enable students to gain practical insights into the concept of Electronic Measurements.
3. To prepare students for advanced laboratory work and research in the related areas of study

Course Outcomes (COs):

After Completion of the course, Students Will be able to -

1: Apply scientific procedures for performing experiments based on basic instrumentation

2: Analyze the experimental data through graph plotting and numerical calculations.

3: Compare the experimental results with theoretical predictions.

List of Experiments:

1. Study of Hartley Oscillator
2. Study of Weinbridge Oscillator
3. Study of Transistorized astable multivibrator
4. Study of transistorized Monostable multivibrator
5. Study of transistorized Bistable multivibrator
6. Study of Colpitts Oscillator
7. Study of JFET junction Field Effect Transistor
8. Study of MOSFET

B. Sc. Third Year Instrumentation Practice

(Semester-V)

Instrumentation Practice: Lab Course-7

Course Code: IP-522

Credit 1.5 **Marks- 50 (CIA-10 and UA-40)**

Learning Objective:

1. To familiarize students with experimental techniques related to blood pressure measurement, LVDT, divergence of laser beam, Decade counter.
2. To enable students to gain practical insights into the concept of Electronic Measurements.
3. To prepare students for advanced laboratory work and research in the related areas of study

Course Outcomes (COs):

After Completion of the course, Students Will be able to -

CO1: Apply scientific procedures for performing experiments based on basic instrumentation

CO2: Analyze the experimental data through graph plotting and numerical calculations.

CO3: Compare the experimental results with theoretical predictions.

List of Experiments:

1. Study of blood pressure measurement.
2. Study of the variation of oxygen contents of blood using oximeter.
3. Study of LVDT.
4. Measurement of divergence of laser beam.
5. Determining random sugar contents in blood using digital glucometer.
6. Study of Decade counter.
7. Determination of the diameter of thin wire using laser
8. Beam divergence of a diode laser.

B. Sc. Third Year Instrumentation Practice
(Semester-V)
Skill Enhancement Course

NOTE:

Any one skill Enhancement Course to be chosen out of two either 'SEC-3(E): **Industrial Sensing Devices,'** ***or 'SEC-3(F):*** **Fundamentals of Control Systems'**

B. Sc. Third Year Instrumentation Practice
(Semester-V)

Title of the course: SEC-3(E) Basics of Electronic Domestic Appliances

Course code: SEC-513

Periods 45 **Credit 02** **Marks 50 (CA=10, ESE 40)**

Learning Objectives:

- In this skill-oriented course, students will study the Microwave Ovens, Washing Machines,
- Air Conditioners and Refrigerators, Online ticket reservation
- All water air conditioning systems

Course Outcomes: On successful completion of this course students will be able to:

- Discuss primary blocks of an Instrumentation System and describe basic selection criteria for transducers as per application demand
- Describe and classify displacement and Properties and generation
- Microwave oven block diagram
- Describe and Washing machine hardware and software
- Components of air conditioning systems

Unit I: Microwave Ovens **[10 L]**

Microwaves - Properties and generation - Microwave oven block diagram - LCD timer with alarm - Controllers - Wiring and Safety instructions - Care and Cleaning.

Unit II: Washing Machines **[12 L]**

Electronic controller for washing machines - Washing machine hardware and software - Types of washing machines - Fuzzy logic washing machines - Features of washing machines.

Unit III : Air Conditioners and Refrigerators **[10 L]**

Air Conditioning - Components of air conditioning systems - All water air conditioning systems - All air conditioning systems - Unitary and central air conditioning systems - Split air conditioners.

Unit IV : Digital Access Devices **[13 L]**

Digital computer - Internet access - Online ticket reservation - Functions and networks - Barcode Scanner and decoder - Electronic Fund Transfer - Automated Teller Machines (ATMs) - Set-Top boxes - Digital cable TV - Video on demand.

Reference books:

1. Consumer Electronic - S.P. Bali, Pearson Education, New Delhi, 2005.

B. Sc. Third Year Instrumentation Practice
(Semester-V)
Title of the course: SEC-3(F) Electromagnetism and Ac Circuits
Course code: SEC-513

Periods 45 **Credit 02** **Marks 50 (CA=10, ESE 40)**

Learning Objectives:

- In this skill-oriented course, students will study the Electromagnetic Induction, AC circuit
- Power generation, three phase AC, DC motors and induction motors,
- Identity terminals of industry grade transducers.

Course Outcomes: On successful completion of this course students will be able to:

- Describe primary blocks of an Instrumentation System and Qualities of Measurement.
- The concepts of electromagnetic induction and its applications and eddy currents,
- Resonant circuits with RC, LR and LCR combinations and the power factor of an AC circuit,
- Identity terminals of industry grade transducers.

Unit I: Electromagnetic Induction: **[13 L]**

Expression for induced EMF - Self induction of a solenoid - Mutual induction of a solenoid inductor - coefficient of Self induction of a solenoid inductor - Coefficient of coupling - Determination of self and mutual induction - Measurement of intense magnetic field using search coil - Induction coil - Induction and its uses - Eddy current and its uses.

Unit II: Alternating Current **[12 L]**

EMF induced in a coil rotating in a uniform magnetic field - Mean, RMS and peak values of alternating currents and EMF - Power factor in the case of an AC circuit containing i) Resistance ii) Inductance iii) Capacitance iv) Inductance and Resistance - Wattless current - Chock coil - AC circuit having capacitance and resistance - AC circuit having LCR - Resistance and Impedance - Series and parallel resonant circuits.

Unit III: AC Circuits **[10 L]**

Construction and working of transformers - Losses - Skin effect - Tesla coil - Growth and decay of current in a circuit having L and R - Time constant - Growth and decay of charge in a circuit having C and R - High resistance by leakage - Growth and decay of current in a charge having LCR - condition for discharge to be oscillatory - Frequency of oscillation.

Unit IV: Electromagnetic Machines **[10 L]**

Production and distribution of three phase AC - Star and Delta connections - Advantages of AC over DC - AC and DC dynamos - Armature winding - Series, Shunt and Compound wound dynamos and their characteristics - DC Motor - Principles of Induction Motor.

Reference books:

1. **Electricity and Magnetism** - M. Narayanamoorthi & Others, National Publishing Co., Chennai.

2. **Electricity and Magnetism** - R. Murugeshan, S. Chand & Co. Ltd., New Delhi, Revised Edition, 2006.

3. **Electricity and Magnetism** - Brijlal & Subrahmanyam, Ratan Prakashan Mandir, Agra.

4. **Fundamentals of Electricity and Magnetism** - B.D. Duggal & C.L. Chhabra, Shoban Lal Nagin Chand & Co., Jallundur.

5. Physics, Vol. II - Resnick, Halliday & Krane, 5/e, John Wiley & Sons, Inc.

B. Sc. Third Year Instrumentation Practice
(Semester-VI)
(Analog Instrumentation)
Course code IP-611 Theory Paper-XI

Periods 45 **Credit 02** **Marks 50 (CA=10, ESE 40)**

Learning Objectives:

- Study of Special Transducer Elements, Intermediate elements, data transmission elements
- Understand A/D converters, D/A converters, radio frequency
- To understand the opto electrical frequency domain transducer
- Study of Indicating, Recording and Display elements

Course Outcomes: On successful completion of this course students will be able to:

- Identify basic Cathode ray oscilloscopes, galvanometric recorders
- Interpret DC voltmeter calibration, deflection instrument calibration
- Justify Interfacing to analog world

Unit I: Special Transducer Elements **[12 L]**

Analog transducers: Electromecanical transducers, Potentiometric resistance type transducer, Inductive type transducers, Capacitive type transducers, lonisation transducers, Photo- voltaic transducer, opto electrical frequency domain transducer, vibratring string transducer, binary codes, digital encoders.

Unit II: Intermediate elements **[11 L]**

Amplifiers, mechanical amplifying element, optical amplifying element, electrical amplifying element, filters, A/D converters, D/A converters, data transmission elements, electrical type data transmission elements, position type data transmission elements, pneumatic type transmission system. data transmission elements, radio frequency

Unit III: Indicating, Recording and Display elements **[11 L]**

Cathode ray oscilloscopes, galvanometric recorders, servo type potentiometric recorders, magnetic tape recorders, data acquisition systems, data display, data storage.

Unit IV: Instrument calibration **[11 L]**

comparison methods, DC voltmeter calibration, deflection instrument calibration, ohmmeter calibration, wattmeter calibration, digital multimeters as standard instruments, DC ammeter calibration by potentiometer calibration method

Reference Books :

1) Instrumentation Measurement and Analysis by B.C. Nakra and K.K. Chaudhary, Tata McGraw Hill, New Delhi.

2) Electronic Instrumentation and Measurements by David A.Bell. (second edition) PHI Learning private limited, New Delhi,

B. Sc. Third Year Instrumentation Practice

(Semester-VI)

(Fundamentals of Instrumentation Communication)

Course code IP-612 Theory Paper-XII

Periods 45 **Credit 02** **Marks 50 (CA=10, ESE 40)**

Learning Objectives:

- Study of Special Basic communication systems, Frequency and phase modulation
- Understand Types of communication systems.
- To understand the AM transmitters, High level and low level transmitters
- Study of SSB transmitters, AM and FM systems

Course Outcomes: On successful completion of this course students will be able to:

- Identify basic Necessity for modulation
- Interpret AM waveforms and DSB
- Justify - Relationship between FM & PM

Unit I: Basic communication systems **[10 L]**

Block diagram - information source and input transducer - Transmitter medium - Noise - Receiver - Destination - Necessity for modulation - Types of communication systems.

Unit II: Amplitude Modulation **[11 L]**

Definition - AM waveforms - Frequency spectrum and hand width - Modulation index - DSB - SC, SSB, Independent SB, Vestigial SB - Comparison and application of various AM schemes.

Unit III: Frequency and phase modulation **[11 L]**

Definition - Relationship between FM & PM - Frequency deviation - Spectrum and transmission BW of FM, comparison of AM and FM systems.

Unit IV: Radio Transmitter and Receiver **[13 L]**

AM transmitters - High level and low level transmitters - SSB transmitters - FM transmitters - Block diagram - stereo FM transmitter. AM receivers - operation - performance parameters - Communication Transceivers - Block diagram - SSB receiver - FM receivers - Block diagram.

Reference Books-

1. Basics of electronic Communications NIIT, prentice - Hall Pvt. Ltd, New Delhi, 2007.
2. Modern digital and analog communications - BP lathi third edition 1998, Oxford University press.
3. Communication System: Analog & digital Singh and sapre, TMH 1995.

B. Sc. Third Year Instrumentation Practice
(Semester-VI)
Instrumentation Practice: Lab Course-8
Course Code: IP-621

Credit 1.5 **Marks- 50 (CIA-10 and UA-40)**

Learning Objectives:

1. To familiarize students with experimental techniques related Calibration of D.C. Voltmeter, D.C. Ammeter, Potentiometer, Ohmmeter.
2. To enable students to gain practical insights into the concept of Electronic Measurements.
3. To prepare students for advanced laboratory work and research in the related areas of study

Course Outcomes (COs):

After Completion of the course, Students Will be able to -

CO1: Apply scientific procedures for performing experiments based on basic instrumentation

CO2: Analyze the experimental data through graph plotting and numerical calculations.

CO3: Compare the experimental results with theoretical predictions.

List of Experiments:

1. Calibration of D.C. Voltmeter.
2. Calibration of D.C. Ammeter.
3. Calibration of Potentiometer.
4. Calibration of A.C. Ammeter.
5. Calibration of Ohmmeter.
6. Calibration of A.C. Voltmeter.
7. Study of CRO
8. Study of encoder & decoder

B. Sc. Third Year Instrumentation Practice
(Semester-VI)
Instrumentation Practice: Lab Course-9
Course Code: IP-622

Credit 1.5 **Marks- 50 (CIA-10 and UA-40)**

Learning Objectives:

1. To familiarize students with experimental techniques related to Amplitude modulation, Frequency modulation, Pulse Amplitude Modulation, DSB amplitude modulation.
2. To enable students to gain practical insights into the concept of Electronic Measurements.
3. To prepare students for advanced laboratory work and research in the related areas of study

Course Outcomes (COs):

After Completion of the course, Students Will be able to -

CO1: Apply scientific procedures for performing experiments based on basic instrumentation

CO2: Analyze the experimental data through graph plotting and numerical calculations.

CO3: Compare the experimental results with theoretical predictions.

List of Experiments:

1. Study of AM (Amplitude modulation)
2. Study of FM (Frequency modulation)
3. To study Pulse Amplitude Modulation
4. To study DSB amplitude modulation
5. To study amplitude demodulation by linear diode detector
6. To study frequency modulation and determine its modulation factor
7. To study PLL 565 as frequency demodulator.
8. To study sampling and reconstruction of Pulse Amplitude Modulation system

B. Sc. Third Year Instrumentation Practice
(Semester-VI)
Skill Enhancement Course

NOTE:
Any one skill Enhancement Course to be chosen out of two either 'SEC-4(G) **Kinematics of machines'** ***or 'SEC-4(H)*** **Introduction to Robotics'**

B. Sc. Third Year Instrumentation Practice
(Semester-VI)

Title of the course: SEC-4(G) Maintenance of Audio and Video Equipments

Course code: SEC-613

Periods 45 **Credit 02** **Marks 50 (CA=10, ESE 40)**

Learning Objectives:

- In this skill-oriented course, students will study the Optical recording, Stereophonic recording on disc and reproduction
- Monochrome, PAL colour TV transmitters Faults in TV transmitter
- Block diagram of MAC encoder - MAC receiver - Advantages

Course Outcomes: On successful completion of this course students will be able to:

- Illustrate Stereophonic recording on disc and reproduction
- Explain Block diagram of Public Addressing system
- Explain Video recording on disk, Faults in colour TV receiver, PA system for an auditorium troubleshooting in PA system.

Unit I: **[11 L]**

Recording and reproduction principles - Optical recording - Different types - Methods of recording and reproduction - Optical recording on compact disc - play back process - Advantage of compact disc - Trouble shooting in compact disc.

Unit II: **[12 L]**

Stereophony - Stereophonic recording on disc and reproduction - Hi-Fi Stereo reproducing system - Block diagram of Public Addressing system - Requirement of Public Addressing system - Typical PA installation planning for a public meeting - PA system for an auditorium troubleshooting in PA system.

Unit III: **[12 L]**

Monochrome, PAL colour TV transmitters Faults in TV transmitter - Testing of TV transmissions monochrome TV receiver - Fault in monochrome TV receiver - PAL colour TV receiver - Faults in colour TV receiver - Testing of TV receiver.

Unit IV: **[10 L]**

Video disc format - Video recording on disk - Very High density disk - High definition TV system - Block diagram of MAC encoder - MAC receiver - Advantages.

Reference books:

1. Electronic Instruments and systems, Principles, Maintenance and Troubleshooting - R.G. Gupta Tata Mc Graw Hill Publishing Co.Ltd.

2. Colour Television Theory and Practice - S.P. Bali, Tata Mc Graw Hill Publishing Co.Ltd.
3. Audio and Video systems - R.G. Gupta Tata Mc Graw Hill Publishing Co.Ltd.
4. Monochrome and Colour Television - R. Gulati. New Age Interbational (P) Ltd. New Delhi.

B. Sc. Third Year Instrumentation Practice
(Semester-VI)

Title of the course: SEC-4(H) Microprocessor and its Applications

Course code: SEC- 613

Periods 45 **Credit 02** **Marks 50 (CA=10, ESE 40)**

Learning Objectives:

- In this skill-oriented course, students will study the Advanced programming techniques
- Semiconductor memories - Classification - Instruction cycle, Machine cycle and T-state
- Hardware and software interrupts Advantages

Course Outcomes: On successful completion of this course students will be able to:

- Architecture of 8085 microprocessor, instruction sets, addressing modes and programming exercises
- Stacks and stack operations
- Interfacing memory devices
- Interfacing 8085 microprocessor with input/output devices

UNIT-I **[12 L]**

Architecture of 8085 microprocessor - Registers - Flags - ALU - Address and data buses - Demultiplexing the address / data bus - Control and status signals - I0nstruction set of 8085 - Addressing modes - Assembly language programming - Programs for addition, subtraction, multiplication and division of binary and BCD numbers (8-bit only).

UNIT II **[11 L]**

Stack and stack related instructions - Subroutines - Advanced programming techniques - Code conversions - Block transfer of data - Sorting of data - Time delays using single register and register pair - Delay calculations.

UNIT III **[11 L]**

Semiconductor memories - Classification - Instruction cycle, Machine cycle and T-state - Timing diagrams for opcode fetch, memory read, memory write, I/O read and I/O write machine cycles - Interfacing memory chips - Interfacing an input port - Interfacing an output port - I/O mapped I/O and memory mapped I/O techniques.

UNIT IV **[11 L]**

Interrupts - Hardware and software interrupts - Interrupt priorities - SIM and RIM instructions - Polled I/O and interrupt controlled I/O data transfer - Interfacing programmable devices - Programmable Peripheral Interface 8255 - Internal architecture - Control register and control word - Programming 8255 - Interfacing hex-keyboard and seven segment display.

Reference Books

1. Microprocessor Architecture, Programming and Applications with the 8085 - *Ramesh S. Gaonkar*, 5/e, Penram International Publishing (India).

2. Fundamentals of Microprocessors-8085 - *V. Vijayendran*, S. Viswanathan (Printers & Publishers), Pvt. Ltd., 2002.

3. Microprocessor and its Applications - *A. Nagoor Kani*, 1/e, RBA Publications, Chennai.

4. Introduction to Microprocessors - *Aditya P. Mathur*, 3/e, Tata McGraw Hill Publishing Company Limited.

5. Fundamentals of Microprocessors and Microcomputers - *B. Ram*, Fifth Revised and Enlarged Edition, Dhanpat Rai Publications, New Delhi.

