Dr.Babasaheb Ambedkar Marathwada University, Aurangabad

Syllabus
B.Sc. (Instrumentation Practice)
Second Year
(Third and Forth Semester)

(Effective from June 2010)

B.Sc. Second Year (Instrumentation Practice)

Semester III

Paper IX :- Instrumentation V

Total Periods 45

1. **Digital Number Systems:-** Decimal number system, Binary number system, Decimal- Binary, Binary-Decimal conversions, Octal number system, Hexadecimal number system, Decimal-Octal , Octal-Decimal conversions, Hexadecimal- Decimal, Decimal- Hexadecimal conversions, Binary- Octal, Octal-Binary conversions.

2. **Binary codes and digital arithmetic:-** BCD code, BCD- Binary , Binary-BCD conversions, Excess-3 code, Decimal-Excess-3 conversion, Gray code, Binary-Gray, Gray- Binary conversions, Binary addition, subtraction, multiplication, division, one's and two's compliment, addition and subtraction using two's complement.

3. **Boolean Algebra and Logic Gate Operation :-** The AND gate, OR gate, NOT gate, NAND gate, NOR gate, Ex-OR gate, Ex-NOR gate, Boolean algebra laws and rules, simplification of combinational logic circuits, De Morgan's theorems, Karnaugh mapping.

4. **Arithmetic Circuits:-** Half Adder, Full Adder, Half Subtractor, Full Subtractor, 4-bit binary adder, Excess-3 adder, 4-bit binary Subtractor.

Text Books :

1. Digital Electronics :- Anil K. Maini , Wiley India Pvt.Ltd.

2. Digital and Microprocessor fundamentals :- William Kleitz, Prentice Hall Internationals.

B.Sc. Second Year (Instrumentation Practice)

Semester III

Paper X :- Instrumentation VI

Total Periods 45

1. Introduction to Op-Amp:-

Inverting and noninverting amplifier, OP-Amp parameters, Op-Amp symbol, Op-Amp transfer characteristics, equivalent circuit of Op-Amp, Ideal operational amplifier, Voltage follower, differential input – differential output amplifier, Bridge amplifier, Reference Voltage Sources, Charge amplifier.

2. Op-Amp Application :-

Summing amplifier, Difference amplifier, Inverting Integrator, Differentiator circuit, Instrumentation Amplifier, Transducer bridge Amplifier. Half wave and full wave Rectifier, Log and Antilog Amplifiers.

3. Voltage regulators:-

Parameters of voltage regulators, Basic configuration of voltage regulators, Basic block diagram of linear voltage regulator.
Study of LM 105, LM 723, LM7805, LM 7905, LM 317

Books-

1. Integrated circuits by K. R. Botkar (Khanna Publications)
2. Analog Electronics by L. K. Maheshwari , M.M.C.Anand P H I India

B.Sc. Second Year (Instrumentation Practice)
Semester III

Paper XI :- Practical Paper V

1. Study of Inverting Amplifier
2. Study of Noninverting Amplifier
3. Study of Offset null arrangement
4. Study of Load and Line Regulation of IC 7805
5. Study of Load and Line Regulation of IC LM317
6. Study of Astable Multivibrator using timer IC 555
7. Study of Instrumentation Amplifier

Paper XII :- Practical Paper VI

1. Study of Full Adder
2. Study of Digital Basic Gates
3. Study of NAND gate as universal building block
4. Study of De Morgan's theorem
5. Study of Decoder (3 : 8)
6. Study of Multiplexer
7. Study of J-K Flip flop

B.Sc. Second Year (Instrumentation Practice)

Semester IV

Paper XIII :- Instrumentation VII

Total Periods 45

1. **Data Control Devices :-** Comparators, Decoders, Encoders, Multiplexers, Demultiplexers

2. **Flip-flops and Sequential Logic:-** R S Flip flops, R-S Flip flop with active low inputs, R-S Flip flop with active high inputs, D Latch, D Flip flop, J-K Flip flop, Flip flop timing parameters, three stage buffers, Octal latches, Transceivers.

3. **Counter Circuits and Shift Registers :-** Ripple (Asynchronous) counter, Synchronous counter, modulus of a counter, Divide by n counter, Binary ripple counter, Decade counter, BCD counter, Shift register, serial in serial out shift register, serial in parallel out shift register, parallel in serial out, parallel in parallel out shift register, ring shift counter.

4. **Interfacing to analog world:-** Digital to analog representations, Binary weighted D/A converter, R-2R Ladder D/A converter, parallel encoded A/D converter, counter type A/D converter, Successive approximation A/D converter, Data acquisition system.

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1. Digital Electronics :- Anil K. Maini , Wiley India Pvt.Ltd.

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Semester IV

Paper XIV :- Instrumentation VIII

Total Periods 45

1. Signal generators:-

Ramp generators using IC 555 in monostable mode, free running ramp generators, missing pulse detectors, timer/ counter circuits.

Study of XR-2240 timer/counter, XR-2242 timer/counter, Triangular waves generators, Basic Triangular waves generators, Voltage controlled Triangular/square waves generators, Triangular to sine wave conversion.

Study of IC-566 VCO, Study of IC- 8038 function generator, Study of XR-2206 function generator, Voltage to frequency and frequency to voltage converter.

2. Study of LED :-

LCD display, Various display formats, display characteristics, addressing techniques, construction of LED display, direct drive circuits for LED display, multiplexed drive circuits for LED display, Alphanumeric LED display

3. Study of LCD:-

Liquid crystal display (LCD), Liquid crystal, LCD modes of operation, principle of operation of twisted nematic LCD (TN-LCD)

Books-

1. Integrated circuits by K. R. Botkar (Khanna Publications)

B.Sc. Second Year (Instrumentation Practice)

Semester IV

Paper XV :- Practical Paper VII

1 Study of Load and Line regulation of IC 7905
2. Study of Monostable Multivibrator using timer IC 555
3. Study of V.C.O. IC 566
4. Study of Function Generator IC 2206
5. Study of Function Generator IC 8038
6. Study of Op-Amp as summing amplifier
7. Study of Op-Amp as difference amplifier

Paper XVI :- Practical Paper VIII

1. Study of Full Subtractor
2. Study of De multiplexer
3. Study of NOR gate as universal building block
4. Study of DFF and TFF
5. Study of 4-Bit asynchronous counter
6. Study of study of mod-8 counter
7. Study of Study of 8-bit A/D converter
8. Study of 8-bit D/A converter