

SARDAR PATEL UNIVERSITY
Programme: B.Sc (Instrumentation-Vocational)
Semester: VI
Syllabus with effect from: June - 2020

Paper Code: US06CINV21	Total Credit: 4
Title of Paper: Process Measurement Techniques - II	

Unit	Description in detail
I	Head, Level and Density Measurement:- Direct measurement of Liquid level: Float and tape type, Float and Shaft Type, Sight glass. Indirect measurement of Liquid level: Pressure measurement in open Vessels, Bubbler method, Diaphragm method, Air trap method. Electrical Methods: Resistance type, Capacitance type, Ultrasonic level gauge, Radiation type level indicator, Density measurement: Liquid level method, Falling weight method and Hydro meter,
II	Moisture and Humidity Measurement:- Moisture content of Materials, Method of Moisture measurement: Thermal Drying method, Distillation method, Electrical Conductivity method and Capacitance method, Humidity, Instruments for Humidity measurement: Hygro-meter, Psychro-meter. Dew Point measurement, Simple Dew point apparatus, Laboratory type and Industrial Dew point apparatus.
III	Flow Measurement – I Nature of Flow: Laminar and Turbulent flow, Expression for Flow rate, Flow meters: Venturi tube, Flow nozzles, Orifices, Pitot tubes, Rota meter.
IV	Flow Measurement – II Quantity Measurement: Titling trap, Nutating Disk, Rotary Vane, Lobbed Impeller. Hot wire anemometer, Electromagnetic flow meter, Ultra sonic Flow meter.

Basic Text & Reference Books:

- Mechanical Measurement and Control (Metropolitan Books) by D.S.Kumar
- Industrial Instrumentation (Wiley Eastern Limited) by D.P.Eckman.
- Mechanical and Industrial Measurements (Khanna Publishers) by R.K.Jain
- Instrumentation by Krik and Rimboi.
- Process Instrumentation and Control (Nirali Publications) by Kulkarni.
- Industrial Measurements and Control by S.K. Singh.
- Instrumentation Devices and Systems by Rangan, Sharma and Mani.

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Paper Code: US06CINV22	Total Credit: 4
Title of Paper: Control System components and Technique – II	

Unit	Description in detail
I	Block Diagram Representation of Process Control Systems, Types of Process Control Systems: Open - Loop Control System, Feedback Control System, Feed forward Control System, Cascade Control System, Ratio Control System, Linear and Non - Linear Control Systems; Annunciation Introduction, Principle of Operation, operating sequences, Annunciator Types: Integrated, Remote, Semi graphic, Recording, Vocal and Relay type, Solid state annunciator, pneumatic annunciator.
II	Introduction to Microcomputers, Programmable Controllers, Programmable Logic Controllers (PLCs): PLC Architecture, Basic Structure, PLC Programming, Ladder Diagram: Symbols, Circuit; PLC Communication and Networking, PLC Selection: I/O Quantity and type, I/O Remoting Requirements, Memory Size and Type, Programmer Units, PLC Installation, Advantages of Using PLCs
III	Instrumentation symbols ,Control panels: Introduction, Overview of DCS: Operator’s Console, Video Display, Keyboard, Information Displays; DCS Software Configuration, DCS Communication, DCS Supervisory Computer Tasks, DCS Integration with PLCs and Computers, Features of DCS, Advantages of DCS; Introduction to Selection, Installation, & Commissioning of Instruments.
IV	Uninterrupted Voltage source, Uninterrupted Power supply features, Networks and Buses, Power failure classification, system components, standby power supply systems, system redundancy Workstation design: Classification, hardware components, software features, selection of correct platform, comparison of operating platforms. Introduction and types of Indicators, Recorders.

Basic Text & Reference Books:

- Industrial Instrumentation and Control By S. K. Singh
- Computer - Based Industrial Control By Krishna Kant
- Control System By Nagrath and Gopal
- Industrial Electronics By Petruzella
- Control Systems By K. Padmanabhan

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Paper Code: US06CINV23	Total Credit: 4
Title of Paper: 8-Bit Microprocessor Programming & Applications-II	

Unit	Description in detail
I	Counter and time Delays, Hexadecimal counter, Modulo-10 counter, Pulse timing for flashing lights, Debugging counter and time delay programs, Stack Subroutines, Conditional and Non conditional CALL and Return instructions, Advance Subroutine concept and related examples.
II	Code conversion: BCD to Binary, Binary to BCD, BCD to Seven Segment, Binary to ASCII and ASCII to Binary.
III	BCD Addition, BCD Subtraction, Introduction to Advanced instructions and Applications, Multiplication and Subtraction with carry, the 8085 interrupts, Interrupts instructions and their utilization and their Examples.
IV	Introduction to micro controller ,8255Perioheral interface, 8254 interval timer,8259 interrupt controller, DAC and ADC

Basic Text & Reference Books:

- Microprocessor, Architecture, Programming and applications with the 8085/8080. By :- Ramesh S. Gaonkar
- Microprocessor By: V.J.Vibhute & P.B.Borole

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Paper Code: US06CINV24	Total Credit: 4
Title of Paper: Spectroscopy & Biomedical Instrumentation	

Unit	Description in detail
I	Electromagnetic Radiation, Beer Lambert Law, Absorption Instruments, Radiation Sources, Monochromators, Detectors: Photovoltaic, Photo Emissive, Single & Double Beam Photometers, Sources of Errors in Spectrophotometer.
II	Components of IR Spectroscopy: Radiation Sources, Monochromators, Slits, Mirrors, Photoconductive Cells, Thermal Detectors: Thermocouple, Bolometer, Pneumatic, Pyroelectric, Optical Null Method, Sample Handling.
III	Sources of Biomedical Signals, Basic Medical Instrumentation System, Body Temperature Measurement Transducers, Optical Fiber Sensors for Medical Field, Methods of Cell Counting, Coulter Counter, Errors in Electronic Counters.
IV	Biopotential, Electrocardiogram (ECG), Electroencephalogram (EEG), Electromyogram (EMG), Blood Pressure Measurement.

Basic Text & Reference Books:

- Handbook of Analytical Instruments, R. S. Khandpur, Tata McGraw-Hill.
- Instrumental Methods of Chemical Analysis, Gurdeep R. Chatwal & Sham Anand, Himalaya Publishing House.
- Handbook of Biomedical Instrumentation, R. S. Khandpur, Tata McGraw-Hill.
- Biomedical Instrumentation and Measurements, Leslie Cromwell, Fred J. Weibell & Erich A. Pfeiffer, Prentice Hall of India.

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 Programme & Subject: B.Sc (Instrumentation – Vocational) Semester: VI
 Syllabus with Effect from: June-2020

Paper Code: US06CINV25	Total Credit: 6
Title Of Paper: Practical	

	List
1	Synchro transmitter and receiver
2	Voltage controlled oscillator
3	Measurement of angular displacement
4	Light intensity measurement
5	Strain gauge measurement
6	Linear variable transformer displacement (LVDT)
7	Flow measurement
8	Pressure measurement
9	Measurement of force using force transducer
10	Measurement of displacement using resistive transducer
11	To study characteristics of relay
12	16 bit addition in 8085 up
13	16 bit subtraction in 8085 up
14	Data transfer in 8085 up
15	BCD to BINARY conversation in 8085 up
16	BINARY to BCD conversation in 8085 up
17	BINARY to ASCII conversation in 8085 up
18	ASCII to BINARY conversation in 8085 up
19	BCD addition in 8085 up
20	BCD subtraction in 8085 up
21	Multiplication in 8085 up
22	Division in 8085 up
23	7 segment code conversation in 8085 up

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Programme: B.Sc (Instrumentation-
Vocational) Semester: VI
Syllabus with effect from: June - 2020

Paper Code: US06DINV26	Total Credit: 2
Title of Paper: Radio, TV Communication and Telemetry fundamentals	

Unit	Description in detail
I	Radio transmitters: Radio frequency spectrum, Modulation, types of modulation, definition, waveforms and expression of AM and FM, block diagram of AM radio transmitters. Radio receiver :- Classification of radio receiver salient features of radio receiver principle of super heterodyne radio receiver, block diagram of AM receiver R.F. amplifier, Frequency mixers, I.F. amp ,Detector.
II	Introduction to Principle of Television: - aspect ratio rectangular switching, interlaced scanning, composite video signal. TV Camera: TV camera tube characteristics, Image Orthicon tube, and Vidicon tube, Video processing of camera tube output.
III	Block diagram of BW TV receiver, RF tuner, RF tuner circuits, Principle of Colour Television, Colour TV Camera, Shadow mask picture tube, Trinitron and In-line picture tube. Colour TV transmission and reception, PAL system.
IV	General Telemetry system, Types of telemetry system, Introduction to Land line telemetry systems:-voltage telemetry system, current telemetry system. Motion, position Telemetry, Introduction to R.F. telemetry:-A.M, FM, Pulse modulation, PAM Telemetry.

Basic Text & Reference Books:

- Electronics Instrumentation and Measurement Techniques - By Cooper and Helfrick.
- Digital Integrated Electronics (TMH) - By Herbert Taub and Donald Schilling.
- Radio Engineering - By G.K. Mithal, (Khanna publisher Delhi).
- A Course in Electrical & Electronic Measurements & Instrumentation. By A.k .SAWHNEY, Dhanpat Rai & Co
- Basic Radio and Television – By S.P. Sharma
- Monochrome and Colour Television – By R.R. Gulati
- Digital Principles and Applications (TMH) – By Malvino and Leach.
- Electrical and Electronics Measurements and Instrumentation – By A.K. Shawny.
- Fundamental of Digital Circuits – By A. Anand Kumar