DIRECTORATE OF TECHNICAL EDUCATION

DIPLOMA IN ELECTRICAL AND ELECTRONICS ENGINEERING

II YEAR

M SCHEME

IV SEMESTER

2015 – 2016 onwards

TRANSDUCERS AND SIGNAL CONDITIONERS

CURRICULUM DEVELOPMENT CENTRE

DIPLOMA IN ELECTRICAL AND ELECTRONICS ENGINEERING

M - SCHEME

Course Name : Diploma in Electrical and Electronics Engineering

Subject Code : 33044

Semester : IV Semester

Subject Title : **TRANSDUCERS AND SIGNAL CONDITIONERS**

TEACHING AND SCHEME OF EXAMINATION:

No. of weeks per Semester: 15 Weeks

Subject	Instruction		Examination			
			Marks			Duration
	Hours/ Week	Hours/ Semester	Internal Assessment	Board Examination	Total	
TRANSDUCERS AND SIGNAL CONDITIONERS	4	60	25	75	100	3 hrs

TOPICS AND ALLOCATION OF HOURS:

UNIT	TOPIC	TIME (Hours)
I	Classification and Sensing elements	09
II	Passive Transducers	09
III	Active Transducers	09
IV	Operational amplifiers	11
V	Signal conditioners in Industrial Instrumentation	10
	Revision and Test	12
	Total	**60**

RATIONALE

Sensors and transducers are used in automation in construction, domestic appliances industries, transport, space exploration, defense equipment, health services and other applications. Transducers have achieved substantial accuracy and control in Industrial automation; Transducers lie at the heart of instrumentation. Hence it becomes imperative to study about the principles and applications of various types of transducers in a single volume in Diploma level.

OBJECTIVES

- To understand the necessity and advantages of transducer.
- To learn about different types of transducers.
- To study the principle of working of resistive type passive transducers and it's applications.
- To learn the operation and applications of capacitive and inductive transducer.
- To learn about various active transducers and their applications.
- To understand the concept of Digital encoding transducers.
- To know the concept of signal conditioning using op.amp
- To study the characteristics and various applications of op.amp.
- To understand the use of signal conditioners in Instrumentation.
- To learn about the selected applications of op.amp in Industrial Instrumentation.

DETAILED SYLLABUS

CONTENTS

UNIT	NAME OF THE TOPICS	HOURS
I	**CLASSIFICATION AND SENSING ELEMENTS** General – Definition - Necessity - Types - classification based on the principle of operation - Active and passive - Primary and Secondary - Examples in each - Advantages - Primary sensing elements - Bourdon tubes. Bellows – Load cells – Thermistors –Types – construction and operation of Metal Resistance thermometer – Digital encoding transducer	09
II	**PASSIVE TRANSDUCERS** Resistive Transducer - Strain Gauge - construction and working of Strain gauge - Strain gauge in measurement of displacement - Capacitive transducer and its applications – Liquid level measurement using capacitive transducers – Inductive transducer - Basic structure - proximity sensor - Measurement of pressure using inductive transducer - Construction and operation of LVDT, RVDT.	09
III	**ACTIVE TRANSDUCERS** Thermocouple - construction and principle - Measurement of angular velocity using Tachogenerator - Piezoelectric transducers - principle - measurement of pressure and vibrations - Hall effect Transducer - photo voltaic transducers (solar cell) - photo conductive transducer Measurement of radiation using Geiger Muller tube.	09
IV	**OPERATIONAL AMPLIFIERS** Block diagram - DC, AC signal conditioning – operational amplifiers IC 741 – Pin details – Important terms – characteristics of Ideal op amp - inverting and Non inverting mode –Gain – Applications of op. amps - Adders, Subtractor, Scale charger, integrator, Differentiator, Voltage to current converter - current to voltage converters - Differential amplifiers - Comparators (inverting and non-inverting).	11

V	**SIGNAL CONDITIONERS IN INDUSTRIAL INSTRUMENTATION** Operational amplifier with capacitive transducer – Operational amplifier as Instrumentation amplifiers – Bridge amplifier – active filters using op.amp - LPF, HPF – LPF as integrator - HPF as differentiator - Clipper, Clamper using op.amp. Successive approximation ADC - R - 2R ladder network DAC - wein bridge oscillator using op.amp - op. amp as Zero crossing Detector	10

TEXT BOOK

S.No	Title	Author	Publishers
1.	Transducers and Instrumentation	DVS Murty	PHI 2009

REFERENCE BOOK

S.No	Title	Author	Publishers
1.	Sensor and Transducers	D. Patranabis	PHI 2011
2.	A Course in Electrical and Electronics Measurements and Instrumentation.	1.A.K. Sawhney 2.Puneet Sawhney	Dhanpat Rai & Co (P) Ltd., New Delhi 1993
3.	Measurement and Instrumentation	Arun. K	PHI 2010
4.	Operational Amplifiers and Linear Integrated Circuits	1.Robert F. Coughlin 2.Frederick F. Driscoll	PHI 1992
5.	Op. amp & Linear Integrated Circuits	Ramakant. A. Gayakwad	PHI 1992