

Course code	Course name	L-T-P-Credits	Year of introduction
AE365	INSTRUMENTATION FOR AGRICULTURE	3-0-0-3	2016
Prerequisite : Nil			
Course Objective			
<ul style="list-style-type: none"> To impart background information required for studying instrumentation and its application in agriculture. 			
Syllabus			
Necessity of instrumentation & control for agriculture, engineering properties of soil - Flow diagram of sugar plant - fermenter & control - dairy industry - Irrigation systems - irrigation methods - soil moisture measurement methods - Application of SCADA for DAM parameters & control - green houses & instrumentation - Hydraulic, pneumatic & electronics control circuits - classification of pumps-TDR-ground water occurrence confined & unconfined aquifers.			
Expected outcome			
<ul style="list-style-type: none"> At the end of the semester students will have the knowledge about instrumentation in agriculture and some of its applications. 			
Text Books			
<ol style="list-style-type: none"> C D Johnson Process control and instrumentation technology, PHI Patranabis, Industrial instrumentation, TMH. Wills B.A., "Mineral Processing Technology", 4th Ed.,Pergamon Press. 			
Reference:			
<ul style="list-style-type: none"> B.G.Liptak , Instrumentation handbook-process control, Chilton 			
Course Plan			
Module	Contents	Hours	Semester exam marks
I	Necessity of instrumentation & control for agriculture, engineering properties of soil: fundamental definitions & relationships, index properties of soil, permeability & seepage analysis, shear strength, Mohr's circle of stress, active & passive earth pressures, stability & slopes, Sensors: introduction to sonic anemometers, hygrometers, fine wire thermocouples, open & close path gas analysers, brief introduction to various bio-sensors.	8	15%
II	Flow diagram of sugar plant & instrumentation set up for it, flow diagram of fermenter & control(batch process),flow diagram of dairy industry & instrumentation set up for it, juice extraction control process & instrumentation set up for it .	6	15%
FIRST INTERNAL EXAMINATION			
III	Irrigation systems: necessity, irrigation methods: overhead, centre pivot, lateral move, micro irrigation systems & it's performance, comparison of different irrigation systems, soil moisture measurement methods: resistance based method, voltage based method, thermal based method, details of gypsum block soil moisture sensor, irrigation scheduling, irrigation efficiencies, design considerations in irrigation channels.	7	15%

IV	Application of SCADA for DAM parameters & control, irrigation control management up- stream & down - stream control systems, green houses & instrumentation: ventilation, cooling & heating, wind speed, temperature & humidity, rain gauge carbon dioxide enrichment measurement & control.	6	15%
SECOND INTERNAL EXAMINATION			
V	Automation in earth moving equipments & farm equipments, application of SCADA & PLC in packing industry and cold storage systems, implementation of Hydraulic, pneumatic & electronics control circuits in harvester's cotton pickers, tractor etc. classification of pumps: pump characteristics, pump selection & installation.	7	20%
VI	Leaf area length evapotranspiration, temperature, wetness & respiration measurement & data logging, electromagnetic radiations photosynthesis, infrared & UV bio sensor methods in agriculture, agro metrological instrumentation weather stations, surface flux measurement, soil water content measurement using time-domain reflectometry (TDR), ground water occurrence confined & unconfined aquifers, evaluation of aquifer properties, ground water recharge.	8	20%
END SEMESTER EXAMINATION			

QUESTION PAPER PATTERN:

Maximum Marks:100

Exam Duration: 3 Hours

Part A

Answer any two out of three questions uniformly covering Modules 1 and 2 together. Each question carries 15 marks and may have not more than four sub divisions.

(15 x 2 = 30 marks)

Part B

Answer any two out of three questions uniformly covering Modules 3 and 4 together. Each question carries 15 marks and may have not more than four sub divisions.

(15 x 2 = 30 marks)

Part C

Answer any two out of three questions uniformly covering Modules 5 and 6 together. Each question carries 15 marks and may have not more than four sub divisions.

(20 x 2 = 40 marks)