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Course Code: MR4101 Course Title: Concepts in Electronics Engineering

Sl.No.	Description of Equipment	Required members (for batch of 25 students)
1	CRO & DSO	Each 1 No
2	DC Power supply (5v, 5A or high), (12v, 5A or high), (24v, 5A or high)	Each 1 No
3	Function generator	1
4	inverting and non-inverting amplifier OP-Amp trainer kit	Each 1 No
5	Analog filters trainer kit	1 No
6	Sequential circuit trainer kit	1 No
7	Combination circuit trainer kit	1 No
8	A/D Converter trainer kit	1 No
9	D/A Converter Trainer kit	1 No
10	Driver Circuit Module with Servomotor	1
11	Driver Circuit module with stepper motor	1
12	Multi-Meter, bread board, and soldering machine	Each 5 No
13	Electronic components for power supply (transformer, regulator, diode, capacitors)	Each 5 No

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Course Code: MR4102	Course Title: Concepts of Machines and Mechanisms	
Sl.No.	**Description of Equipment**	**Required members (for batch of 25 students)**
1	SolidWorks/CREO/ Catia/ MSC-Adams/ OpenCAD/ Any free open source 3D CAD Softwares	15 No's
2	Computer	15 No's

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Course Code: MR4104	Course Title: Control System Design	
Sl.No.	**Description of Equipment**	**Required members (for batch of 25 students)**
1	MATLAB or SCILAB with Control System Tool Box	15 No's
2	Computer	15 No's

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Course Code: MR4111	Course Title: Sensors and Actuators Laboratory	
Sl.No.	**Description of Equipment**	**Required members (for batch of 25 students)**
1	Load Measurement trainer kit	1 No
2	Torque Measurement trainer kit	1 No
3	Force Measurement trainer kit	1 No
4	Pressure Sensor/transducer trainer kit	1 No
5	Piezoelectric Force Sensor trainer kit	1 No
6	LVDT trainer kit	1 No
7	Temperature Sensors trainer kit	1 No
8	LDR, Photodiode, phototransistor, photovoltaic cell optical trainer kit.	Each 1 No
9	Ultrasonic distance Measurement trainer kit	1 No
10	Laser Sensor/LIDAR distance Measurement trainer kit	1 No
11	Gyroscope, magnetometer, accelerometer trainer kit	Each 1 No
12	Optical/ Magnetic encoder trainer kit	1 No
13	Stepper motor and Drive with controller	1 No
14	DC Servomotor and with controller	1 No
15	AC Servomotor and with Controller	1 No

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Course Code: MR4112	Course Title: Industrial Automation Laboratory	
Sl.No.	**Description of Equipment**	**Required members (for batch of 25 students)**
1	PLC station with Computer with I/O terminals and Sensors and Actuators different types to interface (minimum 5 type of sensors & 3 type of Actuators) with supported communication protocols (Ethernet/ Profinet/ CAN/Modbus TCP/ etc) between PLC and with computer	2 No
2	Speed Control Circuits for Pneumatic and Hydraulic cylinders	1 No
3	Single and Double Acting Cylinder Circuits	1 No
4	Pneumatic Sequencing Circuits	1 No
5	Electro Pneumatic Sequencing Circuits	1 No
6	Electro Hydraulic Sequencing Circuits	1 No
7	Traffic Light interface	1 No
8	Material Filling, Object Shorting, Orientation Check and Material Property Check	Each 1 No
9	Material Handling, Delaying Conveyor, Feeding, Pick and Place	Each 1 No

Note : Minimum two PLC stations must be available with all above Different I/O interface capabilities.

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Course Code:MR4211 Course Title: Industrial Robotics And Embedded Systems Laboratory

Sl.No.	Description of Equipment	Required members (for batch of 25 students)
1	Any open source/Licenced software with robotics toolbox/ ROS (Robotic Operating System)	8 user
2	Robo Analyser	8 user
3	Computers	15 numbers
4	Industrial robot with camera and accessories including grippers and tools	1 No
5	Any open source/Licenced software with ANN, Bayesian network	1 No

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Course Code:MR4212 Course Title: Machine Vision And Intelligence Laboratory

Sl.No.	Description of Equipment	Required members (for batch of 25 students)
1	CMOS Camera (USB/Ethernet)	3
2	CCD Camera (USB/Ethernet)	1
3	Standard Boom Stand (Bench top setup)	2
4	Extension Tube (5mm to 50mm)	2
5	Lenses (between 3mm to 50mm focal length)	2
6	Tele-centric lens	1
7	Lighting (Coaxial , ring lighting and Diffused backlighting)	1
8	Machine vision software open source/ licensed software with machine vision/image processing toolbox	15 user
9	Computers	15