Faculty of Mechanical Engineering

B.E. Robotics and Automation

(R 2021) Semester – II

Course Code: BE3273 **Course Title: Basic Electrical, Electronics Engineering and Measurements Laboratory**		
Sl. No.	**Description of Equipment**	**Required numbers (for batch of 30 students**
1	**Verification of ohms and Kirchhoff's Laws** 1. DC Regulated Power supply (0 - 30 V variable) 2. Bread Board 3. Resistors 4. Multimeter 5. Connecting wires	 1 1 As per Circuit diagram 1 As Required
2	**Load test on DC Shunt Motor.** 1. Ammeter MC (0-20A) 2. Voltmeter MC (0-300)V 3. Rheostat 7.5 Ω, 10 A 4. Tachometer 5. Field Rheostat 175 Ω, 1.5 A 6. Connecting wires	 1 1 1 1 1 As Required
3	**Load test on Self Excited DC Generator** 1. DC shunt generator(0- 300V) 2. Ammeter (0-30 A), (0-2A) 3. Voltmeter (0-30V) 4. Rheostat 175Ω, 250 Ω 5. Tachometer 6. Connecting Wires	 1 1 1 1 1 As Required
4	**Load test on Single phase Transformer** 1. Ammeter (0-30) A, (0-5) A 2. Voltmeter (0-150)V, (0-300)V 3. Wattmeter – 300V, 5A, UPF 4. Autotransformer 5. Single phase Transformer 6. Connecting wires	 1 1 1 1 1 As Required
5	**Load Test on Induction Motor** 1. Ammeter MI (0-20A) 2. Voltmeter MI (0-300)V 3. Wattmeter – 300V, 30 A 4. Tachometer – Digital 5. Connecting Wires – As Required 6. Single phase Induction motor	 1 1 1 1 As Required 1
6	**A. Experiment on Transistor based application circuits (Inverting and non-inverting amplifier or switching circuits)** 1. Transistor (No-BC107) 2. Resistors- 2.2kΩ, 47KΩ, 10KΩ, 560Ω 3. Capacitors - 10μF, 3.3μF, 22μF 4.. Bread Board 5. DC Regulated Power supply (0 - 30 V variable)	 1 1 1 1 1

	5. CRO 6. Connecting wires **B. Experiments on Operational Amplifier based Inverting and non-inverting amplifier** 1. Function Generator 1 KHz 2. CRO 20 MHz 3. Dual RPS 0 – 30 V 4. Op-Amp IC 741 5. Resistors R1= 100 Ω and RF= 1.5 K Ω 6. Connecting wires	1 As Required 1 1 1 1 1 As Required
7.	**Experiments on ADC** 1. Resistors – 10 KΩ 2. Resistors - 220Ω 2. Capacitor – 150 µF, 10µF 3. ADC -0804 4. Bread Board 5. Connecting wires 6. Dual RPS (0 – 30) V	 2 8 1 1 1 As Required 1
8,	**Experiments on 555 timer** 1. IC 555 Timer 2. Resistor R1, R2 47kΩ, 1kΩ 3. Resistor R4 220Ω Load 4. Capacitor, C1 10 µF 5. Capacitor, C2 0.01 µF 6. Bread Board 7. Connecting wires 8. CRO 20 MHz 9. RPS (0 – 30) V	 1 1 1 1 1 1 As Required 1 1
9,10.	**Study on function of DSO.** **Measurement of Amplitude, Frequency, Time, Phase Measurement using DSO** **1. DSO**	 1

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(R 2021) Semester – III

MR3361 ELECTRICAL DRIVES AND ACTUATORS LABORATORY

Sl.No.	Description of Equipment	Required Numbers
1.	DC Motor with load	1
2.	3 Phase Induction Motor with load	1
3.	3 Phase Synchronous Motor with load	1
4.	Rheostat based Speed control of motors (AC and DC) with load	1
5.	MOSFET, IGBT, SCR and TRAIC	1
6.	DC motor with speed control Drive	1
7.	DC servomotor with Power Electronic Drive (Position, Direction and speed).	1
8.	BLDC and PMDC motors with Power Electronic Drive (Position, Direction and speed).	1
9.	Stepper Motor with Power Electronic Drive (Position, Direction and speed).	1
10.	Three-phase Induction Motor with Power Electronic Drive.	1
11.	VFD with single phase and three-phase induction motor.	1
12.	AC servomotor with Power Electronic Drive (Position, Direction and speed).	1
13.	Tachometers, voltmeters, ammeters and multimeters	Each 5

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(R 2021) Semester – III

RA3311 ROBOT MODELLING AND SIMULATION LABORATORY

Sl.No.	Description of Equipment	Required Numbers
1	Computers	15
2	CAD modelling packages – open source/ licensed	15

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(R 2021) Semester – IV

MR3452 CONTROL SYSTEMS ENGINEERING (LABORATORY)

Sl.No.	Description of Equipment	Required Numbers
1.	Computer -15 No's	Each -1
2.	MATLAB licenced / SCILAB open source with control system toolbox installed on above computers	15

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(R 2021) Semester – IV

ME3382 MANUFACTURING TECHNOLOGY LABORATORY

LIST OF EQUIPMENT FOR BATCH OF 30 STUDENTS

S.No.	NAME OF THE EQUIPMENT	Required Numbers
1.	Centre Lathes	7 Nos.
2.	Shaper	1 No.
3.	Horizontal Milling Machine	1 No.
4.	Vertical Milling Machine	1 No.
5.	Surface Grinding Machine	1 No.
6.	Cylindrical Grinding Machine	1 No.
7.	Radial Drilling Machine	1 No.
8.	Lathe Tool Dynamometer	1 No.
9.	Milling Tool Dynamometer	1 No.
10.	Gear Hobbing Machine	1 No.
11.	Gear Shaping Machine	1 No.
12.	Arc welding transformer with cables and holders	2 Nos.
13.	Oxygen and Acetylene gas cylinders, blow pipe and other welding outfit	1 No.
14.	Moulding table, Moulding equipments	2 Nos.

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(R 2021) Semester – IV

MR3461 SENSORS AND INSTRUMENTATION LABORATORY

Sl.No.	Description of Equipment	Required Numbers
1.	Load, Torque and Force using Strain Gauge Measurement setup	Each -1
2.	Pressure Sensor and Piezoelectric Force Sensor Measurement setup	Each 1
3.	LVDT setup	1
4.	Temperature Sensors measurement setup with RTD, Thermocouple and Thermistor	Each 1
5.	Measurement setup Optical Sensors LDR, Photo transistor, photo diode	Each 1
6.	Measurement setup -Ultrasonic and Laser Sensor	Each 1
7.	Gyroscope measurement setup	1
8.	Accelerometer measurement setup	1
9.	Magnetometer measurement setup	1
10.	Absolute Encoders and Incremental encoder with DSO/ single board computer	Each 1
11.	DAQ with sensor or transducer	1
12.	3 axis force sensor with measurement setup	1
13.	Tactile Sensor with touch measurement setup	1

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(R 2021) Semester – V

MR3492 EMBEDDED SYSTEMS AND PROGRAMMING (LABORATORY)

Sl.No.	Description of Equipment	Required Numbers
1.	Computers	15
2.	8051 trainer kit interfaced with above computers	2
3.	Alphanumeric and Graphic LCD Interfacing interfaced with 8051	1 Each
4.	Switches and keyboard interfacing of 8051.	1 Each
5.	Sensor Interfacing with ADC to 8051 and DAC & RTC Interfacing with 8051 kit	1 Each
6.	UART Serial and Parallel Port with 8051 kit	1 Each
7.	I^2C, SPI and CAN protocols with 8051 kit	1 Each
8.	Step Motor (Unipolar & Bipolar Motor) and PWM Servo Motor Control to Interfacing with 8051 kit	1 each
9.	Interfacing and Programming of Bluetooth and Wi-Fi with 8051 kit	1 each
10.	ARM Processor– kit/development boards- 2 nos with WIFI module, Sensors, Stepper motor and servomotor – 1 each	1 Set
11.	Single board computer (Raspberry PI/ any other open source boards) with internet provision and open source IOT service provider setup	1 set
12.	Software for 8051 programming	15 No's

Any 7 equipment with the combination 8051, ARM and Single board computers is recommended

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(R 2021) Semester – V

MR3561 INDUSTRIAL AUTOMATION LABORATORY

Sl.No.	Description of Equipment	Required Numbers
Hydraulic Equipment		
1.	Pressure relief valve	4
2.	Pressure reducing valves	2
3.	Flow control valves	2
4.	Pressure switch	1
5.	Limit switches	2
6.	Linear actuator	1
7.	Rotary actuator	1
8.	Double solenoid actuated DCV	1
9.	Single solenoid actuated DCV	1
10.	Hydraulic power pack with pump and pressure relief valve	1
11.	PLC with hydraulic interface	1 set
Pneumatics Equipment		
1.	Pneumatic trainer kit with FRL Unit, Single acting cylinder, push button	1
2.	Pneumatic training kit with FRL unit, Double acting cylinder, manually actuated DCV	1
3.	Pneumatic trainer kit with FRL unit, Double acting cylinder, Pilot actuated DCV	1
4.	Pneumatic trainer kit with FRL unit Double acting cylinder, Double solenoid actuated DCV, DCV with sensor / magnetic reed switches	1
5.	PLC with Pneumatic Interface.	1
Industrial Automation Equipment		
1.	PLC to PLC communication station IOs with sensors and actuators.	1 set
2.	• Bottle Filling System. • Material Filling • Object Sorting • Orientation Check • Material Property Check. • Material Handling, Delaying Conveyor, Feeding, Pick and Place Operation	Each 1 No.

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(R 2021) Semester – VI

RA3611 ROBOT KINEMATICS AND DYNAMICS LABORATORY

Sl. No.	Description of Equipment	Required Numbers
1	PC workstation	15
2	Robot Analyser (open source) installed on computer	15
3	ROS with Gazebo/ moveit /v-rep installed on computer	15
4	Robot	1

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(R 2021) Semester – VII

RA3711 ROBOTIC VISION AND INTELLIGENCE LABORATORY

Sl.No.	Description of Equipment	Required Numbers
1	Camera with lenses and camera mounting interfaced with PC/any system	5
2	Camera with any single board computers (system on chip models)	5
3	OpenCV/ python with supported library/ licensed image processing software	10