LOK JAGRUTI UNIVERSITY (LJU)

INSTITUTE OF ENGINEERING & TECHNOLOGY

Department of Computer Engineering (701)

Bachelor of Engineering (B.E.) – Semester – I

Course Code:	**017012192**
Course Name:	**IOT Workshop - Laboratory**
Category of Course:	Engineering Science Course (ESC)
Prerequisite Course:	---

Teaching Scheme			
Lecture (L)	**Tutorial (T)**	**Practical (P)**	**Credit**
0	**0**	**4**	**2**

Sr No.	Practical Title	Link to Theory Syllabus
1	Understating PROTEUS, ARDUINO (Nano/ Uno/ Mega), NODEMCU/ESP32	--
2	IR & Ultrasonic Sensor Interfacing with ARDUINO /NODEMCU/ESP32 & Simulation with PROTEUS	--
3	PIR Sensor Interfacing with ARDUINO /NODEMCU/ESP32 & Simulation with PROTEUS	--
4	Gas Sensor & Flame sensor Interfacing with ARDUINO /NODEMCU/ESP32 & Simulation with PROTEUS	--
5	LM35 Interface Interfacing with ARDUINO /NODEMCU/ESP32 & Simulation with PROTEUS	--
6	Moisture Sensor & DHT11/22 Interfacing with ARDUINO /NODEMCU/ESP32 & Simulation with PROTEUS	--
7	2-Channel Relay Interfacing with ARDUINO /NODEMCU/ESP32 & Simulation with PROTEUS	--
8	Display (16x 2/ 16x x4 LCD) Interfacing with ARDUINO /NODEMCU/ESP32 & Simulation with PROTEUS	--
9	Working on soldering with GPP	--
10	MINI PROJECT	--

Major Components/ Equipment

Sr. No.	Component/Equipment	Specification
1	PROTEUS Software	
2	Controller board: ARDUINO (Nano/ Uno/ Mega), NODEMCU/ESP32	Microcontroller ATmega328. Operating Voltage (logic level): 5 V. Input Voltage (recommended): 7-12 V. Input Voltage (limits): 6-20 V. Digital I/O Pins : 14 (of which 6 provide PWM output) Analog Input Pins: 8. DC Current per I/O Pin: 40 mA.
3	IR Sensor	VCC: External 3.3V-5V voltage (can be directly connected to 5v MCU and 3.3v MCU) GND: GND External OUT: Small board digital output interfaces (0 and 1)
4	Ultrasonic Sensor	Transmitter & Receiver Technology Used Non-Contact Technology Operating Voltage 5 V Operating Frequency 4 MHz Detection Range 2cm to 400cm Measuring Angle 30º Resolution 3mm Operating Current <15mA Sensor Dimensions 45mm x 20mm x 15mm
5	PIR Sensor	The HC-SR501 Operating Voltage 5 V to 20 V Current consumption: 65 mA Output Voltage: 3.3 V on condition Delay time: 5 seconds to 5 minute. Sensitivity Range: 3 meter to 7 meters
6	Gas Sensor	MQ2 Operating voltage: 5V Load resistance: 20 KΩ Heater resistance: 33Ω ± 5% Heating consumption: <800mw Sensing Resistance: 10 KΩ – 60 KΩ Concentration Scope: 200 – 10000ppm Preheat Time: Over 24 hour
7	Flame sensor	Operating Voltage: 3.3V to 5V DC Operating Current: 15ma Output Digital - 0V to 5V, Adjustable trigger level from preset

		Output Analog - 0V to 5V based on infrared radiation from fire flame falling on the sensor LEDs indicating output and power PCB Size: 3.2cm x 1.4cm LM393 based design
8	LM35	Calibrated directly in Celsius (Centigrade) Linear + 10.0 mV/ C scale factor 0.5 C accuracy guaranteeable (at +25 C) Rated for full -55 to +150 C range Suitable for remote applications Low cost due to wafer-level trimming Operates from 4 to 30 volts Less than 60 A current drain Low self-heating, 0.08 C in still air Nonlinearity only 1/4 C typical Low impedance output, 0.1 W for 1 mA load
9	Moisture Sensor	Operating Voltage 3.3V-5V. Module Dual Output mode, a simple digital output, and analog output more accurate. With fixed bolt hole for easy installation. Small PCB board size: 3cm * 1.6cm. Power indicator (red) and the digital switch output indicator (green). Using LM393 comparator chip, stable. VCC external 3.3V-5V GND GND External DO small board digital output interfaces (0 and 1) AO small board analog output interface
10	DHT11/22 Sensor	Super compact size Super low power consumption Super low voltage operation Standard I2C and 1-wire interface. Semi-conductor technology Sensing range Temperature: -20 ~ +60 C Humidity: 20-95 RH Humidity: Resolution: 0.1%RH Repeat: -+ 1%RH Precision 25C @ -+5RH Temperature: Resolution: 0.1C Repeat: -+0.2C Precision: 25C @ -+0.5C Power: DC 2.7-5.5V Normal current 1mA Standby current 60uA Sample cycle: > 2 seconds Pin interface: 1. VDD 2. SDA 3. GND 4. SCL (connect to GND when use as 1-wire)
11	Relay	2-Channel, 5 A, 230V
12	LCD	16x 2/ 16x4
13	Soldering iron along with soldering flux & wax, De-soldering pump, standard size GPP	-

Proposed Theory + Practical Evaluation Scheme by Academicians (% Weightage Category Wise and it's Marks Distribution)					
L :	**0**	**T:**	**0**	**P:**	**4**
Note : In Theory Group, Total 4 Test (T1+T2+T3+T4) will be conducted for each subject. Each Test will be of 25 Marks. Each Test Syllabus Weightage: Range should be 20% - 30%					
Group (Theory or Practical)	**Group (Theory or Practical) Credit**	**Total Subject Credit**	**Category**	**% Weightage**	**Marks Weightage**
Theory	**0**	**2**	MCQ	0%	0
Theory			Theory Descriptive	0%	0
Theory			Formulas and Derivation	0%	0
Theory			Numerical	0%	0
Expected Theory %	**0%**		**Calculated Theory %**	**0%**	**0**
Practical	**2**		Individual Project	0%	0
Practical			Group Project	70%	70
Practical			Internal Practical Evaluation (IPE)	0%	0
Practical			Viva	30%	30
Practical			Seminar	0%	0
Expected Practical %	**100%**		**Calculated Practical %**	**100%**	**100**
Overall %	**100%**			**100%**	**100**

Course Outcome	
	Upon completion of the course students will be able to
CO1	Learning usage of tools for IOT environment
CO2	Learn sensor Interfacing with various controller boards for IOT application.
CO3	Understanding applications of various Sensors
CO4	Learning Hardware Programming with Microcontroller.
Suggested Reference Books	
1	Beginning Arduino, Michael McRobetrs Technology in Action
2	Exploring Arduino, Jeremy Blum. Wiley
3	NodeMCU ESP8266 Communication Methods and Protocols : Programming with Arduino IDE, Manoj R. Thakur

List of Open Source Software/Learning website	
1	http://arduino.cc
2	www.instructables.com/id/Arduino-Projects/
3	http://www.jeremyblum.com/category/arduino-
4	https://www.labcenter.com/downloads/
5	https://rntlab.com/learn-esp32-welcome/

Practical Project/Hands on Project		
Sr. No.	**Project List**	**Linked with Unit**
1	Design Mini Weather Station using Arduino Uno/NODEMCU.	--
2	Real time Data Logger Using Arduino Uno/NODEMCU.	--
3	Smart Home Automation Using Arduino Uno/NODEMCU.	--
4	Smart Irrigation System Using Arduino Uno/NODEMCU.	--
5	Health Monitoring System Using Arduino Uno/NODEMCU.	--
6	Advance Fire Alarm System Using Arduino Uno/NODEMCU.	--
7	Smart Room Temperature Using Arduino Uno/NODEMCU.	--