EX.2.0		**Interfacing with Input / Output Devices using Python**	**04**
	2.1	**Introduction to Python, Connecting to the outside World with GPIO.**	
	1	**To Interface LED/Buzzer with Raspberry PI and write a program to turn ON LED for 1 sec after every 2 sec.** Apparatus Requirement: Raspberry PI with inbuilt Python Package, LED, Buzzer.	
	2	**To interface Push Button / Digital Sensor (IR/LDR) with Raspberry PI and write a program to turn ON LED when Push button is pressed or at sensor detection.** Apparatus Requirement: Raspberry PI with inbuilt Python Package, Push Button Switch, Digital Sensor (IR/LDR).	
	3.	**To interface analog sensor using MCP 3008 analog to digital converter chip.** Apparatus Requirement: Raspberry PI with inbuilt Python Package, analog sensor, MCP 3008 chip.	
EX.3.0		**Interfacing Temperature Sensor, Motors, Display Devices.**	**04**
	3.1	**Introduction to Temperature sensor (Analog and Digital), Relays, Motors (DC, Stepper) and Driver circuits.**	
	1	**To interface DHT11 sensor with Raspberry PI and write a program to print temperature and humidity readings.** Apparatus Requirement: Raspberry PI with inbuilt Python Package, DTH11 Sensor.	
	2	**To interface motor using relay with Raspberry PI and write a program to turn ON motor when push button is pressed.** Apparatus Requirement: Raspberry PI with inbuilt Python Package, Relays, Motor Driver, Motors.	
	3	**To interface OLED with Raspberry PI and write a program to print temperature and humidity readings on it.** Apparatus Requirement: Raspberry PI with inbuilt Python Package, OLED display device.	
EX.4.0		**Interfacing Communication Devices and Cloud Networking**	**04**
	4.1	**Introduction to Bluetooth, Zigbee, RFID and WIFI, specifications and interfacing methods.**	
	1	**To interface Bluetooth/Zigbee/RFID/WiFI with Raspberry PI and write a program to send sensor data to smartphone using Bluetooth/Zigbee/RFID/WIFI. (Any one can be used for performing)** Apparatus Requirement: Raspberry PI with inbuilt Python Package, Bluetooth/Zigbee/RFID/WIFI.	
	2	**Introduction to Cloud computing, different types cloud networks and interconnection using Raspberry PI**	
	3	**Write a program on Raspberry PI to upload temperature and humidity data from thingspeak cloud.** Apparatus Requirement: Raspberry PI with inbuilt Python Package, Cloud networks such as thingspeak (open source), AWS, Azure, etc. anyone can be used for understanding purpose and building projects.	
EX.5.0		**Understanding of Communication Protocols**	**04**
	5.1	**Introduction to MQTT, IFTTT protocols and configuration steps.**	
	1	**Write a program on Raspberry PI to publish temperature data to MQTT broker**	
	2	**Write a program on Raspberry Pi to subscribe to MQTT broker for temperature data and print it.**	
	3	**Configuration of Webserver using Raspberry PI.**	
6.0		**Sample Projects**	**10**
	1.	**MQTT Based Raspberry Pi Home Automation: Controlling Raspberry Pi GPIO using MQTT Cloud**	
	2.	**License Plate Recognition using Raspberry Pi and OpenCV**	
	3.	**Real Time Face Recognition with Raspberry Pi and OpenCV**	
	4.	**Smart Garage Door Opener using Raspberry Pi**	