Department of Electrical and Electronics Engineering

COURSE MODULE OF THE COURSE TAUGHT FOR THE SESSION FEB-MAY: 2024-25

Course Syllabus with CO's

Faculty Member: **SHREESHAYANA R**				Academic Year: 2024-25			
Department: Electrical & Electronics Engineering							
Course Code	Course Title	Core/Elective	Prerequisite	Contact Hours			Total Hrs/ Sessions
				L	T	P	
BEEL456D	**Arduino And Raspberry Pi Based Project**	**Elective**	C Programming, Microcontrollers fundamentals	-	-	2	**14 Sessionsx2 = 28 Hours**
Objectives	1. To impart necessary and practical knowledge of components of Internet of Things 2. To develop skills required to build real-life IoT based projects						

Topic to be Covered as per Syllabus

Expt.No.	Name of the Experiment
1.	i) To interface LED/Buzzer with Arduino/Raspberry Pi and write a program to 'turn ON' LED for 1 sec after every 2 seconds. ii) To interface Push button/Digital sensor (IR/LDR) with Arduino/Raspberry Pi and write a program to 'turn ON' LED when push button is pressed or at sensor detection.
2.	i) To interface DHT11 sensor with Arduino/Raspberry Pi and write a program to print temperature and humidity readings. ii) To interface OLED with Arduino/Raspberry Pi and write a program to print temperature and humidity readings on it.
3.	To interface motor using relay with Arduino/Raspberry Pi and write a program to 'turn ON' motor when push button is pressed
4.	To interface Bluetooth with Arduino/Raspberry Pi and write a program to send sensor data to Smartphone using Bluetooth
5.	To interface Bluetooth with Arduino/Raspberry Pi and write a program to turn LED ON/OFF when '1'/'0' is received from Smartphone using Bluetooth
6.	Write a program on Arduino/Raspberry Pi to upload temperature and humidity data to thing speak cloud
7.	Write a program on Arduino/Raspberry Pi to retrieve temperature and humidity data from thing speak cloud.
8.	Write a program on Arduino/Raspberry Pi to publish temperature data to MQTT broker
9.	Write a program to create UDP server on Arduino/Raspberry Pi and respond with humidity data to UDP client when requested
10.	Write a program to create TCP server on Arduino/Raspberry Pi and respond with humidity data to TCP client when requested.
11.	Write a program on Arduino/Raspberry Pi to subscribe to MQTT broker for temperature data and print it.

List of Text Books/ Reference URLS
1. https://www.arduino.cc 2. https://www.raspberrypi.org/ 3. Course in Internet of Things (IOT) Using Arduino - NIELIT Delhi Centre 4. Vijay Madisetti, Arshdeep Bahga, Internet of Things. "A Hands on Approach", University Press 5. Dr. SRN Reddy, Rachit Thukral and Manasi Mishra, "Introduction to Internet of Things: A practical Approach", ETI Labs 6. Pethuru Raj and Anupama C Raman, "The Internet of Things: Enabling Technologies, Platforms, and Use Cases", CRC Press 7. Jeeva Jose, "Internet of Things", Khanna Publishing House, Delhi 8. Adrian McEwen, "Designing the Internet of Things", Wiley 9. Raj Kamal, "Internet of Things: Architecture and Design", McGraw Hill 10. https://projecthub.arduino.cc/ 11. https://www.raspberrypi.com/documentation/computers/remote-access.html

Course Outcomes	At the end of the course the student will be able to: **CO-1:Explain** the concepts of Internet of Things and its hardware and software components [L2] **CO-2: Evaluate** Interfacing of I/O devices, sensors & communication modules. [L4] **CO-3: Evaluate** Remotely monitoring data and control devices. [L4] **CO-4: Develop** real life IoT based projects[L4]

Assessment Details (both CIE and SEE)

The weightage of Continuous Internal Evaluation (CIE) is 50% and for Semester End Exam (SEE) is 50%.The minimum passing mark for the CIE is 40% of the maximum marks (20 marks out of 50) and for the SEE minimum passing mark is 35% of the maximum marks (18 out of 50 marks). A student shall be deemed to have satisfied the academic requirements and earned the credits allotted to each subject/ course if the student secures a minimum of 40% (40 marks out of 100) in the sum total of the CIE (Continuous Internal Evaluation) and SEE (Semester End Examination) taken together.

Continuous Internal Evaluation (CIE):

CIE marks for the practical course are: **50 Marks**.

The split-up of CIE marks for record/ journal and test are in the ratio **60:40**.

• Each experiment is to be evaluated for conduction with an observation sheet and record write-up. Rubrics for the evaluation of the journal/write-up for hardware/software experiments are designed by the faculty who is handling the laboratory session and are made known to students at the beginning of the practical session.

• Record should contain all the specified experiments in the syllabus and each experiment write-up will be evaluated for 10 marks.

• Total marks scored by the students are scaled down to **30 marks** (60% of maximum marks).

• Weightage to be given for neatness and submission of record/write-up on time.

• Department shall conduct a test of 100 marks after the completion of all the experiments listed in the syllabus.

• In a test, test write-up, conduction of experiment, acceptable result, and procedural knowledge will carry a weightage of 60% and the rest 40% for viva-voce.

• The suitable rubrics can be designed to evaluate each student's performance and learning ability.

• The marks scored shall be scaled down to **20 marks** (40% of the maximum marks). The Sum of scaled-down marks scored in the report write-up/journal and marks of a test is the

total CIE marks scored by the student.

Semester End Evaluation (SEE):
• SEE marks for the practical course are 50 Marks.
• SEE shall be conducted jointly by the two examiners of the same institute, examiners are appointed by the Head of the Institute.
• The examination schedule and names of examiners are informed to the university before the conduction of the examination. These practical examinations are to be conducted between the schedule mentioned in the academic calendar of the University.
• All laboratory experiments are to be included for practical examination.
• (Rubrics) Breakup of marks and the instructions printed on the cover page of the answer script to be strictly adhered to by the examiners. **OR** based on the course requirement evaluation rubrics shall be decided jointly by examiners.
• Students can pick one question (experiment) from the questions lot prepared by the examiners jointly.
• Evaluation of test write-up/ conduction procedure and result/viva will be conducted jointly by examiners.
• General rubrics suggested for SEE are mentioned here, writeup-20%, Conduction procedure and result in -60%, Viva-voce 20% of maximum marks. SEE for practical shall be evaluated for 100 marks and scored marks shall be scaled down to 50 marks (however, based on course type, rubrics shall be decided by the examiners) Change of experiment is allowed only once and 15% of Marks allotted to the procedure part are to be made zero. **The minimum duration of SEE is 02 hours**

The Correlation of Course Outcomes (CO's) and Program Outcomes (PO's)

Course Code:	BEEL456D	TITLE: Arduino And Raspberry Pi Based Project								Faculty Member: SHREESHAYANA R			
List of Course Outcomes	Program Outcomes												
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO-1	3	3	3	-	3	-	-	-	3	3	-	3
CO-2	3	3	3	-	3	-	-	-	3	3	-	3
CO-3	3	3	3	-	3	-	-	-	3	3	-	3
CO-4	3	3	3	-	3	-	-	-	3	3	-	3

Note: 3 = Strong Contribution   2 = Average Contribution   1= Weak Contribution   - = No Contribution

The Correlation of Course Outcomes (CO's) and Program Specific Outcomes (PSO's)

Course Code:	BEEL456D	TITLE: Arduino And Raspberry Pi Based Project	Faculty Member: SHREESHAYANA R
List of Course Outcomes	Program Specific Outcomes		
	PSO1		PSO2
CO-1	-		3
CO-2	-		3
CO-3	-		3
CO-4	-		3

Note: 3 = Strong Contribution   2 = Average Contribution   1 = Weak Contribution   - = No Contribution