ST. ALOYSIUS COLLEGE (AUTONOMOUS), JABALPUR

Reaccredited 'A+ 'Grade by NAAC(CGPA:3.68/4.00)
College with Potential for Excellence by UGC
DST-FIST Supported & STAR College Scheme by DBT

Faculty of Science

Bachelor of Computer Application
BCA III Semester
Paper: Elective - II
Internet of Things

Course Outcomes

CO. No.	Course Outcomes	Cognitive Level
CO 1	To understand the basics of the Internet of Things	U, R
CO 2	To get an idea of some of the application areas where the Internet of Things can be applied.	U, R, Ap
CO 3	To understand the middleware for the Internet of Things and the concepts of the Web of Things.	U, Ap, C
CO 4	To understand the concepts of the Cloud of Things with an emphasis on Mobile cloud computing.	An, Ap, C
CO 5	To understand the IOT protocols.	U, Ap, C

Credit and Marking Scheme

	Credits	Marks		Total Marks
		Internal	External	
Theory	4	40	60	**100**
Practical	2	40	60	**100**
Total	**6**		**200**	

Evaluation Scheme

	Marks	
	Internal	External
Theory	3 Internal Exams of 20 Marks (During the Semester) (Best 2 will be taken)	1 External Exams (At the End of the Semester)
Practical	3 Internal Exams (During the Semester) (Best 2 will be taken)	1 External Exams (At the End of the Semester)

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BCA III Semester   **Paper: Elective-II**

Internet of Things
Theory

No. of Lectures (in hours per week): 2 Hrs. per week

Total No. of Lectures: 60 Hrs.   **Maximum Marks:** 60

Units	Topics	No. of Lectures
I	Introduction: Introduction: Definition, characteristics of IoT, IoT Conceptual framework, IoT Architectural view, Physical design of IoT, Logical design of IoT, Application of IoT, Arduino IDE, Setup(), loop(), delay, bound, serial monitor.	15
II	Machine-to-machine (M2M). SDN (software-defined networking) and NFV (network function virtualization) for IoT, data storage in IoT. IoT Cloud-Based Services.	15
III	Design Principles for Web Connectivity: Web Communication Protocols for connected devices, Message Communication Protocols for connected devices, SOAP, and REST. HTTP Restful Web Sockets. Internet. Connectivity Principles: Internet Connectivity, Internet-based communication, IP addressing in IoT, and Media Access control.	15
IV	Sensor Technology, Participatory Sensing, Industrial IOT and Automotive IOT, Actuator. Sensor data Communication Protocols, Radio Frequency Identification Technology, Wireless-Sensor Network Technology. IoT Design methodology: Specification Requirement, process, model, service, functional & operational view. IoT Privacy and security solutions, Raspberry Pi & Arduino devices. IoT Case studies: smart city streetlights control & monitoring, E-waste Management.	15

Text Books:

- Rajkamal, Internet of Things—, Tata McGraw Hill publication.
- Hakima Chaouchi —The Internet of Things: Connecting Objects, Wiley publication.
- Francis Dacosta -Rethinking the Internet of things: A scalable Approach to connecting everything, 1st edition, Apress publications20l3.
- Donald Norris—The Internet of Things: Do-It-Yourself at Home Projects for Arduino, Raspberry Pi, and BeagleBone Black—, McGraw Hill publication.

Reference books:

- I . Philip Levis, -TinyOS Programming.
- D. Norris, —The Internet of Things: Do-it-Yourself Projects with Arduino, Raspberry Pi, and Beagle Bone Black, McGraw-Hill Education, New Delhi.
- Raj Karnal, —Internet of Things: Architecture and Desist, Tata McGraw Hill publication.
- Pajankarand A. Kakkar, —Raspberry Piby Example J, Pack Publishing Ltd, Birmingham, UK.
- S. Dooks published by II.P. Hindi Granth Academy, Bhopal

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BCA III Semester   **Paper: Elective-II**

Internet of Things
List of Practical

Main

1. To interface LED with Arduino /Raspberry Pi and write a program to turn on LED after every 2 seconds.
2. To interface BUZZER with Arduino /Raspberry Pi and write a program to turn on LED after every 2 seconds.
3. To interface Push button/Digital sensor (IR/PDR) with Arduino/RaspberryPi and write a program to turn on LED when push button is pressed or at sensor detection.
4. Simulate the rolling of a dice using LEDs. Use 7 LEDs to represent the numbers 1 to 6 and a random number generator in Arduino to light up the corresponding LED when a button is pressed.
5. Simulate a traffic light system using LEDs. Use red, yellow, and green LEDs to represent a traffic signal and control the timing with Arduino code to simulate traffic light changes.
6. To interface IR sensor with Arduino/Raspberry Pi and Write a program to turn on an LED when motion is detected.
7. To interface DHT11 sensor with Arduino/Raspberry Pi and write a program to Measure and display temperature and humidity readings on the Serial Monitor.
8. To interface motor using relay with Arduino/Raspberry Pi and write a program to turn on motor when push button is pressed.
9. To interface blue tooth with Arduino/Raspberry Pi and write a program to send sensor data to smartphone using Bluetooth.
10. Write a program Arduino/Raspberry Pi to upload temperature and humidity data to thing speak cloud.

Other

1. Write a program to turn a device on/off based on input from a push button.
2. Create a system that triggers an alarm (buzzer) when temperature exceeds a certain threshold or motion is detected.
3. Use NodeMCU to send temperature and humidity readings to ThingSpeak.
4. Monitor water levels in tanks by Using ultrasonic/IR sensors to measure water levels and send alerts via RED and GREEN LED when levels are low or high.
5. To interface Bluetooth with Arduino/Raspberry Pi and write a program to turn LED OFF when 1 "0'is received from smartphone using Bluetooth.
6. Write a program Arduino/Raspberry Pi to retrieve temperature and humidity data from thing speak cloud.
7. Develop a memory game using LEDs. Create a sequence of LED lights that the player has to repeat. The Arduino will keep track of the score based on correct repetitions.
8. Simulate a heartbeat using an LED. Program an LED to blink in a pattern that mimics a heartbeat (e.g., quick blink followed by a pause).
9. Create a visual effect like a dance floor. Use multiple LEDs to create a sequence of lights that change in sync with music or in a pre-programmed pattern.

Project:

- **Objective**: Create a smart home prototype.
- **Task**: Combine all previous experiments to build a system that monitors temperature, humidity, and motion, triggering alarms and controlling appliances via a web interface.
- **Materials**: DHT11 sensor, IR sensor, relay module, LED, buzzer, NodeMCU, breadboard, jumper wires.