**MANAV RACHNA INTERNATIONAL INSTITUTE OF RESEARCH AND STUDIES**

(Deemed to be University under section 3 of the UGC Act 1956)

**NAAC 'A' Grade University**

**BCS-DS-731: INTRODUCTION TO IoT (CC)**

Periods/week Credits Max. Marks : 200

L :2 T: 0 2.0 Continuous Evaluation : 100

Duration of Exam: 3 Hrs End Sem Examination : 100

**Pre-Requisite: Programming : Python, Javascript, C/C++, Basic knowledge of any of Azure, concepts of networking**

**Course Type: Program Electives**

**Course Outcomes:** Students will be able to-

BCS-DS-731.1 Describe concepts and technologies of IoT communication.

BCS-DS-731.2 Define the processes for IoT solutions and data management in IoT.

BCS-DS-731.3 Identify different infrastructure components including sensors, embedded hardware,

gateways and network systems for IoT applications.

BCS-DS-731.4 Differentiate between the levels of the IoT stack and be familiar with the key

technologies and protocols employed at each layer of the stack.

BCS-DS-731.5 Illustrate security requirements and privacy risks in IoT communication.

BCS-DS-731.6 Apply the knowledge and skills acquired during the course to build and test a

complete, working IoT system involving prototyping, programming and data analysis.

**PART- A**

**Unit-1: Introduction**

1.1 IOT Concepts

1.2 Introduction to IOT Communications

1.3 Telemetry vs IOT

1.4 Applications of IOT Communications

1.5 People, Processes and Devices.

**Unit-2: IOT Technologies behind smart and intelligent devices**

2.1 Automation, asset management

2.2 Telemetry, transportation, telematics.

2.3 Telemetry and Telemetric; Report location, logistics

2.4 Tracking and remote assistance; next generation kiosks

2.5 Self-service technology; Cellular IOT connectivity services

**Unit-3: IOT Applications**

3.1 IOT Verticals

3.2 IOT Hosted Services

3.3 IOT Application development.

3.4 IOT Connectivity

3.5 IOT Software providers.

**PART-B**

**Unit-4: IOT Systems and Networks**

4.1 Study of RF Wireless Sensors

4.2 Wireless networks and Wireless Sensor Networks

4.3 Computer Connected to Internet

4.4 Network Devices

4.5 Device configuration and management

4.6 Exchange information in real time without human intervention.

**Unit-5: IOT Design and System Engineering**

5.1 IOT Requirements; Hardware & Software

5.2 Study of IOT Sensors

5.3 Tagging and Tracking

5.4 Embedded Products

5.5 IOT Design; (U) SIM Card Technology

5.6 IOT Connectivity and Management

5.7 IOT Security & IOT Communication.

**Unit-6: IOT Communication Technologies & Security**

6.1 Cellular Machine-to- Machine (M2M) application networks

6.2 Software for M2M Applications, Hardware

6.3 IP Based Cellular Networks & 3G, 4G.

6.4 Security & Trust M2M Communications; Secure Communications

6.5 M2M Security Framework

6.6 Securing Data input/output and internet communication.

**Text Books / Reference Books:**

Introduction to IOT, IBM ICE Publication.

**Software required/Weblinks:**

https://onlinecourses.nptel.ac.in/noc17\_cs22

www.analyticsvidya.com

**Instructions for paper setting:** Seven questions are to be set in total. First question will be conceptual covering entire syllabus and will be compulsory to attempt. Three questions will be set from each Part A and Part B (one from each unit) Student needs to attempt two questions out of three from each part. Each question will be of 20 marks.

**Distribution of Continuous Evaluation:**

|  |  |
| --- | --- |
| Sessional- I | 30% |
| Sessional- II | 30% |
| Assignment/Tutorial | 20% |
| Class Work/ Performance | 10% |
| Attendance | 10% |

**Evaluation Tools:**

Assignment/Tutorials

Sessional tests

Surprise questions during lectures/Class Performance

End Semester Examination

**COURSE ARTICULATION MATRIX :**

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **CO Statement**  **(BCS-DS-731)** | **PO**  **1** | **PO**  **2** | **PO**  **3** | **PO**  **4** | **PO**  **5** | **PO**  **6** | **PO**  **7** | **PO**  **8** | **PO**  **9** | **PO**  **10** | **PO**  **11** | **PO**  **12** | **PSO**  **1** | **PSO**  **2** | **PSO**  **3** |
| BCS-DS-731.1 | 3 | - | - | - | - | - | - | - | - | - | - | 1 | - | - | - |
| BCS-DS-731.2 | - | 3 | - | - | - | - | - | - | - | - | - | - | - | - | - |
| BCS-DS-731.3 | - | - | 3 | - | - | - | - | - | - | - | - | - | - | - | - |
| BCS-DS-731.4 | - | - | 2 | 3 | 2 | - | - | - | - | - | - | - | - | - | - |
| BCS-DS-731.5 | - | - | - | - | - | 2 | 3 | 1 | - | - | - | - | - | - | - |
| BCS-DS-731.6 | - | - | - | 2 | 2 | 3 | - | - | - | 1 | - | 2 | 1 | - | - |

**MANAV RACHNA INTERNATIONAL INSTITUTE OF RESEARCH AND STUDIES**

(Deemed to be University under section 3 of the UGC Act 1956)

**NAAC 'A' Grade University**

**BCS-DS-773: INTRODUCTION TO IoT LAB (CC)**

Periods/week Credits Max. Marks : 100

P: 2 1.0 Continuous Evaluation : 50

Duration of Examination: 2 Hrs End Sem Examination : 50

**Co-Requisite: Introduction To IoT (BCS-DS-731)**

# Course Type: Program Electives

**Course Outcomes:** Students will be able TO-

1. Identify different infrastructure components including sensors, embedded hardware, gateways and network systems for specified IoT application.
2. Set up an embedded/microcomputer system and enable to write IoT application on it.
3. Integrate microcontroller/microcomputer system with sensors to acquire data in real time.
4. Establish a secure and consistent communication from microcontroller/microcomputer system to the cloud.
5. Design an application to create communication with multiple sensors to store data locally and make it available on the Internet for subsequent comparison with cloud data.
6. Apply the knowledge and skills acquired during the course to design IoT based solutions for real world problems.

**List of Experiments**:

1. Write a program to assign NET10 module an IPv4 address and perform a ping operation to the PC.
2. Design an application to store/update the sensed value to a HTTP webpage using the iSense IP stack and API’S
3. Implement Constraint Application Protocol (CoAP) to access the sensor value at the application layer.
4. Design a web page with default IP address such that it should display the values sent by the sensor with NET 10 interface.

**Note:** At least 5 more exercises to be given by the teacher concerned.

**Distribution of Continuous Evaluation:**

|  |  |
| --- | --- |
| Viva- I | 30% |
| Viva- II | 30% |
| File/Records | 20% |
| Class Work/ Performance | 10% |
| Attendance | 10% |

**Evaluation Tools:**

Experiments in lab

File work/Class Performance

Viva (Question and answers in lab)

End Semester Practical Examination

**COURSE ARTICULATION MATRIX:**

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **CO Statement**  **(BCS-DS-773)** | **PO**  **1** | **PO**  **2** | **PO**  **3** | **PO**  **4** | **PO**  **5** | **PO**  **6** | **PO**  **7** | **PO**  **8** | **PO**  **9** | **PO**  **10** | **PO**  **11** | **PO**  **12** | **PSO**  **1** | **PSO**  **2** | **PSO**  **3** |
| BCS-DS-773.1 | 1 | 3 | - | - | - | - | - | - | - | - | - | 1 | - | - | 1 |
| BCS-DS-773.2 | - | - | 3 | 1 | - | 2 | - | - | - | - | - | 1 | - | - | - |
| BCS-DS-773.3 | - | - | 2 | 2 | - | - | - | - | - | - | - | 1 | - | - | - |
| BCS-DS-773.4 | - | - | - | - | 3 | 2 | 2 | - | - | - | - | 1 | - | - | - |
| BCS-DS-773.5 | - | - | - | 2 | 3 | 3 | 2 | - | - | - | - | 1 | 1 | - | - |
| BCS-DS-773.6 | - | - | - | - | 2 | 2 | 3 | - | 1 | - | 2 | 1 | - | 2 | - |