



Government Holkar (Model, Autonomous) Science
College, Indore (M.P.)

Computer Science Department

Part A - Introduction			
Programme - B.Sc. (Computer Science - Major)	Class – B.Sc. VII Semester	Year- 2024	Session- 2024-25
Course Type (Computer Science) – Major			
1	Course Code	S7-CSC11	
2	Course Title	Internet of Things (IoT)	
3	Prerequisite (if any)	To study this course a student must have degree course in B.Sc. .	
4	Course Learning Outcomes (CLO)	After the completion of this course, a student shall be able to do the following: 1. Understand the basic concepts of the IoT. 2. Use of Devices, Gateways and Communication in IoT. 3. Learn Arduino and Python Programming. 4. Implement IoT with Raspberry Pi. 5. Explore the relationship between IoT, cloud computing, and data analytics.	
5	Credit Value	4 Credits	
6	Total Marks	Formative Assessment (CCE) – 40 Marks Summative Assessment (End Semester Exam) – 60 Marks Total 40+60= 100 Marks	Minimum Pass Marks – 35

Mr. Mohit Gupta
Student
Clause 06

Mr. Manish Kumar
Industrial Person
Clause 05

Dr. Ugrasen Suman
Subject Expert
Clause 04

Dr. Sharad Gangele
Subject Expert
Clause 03

Dr. Sanjeev Sharma
Subject Expert
Clause 03

Dr. Pradeep Sharma
Convener & HoD

Part A - Introduction			
Programme - B.Sc. (Computer Science - Major)	Class – B.Sc. VII Semester	Year- 2024	Session- 2024--25
Course Type (Computer Science) – Major			
Course Code		S7-CSCIT	
Course Title		Internet of Things (IoT)	

Part – B Content of the Course		
Total no. of lectures – As per UGC rules (1 Credit = 15 Lectures)		
S. No.	Topics	No. of Lectures
I	Introduction to IoT: Definition, Characteristics, Applications, Evolution, Enablers, Connectivity Layers, Addressing, Networking and Connectivity Issues, Network Configurations, Multi -Homing, Sensing: Sensors and Transducers, Classification, Different Types of Sensors, Errors, Actuation: Basics, Actuator Types- Electrical, Mechanical Soft Actuators	9
II	Networking — Introduction, Basics of Networking, Communication Protocols, Sensor Networks. Machine to Machine Communication - IoT Components, Inter Dependencies, SoA, Gateways, Comparison Between IoT & Web, Difference Protocols, Complexity of Networks, Wireless Networks, Scalability, Protocol Classification, MQTT & SMQTT, IEEE 802.15.4, Zigbee.	9
III	Arduino Programming: Interoperability in IoT, Introduction to Arduino Programming, Integration of Sensors and Actuators with Arduino. Python Programming and Raspberry Pi: Introduction to Python Programming, Introduction to RaspberryPi, Implementation of IoT with Raspberry Pi.	22
IV	Data Analytics and Cloud Computing: Data Handling and Analytics, Cloud Computing Fundamentals, Cloud Computing Service Model, Cloud Computing Service Management and Security, Sensor-Cloud Architecture, View and Dataflow.	8

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Course Title	Internet of Things(IoT)		

S. No.	Topics	No. of Lectures
V	FOG Computing and Case Studies: FOG Computing: Introduction, Architecture, Need, Applications and Challenges Industrial IoT, Case Studies: Agriculture, Healthcare, Activity Monitoring.	10

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Course Title	Internet of Things(IoT)		

Part – C Learning Resources
Text Books, Reference Books, Other Resources
<p>Suggested Readings:</p> <p>Text Books:</p> <ol style="list-style-type: none"> 1. Internet of Things: Architecture and Design Principles, by Rajkamal, Mc Graw Hill India, 2017 2. The Internet of Things: Enabling Technologies, Platforms, and Use Cases", by Pethuru Raj and Anupama C. Raman (CRC Press). 3. Internet of Things: A Hands-on Approach", by A Bahga and Vijay Madisetti (Universities Press). <p>Suggested Digital Platforms Web Links:</p> <ol style="list-style-type: none"> 1. https://github.com/connectIoT/iottoolkit 2. https://www.arduino.cc/ 3. http://www.zettajs.org/ 4. https://nptel.ac.in/courses/108/108/108108098/ <p>Suggested Equivalent Online Courses:</p> <ol style="list-style-type: none"> 1. https://nptel.ac.in/courses/108/108/108108179/ 2. https://nptel.ac.in/courses/106/105/106105195/ 3. https://nptel.ac.in/courses/106/105/106105166/

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Course Title	Internet of Things(IoT)		

Part – D Assessment and Evaluation				
Internal Assessment: Continuous Comprehensive Evaluation (CCE)/ Formative Assessment: 40 Marks Formative Assessment shall be based on – Quiz, Seminar, Presentation, Written test, Case Study, Project, Assignment etc. The division of marks is as follows:			External Evaluation (Summative Assessment): End Semester Exam:60 Marks Time: 03 hours	
Test I	20 Marks	Best two test Marks = (20 + 20)	Section (A): 5 Objective Questions (1 mark each)	5 x 1 = 5
Test II	20 Marks		Section (B): 5 Short Questions out of eight questions (200 words each) (7 Marks each)	5 x 7 = 35
Test III	20 Marks		Section (C): Two long questions out of four questions (500 Words each) (10 Marks each)	2 x 10 = 20
Total Internal Assessment (CCE) Marks		40 Marks	Total External Evaluation (Theory) Marks (A+B+ C)	60 Marks
Note;-	1.	For Major, Minor, Open Elective, Foundation and Vocational Courses, Part D will be as per the scheme of marks given.		
	2.	The student should secure 35% marks in Internal Assessment (CCE) and External Evaluation (theory) combined.		





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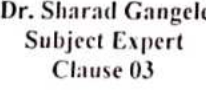
Computer Science Department

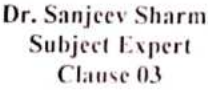
Part A- Introduction (Practical)			
Programme - B.Sc. (Computer Science - Major)		Class – B.Sc. VII Semester	Year- 2024 Session- 2024--25
Course Type (Computer Science) – Major			
1.	Course Code	S7-CSCITP	
2.	Course Title	Internet of Things(IoT) Lab	
3.	Pre-requisite (if any)	To Study this course a student must have degree course in B.Sc.	
4.	Course Learning Outcomes (CLO)	After the completion of this course, a student shall be able to do the following: 1. Use Devices, Gateways and Communication in IoT. 2. Learn Arduino and Python Programming. 3. Implement IoT with Raspberry Pi. 4. Explore the relationship between IoT, cloud computing.	
5.	Credit Value	2 Credits	
6	Total Marks	Formative Assessment (CCE) – 40 Marks Summative Assessment (End Semester Exam) – 60 Marks Total 40+60= 100 Marks	Minimum Pass Marks – 35



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Clause 06


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Course Type (Computer Science) – Major			
1.	Course Code	S7-CSC1TP	
2.	Course Title	Internet of Things(IoT) Lab	

Part B- Content of the Course	
Total no. of lectures – As per UGC rules: 30	
Suggestive List of Practicals	
1.	To interface LED/Buzzer with Arduino/Raspberry Pi and write a program to turn ON LED for 1 sec after every 2 seconds.
2.	To interface Push button/Digital sensor (IR/LOR) with Arduino/Raspberry Pi and write a program to turn ON LED when push button is pressed or at sensor detection.
3.	To interface DHT11 sensor with Arduino/Raspberry Pi and write a program to print Temperature and humidity readings.
4.	To interface motor using relay with Arduino/Raspberry Pi and write a program to turn ON motor when push button is pressed.
5.	To interface OLED with Arduino/Raspberry Pi and write a program to print temperature and humidity readings on it.
6.	To interface Bluetooth with Arduino/Raspberry Pi and write a program to send sensor data to smartphone using Bluetooth.
7.	To interface Bluetooth with Arduino/Raspberry Pi and write a program to turn LED ON/OFF when 'I/O' is received from smartphone using Bluetooth.
8.	Write a program on Arduino/Raspberry Pi to upload temperature and humidity data to things peak cloud.
9.	Write a program on Arduino/Raspberry Pi to retrieve temperature and humidity data from thing speak cloud.
10.	To install MySQL database on Raspberry Pi and perform basic SQL queries.
11.	Write a program on Arduino/Raspberry Pi to publish temperature data to MQIT broker.
12.	Write a program on Arduino/Raspberry Pi to subscribe to MQTT broker for temperature data and print it.
13.	Write a program to create TCP server on Arduino/Raspberry Pi and respond with humidity data to TCP client when requested.
14.	Write a program to create UDP server on Arduino/Raspberry Pi and respond with humidity data to UDP client when requested.

Part A- Introduction (Practical)			
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1.	Course Code	S7-CSC1TP	
2.	Course Title	Internet of Things(IoT) Lab	

Part – C Learning Resources	
Text Books, Reference Books, Other Resources	
Suggested Readings:	
Text Books:	
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Part D- Assessment and Evaluation	
Suggested Continuous Evaluation methods:	
Internal Assessment/Formative Examination(A):	40 Marks
Lab Record	15 Marks
Attendance in the Lab	05 Marks
Assignments (It can be in different modes)	20 Marks
End Semester External Evaluation (B):	60 Marks
Viva Voce on Practical	10 Marks
Practical Record File	10 Marks
Experiments	40 Marks
Total Marks (A+B)	(40 + 60 =100 Marks)