THIRD-YEAR OF BACHELOR OF COMPUTER SCIENCE REVISED SYLLABUS ACCORDING TO CBCS

COURSE TITLE: ARCHITECTING OF IOT

SEMESTER-V, W.E.F. 2021-2022

Recommended by the Board of Studies in Computer Science
And
Approved by the Academic Council

Devrukh Shikshan Prasarak Mandal's
Nya. Tatyasaheb Athalye Arts, Ved. S. R. Sapre Commerce, and Vid. Dadasaheb Pitre Science College (Autonomous), Devrukh.
Tal. Sangameshwar, Dist. Ratnagiri-415804, Maharashtra, India

Academic Council Item No: _____

Name of the Implementing Institute	:	Nya. Tatyasaheb Athalye Arts, Ved. S. R. Sapre Commerce, and Vid. Dadasaheb Pitre Science College (Autonomous), Devrukh. Tal. Sangameshwar, Dist. Ratnagiri-415804,
Name of the Parent University	:	University of Mumbai
Name of the Programme	:	Bachelor of Science
Name of the Department	:	Computer Science
Name of the Class	:	Third Year
Semester	:	Five
No. of Credits	:	03
Title of the Course	:	Architecting of IoT
Course Code	:	USCST55
Name of the Vertical	:	Elective II
Eligibility for Admission	:	Any 12^{th} Pass seeking Admission to Degree Programme in adherence to Rules and Regulations of the University of Mumbai and Government of Maharashtra
Passing Marks	:	40%
Mode of Assessment	:	Formative and Summative
Level	:	UG
Pattern of Marks Distribution for TE and CIA	:	70:30
Status	:	CBCS
To be implemented from Academic Year	:	2021-2022
Ordinances /Regulations (if any)		

Syllabus for Third Year of Bachelor of Science in Computer Science

(With effect from the academic year 2021-2022)

SEMESTER-V **Paper No.– 5**

Course Title: Architecting of IoT **No. of Credits - 03**

Type of Vertical: Elective II **COURSE CODE: USCST55**

Learning Outcomes Based on BLOOM's Taxonomy:

After completing the course, the learner will be able to…		
Course Learning Outcome No.	Blooms Taxonomy	Course Learning Outcome
CO-01	Understand	Learners are able to design & develop IoT Devices..
CO-02	Understand	They should also be aware of the evolving world of M2M Communications and IoT analytics.

Syllabus for Third Year of Bachelor of Science in Computer Science

(With effect from the academic year 2021-2022)

SEMESTER-V **Paper No.– 5**

Course Title: Architecting of IoT **No. of Credits - 03**

Type of Vertical: Elective II **COURSE CODE: USCST55**

COURSE CONTENT			
Unit No.	**Content**	**Credits**	**No. of Lectures**
I	IoT-An Architectural Overview: Building architecture, Main design principles and needed capabilities, An IoT architecture outline, standards considerations. IoT Architecture-State of the Art : Introduction, State of the art, Reference Model and architecture, IoT reference Model - IoT Reference Architecture Introduction, Functional View, Information View, Deployment and Operational View, Other Relevant architectural views.	**01**	**15**
II	IoT Data Link Layer and Network Layer Protocols: PHY/MAC Layer(3GPP MTC, IEEE 802.11, IEEE 802.15), Wireless HART,Z-Wave, Bluetooth Low Energy, Zigbee Smart Energy DASH7 Network Layer:IPv4, IPv6, 6LoWPAN, 6TiSCH,ND, DHCP, ICMP, RPL, CORPL, CARP	**01**	**15**
III	Transport layer protocols : Transport Layer (TCP, MPTCP, UDP, DCCP, SCTP)-(TLS, DTLS) Session layer: Session Layer-HTTP, CoAP, XMPP, AMQP, MQTT Service layer protocols: Service Layer -oneM2M, ETSI M2M, OMA, BBF	**01**	**15**

	Total	03	45

Required Previous Knowledge

Students should know basic concepts related to computer and computer handling

Access to the Course

The course is available for all the students admitted for Bachelor of Science (Computer Science).

Forms of Assessment

The assessment of the course will be of Diagnostic, Formative and Summative type. At the beginning of the course diagnostic assessment will be carried out. The formative assessment will be used for the Continuous Internal Evaluation whereas the summative assessment will be conducted at the end of the term. The weightage for formative and summative assessment will be 60:40. The detailed pattern is as given below.

Semester End Evaluation (60 Marks)
Question Paper Pattern
Time: 2 hours

Question No.	Unit/s	Question Pattern	Marks
Q.1	I ,II &III	MCQ/Fill in the blanks/One line sentence	10
Q.2	I	Descriptive Questions	20
Q.3	II	Descriptive Questions	20
Q4.	III	Descriptive Questions	20
	Total		**70**

Internal evaluation (30 Marks)

Sr. No.	Description	Marks
1	Classroom Tests	10
2	Project/ Viva/ Presentations/ Assignments	10
3	Attendance	10
	Total	**30**

Grading Scale

10 points grading scale will be used. The grading scale used is O to F. Grade O is the highest passing grade on the grading scale, and grade F is a fail. The Board of Examinations of the college reserves the right to change the grading scale.

Reference book:

- From Machine-to-Machine to the Internet of Things: Introduction to a New Age of Intelligence, Jan Holler, Vlasios Tsiatsis, Catherine Mulligan, Stefan Avesand, Stamatis Karnouskos, David Boyle,1st Edition, Academic Press, 2014.
- Learning Internet of Things, Peter Waher, PACKT publishing, BIRMINGHAM – MUMBAI,2015

Text book:

- Techmax publication book

Additional References:

- Building the Internet of Things with IPv6 and MIPv6: The Evolving World of M2M Communications, Daniel Minoli, Wiley Publications,2013
- Internet of Things (A Hands-onApproach), Vijay Madisetti and Arshdeep Bahga, 1st Edition, VPT, 2014.
- http://www.cse.wustl.edu/~jain/cse570-15/ftp/iot_prot/index.html

Course: USCSP59	Practical of USCST55 (Credits : 1, Lectures/Week: 3)
USCSP59	1. a) Edit text files with nano and cat editor, Learn sudo privileges and Unix shell commands such as cd , ls , cat, etc b) Learn to set dynamic and static IP. Connect to and Ethernet and WiFi network. Learn to vnc and ssh into a raspberry pi using vnc and putty from a different computer on the network. c) Write a basic bash script to open programs in kiosk mode. Learn how to autostart programs on boot. 2. Run the node red editor and run simple programs and trigger gpios. Use basic nodes such as inject, debug, gpio 3. Open the python idle editor and run simple Python scripts such as to print Fibonacci numbers, string functions. Learn how to install modules using Pip and write functions 4. Setup a physical button switch and trigger an led in node red and python w debounce 5. Write simple JavaScript functions in Node-Red simple HTTP server page using node red 6. Setup a TCP server and client on a raspberry pi using Python modules to send messages and execute shell commands from within python such as starting another application 7. Trigger a set of led Gpios on the pi via a Python Flask web server 8. Interface the raspberry pi with a 16x2 LCD display and print values. 9. Setup a Mosquitto MQTT server and client and write a Python script to communicate data between Pi's. 10. Interface with an Accelerometer Gyro Mpu6050 on the i2c bus and send sensor values over the internet via mqtt.