SARVAJANIK UNIVERSITY
Sarvajanik College of Engineering and Technology
Bachelor of Technology

B. Tech. Semester VI

Subject Name: **IoT and Cloud Computing** **Subject Code: BTEC14615**
Type of course: PEC
Prerequisite: Microcontrollers, Sensors, And Interfacing
Rationale: This course provides an overview of the Internet of Things (IoT) and Cloud Computing concepts, infrastructures and capabilities. This will help students gain the necessary knowledge to construct IoT systems and use cloud services for processing and storage of the data produced by the IoT devices.

Teaching and Examination Scheme:

Teaching Scheme				Theory Marks			Practical Marks		Total
L	T	P	C	TEE	CA1	CA2	TEP	CA3	150
3	0	2	4	60	25	15	30	20	

CA1: Continuous Assessment (assignments/projects/open book tests/closed book tests **CA2:** Sincerity in attending classes/class tests/ timely submissions of assignments/self-learning attitude/solving advanced problems **TEE:** Term End Examination **TEP:** Term End Practical Exam (Performance and viva on practical skills learned in course) **CA3:** Regular submission of Lab work/Quality of work submitted/Active participation in lab sessions/viva on practical skills learned in course

Content:

Sr. no.	Topics	Teaching Hrs.	Module % Weightage
1.	**Introduction to Internet of Things:** IoT Definition and characteristics, Physical and logical design of IoT, IoT enabling Technologies, IoT Levels and Deployment Templates, IoT and M2M, Domain Specific IoTs.	6	15
2.	**Introduction to Cloud Computing:** Computing and its paradigms, Cloud Computing: A new paradigm, Cloud Architecture, Differences and similarities among computing paradigms, central idea behind cloud computing, Cloud services and deployment models, properties, characteristics, benefits and challenges of CC, Cloud supporting services.	9	20
3.	**Cloud providers and services:** Cloud infrastructure service providers and benefits, Identification of application need for choosing cloud infrastructure provider, Cloud platform service providers and benefits, Identification of application need for choosing cloud platform provider, Cloud software service providers and benefits, Identification of application need for choosing cloud software provider,	9	20

4.	**Communication Protocols:** SOAP, REST, HTTP, HTTPS, FTP, Telent, Constrained application protocol CoAP), Message Queue Telemetry Transport-MQTT, WebSockets, IP addressing in IoT, Media Access Control.	6	15
5.	**Data Collection, Storage and Computing Using a Cloud Platform:** Sensors for IoT applications, NodeMCU and its programming, Implementation of IoT with Edge devices, Data Collection, Storage and Computing, everything as a service and Cloud Service Models, IoT Cloud-based services using different platforms, Controlling devices through cloud using mobile application and web application, Types and configurations of gateways, Specifications of IoT gateways.	10	20
6.	**IoT Cloud Computing consumer case studies:** Consumer IoT, Commercial IoT, Industrial IoT, Infrastructure IoT, Military Things (IoMT), Cloud infrastructure adoption case study: Nutritious food, gamysoft application, ERPs.	5	10

Suggested Specification table with Marks (Theory/Practical):

% Distribution of Marks					
R Level	**U Level**	**A Level**	**N Level**	**E Level**	**C Level**
20	20	20	20	10	10

Legends: R: Remembrance, **U:** Understanding; **A:** Application, **N:** Analyze, **E:** Evaluate **C:** Create and above Levels **(Revised Bloom's Taxonomy)**

Note: This specification table shall be treated as a general guideline for students and teachers. The actual distribution of marks in the question paper may vary slightly from above table.

Reference Text Books:

Sr. No.	**Title of book /article**	**Author(s)**	**Publisher and details like ISBN**	**Year of publication**	**Publication Edition**
1.	Cloud Computing, Fundamentals, Industry approach and trends	Rishabh Sharma	Wiley	2017	2nd
2.	Internet of Things: Architecture and Design Principles	Raj Kamal	Mc Graw Hill 9789352605224 9352605225	2017	Latest
3.	An Introduction: Internet of Things, Connecting	Rahul Dubey	CENGAGE 9789353500931	2019	Latest

	Devices, Edge Gateway, and Cloud with Applications		9353500931		
4.	Internet of Things (A Hands-on-Approach)"	Vijay Madisetti and Arshdeep Bahga	University Press, 9788173719547	2015	Latest
5.	The Internet of Things: Do it yourself Projects with Arduino, Raspberry PI and BeagleBone Black	Donald Noris	Mc Graw Hill 9780071835213	2015	Latest
6.	Designing the Internet of things	Adrian McEwen & Hakim Cassimally	Willey 9781118430620 9781118430637 9781118430651	2014	Latest

Course Outcome:

Sr. No.	CO Statement After learning this subject students will be able to	Marks % weightage
CO-1	Describe the characteristics and framework of Internet of Things.	20
CO-2	Explain a new paradigm of Cloud Architecture with Differences and similarities among computing paradigms.	20
CO-3	Identify the importance of application needs for choosing a cloud platform provider.	20
CO-4	Describe the architecture of various IoT communication protocols.	20
CO-5	Demonstrate the controlling of devices through cloud using mobile application and web application.	15
CO-6	Analyze numerous IoT Cloud Computing consumer case studies.	5

Mapping with POs:

	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
CO-1	3	-	-	1	-		-		-	1	-	-	-	-	-
CO-2	3	-	-	-	-		-		-	1	-	2	-	-	-
CO-3	3	-	1	1	-		1		-	2	2	2	-	-	-
CO-4	3	-	-	-	-		-		-	1	-	-	-	-	-
CO-5	3	2	3	2	3		2		3	3	3	3	2	3	-
CO-6	3	-	-	-	-	2	-		-	2	-	3	-	-	-

List of Practical:

1. List down the services offered by Azure, AWS and GOOGLE and Compare them.
2. a. Installation and configuration of Google App Engine.
   b. Develop a hello world program web application and deploy it on the Google app engine.
3. Develop a web application which displays the current date and time in a formatted way.
4. To interface Bluetooth with Arduino/Raspberry Pi and write a program to turn LED ON/OFF when '1'/'0' is received from a smartphone using Bluetooth.
5. Write a program on Arduino/Raspberry Pi to
   a. Send temperature and humidity data to thingspeak cloud channel.
   b. Retrieve temperature and humidity data from thingspeak cloud channel and analyse on Matlab.
6. To install MySQL database on Raspberry Pi and perform basic SQL queries.
7. Write a program on Arduino/Raspberry Pi to publish temperature data to MQTT broker.
8. Installation & configuration of Hadoop.
9. Project work for Design of cloud environment using open source.
10. Case study on Amazon EC2 and learn about Amazon EC2 web services.
11. Case study on Microsoft Azure to learn about Microsoft Azure is a cloud computing platform and infrastructure, created by Microsoft, for building, deploying and managing applications and services through a global network of Microsoft-managed data centers.