SARVAJANIK UNIVERSITY
SarvajanikCollege of Engineering and Technology
Bachelor of Technology

BTech-III Semester VI

Subject Name: Internet of Things **Subject Code:BTEL14613**

Type of course: Professional Elective Course (PEC)

Prerequisite: Embedded systems

Rationale: IoT market is growing rapidly from installed base of about 30 billion devices in the year 2020 and expected to grow up to 75 billion devices by 2025. IoT is useful in many sectors like consumer, commercial, infrastructure, health, industry and military. Industry 4.0 is based on IoT. This course will provide opportunity to the students for contribution in IoT applications..

Teaching and Examination Scheme:

TEACHING SCHEME				Theory Marks			Practical Marks		Total
L	T	P	C	TEE	CA1	CA2	TEP	CA3	100
3	0	0	3	60	25	15	-	-	

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, IoT characteristics, M2M and IoT, End to End IoT Architecture, Physical design of IoT, Logical Design of IoT, Overview of IoT protocols, IoT levels and deployment templates, Challenges for IoT, Interdependencies of IoT and cloud computing, Web of things.	8	15
2.	**Embedded IoT devices:** Sensors and actuators for IoT applications, IoT components and implementation, Programming of NodeMCU and Raspberry PI, Implementation of IoT with Edge devices, Reading sensor data and transmit to cloud, Controlling devices through cloud using mobile application and web application, Types and configurations of gatways, Specifications of IoT gateways (Practical aspects of this chapter should be covered during lab sessions)	12	25
3.	**IoT Protocols:** Link layer protocols, Network/internet layer protocols, Transport layer protocols, Application layer protocols: Hypertext transfer protocol (HTTP), Systematic HTTP access methodology, Web Socket, Constrained application protocol CoAP), Message Queue Telemetry Transport Protocol (MQTT), XMPP, DDS, AMQP	12	30
4.	**IoT Security and challenges :**	7	15

PEC: Professional Elective Course

	IOT Security, Dangers, Assigning values to Information, Security Components, Key Management, Update Management, Challenges in IoT security.		
5.	**IoT Applications and case study** Broad categories of IoT applications: Consumer IoT, Commercial IoT, Industrial IoT, Infrastructure IoT, Military Things (IoMT) IoT Case studies: Home automation with IoT, River water pollution monitoring, Smart city street light control and monitoring, Health care monitoring, Voice Apps on IoT device	**6**	**15**

Suggested Specification table with Marks (Theory/Practical):

% Distribution of Marks					
R Level	**U Level**	**A Level**	**N Level**	**E Level**	**C Level**
15	**35**	**30**	**5**	**5**	**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 studentsandteachers. 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.	"Internet of Things: Architecture and Design Principles,	Raj Kamal	Mc Graw Hill Education		
2.	"An Introduction to Internet of Things: Connecting Devices, Edge Gateway, and Cloud with Applications"	Rahul Dubey	Cengage India Publication		
3.	"IoT Fundamentals"	Hanes et al	Cisco Press		
4.	"Internet of Things (A Hands-on-Approach)"	Vijay Madisetti and ArshdeepBahga		2015	
5.	"Designing the Internet of Things",	A. McEwen, H. Cassimally	Wiley	2013	

PEC: Professional Elective Course

6.	"21 Internet of Things Experiments",	YashwantKanetkar	Kindle edition		
7.	"Building Arduino projects for Internet of Things"	AdeelJaved			
8.	"The Internet of Things: Do it yourself Projects with Arduino, Raspberry PI and BeagleBone Black"	Donald Noris	Mc Graw Hill Publication		
9	"Designing the Internet of things"	Adrian McEwen & Hakim Cassimally	Willey publication		

Course Outcome:

Sr. No.	CO Statement After learning this subject, students will be able to	Marks % weightage
CO-1	Understand IoT architecture	20
CO-2	Program Embedded IoT devices	30
CO-3	Use IoT protocol to upload sensor data and to control devices	30
CO-4	Design IoT application	20

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	3	1	1	1	1	2	1	-	-	1	1	2	-	-
CO-2	3	3	2	3	1	1	2	1	-	-	1	1	2	3	-
CO-3	3	3	2	1	1	1	2	1	-	-	1	1	2	-	-
CO-4	3	3	3	3	3	3	2	1	3	3	3	1	3	3	2
Rationale *															

Rationale*: Explaining why it is matching this particular program outcome

List of Open Source/learning website:

1. NPTEL online course on IoT: https://onlinecourses.nptel.ac.in/noc18_cs08
2. IoT Tutorial point www.tutorialspoint.com
3. https://www.microsoft.com/en-us/internet-of-things/
4. https://www.scnsoft.com/blog/iot-architecture-in-a-nutshell-and-how-it-works

PEC: Professional Elective Course