CONTENTS

1. Front sheet (Cover page)
2. Vision and Mission of the Department
3. Syllabus
4. Calendar of Events
5. Time table (Individual)
6. Student list
7. Lesson plan
8. Question Bank
9. CO-PO mapping
10. Assignments (3 Assignments)
11. Internal Question paper and scheme (Set-A & Set-B) (3 Internals)
12. Previous year university question papers
13. Course Materials
    - Notes/PPT/ lecture videos/ Materials/other contents related to the subject
14. Additional teaching aid with proof (TPS/flip class/programming etc) (IF ANY)
15. Slow learners and Advanced learners list (after the first internals)
16. Assignments Marks (3 Assignments)
17. Internal Test Marks (3 Internals)
18. Internal Final Marks

K.S. SCHOOL OF ENGINEERING AND MANAGEMENT, BANGALORE - 560109
DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

Course File

18CS81
INTERNET OF THINGS

VIII sem 2023-24

Faculty In-charge
BELJI T
ASSISTANT PROFESSOR
Dept of Computer Science and Engineering
KS School of Engineering & Management, Bangalore

K. S. SCHOOL OF ENGINEERING AND MANAGEMENT

VISION

To impart quality education in engineering and management to meet technological, business and societal needs through holistic education and research.

MISSION

K.S. School of Engineering and Management shall,

- Establish state-of-art infrastructure to facilitate effective dissemination of technical and Managerial knowledge.
- Provide comprehensive educational experience through a combination of curricular and Experiential learning, strengthened by industry-institute-interaction.
- Pursuesocially relevant research and disseminate knowledge.
- Inculcate leadership skills and foster entrepreneurial spirit among students.

Department of Computer Science and Engineering

VISION

To produce quality Computer Science professional, possessing excellent technical knowledge, skills, personality through education and research.

MISSION

Department of Computer Science and Engineering shall,

- Provide good infrastructure and facilitate learning to become competent engineers who meet global challenges.
- Encourages industry instituteinteraction to give an edge to the students.
- Facilitates experimental learning through interdisciplinary projects.
- Strengthen soft skill to address global challenges.

INTERNET OF THINGS (Effective from the academic year 2018 -2019) SEMESTER – VIII			
Course Code	**18CS81**	**CIE Marks**	40
Number of Contact Hours/Week	3:0:0	**SEE Marks**	60
Total Number of Contact Hours	40	**Exam Hours**	03
CREDITS –3			

Course Learning Objectives: This course (18CS81) will enable students to:

- Assess the genesis and impact of IoT applications, architectures in real world.
- Illustrate diverse methods of deploying smart objects and connect them to network.
- Compare different Application protocols for IoT.
- Infer the role of Data Analytics and Security in IoT.
- Identifysensor technologies for sensing real world entities and understand the role of IoT in various domains of Industry.

Module 1	**Contact Hours**
What is IoT, Genesis of IoT, IoT and Digitization, IoT Impact, Convergence of IT and IoT, IoT Challenges, IoT Network Architecture and Design, Drivers Behind New Network Architectures, Comparing IoT Architectures, A Simplified IoT Architecture, The Core IoT Functional Stack, IoT Data Management and Compute Stack. **Textbook 1: Ch.1, 2** **RBT: L1, L2, L3**	08
Module 2	
Smart Objects: The "Things" in IoT, Sensors, Actuators, and Smart Objects, Sensor Networks, Connecting Smart Objects, Communications Criteria, IoT Access Technologies. **Textbook 1: Ch.3, 4** **RBT: L1, L2, L3**	08
Module 3	
IP as the IoT Network Layer, The Business Case for IP, The need for Optimization, Optimizing IP for IoT, Profiles and Compliances, Application Protocols for IoT, The Transport Layer, IoT Application Transport Methods. **Textbook 1: Ch.5, 6** **RBT: L1, L2, L3**	08
Module 4	
Data and Analytics for IoT, An Introduction to Data Analytics for IoT, Machine Learning, Big Data Analytics Tools and Technology, Edge Streaming Analytics, Network Analytics, Securing IoT, A Brief History of OT Security, Common Challenges in OT Security, How IT and OT Security Practices and Systems Vary, Formal Risk Analysis Structures: OCTAVE and FAIR, The Phased Application of Security in an Operational Environment **Textbook 1: Ch.7, 8** **RBT: L1, L2, L3**	08
Module 5	
IoT Physical Devices and Endpoints - Arduino UNO: Introduction to Arduino, Arduino UNO, Installing the Software, Fundamentals of Arduino Programming. IoT Physical Devices and Endpoints - RaspberryPi: Introduction to RaspberryPi, About the RaspberryPi Board: Hardware Layout, Operating Systems on RaspberryPi, Configuring RaspberryPi, Programming RaspberryPi with Python, Wireless Temperature Monitoring System Using Pi, DS18B20 Temperature Sensor, Connecting Raspberry Pi via SSH, Accessing Temperature from DS18B20 sensors, Remote access to RaspberryPi, Smart and Connected Cities, An IoT	08

Strategy for Smarter Cities, Smart City IoT Architecture, Smart City Security Architecture, Smart City Use-Case Examples. **Textbook 1: Ch.12** **Textbook 2: Ch.7.1 to 7.4, Ch.8.1 to 8.4, 8.6** **RBT: L1, L2, L3**	

Course Outcomes: The student will be able to :

- Interpret the impact and challenges posed by IoT networks leading to new architectural models.
- Compare and contrast the deployment of smart objects and the technologies to connect them to network.
- Appraise the role of IoT protocols for efficient network communication.
- Elaborate the need for Data Analytics and Security in IoT.
- Illustrate different sensor technologies for sensing real world entities and identify the applications of IoT in Industry.

Question Paper Pattern:

- The question paper will have ten questions.
- Each full Question consisting of 20 marks
- There will be 2 full questions (with a maximum of four sub questions) from each module.
- Each full question will have sub questions covering all the topics under a module.
- The students will have to answer 5 full questions, selecting one full question from each module.

Textbooks:

1. David Hanes, Gonzalo Salgueiro, Patrick Grossetete, Robert Barton, Jerome Henry,**"IoT Fundamentals: Networking Technologies, Protocols, and Use Cases for the Internet of Things",** 1st Edition, Pearson Education (Cisco Press Indian Reprint). **(ISBN:** 978-9386873743)
2. Srinivasa K G, **"Internet of Things",**CENGAGE Leaning India, 2017

Reference Books:

1. Vijay Madisetti and ArshdeepBahga, **"Internet of Things (A Hands-on-Approach)",** 1st Edition, VPT, 2014. **(ISBN:** 978-8173719547)
2. Raj Kamal, **"Internet of Things: Architecture and Design Principles",** 1st Edition, McGraw Hill Education, 2017. **(ISBN:** 978-9352605224)

Mandatory Note:

Distribution of CIE Marks is a follows (Total 40 Marks):

- 20 Marks through IA Tests
- 20 Marks through practical assessment

Maintain a copy of the report for verification during LIC visit.

Posssible list of practicals:

1. Transmit a string using UART
2. Point-to-Point communication of two Motes over the radio frequency.
3. Multi-point to single point communication of Motes over the radio frequency.LAN (Sub-netting).
4. I2C protocol study
5. Reading Temperature and Relative Humidity value from the sensor

K. S. SCHOOL OF ENGINEERING AND MANAGEMENT,
BENGALURU-560109

TENTATIVE CALENDAR OF EVENTS: VIII EVEN SEMESTER (2023-2024)

SESSION: FEB TO MAY 2024

Week No.	Month	Day						Days	Activities
		Mon	Tue	Wed	Thu	Fri	Sat		
1	FEB	12*	13	14	15	16	17DH	5	12*-Commencement of VIII sem
2	FEB	19	20	21	22	23	24	6	24- Monday Time Table
3	FEB /MAR	26	27	28	29	1	2DH	5	
4	MAR	4	5	6	7	8 H	9 TA	5	8- Maha Shivratri 9- Tuesday Time Table
5	MAR	11T1	12 T1	13	14 BV	15 ASD	16 DH	5	
6	MAR	18*FFB1	19	20	21	22	23	6	18-First Faculty Feed Back 23 - Friday Time Table
7	MAR	25	26	27	28	29 H	30	5	29- Good Friday 30 - Monday Time Table
8	APR	1	2	3	4	5 TA	6 DH	5	
9	APR	8 T2	9 H	10 T2	11 H	12	13	4	9 - Ugadi 11 - Kutub A Ramzan 13-Tuesday Time Table
10	APR	15 BV	16 ASD	17	18	19	20 DH	5	
11	APR	22* FFB2	23	24	25	26	27	6	27- Wednesday Time Table 22 - Second Faculty Feed Back
12	APR/MAY	29	30	1 H	2 T3	3 T3	4 DH	4	1- May Day
13	MAY	6	7	8	9	10 H	11*	5	10 - Basava Jayanthi 11- Friday Time Table **11* - Last Working day**
Total No of Working Days : 66									

Total Number of working days (Excluding holidays and Tests)=60

H	Holiday
BV	Blue Book Verification
T1,T2,T3	Tests 1,2,3
ASD	Attendance & Sessional Display
DH	Declared Holiday
LT	Lab Test
TA	Test attendance

Monday	13
Tuesday	13
Wednesday	12
Thursday	11
Friday	11
Total	**60**

K.S. SCHOOL OF ENGINEERING AND MANAGEMENT, BENGALURU-560109

DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING

SESSION: 2023-2024(EVEN SEMESTER)

(w. e. f :12/2/2024 & 29/4/2024)

INDIVIDUAL TIME TABLE

Class: VIII ' A & B' **Faculty Name: Mrs. Belji. T**

DAY	8.40-9.35	9.35-10.30	10.30 -10.45	10.45 -11.40	11.40-12.35	12.35-1.20	1.20 -2.10	2.10-3.00	3.00-3.50
MONDAY	Fullstack Development Laboratory Batch - A1			IoT (VIII A)	IoT (VIII A)	LUNCH BREAK			
TUESDAY	IoT (VIII A)	Fullstack Development Laboratory Batch - A2		IoT (VIII A)					
WEDNESDAY	TECHNICAL SEMINAR (18CSS84) Fullstack Development Laboratory Batch - B1								
THURSDAY	IOT LAB (G1/G2/G3) Fullstack Development Laboratory Batch - B2						IOT LAB (G4/G5/G6)		
FRIDAY								NSS (VI A)	
SATURDAY	AS PER CALENDAR OF EVENTS								

CODE	SUBJECT	Hours /Week	
18CS81	Internet of Things	4	Mrs. Belji. T
18CS81	Internet of Things Lab	3	
21CS62	Fullstack Development Laboratory	6	
BNSK658	National Service Scheme (NSS)	1	
18CSS84	Technical Seminar	2	
18CSI85	Internship	1	
18CSP83	Project Work Phase-II	1.5	

Time-table Coordinator

HOD
Department of Computer Science Engineering
K.S School of Engineering & Management
Bangalore-560109
Head of the Department

Dr. K. [illegible]
Principal/Director
K S School of Engineering and Management
Bengaluru - 560 109

K. S. SCHOOL OF ENGINEERING AND MANAGEMENT, BENGALURU -560 019

DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

SESSION: 2023-2024 (EVEN SEMESTER)

VIII Semester - A Student List

Sl. No.	USN	Name of the Student
1	1KG20CS001	ADITHYA S R
2	1KG20CS002	AKHILESH K A
3	1KG20CS003	ANANYA P
4	1KG20CS004	ANUPA M B
5	1KG20CS005	ANURAG APPAJI PATIL
6	1KG20CS006	ARAVIND M
7	1KG20CS007	ASHRITHA M
8	1KG20CS008	BHANUPRIYA B
9	1KG20CS009	BHARANI B
10	1KG20CS010	BHAVANA H S
11	1KG20CS011	BHAVANI S
12	1KG20CS012	BHOOMIKA T
13	1KG20CS013	BHUSHAN P
14	1KG20CS014	BOYAPATI JYOTHSNA
15	1KG20CS015	C P OMKAR RAYA RAWATH
16	1KG20CS016	CHANDANA B N
17	1KG20CS017	CHANDRASHEKHAR
18	1KG20CS018	CHARAN M J
19	1KG20CS019	CHARISHMA C
20	1KG20CS020	CHETHANA B M
21	1KG20CS021	CHINMAY N M
22	1KG20CS022	D THEJESH
23	1KG20CS023	DARSHAN M
24	1KG20CS024	DEEKSHA B
25	1KG20CS025	DEEKSHITH G
26	1KG20CS026	DEVANAND M
27	1KG20CS027	DEVI SHANKAR S KAATURI
28	1KG20CS028	DHANUSH S P
29	1KG20CS029	DHIKSHITH T
30	1KG20CS030	DILIP N
31	1KG20CS031	DISHA R
32	1KG20CS032	DIVYA LAKSHMI J H
33	1KG20CS033	DIVYALAKSHMI K
34	1KG20CS034	DRUTHI N
35	1KG20CS035	DURGA PRASHANTH N
36	1KG20CS036	ESHWAR SAI CHANDRA
37	1KG20CS037	GAGAN R
38	1KG20CS038	GAUTHAM B J
39	1KG20CS039	GAUTHAM NARKODU
40	1KG20CS040	GOVARDHAN A V
41	1KG20CS041	GUNDARAPU JASWANTH
42	1KG20CS042	H R INCHARA
43	1KG20CS043	HARSH

44	1KG20CS044	HARSHAL V PAI
45	1KG20CS045	HEMANTH M
46	1KG20CS046	J BINDUPRIYA
47	1KG20CS047	J R CHANDAN
48	1KG20CS048	J SASIDHAR
49	1KG20CS049	JATIN SINGH
50	1KG20CS050	JEEVAN REDDY R
51	1KG20CS051	JOSHNA M J
52	1KG20CS052	K PREETHAM
53	1KG20CS053	KALPANA C
54	1KG20CS054	KAVYA N
55	1KG20CS055	KAVYA S
56	1KG20CS056	KIRAN CHANDRASHEKHAR DWATA
57	1KG20CS057	KUMARASWAMY N
58	1KG20CS058	LAVANYA M
59	1KG20CS059	LIKHITHA L MAHESH
60	1KG20CS060	M JESWANTH
61	1KG21CS400	ANJALI
62	1KG21CS401	DAKSHAYINI
63	1KG21CS402	PALLAVI

K.S. SCHOOL OF ENGINEERING AND MANAGEMENT, BENGALURU - 560109

DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

LESSON PLAN

NAME OF THE STAFF : Belji T

SUBJECT CODE/TITLE : 18CS81 / Internet of Things

SEMESTER/SEC/YEAR : VIII/A/IV

ACADEMIC YEAR : 2023-2024(Even)

Sl. No.	Topic to be covered	Mode of Delivery	Teaching Aid	No. of Periods	Cumulative No. of Periods	Proposed Date	Engaged Date
MODULE 1:Introduction							
1	What is IoT, Genesis of IoT	L+D	BB	1	1	12/02/2024	12/02/24
2	IoT and Digitization, IoT Impact	L+D	BB	1	2	12/02/2024	12/02/24
3	Convergence of IT and IoT, IoT Challenges	L+D	BB	1	3	13/02/2024	13/02/24
4	IoT Network Architecture and Design Drivers Behind New Network Architectures	L+D	BB	1	4	13/02/2024	13/02/24
5	Comparing IoT Architectures	L+D	BB	1	5	19/02/2024	19/02/24
6	A Simplified IoT Architecture	L+D	BB	1	6	19/02/2024	19/02/24
7	The Core IoT Functional Stack	L+D	BB+LCD	1	7	20/02/2024	20/02/24
8	IoT Data Management and Compute Stack	L+D	BB+LCD	1	8	20/02/2024	20/02/24

MODULE 2:Smart Objects							
9	The "Things" in IoT, Sensors, Actuators	L+D	BB	1	9	24/02/2024	26/2/24
10	Smart Objects, Sensor Networks	L+D	BB	1	10	24/02/2024	26/2/24
11	Connecting Smart Objects	L+D	BB	1	11	26/02/2024	27/2/24
12	Communications Criteria	L+D	BB+LCD	1	12	26/02/2024	27/2/24
13	IEEE 802.15.4, Standardization and Alliances Physical Layer,MAC Layer Topology, Security	L+D	BB+LCD	1	13	27/02/2024	4/3/24
14	IEEE 802.15.4g and 802.15.4e, Conclusions IEEE 1901.2a, Standardization and Alliances,Physical Layer , MAC Layer Topology ,Security	L+D	BB+LCD	1	14	27/02/2024	4/3/24
15	IEEE 802.11ah ,Standardization and Alliances Physical Layer, MAC Layer, Topology, Security	L+D	BB+LCD	1	15	04/03/2024	5/3/24
16	LoRa WAN, Standardization and Alliances Physical Layer, MAC Layer, Topology, Security	L+D	BB	1	16	04/03/2024	5/3/24
MODULE 3:IP as the IoT Network Layer							
17	The Business Case for IP	L+D	BB	1	17	05/03/2024	12/3/24
18	The need for Optimization	L+D	BB	1	18	05/03/2024	12/3/24
19	Optimizing IP for IoT	L+D	BB	1	19	09/03/2024	18/3/24
20	Profiles and Compliances	L+D	BB	1	20	09/03/2024	18/3/24
21	Application Protocols for IoT	L+D	BB	1	21	18/03/2024	19/3/24
22	The Transport Layer, Application Layer Protocol Not Present, SCADA, A Little Background on	L+D	BB	1	22	18/03/2024	19/3/24

	SCADA						
23	Adapting SCADA for IP,Tunneling Legacy SCADA over IP Networks,SCADA Protocol Translation, SCADA Transport over LLNs with MAP-T	L+D	BB+LCD	1	23	19/03/2024	25/3/24
24	Generic Web-Based Protocols, IoT Application Layer Protocols, CoAP, Message Queuing Telemetry Transport (MQTT)	L+D	BB+LCD	1	24	19/03/2024	25/3/24
MODULE 4: Data and Analytics for IoT							
25	An Introduction to Data Analytics for IoT, Machine Learning	L+D	BB	1	25	25/03/2024	26/3/24
26	Big Data Analytics Tools and Technology, Edge Streaming Analytics	L+D	BB	1	26	25/03/2024	26/3/24
27	Network Analytics, Securing IoT	L+D	BB	1	27	26/03/2024	1/4/24
28	A Brief History of OT Security	L+D	BB	1	28	26/03/2024	1/4/24
29	Common Challenges in OT Security	L+D	BB+LCD	1	29	30/03/2024	2/4/24
30	How IT and OT Security Practices and Systems Vary	L+D	BB+LCD	1	30	30/03/2024	2/4/24
31	Formal Risk Analysis Structures: OCTAVE and FAIR	L+D	BB+LCD	1	31	01/04/2024	15/4/24
32	The Phased Application of Security in an Operational Environment	L+D	BB	1	32	01/04/2024	15/4/24
MODULE 5 : IoT Physical Devices and Endpoints							

33	Arduino UNO: Introduction to Arduino, Arduino UNO, Installing the Software, Fundamentals of Arduino Programming	L+D	BB+LCD	1	33	02/04/2024	16/4/24
34	IoTPhysical Devices and Endpoints - RaspberryPi: Introduction to RaspberryPi	L+D	BB+LCD	1	34	02/04/2024	16/4/24
35	About the RaspberryPi Board: Hardware Layout, Operating Systems on RaspberryPi,	L+D	BB+LCD	1	35	15/04/2024	22/4/24
36	Configuring RaspberryPi, Programming RaspberryPi with Python, Wireless Temperature Monitoring System Using Pi	L+D	BB+LCD	1	36	15/04/2024	22/4/24
37	DS18B20 Temperature Sensor, Connecting Raspberry Pi via SSH,Accessing Temperature from DS18B20 sensors, Remote access to RaspberryPi	L+D	BB	1	37	16/04/2024	23/4/24
38	Smart and Connected Cities, An IoT Strategy for Smarter Cities	L+D	BB	1	38	16/04/2024	23/4/24
39	Smart City IoT Architecture	L+D	BB	1	39	22/04/2024	29/4/24
40	Smart City Use-Case Examples	L+D	BB+LCD	1	40	22/04/2024	29/4/24
41	Revision	L+D	BB+LCD	0	41	23/04/2024	30/4/24
42	Revision	L+D	BB+LCD	0	42	23/04/2024	30/4/24

Total No. of Lecture Hours = 40

Total No. of Revision Hours = 02

Course in charge

Head of the Department

HOD
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Principal

Dr. K. RAMA NARASIMHA
Principal/Director
K S School of Engineering and Management

K S SCHOOL OF ENGINEERING AND MANAGEMENT, BENGALURU - 560109

DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

SESSION: 2023-2024 (EVEN SEMESTER)

Question Bank-1

Batch	2020
Year/Semester/Section	IV/VIII/A&B
Course Code/Title	18CS81/Internet Of Things
Name of the Course In charge	Mrs. R S Geethanjali& Mrs. Belji T

Sl. No.	MODULE 1	K Level	CO
1.	**Explain** oneM2M IoT standardized architecture with a neat diagram.	**Understanding K2**	**CO1**
2	**Explain** theimpact of "IoT" in real world with an example of connected factories.	**Understanding K2**	**CO1**
3.	**Define** Internet of Things (IoT). **Explain** in detail the genesis of IoT with neat diagram.	**Understanding K2**	**CO1**
4.	**Illustrate** The IoT world forum (IoTWF) standardized architecture with a neat block diagram.	**Understanding K2**	**CO1**
5.	**Illustrate** the extended simplified IoT architecture with the help of a diagram.	**Understanding K2**	**CO1**
6.	**Explain**IoT data management and compute stack.	**Understanding K2**	**CO1**
7.	**Explain** the core IoT functional stack.	**Understanding K2**	**CO1**
8.	**Explain** few of the most significant challenges and problems that IoT is currently facing.	**Understanding K2**	**CO1**
9.	**Define** IoT.**Explain** the evolutionary phases of IoT.	**Understanding K2**	**CO1**
10.	**Illustrate** some of the differences between IT and OT networks and their various challenges.	**Understanding K2**	**CO1**
11	**Explain** the access network sub layer with a neat diagram.	**Understanding K2**	**CO1**

12	**Explain** the following in terms of IoT. i) Connected roadways ii) Smart connected buildings.	**Understanding K2**	**CO1**
13	**Explain** briefly about connecting smart objects.	**Understanding K2**	**CO1**
14	**Explain** the drivers behind IoT Architecture.	**Understanding K2**	**CO1**
	MODULE 2		
15	**Explain** briefly about Wireless Sensor Networks (WSN).	**Understanding K2**	**CO2**
16.	**Define** sensor and smart objects. **Explain** their characteristics.	**Understanding K2**	**CO2**
17.	**Explain** thedifferent types of sensors.	**Understanding K2**	**CO2**
18.	**Define** actuator. **Explain** how sensors and actuators Interact with the physical world.	**Understanding K2**	**CO2**
19.	**Explain**IoT access technologies of IEEE 802.15.4	**Understanding K2**	**CO2**
20.	**Explain** about data aggregation in wireless sensor networks.	**Understanding K2**	**CO2**

R.S.Chethan

Course Incharge

Head of the Department

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KSSEM

SCHOOL OF ENGINEERING AND MANAGEMENT, BENGALURU - 560109

DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

SESSION: 2023-2024 (EVEN SEMESTER)

Question Bank-2

Batch	2020
Year/Semester/Section	IV/VIII/A&B
CourseCode/Title	18CS81/Internet Of Things
Name of the Course In charge	Mrs. R S Geethanjali& Mrs. Belji T

Sl. No.	MODULE 2	K Level	CO
1.	**Explain** all the Protocol Stacks Utilizing IEEE 802.15.4.	Understanding K2	CO1
2	**Explain**IEEE 802.15.4 PHY Format with neat diagram.	Understanding K2	CO1
3.	**Explain**IEEE 802.15.4 MAC Format with neat diagram.	Understanding K2	CO1
4.	**Explain**High-Level ZigBee and Zigbee IP Protocol Stack with neat diagram.	Understanding K2	CO1
5.	**Explain** the main topologies used for IOT connecting devices.	Understanding K2	CO1
6.	**Explain** the Protocol Stacks Utilizing IEEE 802.15.4.	Understanding K2	CO1
7.	**Explain** 802.15.4 Sample Mesh Network Topology.	Understanding K2	CO1
8.	**Draw and explain** Frame Format with the Auxiliary Security Header Field for 802.15.4-2006 and later versions.	Understanding K2	CO1
9.	**Define** SANET. **Explain** its advantages and disadvantages.	Understanding K2	CO1
10.	**Explain**the different schedule management and packet forwarding models of 6TiSCH.	Understanding K2	CO1
	MODULE 3		
11.	**Explain** the working of IP as the IOT Network layer.	Understanding K2	CO2
12.	**Discuss** need for optimization.	Understanding K2	CO2
13.	**Describe** application protocols of IOT.	Understanding K2	CO2
14.	**Compare** between COAP and MQTT.	Understanding K2	CO2
15.	**Explain** in detail the 6LOWPAN.	Understanding K2	CO2
16.	**Write** a short notes on Data Aggregation in Wireless Sensor Networks	Understanding K2	CO2
17.	**Define** sensor and smart objects. **Explain** their characteristics.	Understanding K2	CO2
18.	**Explain** business case for IP.	Understanding K2	CO2

19.	**Explain** in detail COAP message format.	**Understanding K2**	**CO2**
20.	**Explain** Message Queuing Telemetry Transport (MQTT).	**Understanding K2**	**CO2**

Course Incharge

Head of the Department

HOD
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K.S School of Engineering & Management
Bangalore-560109

KSSEM

K S SCHOOL OF ENGINEERING AND MANAGEMENT, BENGALURU - 560109

DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

SESSION: 2023-2024 (EVEN SEMESTER)

Question Bank-3

Batch	2020
Year/Semester/Section	IV/VIII/A&B
CourseCode/Title	18CS81/Internet Of Things
Name of the Course In charge	Mrs. R S Geethanjali& Mrs. Belji T

Sl. No.	MODULE 4	K Level	CO
1.	**Discuss** Big data analytics tools and technologies.	**Understanding K2**	**CO4**
2	**Explain**the elements of Hadoop with a neat diagram.	**Understanding K2**	**CO4**
3.	**Discuss** the following: a) Supervised learning b) Unsupervised learning c) Neural networks	**Understanding K2**	**CO4**
4.	**Explain**in detail the core functions of edge analytics with a neat diagram.	**Understanding K2**	**CO4**
5.	**Explain** the different steps and phases of OCTAVE allegro methodology.	**Understanding K2**	**CO4**
6.	**Explain** formal risk analysis structures.	**Understanding K2**	**CO4**
7.	**Explain** Lambda architecture with a neat diagram.	**Understanding K2**	**CO4**
8.	**Explain** the different components of Flexible Network Flow architecture (FNF).	**Understanding K2**	**CO4**
9.	**Explain** Secured Network Infrastructure by using process control hierarchy model.	**Understanding K2**	**CO4**
10.	**Explain**the data and analytics of IOT.	**Understanding K2**	**CO4**
	MODULE 5		
11.	**Explain** the different pins/parts of Arduino Uno Board.	**Understanding K2**	**CO5**
12.	**Explain** the following with respect to Arduino programming. a) Structure b) Functions c) Variables d) Flow control statements e) Data type f) Constants	**Understanding K2**	**CO5**
13.	**Explain** Raspberry Pi learning board.	**Understanding K2**	**CO5**
14.	**Develop** a program to measure the humidity and temperature using Arduino Uno board.	**Applying K3**	**CO5**
15.	**Define** Arduino. **Explain** the advantages of Arduino.	**Understanding K2**	**CO5**

16.	**Explain** smart city security architecture.	**Understanding K2**	**CO5**
17.	**Explain** wireless temperature monitoring system using Raspberry P_i.	**Understanding K2**	**CO5**
18.	**Distinguish** between Raspberry P_i and Arduino.	**Understanding K2**	**CO5**
19.	**Explain** the steps to install Arduino software for the windows PCs.	**Understanding K2**	**CO5**
20.	**Explain** smart parking architecture with advantages and disadvantages.	**Understanding K2**	**CO5**

Course Incharge

Head of the Department

HOD
Department of Computer Science Engineering
K.S School of Engineering & Management
Bangalore-560109

K.S. SCHOOL OF ENGINEERING AND MANAGEMENT, BENGALURU - 560109

DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

CO-PO Mapping

Course: Internet of Things			
Type: Core		**Course Code: 18CS81**	
No of Hours			
Theory (Lecture Class)	Practical/Field Work/Allied Activities	Total/Week	Total teaching hours
4	3	4	40
Marks			
Internal Assessment	Examination	Total	Credits
40	60	100	4

Aim/Objectives of the Course

1. To assess the genesis and impact of IoT applications and architectures in real world.
2. To illustrate diverse methods of deploying smart objects and connecting them to network.
3. To compare different Application protocols for IoT.
4. To infer the role of Data Analytics and Security in IoT.
5. To identify sensor technologies for sensing real world entities and understand the role of IoT in various domains of Industry.

Course Learning Outcomes

After completing the course, the students will be able to

CO1	**Interpret** the impact and challenges posed byIoT networks leading to new architectural models.	**Understanding (K2)**
CO2	**Outline** the deployment of smart objects and access technologies to frame network.	**Understanding (K2)**
CO3	**Describe** the role of IoT protocols for efficient network communication.	**Understanding (K2)**
CO4	**Exhibit** the need for Data Analytics,Big Data Analytics and Tools & Security in IoT.	**Applying (K3)**
CO5	**Illustrate** different sensor technologies for sensing real world entities and **Identify** the applications of IoT in Industry.	**Applying (K3)**

Syllabus Content

Module 1: What isIoT, Genesis ofIoT, IoT and Digitization, IoT Impact, Convergence of IT and IoT, IoT Challenges, IoT Network Architecture and Design, Drivers Behind New Network Architectures, Comparing IoT Architectures, A Simplified IoT Architecture, The Core IoT Functional Stack, IoT Data Management and Compute.	**CO1** 08 hours PO1-3 PO4-1 PO5-1

LO: At the end of this session the student will be able to 1. What is mean by IOT? 2. What are the difference between IOT and Digitization? 3. Write a short note IOT network architecture designs. 4. Explain the the drivers behind new network architecture. 5. Explain IoT Data Management and Compute Stack. 6. Explain Core IoT Functional Stack	PO6-1 PO7-3 PO12-1 PSO1-3 PSO2-1
Module 2: Smart Objects: The "Things" in IoT, Sensors, Actuators, and Smart Objects, Sensor Networks, Connecting Smart Objects, Communications Criteria, IoT Access Technologies. **LO:** At the end of this session the student will be able to 1. Explain the IOT with help of Sensors and actuators 2. Explain the smart objects. 3. Explain connecting smart objects 4. Explain IoT Access Technologies.	**CO2** 08 hrs. PO1-3 PO4-1 PO5-1 PO6-1 PO7-2 PO9-1 PO12-1 PSO1-3 PSO2-1
Module 3: IP as the IoT Network Layer, The Business Case for IP, The need for Optimization, Optimizing IP for IoT, Profiles and Compliances, Application Protocols for IoT, The Transport Layer, IoT Application Transport Methods. **LO:** At the end of this session the student will be able to 1. Explain IOT network layer. 2. Explain the business case for IP. 3. What is the need for Optimization? 4. Explain the IoT Application Transport Methods.	**CO3** 08 hrs PO1-3 PO5-1 PO6-1 PO7-2 PO9-1 PO12-1 PSO1-3 PSO2-1
Module 4: Data and Analytics for IoT, An Introduction to Data Analytics for IoT, Machine Learning, Big Data Analytics Tools and Technology, Edge Streaming Analytics, Network Analytics, Securing IoT, A Brief History of OT Security, Common Challenges in OT Security, How IT and OT Security Practices and Systems Vary, Formal Risk Analysis Structures: OCTAVE and FAIR, The Phased Application of Security in an Operational Environment. **LO:** At the end of this session the student will be able to 1. Demonstrate the need for Data Analytics inIoT 2. Explain Big Data Analytics Tools and Technology 3. Write a Brief History of OT Security. 4. What are Common Challenges in OT Security. 5. Explain Formal Risk Analysis Structures: OCTAVE and FAIR	**CO4** 08 hrs PO1-3 PO5-1 PO6-1 PO7-2 PO9-1 PO12-1 PSO1-3 PSO2-1

Module 5:IoT Physical Devices and Endpoints - Arduino UNO: Introduction to Arduino, Arduino UNO, Installing the Software, Fundamentals of Arduino Programming. IoT Physical Devices and Endpoints - RaspberryPi: Introduction to RaspberryPi, About the RaspberryPi Board: Hardware Layout, Operating Systems on RaspberryPi, Configuring RaspberryPi, Programming RaspberryPi with Python, Wireless Temperature Monitoring System Using Pi, DS18B20 Temperature Sensor, Connecting Raspberry Pi via SSH, Accessing Temperature from DS18B20 sensors, Remote access to RaspberryPi, Smart and Connected Cities, An IoT Strategy for Smarter Cities, Smart City IoT Architecture, Smart City Security Architecture, Smart City Use-Case Examples. **LO:** At the end of this session the student will be able to 1. Develop programs using Arduino UNO. 2. Explain Physical Devices and Endpoints. 3. Explain remote access to RaspberryPi. 4. Develop steps required for Configuring RaspberryPi. 5. Show use case examples for temperature sensors and smart city.	**CO5** 08 hrs PO1-3 PO5-1 PO6-1 PO7-2 PO9-1 PO12-1 PSO1-3 PSO2-1

Text Books:

1. David Hanes, Gonzalo Salgueiro, Patrick Grossetete, Robert Barton, Jerome Henry,"IoT Fundamentals: Networking Technologies, Protocols, and Use Cases for the Internet of Things", 1stEdition, Pearson Education (Cisco Press Indian Reprint). (ISBN: 978- 9386873743)
2. Srinivasa K G, "Internet of Things",CENGAGE Leaning India, 2017.

Reference Books:

1. Vijay Madisetti and ArshdeepBahga, "Internet of Things (A Hands-on-Approach)", 1stEdition, VPT, 2014. (ISBN: 978-8173719547)
2. Raj Kamal, "Internet of Things: Architecture and Design Principles", 1st Edition, McGraw Hill Education, 2017. (ISBN: 978-9352605224)

Useful Websites

1. https://www.goodfirms.co/internet-of-things
2. https://builtin.com/internet-things/iot-examples
3. https://new.siemens.com/
4. https://nptel.ac.in/noc/courses/noc20/SEM2/noc20-cs66/
5. https://nptel.ac.in/courses/106/105/106105166/

Useful Journals

1. International Journal of Computers and Applications on IOT.
2. International Journal of Computer Techniques Internet of Things Technologies.

Teaching and Learning Methods

1. Lecture class: 40hrs

CO to PO Mapping

PO1: Science and engineering Knowledge **PO2:** Problem Analysis **PO3:** Design & Development **PO4:**Investigations of Complex Problems **PO5:** Modern Tool Usage **PO6:** Engineer & Society	**PO7:**Environment and Society **PO8:**Ethics **PO9:**Individual& Team Work **PO10:** Communication **PO11:**ProjectMngmt& Finance **PO12:**Lifelong Learning

PSO1: Understand fundamental and advanced concepts in the core areas of Computer Science and Engineering to analyze, design and implement the solutions for the real world problems.

PSO2: Utilize modern technological innovations efficiently in various applications to work towards the betterment of society and solve engineering problems.

CO	PO	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
18CS 81	K-level														
CO1	K2	3	-	-	1	1	1	3	-	-	-	-	1	3	1
CO2	K2	3	-	-	1	1	1	2	-	1	-	-	1	3	1
CO3	K2	3	-	-	-	1	1	2	-	1	-	-	1	3	1
CO4	K3	3	1	1	-	1	1	2	-	1	-	-	1	3	1
CO5	K3	3	1	1	-	1	1	2	-	1	-	-	1	3	1

Course in charge

Head of the Department

HOD
Department of Computer Science Engineering
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Bangalore-560109

Principal
Dr. K. RAMA NARASIMHA
Principal/Director
K S School of Engineering and Management
Bangaluru - 560 109

K S SCHOOL OF ENGINEERING AND MANAGEMENT, BENGALURU - 560109

DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

SESSION: 2023-2024 (EVEN SEMESTER)

ASSIGNMENT 1

Batch	2020
Year/Semester/Section	IV/VIII/A&B
CourseCode/Title	18CS81/Internet Of Things
Name of the Course In charge	Mrs. R S Geethanjali& Mrs. Belji T

AssignmentNo:1 **Totalmarks:15**
Date ofIssue:23/2/2024 **Date of Submission:07/3/2024**

Sl. No.	Assignment Questions	K Level	CO	Marks
1.	**Define** IOT. **Explain** the evolutionary phases of IOT.	**Understanding K2**	**CO1**	2
2	**List** and **explain** some of the differences between IT and OT networks and their various challenges.	**Understanding K2**	**CO1**	2
3.	**Explain** the oneM2M IoT standardized architecture with a neat diagram.	**Understanding K2**	**CO1**	2
4.	**Explain**IoT Data Management and Compute Stack with Fog Computing.	**Understanding K2**	**CO1**	2
5.	**Illustrate** The IoT World Forum (IoTWF) standardized architecture with a neat block diagram. (explain every layer)	**Understanding K2**	**CO1**	2
6.	**Define** actuator.**Explain** how sensors and actuators Interact with the physical world.	**Understanding K2**	**CO2**	1
7.	**List** and **explain** different types of sensors.	**Understanding K2**	**CO2**	1
8.	**Explain** IOT access technologies.	**Understanding K2**	**CO2**	1
9.	**Explain**briefly the Wireless Sensor Networks (WSN).	**Understanding K2**	**CO2**	1
10.	**Define** sensor and smart objects. **Explain** their characteristics.	**Understanding K2**	**CO2**	1

RS Geethanjali
Course Incharge

Head of the Department

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KSSEM

SCHOOL OF ENGINEERING AND MANAGEMENT, BENGALURU - 560109

DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

SESSION: 2023-2024 (EVEN SEMESTER)

ASSIGNMENT 2

Batch	2020
Year/Semester/Section	IV/VIII/A&B
CourseCode/Title	18CS81/Internet Of Things
Name of the Course In charge	Mrs. R S Geethanjali& Mrs. Belji T

AssignmentNo:2 **Totalmarks:15**
Date ofIssue: 01/04/2024 **Date of Submission:11/04/2024**

Sl. No.	Assignment Questions	K Level	CO	Marks
1.	**Explain** all the Protocol Stacks Utilizing IEEE 802.15.4.	Understanding K2	CO2	1
2	**Explain**IEEE 802.15.4 PHY Format with neat diagram.	Understanding K2	CO2	1
3.	**Explain**IEEE 802.15.4 MAC Format with neat diagram.	Understanding K2	CO2	1
4.	**Explain**High-Level ZigBee and Zigbee IP Protocol Stack with neat diagram.	Understanding K2	CO2	1
5.	**Explain** the main topologies used for IOT connecting devices.	Understanding K2	CO2	1
6.	**Explain** the working of IP as the IOT Network layer.	Understanding K2	CO3	2
7.	**Discuss** need for optimization.	Understanding K2	CO3	2
8.	**Describe** application protocols of IOT.	Understanding K2	CO3	2
9.	**Compare** between COAP and MQTT.	Understanding K2	CO3	2
10.	**Explain** in detail the 6LOWPAN.	Understanding K2	CO3	2

Course Incharge

Head of the Department

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K S SCHOOL OF ENGINEERING AND MANAGEMENT, BENGALURU - 560109

DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

SESSION: 2023-2024 (EVEN SEMESTER)

ASSIGNMENT 3

Batch	2020
Year/Semester/Section	IV/VIII/A&B
CourseCode/Title	18CS81/Internet Of Things
Name of the Course In charge	Mrs. R S Geethanjali & Mrs. Belji T

AssignmentNo:3 **Totalmarks:20**
Date ofIssue: 22/4/2024 **Date of Submission:02/5/2024**

Sl. No.	Assignment Questions	K Level	CO	Marks
1.	**Discuss** Big data analytics tools and technologies.	**Understanding K2**	**CO4**	2
2	**Explain**the elements of Hadoop with a neat diagram.	**Understanding K2**	**CO4**	2
3.	**Discuss** the following: a) Supervised learning b) Unsupervised learning c) Neural networks	**Understanding K2**	**CO4**	2
4.	**Explain**in detail the core functions of edge analytics with a neat diagram.	**Understanding K2**	**CO4**	2
5.	**Explain** the different steps and phases of OCTAVE allegro methodology.	**Understanding K2**	**CO4**	2
6.	**Explain** the different pins/parts of Arduino Uno Board.	**Understanding K2**	**CO5**	2
7.	**Explain** the following with respect to Arduino programming. a) Structure b) Functions c) Variables d) Flow control statements e) Data type f) Constants	**Understanding K2**	**CO5**	2
8.	**Explain** Raspberry Pi learning board.	**Understanding K2**	**CO5**	2
9.	**Develop** a program to measure the humidity and temperature using Arduino Uno board.	**Applying K3**	**CO5**	2
10.	**Define** Arduino. **Explain** the advantages of Arduino.	**Understanding K2**	**CO5**	2

Course Incharge

Head of the Department

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Department of Computer Science Engineering
K.S School of Engineering & Management
Bangalore-560109

CBCS SCHEME

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18CS81

Eighth Semester B.E. Degree Examination, Dec.2023/Jan.2024
Internet of Things

Time: 3 hrs. Max. Marks: 100

Note: Answer any FIVE full questions, choosing ONE full question from each module.

Important Note : 1. On completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages.
2. Any revealing of identification, appeal to evaluator and /or equations written eg, 42+8 = 50, will be treated as malpractice.

Module-1

1 a. What is IOT? Explain in detail on genesis of IOT with example. **(07 Marks)**
b. Write a short note on IOT impact in real world with example. **(07 Marks)**
c. Discuss the IOT challenges with example. **(06 Marks)**

OR

2 a. What is M2M IOT architecture? Explain its elements with architecture in detail. **(07 Marks)**
b. Explain in detail simplified IOT architecture with example. **(07 Marks)**
c. Compare and contrast IT and OT. **(06 Marks)**

Module-2

3 a. List and explain types of sensors with example. **(07 Marks)**
b. What is smart object? Explain its characteristics with example. **(07 Marks)**
c. What is SANET? Explain its advantages and disadvantages that a wireless based solution offers. **(06 Marks)**

OR

4 a. List out the limitation of smart objects in WSN's and explain the data aggregation in WSN with neat diagram. **(07 Marks)**
b. What is Zigbee? Explain 802.15.4 physical layer, MAC layer and security with example. **(07 Marks)**
c. Explain in brief LORaWAN standard and Alliance MAC layer and security. **(06 Marks)**

Module-3

5 a. Explain Business case for IP with example. **(07 Marks)**
b. Explain generic web based protocol with example. **(07 Marks)**
c. What is COAP? Explain with example. **(06 Marks)**

OR

6 a. What is SCADA? Explain with example. **(07 Marks)**
b. Explain optimization of IP with example. **(07 Marks)**
c. What is RPL? Explain with example. **(06 Marks)**

Module-4

7 a. Explain structured vs unstructured data with example. **(07 Marks)**
b. What is IOT data analytics? Explain its 4 types of data analytics with example. **(07 Marks)**
c. What is Hadoop ecosystem? Explain in detail with example. **(06 Marks)**

OR

8	a.	What is Apache Kafka? Explain in detail with example.	(07 Marks)
	b.	Explain in detail Lambda architecture with example.	(07 Marks)
	c.	What is distributed analytics system? Explain with example.	(06 Marks)

Module-5

9	a.	What is Ardino? Explain in detail with example and why Ardino.	(07 Marks)
	b.	Explain foundation of Ardino program with example.	(07 Marks)
	c.	What is SOC? Explain in detail with example.	(06 Marks)

OR

10	a.	What is Raspbery operating system? Explain its various OS with example.	(07 Marks)
	b.	Explain in detail OS set upon Raspbery pi with example.	(07 Marks)
	c.	How do you programming in Raspbery pi? Explain with example.	(06 Marks)

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18CS81

Eighth Semester B.E. Degree Examination, June/July 2023
Internet of Things

Time: 3 hrs. Max. Marks: 100

Note: Answer any FIVE full questions, choosing ONE full question from each module.

Important Note : 1. On completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages.
2. Any revealing of identification, appeal to evade and /or equations written eg, 42+8 = 50, will be treated as malpractice.

Module-1

1 a. Define IOT. Explain in detail IOT and digitization. **(06 Marks)**

b. Explain in detail with any two example IOT impact. **(08 Marks)**

c. Explain the different evolutionary phases of the Internet. **(06 Marks)**

OR

2 a. Explain different challenges of IOT. **(04 Marks)**

b. Explain in detail IOT World Forum (IOTWF) Standard Architecture. **(08 Marks)**

c. Explain expanded view of the simplified IOT Architecture. **(08 Marks)**

Module-2

3 a. List and explain different types of sensors (any 8) with an example each. **(08 Marks)**

b. What are smart objects? With neat diagram, explain characteristics of smart object. **(08 Marks)**

c. What are Actuators? Explain comparison of sensors and actuators functionality with human. **(04 Marks)**

OR

4 a. What is SANET? Explain some advantages and disadvantages that a wireless based solution offers. **(06 Marks)**

b. Briefly explain protocol stack utilization IEEE 802.15.4. **(08 Marks)**

c. List and explain in brief communication criteria. **(06 Marks)**

Module-3

5 a. Explain key advantages of Internet Protocol for the IOT. **(08 Marks)**

b. Explain the need for optimization. **(08 Marks)**

c. With a neat diagram, explain comparison of an IOT protocol stack utilizing 6LOWPAN and IP protocol stack. **(04 Marks)**

OR

6 a. Write notes on Supervisory Control and Data Acquisition (SCADA). **(06 Marks)**

b. Explain with neat diagram Constrained Application Protocol (COAP) message format. **(08 Marks)**

c. Explain in detail Message Queuing Telemetry Transport (MQTT) publish/subscribe frame. **(06 Marks)**

Module-4

7 a. Compare: (i) Structured versus unstructured data (ii) Data in motion versus data at rest **(06 Marks)**

b. With neat diagram, explain Hadoop distributed cluster and writing a file to HDFS. **(08 Marks)**

c. Explain Lambda Architecture. **(06 Marks)**

OR

8 a. Explain edge streaming analytics and functions of Edge Analytics Processing Unit. (10 Marks)

b. Explain in detail formal risk analysis structures. (10 Marks)

Module-5

9 a. Write notes on: (i) Arduino UNO (ii) Raspberry Pi (12 Marks)

b. With a neat diagram, explain wireless temperature monitoring system using Raspberry Pi. (08 Marks)

OR

10 a. Explain IOT strategy for smarter cities. (10 Marks)

b. With neat smart cities Layered Architecture diagram, explain Smart City IOT Architecture. (10 Marks)

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18CS81

Eighth Semester B.E. Degree Examination, Jan./Feb. 2023
Internet of Things

Time: 3 hrs. Max. Marks: 100

Note: Answer any FIVE full questions, choosing ONE full question from each module.

Important Note : 1. On completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages.
2. Any revealing of identification, appeal to eva or and /or equations written eg, 42+8 = 50, will be treated malpractice.

Module-1

1 a. What is IoT? Discuss the evolutionary phases of the internet with neat diagram. **(06 Marks)**

b. List the difference between Operation Technology (OT) and Information Technology (IT) with their challenges. **(06 Marks)**

c. Explain the M2M IoT Architecture with neat diagram. **(08 Marks)**

OR

2 a. Discuss the significant challenges and problems facing by IoT. **(05 Marks)**

b. With neat diagram explain the simplified IoT architecture. **(08 Marks)**

c. Describe the Fog layer in the IoT data management and computer stack with neat diagram and Fog computing characteristics. **(07 Marks)**

Module-2

3 a. Define sensors. List the different categories of the sensors. **(05 Marks)**

b. Describe the different sensor types with an example. (Consider any 8 sensor type). **(08 Marks)**

c. What is actuator and smart object? Explain the different characteristics of smart object. **(07 Marks)**

OR

4 a. With neat diagram explain ZigBee IP protocol stack. **(10 Marks)**

b. Define LoRaWAN. Explain LoRaWAN layers with neat diagram. **(10 Marks)**

Module-3

5 a. Explain any six key advantages of the IP suite for IoT. **(06 Marks)**

b. With neat diagram explain 6 LoWPAN with and without header compression. **(08 Marks)**

c. Define RPL and list the different RPL routing metrics and constraints of RFC 6551. **(06 Marks)**

OR

6 a. Describe CoAP message format with neat diagram. **(08 Marks)**

b. Explain MQTT message format and its types with neat diagram. **(08 Marks)**

c. Explain IoT – Data Broker with an example. **(04 Marks)**

Module-4

7 a. Explain in detail how the IoT data is categorized. **(06 Marks)**

b. With neat diagram explain the edge analytics processing unit with its functions. **(08 Marks)**

c. Explain MPP Databases with its architecture. **(06 Marks)**

OR

8 a. Explain the Lambda architecture with neat diagram. (08 Marks)
b. With neat diagram explain the OCTAVE risk assessment frameworks. (08 Marks)
c. List the advantages of FNF. (04 Marks)

Module-5

9 a. Write an Arduino program to implement the traffic light simulation for pedestrians. (08 Marks)
b. With neat diagram explain the parts of Raspberry Pi board. (08 Marks)
c. Write a Raspberry Pi program to implement blinking an LED. (04 Marks)

OR

10 a. Explain in detail IoT smart parking architecture. (08 Marks)
b. With neat diagram explain the role of the cloud for smart city applications. (10 Marks)
c. Write a short note on Arduino. (02 Marks)

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18CS81

Eighth Semester B.E. Degree Examination, June/July 2024
Internet of Things

Time: 3 hrs. Max. Marks: 100

Note: Answer any FIVE full questions, choosing ONE full question from each module.

Important Note : 1. On completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages.
2. Any revealing of identification, appeal to evaluator and /or equations written eg, 42+8 = 50, will be treated as malpractice.

Module-1

1	a.	Define IoT and discuss the genesis of IoT in detail.	(06 Marks)
	b.	List out the difference between IT and OT networks and their various challenges.	(06 Marks)
	c.	What are the different challenges of IOT? Explain.	(08 Marks)
		OR	
2	a.	Explain with diagram the one M2M IoT standardized architecture.	(08 Marks)
	b.	Explain IoT Data Management and Compute Stack.	(08 Marks)
	c.	List and explain the defining characteristics of fog computing.	(04 Marks)

Module-2

3	a.	List out the most useful classification scheme for the pragmatic application of sensors in a IoT network.	(08 Marks)
	b.	Define sensors and actuators. Explain how they interact with the physical world.	(08 Marks)
	c.	Define smart objects. Explain its characteristics.	(04 Marks)
		OR	
4	a.	What are constrained devices and constrained node networks? Classify them.	(08 Marks)
	b.	Explain Zigbee protocol stack using IEEE 802.15.4.	(08 Marks)
	c.	Briefly describe about communication criteria.	(04 Marks)

Module-3

5	a.	What are the key advantages of the IP suite for IoT?	(08 Marks)
	b.	Explain in detail the 6LOWPAN.	(08 Marks)
	c.	Explain the different schedule management and packet forwarding models of TiSCH.	(04 Marks)
		OR	
6	a.	Explain in detail COAP message format.	(08 Marks)
	b.	Explain Message Queuing Telemetry Transport (MQTT).	(06 Marks)
	c.	Explain the raw socket tunneling of SCADA using different scenarios.	(06 Marks)

Module-4

7	a.	What are the ways IoT data is categorized? Explain in detail.	(08 Marks)
	b.	Explain in detail supervised learning and unsupervised learning.	(06 Marks)
	c.	Explain in detail the core functions of edge analytics with necessary diagrams.	(06 Marks)
		OR	
8	a.	Explain the different steps and phases of OCTAVE Allegro methodology.	(08 Marks)
	b.	Explain Lambda Architecture in details.	(06 Marks)
	c.	Explain any two Big data Analytics tools and technologies.	(06 Marks)

Module-5

9 a. What is Arduino? What are the advantages of Arduino? **(08 Marks)**

b. How to install arduino software for the windows PCs? **(06 Marks)**

c. Explain the different pins/parts of Arduino Uno Board. **(06 Marks)**

OR

10 a. Explain the different layers of IoT smart layered architecture. **(08 Marks)**

b. Explain smart parking architecture with advantages and disadvantages. **(06 Marks)**

c. With a neat diagram, explain wireless temperature monitoring system using Raspberry Pi. **(06 Marks)**

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INTERNET OF THINGS TECHNOLOGY (18CS81)
MODULE 5

1. Write a note on DS18B20 temperature sensor.

Answer:

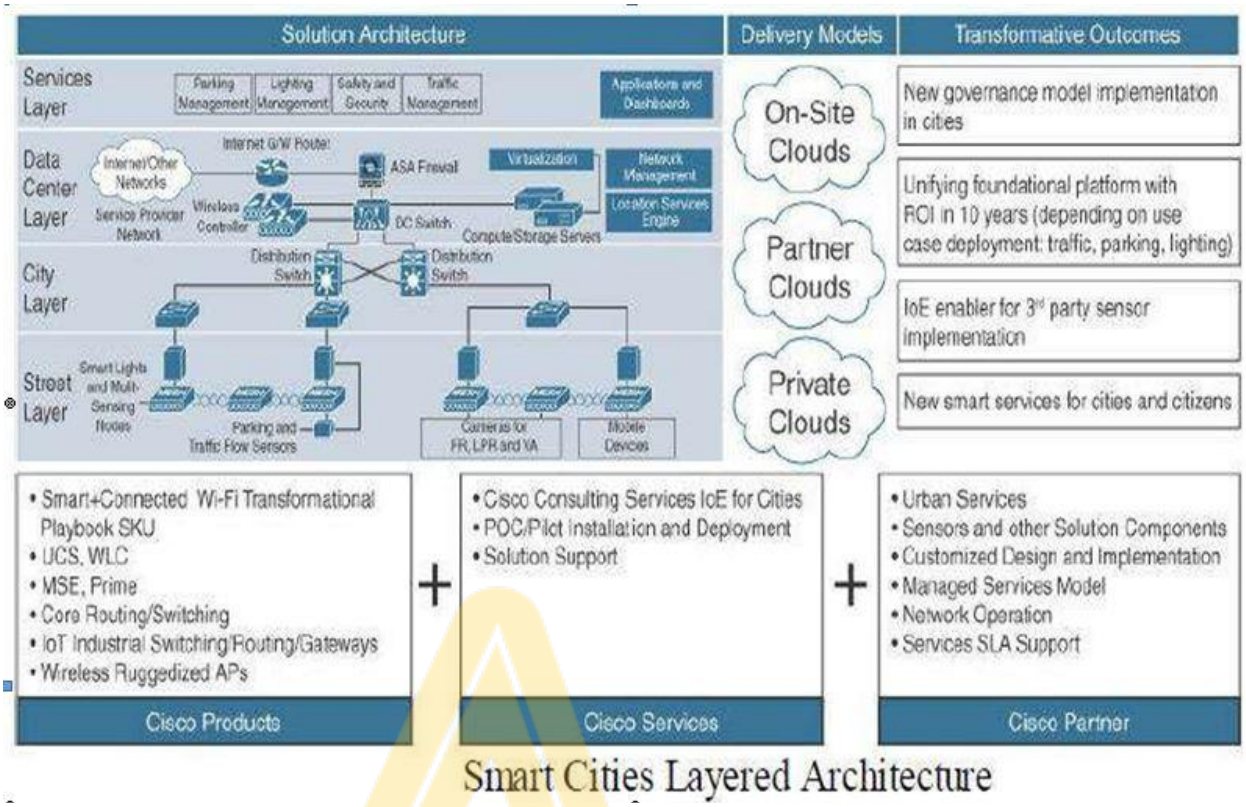
- The DS18B20 is a 1-wire programmable Temperature sensor from maxim integrated. It is widely used to measure temperature in hard environments like in chemical solutions, mines or soil etc.
- It can measure a wide range of temperature from-55°C to +125°with a decent accuracy of±5°C.
- Each sensor has a unique address and requires only one pin of the MCU to transfer data so it a very good choice for measuring temperature at multiple points without compromising much of your digital pins on the microcontroller.
- Applications of DB18B20 are
    - Measuring temperature at hard environments.
    - Liquid temperature measurement.
    - Applications where temperature has to be measured at multiple points.
- Pin Configuration:

PinName	Description
Ground	Connect to the ground of the circuit
Vcc	Powers the Sensor, can be3.3V or 5V
Data	This pin gives output the temperature value which can be read using 1-wire method

2. With a neat diagram, explain a four layered architecture of a smart city IoT Infrastructure.

Answer:

- A smart city IoT infrastructure is a four-layered architecture.
- Data flows from devices at the street layer to the city network layer and connect to the data center layer, where the data is aggregated, normalized, and virtualized .
- The data center layer provides information to the services layer, which consists of the applications that provide services to the city.
- In smart cities, multiple services may use IoTsolutions for many different purposes. These services may use different IoTsolutions, with different protocols and different application languages.



Smart Cities Layered Architecture

- Street Layer:
  - The street layer is composed of devices and sensors that collect data and take action based on instructions from the overall solution, as well as the networking components needed to aggregate and collect data.
  - A sensor is a data source that generates data required to understand the physical world. Sensor devices are able to detect and measure events in the physical world.
  - ICT connectivity solutions rely on sensors to collect the data from the world around them so that it can be analyzed and used to operationalise use cases for cities.
- City Layer:
  - At the city layer, which is above the street layer, network routers and switches must be deployed to match the size of city data that needs to be transported.
  - This layer aggregates all data collected by sensors and the end-node network into a single transport network.
  - The city layer may appear to be a simple transport layer between the edge devices and the data center or the Internet.
  - In this model, at least two paths exist from any aggregation switch to the data center layer. A common protocol used to ensure this resiliency is Resilient Ethernet Protocol (REP).
- Data Center Layer:
  - Data collected from the sensors is sent to a data center, where it can be processed and correlated.

- Based on this processing of data, meaningful information and trends can be derived, and information can be provided back.
- The cloud model is the chief means of delivering storage, virtualization, adaptability, and the analytics know-how that city governments require for the technological mashup and synergy of information embodied in a smart city.
- The cloud enables data analytics to be taken to server farms with large and extensible processing capabilities.

- Service Layer
  - The true value of ICT connectivity comes from the services that the measured data can provide to different users operating within a city.
  - Smart city applications can provide value to and visibility for a variety of user types, including city operators, citizens, and law enforcement.
  - The collected data should be visualized according to the specific needs of each consumer of that data and the particular user experience requirements and individual use cases.

3. Write a note on Smart City Security Architecture.

Answer:

- A serious concern of most smart cities and their citizens is data security**.**
- Vast quantities of sensitive information are being shared at all times in a layered, real-time architecture, and cities have a duty to protect their citizens' data from unauthorized access, collection, and tampering.
- Security protocols should authenticate the various components and protect data transport throughout.
- The street level, sensors should have their own security protocols.
- Common element for security on network layer are
  - Firewall
  - VLAN(Virtual Local Area Network)
  - Encryption

MODULE - 5

IOT physical Devices and Endpoints - Arduino UNO

Introduction to Arduino

Arduino is an open-source advancement prototying platform which depends on simple to-utilize equipment and programming.

Arduino can read inputs - such as detecting the power of light, events triggered by a button or a twitter message and can respond into a yield.

The Arduino is a small computer that you can program to read information from the world around you and to send commands to the outside world.

- Arduino is a tiny computer that you can connect to electrical circuits. This makes it easy to read inputs - and control outputs - send a command to the outside.

Why Arduino ?

Arduino is an open source product, software/hardware which is accessible and flexible to customers.

Arduino is flexible because of offering variety of digital and analog pins, SPI and PWM outputs.

Arduino is easy to use, connected to computer via a USB and communicates using serial protocol.

Arduino has growing online community where lots of source code is available for use.

Arduino is Cross-platform, which can work on Windows, Mac or Linux platforms.

Arduino follows simple, clear programming environment as C language.

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Which Arduino ?

There are hundreds of "Arduino boards" available in the market serving every kind of purpose. Among all we almost focus on popular Arduino UNO which is used in almost 99% of projects use.

→ Some of the Boards from Arduino family are given below

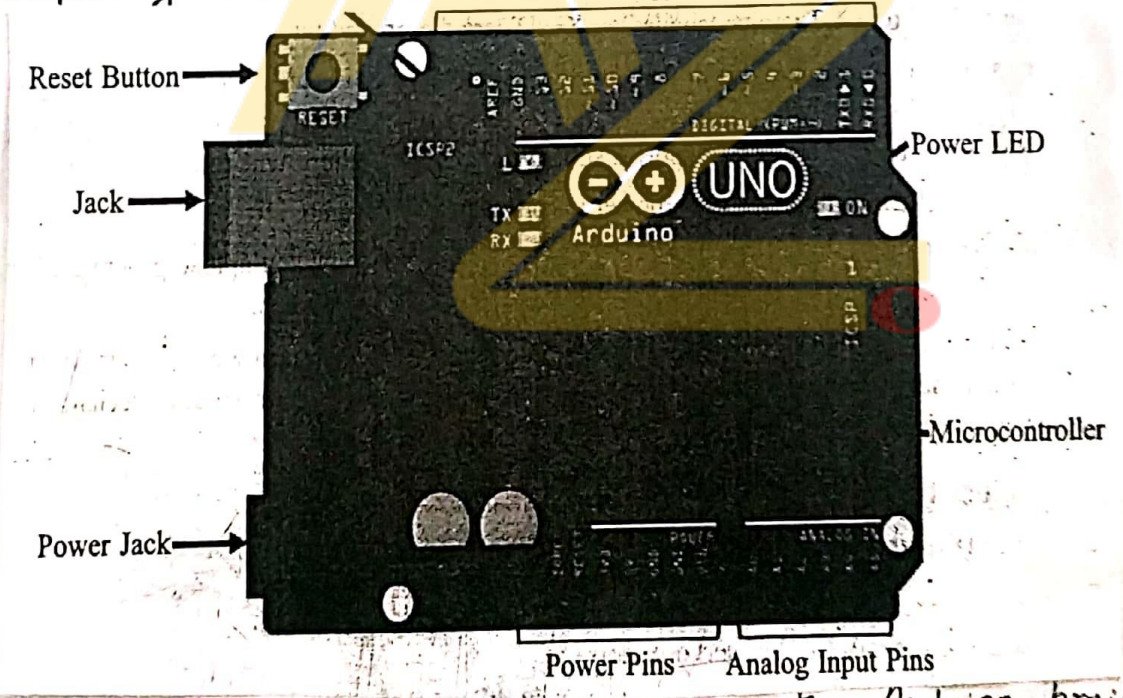
Arduino Mega is a big sister to the UNO with more memory and pins with a different chip the ATmega2560.

Flora is an Arduino compatible from Adafruit which is a round wearable which can be sewed into clothing.

The Arduino MKR1000 is a little like an Arduino Micro but has a more powerful 32-bit ATSAM ARM chip and built-in Wifi.

Arduino Micro is bit smaller with a chip Atmega 32u4 that can act like a keyboard or mouse.

Exploring Arduino UNO Learning Board



* Microcontroller : The ATmega328p is the Arduino brain. Everything on the Arduino board is meant to support this microcontroller.
* Digital pins : Arduino has 14 digital pins, labeled from 0 to 13 that can act as inputs or outputs.

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* PWM pins : These are digital pins marked with a ~ (pins 11, 10, 9, 6, 5 and 3). PWM stands for "pulse width modulation" and allows to make digital pins output "fake" varying amounts of voltage.
* TX and RX pins : digital pins 0 and 1. The T stands for "transmit" and the R for "receive".
* LED attached to digital pin 13 : This is useful for an easy debugging of the Arduino sketches.
* Analog pins : The analog pins are labeled from A0 to A5 and are most often used to read analog sensors.
* Power pins : The Aurdino has 3.3V or 5V supply, which is really useful since most components require 3.3V or 5V.
* Reset button : When you press that button, the program that is currently being run in your Arduino will start from the beginning.
* Power ON LED : will be on since power is applied to the Arduino.
* USB jack : Connecting a male USB A to male USB B cable is how you upload programs from your computer to your Arduino board.
* Power jack : The power jack is where you connect a component to power up your Arduino.

Things that Arduino can do

Motion Sensor : It allows you detect movement

Light Sensor : this allows you to "measure" the quantity of light in the outside world.

Humidity and temperature Sensor : this is used to measure the humidity and temperature.

Ultrasonic Sensor : this Sensor allows to determine the distance to an object through Sonar.

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Installing the Software (ARDUINO IDE)

The Arduino IDE (Integrated Development Environment) is where you develop your programs that will tell your Arduino what to do.

To download your Arduino IDE, browse on the following link https://www.arduino.cc/en/Main/Software.

Select which Operating System you're using and download it.

Fundamentals of Arduino Programming

1) Structure

The Structure of Arduino programming contains of two parts as shown below

```
void setup()
{
  Statement(s);
}
void loop()
{
  Statement();
}
```

2)
```
void setup()
  void loop()
  {
    digitalWrite(pin, HIGH);
    delay(10000);
    digitalWrite(pin, LOW);
    delay(10000);
  }
```

3) Functions

A function is a piece of code that has a name and set of statements executed when function is called.

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Functions are declared by its type followed with name of a function.

Syntax : type functionName (parameters)
{
Statement(s);
}

4) { } Curly braces

They define beginning and end of function.

5) Semicolon

It is used to end a statement and separate elements of a program.

Syntax : int x=14;

Differences between Analog, Digital and PWM Pins

In analog pins, you have unlimited possible states between 0 and 1023, This allows you to read sensor values For example, with a light sensor, if it is very dark, you'll read 1023, if it is very bright you'll read 0 If there is a brightness between dark and very bright you'll read a value between 0 and 1023.

In digital pins, you have just two possible states, which are on or off. These can also be referred as High or Low, 1 or 0 and 5V or 0V. For example, if an LED is on, then, its state is high or 1 or 5V. If it is off, you'll have Low, or 0 or 0V.

PWM pins are digital pins, so they output either 0 or 5V. However these pins can output "fake" intermedia voltage values between 0 and 5V, because they can perform "Pulse Width Modulation" (PWM). PWM allows to "simulate" varying levels of power by oscillating the output voltage of the Arduino.

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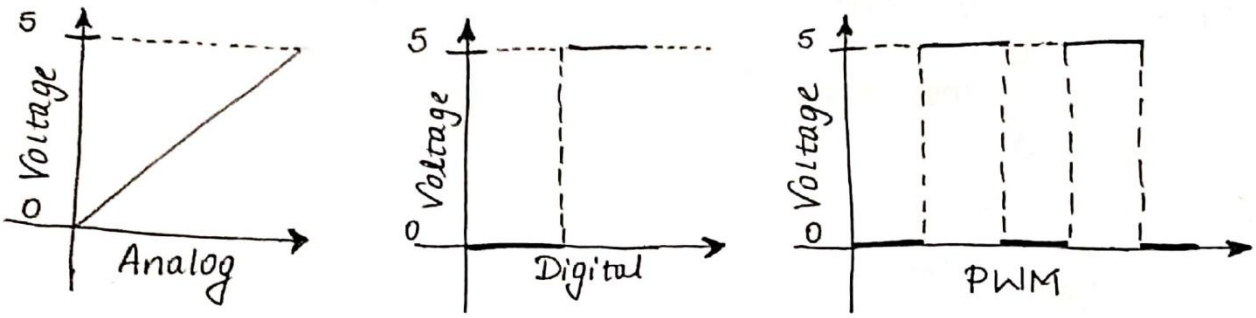
The below figure shows the representation of Analog, Digital and PWM pins of Arduino.



IOT Physical Devices and Endpoints : RaspberryPi

Introduction to RaspberryPi

The RaspberryPi is a series of credit card sized single-board computers developed in the United Kingdom by Raspberrypi Foundation to promote the teaching of basic computer science in School and developing Countries.

The original model became far more popular than anticipated, selling outside its target market for uses such as robotics. It does not include peripherals and cases. However, some accessories have been included in several official and unofficial bundles.

The Organisation behind the Raspberry Pi consists of two arms. The first two models were developed by the Raspberry Pi Foundation. After the Pi Model B was released, the Foundation setup Raspberry Pi Trading, with Eben Upton as CEO, to develop the third model the B+.

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"Why Raspberry Pi?" - Inexpensive, Cross-platform, Simple, clear programming environment, Open Source and extensible Software and Open Source and extensible hardware.

Exploring The Raspberrypi Learning Board

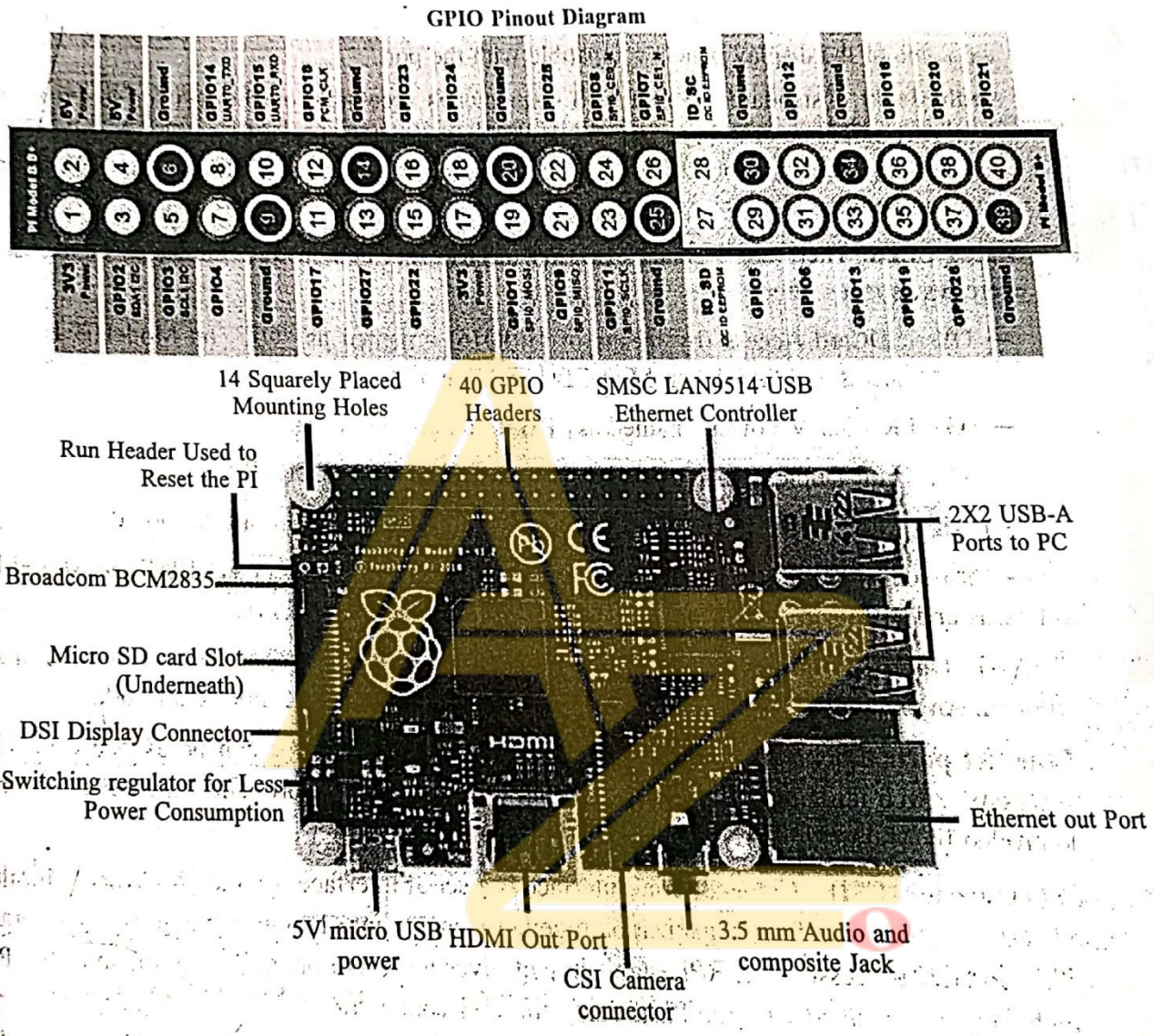

Figure 8-1: Raspberry Pi2 Model B and its GPIO

Processor : The Broadcom BCM2835 SoC used in the first generation Raspberrypi is somewhat equivalent to the chip used in first generation smart phones, which includes a 700 MHz ARM 1176JZF-S processor, Video Core IV graphics processing Unit (GPU) and RAM. This has a level 1 cache of 16KB and a level 2 cache of 128KB.

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Power Source : The recommended and easiest way to power the Raspberrypi is Via the Micro USB port on the side of the unit.

SD Card : The Raspberry Pi does not have any locally available storage accessible. The working framework is stacked on a SD card which is embedded on the SD card space on the Raspberry Pi.

GPIO (General Purpose Input Output) : GPIO is a non specific pins on a coordinated circuit to know is an input or output pin which can be controlled by the client at run time. GPIO pins have no exceptional reason characterized, and go unused as a matter of course.

DSI Display X : The Raspberrypi Connector S2 is a display Serial interface (DSI) for connecting a liquid crystal display (LCD) panel using a 15-pin ribbon cable.

Audio Jack : A standard 3.5mm TRS connector is accessible on the RPi for stereo sound yield. Any earphone or 3.5mm sound link can be associated straightforwardly.

Ethernet Port : It is accessible on Model B and B+. It can be associated with a system or web utilizing a standard LAN link on the Ethernet port.

CSI connector(CSI) : Camera Serial Interface is a Serial interface outlined by MIPI (Mobile Industry Processor Interface) organization together went for interfacing computerized cameras with a portable Processor.

JTAG headers : JTAG is an acronym for 'Join Test Action Group', an association that began back in the mid 1980's to address test point get to issues on PCB with Surface mount gadgets.

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Description of System on Chip (SoC)

A System on a chip (SoC) is an integrated Circuit (IC) that co-ordinates all parts of a PC or other electronic framework into a Solitary chip.

It might contained advanced, simple, blended flag, and regularly radio-recurrence works - all on a Solitary chip Substrate. SoCs are exceptionally regular in the portable gadgets advertise in view of their low power utilization. A run of the mill application is in the range of implanted frameworks.

An SoC comprises of:

* A microcontroller, chip or DSP core(s). Some SoCs - called multiprocessor framework on chip (MPSoC) - incorporate more than one processor center.
* Memory pieces including a choice of ROM, RAM, EEPROM and Streak memory.
* Timing Sources including oscillators and Stage bolted circles.
* Simple interfaces including ADCs and DACs.
* Voltage controllers and power administration circuits.

Raspberry Pi interfaces

Raspberry Pi has Serial, SPI and I2C interfaces as shown in the figure of Raspberry Pi Learning board.

* Serial : The Serial interface on Raspberry Pi has receive (rx) and transmit (Tx) pins for Communication With Serial peripherals.
* SPI : Serial Peripheral Interface (SPI) is a Synchronous Serial data Used for communicating with one or more peripheral devices.

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* I2C : The I2C interface pins on Raspberry Pi allow you to connect hardware modules. I2C interface allows Synchronous data transfer with just two pins - SDA (data line) and SCL (clock ~~line~~ line).

Raspberry Operating Systems

Various operating systems can be installed on Raspberry through SD cards. Most use a MicroSD slot located on the bottom of the board.

The Raspberrypi primarily uses Raspbian, a Debian-based Linux operating System.

Operating Systems (not Linux based)

- RISC OS Pi
- FreeBSD
- NetBSD
- Plan 9 from Bell Labs and Inferno
- Windows 10 IOT Core - a no cost edition of Windows 10 offered by Microsoft that runs natively on the RaspberryPi 2.

Operating Systems (Linux based)

- Xbian - using Kodi open source digital media center
- openSUSE
- Raspberry Pi Fedora remix
- Pidora, another fedora Remix optimised for Raspberry Pi
- Gentoo Linux
- Diet Pi
- CentOS \ Open Wrt
- Kali Linux
- Ark OS
- Kano OS
- Nard SDK

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Media center operating systems

- OSMC
- OpenELEC
- LibreELEC
- Xbian
- Rasplex

Audio operating Systems

- Volumio
- Pimusicbox
- Runeaudio
- moOdeaudio

Recalbox

- Happi Game Center
- Lakka
- ChameleonPi
- Piplay

Operating System Setup On RaspberryPi

Preinstalled NOOBS operating System is already available in many authorized as well as independent Seller, there are many other operating system for RaspberryPi in the market like NOOBS, Raspbian and third party Operating Systems are also available like UBUNTU MATE, OSMC, RISC OS etc. TO setup an operating System we need a SD card with minimum capacity of 8GB.

Formatting SD card

Format the SD card before copying NOOBS onto it. To do this -

- Download SD formatter 4.0 from SD Association Website for either Windows or Mac.

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- Follow the instructions to install the Software
- Insert the SD card into the computer or laptops SD card reader and make a note of the drive letter allocated to it.
- In SD formatter, Select the drive letter the SD card is and format it.

OS Installation

Follow the Step to install operating System in SD card

- Go to Raspberry Pi foundation website and click on DOWNLOAD Section.
- Click on NOOBS, then click on "Download zip" button under NOOBS and Select a folder to Save this Zip file.
- Extract all the files from ZIP.
- Once SD card has been formatted, drag all the files in the extracted NOOBS folder and drop them onto the SD card drive.
- The necessary file will then be transferred to the SD card.
- When this process has finished, Safely remove the SD card and insert it into the RaspberryPi.

First Boot

- Plug in the Keyboard, mouse, and monitor cables.
- Now plug the USB cable into the RaspberryPi
- Now Raspberrypi will boot, and a window will appear with a list of different operating System.
- Raspbian will then run through its installation Process.

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Programming RaspberryPi With Python

RaspberryPi runs Linux and supports python out of the box. Henceforth you can run any python program that runs on a normal computer. However it is the general purpose input/output capability provided by the GPIO pins on Raspberry Pi that makes it useful device for Internet of things.

Simple python Programs on RaspberryPi:

Program	Code
1. Print hello world	`print ("hello world")`

2. Program to add two numbers	`a = 1.2`
	`b = 5.3`
	`Sum = float(a) + float(b)`
	`Print ("the sum of {0} and {1} is {2}":`
	`format (a,b,sum))`

3. Program to print fibonacci Series	`a,b = 0,1`
	`While b < 200 :`
	`Print(b)`
	`a,b = b, a+b`

4. Program to display calender of given month of the year	`import calender`
	`yy = 2017`
	`mm = 11`
	`print(calender.month(yy.mm))`

5. Program to find the ip address of raspberrypi	`import urllib`
	`import re`
	`point("we will try to open this url, in order to get ip address")`
	`url = http://checkip.dyndns.org`
	`point(url)`

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1	1KG20CS001	ADITYA S R	11	
2	1KG20CS002	AKHILESH K A	12	
3	1KG20CS026	DEVANAND M	8	
4	1KG20CS049	JATIN SINGH	12	

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	1KG20CS059	LIKITHA L MAHESH	27	

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3	1KG20CS017	CHANDRASHEKHAR	13	Chandra
4	1KG20CS026	DEVANAND M	12	Dev

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2	1KG20CS005	ANURAG APPAJI PATIL	27	
3	1KG20CS006	ARAVIND M	27	
4	1KG20CS007	ASHRITHA M	26	
5	1KG20CS011	BHAVANI S	26	
6	1KG20CS016	CHANDANA B N	29	
7	1KG20CS018	CHARAN M J	27	
8	1KG20CS019	CHARISHMA C	26	
9	1KG20CS021	CHINMAY N M	30	
10	1KG20CS022	D THEJESH	28	
11	1KG20CS023	DARSHAN M	28	
12	1KG20CS024	DEEKSHA B	30	
13	1KG20CS029	DHIKSHITH T	30	
14	1KG20CS030	DILIP N	27	
15	1KG20CS031	DISHA R	28	
16	1KG20CS033	DIVYALAKSHMI K	30	
17	1KG20CS041	GUNDARAPU JASWANTH	30	
18	1KG20CS044	HARSHAL V PAI	27	
19	1KG20CS045	HEMANTH M	27	
20	1KG20CS047	J R CHANDAN	28	
21	1KG20CS049	JATIN SINGH	30	
22	1KG20CS050	JEEVAN REDDY R	28	
23	1KG20CS051	JOSHNA M J	30	
24	1KG20CS055	KAVYA S	28	
25	1KG20CS056	KIRAN CHANDRASHEKAR DATAWAD	27	
26	1KG20CS059	LIKITHA L MAHESH	27	
27	1KG21CS402	PALLAVI	27	

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Session 2023-2024 (EVEN Semester)

INTERNET OF THINGS LABORATORY INTERNAL

Sem: VIII BATCH:- B17, B29, B30, B16, B8 Subject Code:18CS81

DATE: 07-05-2024 Time:- 8.40 AM To 11.30 AM

SL. NO.	BATCH	USN	STUDENT NAME	Signature
1	B17	1KG20CS005	Anurag Appaji Patil	
2		1KG20CS006	Aravind M	
3		1KG20CS015	C P Omkar Raya Rawath	
4		1KG20CS018	Charan MJ	
5	B29	1KG20CS001	Adithya SR	
6		1KG20CS004	Anupa MB	
7		1KG20CS017	Chandrashekhar	
8		1KG20CS041	G Jaswanth	
9	B30	1KG20CS035	Durga Prashanth N	
10		1KG20CS030	Dhilip N	
11		1KG20CS040	Govardhan AV	
12		1KG20CS023	Darshan M	
13	B16	1KG20CS066	Monali B Pipaliya	
14		1KG20CS037	Gagan R	
15		1KG20CS080	Pathipati Harshitha	
16	B8	1KG20CS016	Chandana B N	
17		1KG20CS009	Bharani B	
18		1KG20CS033	Divya Lakshmi K	
19		1KG20CS053	Kalpana C	

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DATE: 07-05-2024 Time:- 10.30 AM To 1.30 PM

SL. NO.	BATCH	USN	STUDENT NAME	Signature
1	B10	1KG20CS046	J.Bindu Priya	
2		1KG21CS402	Pallavi.E	
3		1KG21CS400	Anjali R Shastry	
4		1KG21CS401	Dakshayini DS	
5	B2	1KG20CS101	Sidapara Nancy Arvindkumar	
6		1KG20CS123	Yashitha T	
7		1KG20CS118	Vibha M	
8		1KG20CS098	Samyuktha Madhav	
9	B15	1KG20CS013	Bhushan	
10		1KG20CS058	Lavanya	
11		1KG20CS059	Likhitha	
12		1KG20CS057	Kumarswamy	
13	B19	1KG20CS061	M Rohini	
14		1KG20CS081	Prajwal Gowda M	
15	B28	1KG20CS077	Nitesh A	
16		1KG20CS082	Prajwal R	
17		1KG20CS064	Mohammed Yaseen	
18		1KG20CS068	Nagendra	
19	B11	1KG20CS067	Monisha M	
20		1KG20CS074	Nischitha M	
21		1KG20CS075	Nisha M	
22		1KG20CS088	Rakshitha A	

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DATE: 07-05-2024 Time:- 12.30 PM To 3.30 PM

SL. NO.	BATCH	USN	STUDENT NAME	Signature
1	B18	1KG20CS119	Vijayalakshmi D	
2		1KG20CS084	Prerana Kumari	
3		1KG20CS050	Jeevan Reddy R	Jeevan
4		1KG20CS069	Nandan Kumar	Nandan Kumar N
5	B22	1KG20CS071	Nandini.V	Nandini.V.
6		1KG20CS076	Nishmitha.R	Nishmitha.R
7		1KG20CS078	Nithya.A	Nithya.A
8		1KG20CS093	Roshan Kumar.L	
9	B27	1KG20CS028	Dhanush SP	
10		1KG20CS027	Devi Shankar S Kaaturi	Shankar.S
11		1KG20CS091	Ranjith Kumar GD	
12		1KG20CS025	Deekshith G	
13	B32	1KG20CS008	Bhanupriya B	
14		1KG20CS054	Kavya N	
15		1KG20CS011	Bhavani S	Bhavani S
16	B34	1KG20CS063	Meghana M	Meghana.M
17		1KG20CS113	Vaishnavi N Bhat	
18	B12	1KG20CS115	V. Laxmi Priya	
19		1KG20CS110	T.Vyshnavi	T.Vyshnavi
20		1KG20CS124	Yashwanth B	
21		1KG20CS062	M.Yasaswani	

R.S. Chaithra S.L.

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Session 2023-2024 (EVEN Semester)

INTERNET OF THINGS LABORATORY INTERNAL

Sem: VIII BATCH:- B26, B9, B20, B5, B6, B35 Subject Code:18CS81

DATE: 09-05-2024 Time:- 8.40 AM To 11.30 AM

SL. NO.	BATCH	USN	STUDENT NAME	Signature
1	B26	1KG20CS085	Prithviraj	
2		1KG20CS095	Sagar Naidu	
3		1KG20CS073	Nikhil	
4		1KG20CS086	Rahul	Rahul.BM
5	B9	1KG20CS079	Nithya K	Nithya.K
6		1KG20CS089	Rakshitha H C	Rakshitha.
7		1KG20CS070	Nandini M N	Nandini MN.
8	B20	1KG20CS072	Naveen	
9		1KG20CS094	Dinesh S	
10		1KG20CS102	Siddharth Ganesan	G. Siddharth
11		1KG20CS117	Venkatesh DJ	
12	B5	1KG20CS090	Rakshitha R	Rakshitha R
13		1KG20CS096	Sahana.H. S	Sahana. H. S
14		1KG20CS103	Sriraksha	
15		1KG20CS114	Vanditha	Vanditha
16	B6	1KG20CS044	Harshal V Pai	
17		1KG20CS055	Kavya S	Kavya S
18		1KG20CS060	M Jeswanth	M Jeswanth
19		1KG20CS051	Joshna M J	
20	B35	1KG20CS083	Preetham NN	
21		1KG20CS106	Sujay C L	
22		1KG20CS107	Sumanth GG	Sumanth GG
23		1KG20CS002	Akhilesh k A	Akhilesh. K.A

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K. S. SCHOOL OF ENGINEERING AND MANAGEMENT- 560 109

DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING

Session 2023-2024 (EVEN Semester)

INTERNET OF THINGS LABORATORY INTERNAL

Sem: VIII | BATCH:- B21, B3, B4, B14, B23, B24 | Subject Code:18CS81

DATE: 09-05-2024 | Time:- 10.30 AM To 1.30 PM

SL. NO.	BATCH	USN	STUDENT NAME	Signature
1	B21	1KG20CS003	Ananya P	
2		1KG20CS007	Ashritha M	
3		1KG20CS010	Bhavana H S	
4		1KG20CS020	Chethana B M	
5	B3	1KG20CS024	Deeksha.B	
6		1KG20CS019	Charishma.C	
7		1KG20CS014	Boyapati Jyothsna	
8		1KG20CS012	Bhoomika.T	
9	B4	1KG20CS039	Gautham Narkodu	
10		1KG20CS036	Eshwar Sai Chandra	
11		1KG20CS032	Divya Lakshmi J. H.	
12		1KG20CS021	Chinmay N M	
13	B14	1KG20CS092	Ranjithaa MA	
14		1KG20CS109	Thanushree R	
15		1KG20CS104	Suchitha R	
16	B23	1KG20CS087	Rajath K	
17		1KG20CS108	Shwetha M	
18		1KG20CS097	Sahana S Hegde	
19		1KG20CS099	Shreya S	
20	B24	1KG20CS120	Vikrama C	
21		1KG20CS111	Yashwant Naidu	
22		1KG20CS105	Suchitra MB	
23		1KG20CS123	Vishwanath vivek	

R.S. Reddy

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DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING

Session 2023-2024 (EVEN Semester)

INTERNET OF THINGS LABORATORY INTERNAL

Sem: VIII | BATCH:- B7, B33, B1, B13, B31 | Subject Code:18CS81

DATE: 09-05-2024 | Time:- 12.30 PM To 3.30 PM

SL. NO.	BATCH	USN	STUDENT NAME	Signature
1	B7	1KG20CS100	Shruthi M	
2		1KG20CS121	Vinay A	
3		1KG20CS112	Vadiraj R Nadig	
4		1KG20CS116	Veluru Bhanuprasad	
5	B33	1KG20CS049	Jatin singh	
6		1KG20CS065	Mohammed zayed pasha	
7		1KG20CS043	Harsh	
9	B1	1KG20CS047	Chandan J R	
10		1KG20CS056	Kiran Chandrashekar	
11		1KG20CS052	Preetham K	
12		1KG20CS045	Hemanth Mahesh	
13	B13	1KG20CS008	Devanand M	
14		1KG20CS054	Inchara	
15		1KG20CS31	Disha R	
16		1KG20CS34	Druthi N	
18	B31	1KG20CS029	Dhikshith T	
19		1KG20CS038	Gautham BJ	
20		1KG20CS022	D Tejesh	
21		1KG20CS048	J Shashedhar	

R.S. Geetha
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K. S. SCHOOL OF ENGINEERING AND MANAGEMENT- 560 109
DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING
Session 2023-2024 (EVEN Semester)
INTERNET OF THINGS LABORATORY INTERNAL

Sem: VIII | BATCH:- B17, B29, B30, B16, B8 | Subject Code:18CS81

DATE: 07-05-2024 | Time:- 8.40 AM To 11.30 AM

SL. NO.	BATCH	USN	STUDENT NAME	Part (100)			Total	Scale Down to 10	Report	Final Marks	Signature
				Writeup (15)	Execution (70)	Viva (15)					
1	B17	1KG20CS005	Anurag Appaji Patil	15	55	8	78	7.8	10	17.8	Anurag
2		1KG20CS006	Aravind M	15	70	10	95	9.5	10	19.5	[illegible]
3		1KG20CS015	C P Omkar Raya Rawath	10	50	05	65	6.5	10	16.5	[illegible]
4		1KG20CS018	Charan MJ	15	70	10	95	9.5	10	19.5	[illegible]
5	B29	1KG20CS001	Adithya SR	10	50	05	65	6.5	10	18.5	Adithya
6		1KG20CS004	Anupa MB	15	70	12	97	9.7	10	19.7	Anupa
7		1KG20CS017	Chandrashekhar	10	50	05	65	6.5	10	16.5	[illegible]
8		1KG20CS041	G Jaswanth	10	50	05	65	6.5	10	16.5	[illegible]
9	B30	1KG20CS035	Durga Prashanth N	10	50	10	70	7.0	10	17.0	[illegible]
10		1KG20CS030	Dhilip N	10	50	05	65	6.5	10	16.5	[illegible]
11		1KG20CS040	Govardhan AV	10	50	08	68	6.8	10	16.8	[illegible]
12		1KG20CS023	Darshan M	10	50	05	65	6.5	10	16.5	[illegible]
13	B16	1KG20CS066	Monali B Pipaliya	10	50	05	65	6.5	10	16.5	Monali B
14		1KG20CS037	Gagan R	0	70	10	80	8.0	10	18.0	[illegible]
15		1KG20CS080	Pathipati Harshitha	10	50	10	70	7.0	10	17.0	P. [illegible]
16	B8	1KG20CS016	Chandana B N	15	60	10	85	8.5	10	18.5	Chandana
17		1KG20CS009	Bharani B	15	70	15	100	10	10	20	Bharani B
18		1KG20CS033	Divya Lakshmi K	12	60	8	80	8	10	18	Divya
19		1KG20CS053	Kalpana C	15	70	15	100	10	10	20	Kalpana C

R.S. Gathayal
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K. S. SCHOOL OF ENGINEERING AND MANAGEMENT- 560 109

DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING

Session 2023-2024 (EVEN Semester)

INTERNET OF THINGS LABORATORY INTERNAL

Sem: VIII | BATCH:- B10, B2, B15, B19, B28, B11 | Subject Code:18CS81

DATE: 07-05-2024 | Time:- 10.30 AM To 1.30 PM

SL. NO.	BATCH	USN	STUDENT NAME	Part (100)			Total	Scale Down to 10	Report	Final Marks	Signature
				Writeup (15)	Execution (70)	Viva (15)					
1	B10	1KG20CS046	J Bindu Priya	15	70	13	98	9.8	10	19.8	J.Bindu
2		1KG21CS402	Pallavi E	15	70	10	95	9.5	10	19.5	Pallavi
3		1KG21CS400	Anjali R Shastry	15	65	10	90	9.0	10	19	Anj.R
4		1KG21CS401	Dakshayini DS	15	65	10	90	9.0	10	19	Daks
5	B2	1KG20CS101	Sidapara Nancy Arvindkumar	15	70	15	100	10	10	20	Nancy
6		1KG20CS123	Yashitha T	15	70	15	100	10	10	20	Yash
7		1KG20CS118	Vibha M	15	65	10	90	9.0	10	19.0	Vibha
8		1KG20CS098	Samyuktha Madhav	15	50	13	78	7.8	10	17.8	Samyuktha
9	B15	1KG20CS013	Bhushan	10	50	10	70	7.0	10	17	Bhushan
10		1KG20CS058	Lavanya	10	60	10	80	8	10	18	Lavanya
11		1KG20CS059	Likhitha	10	60	5	75	7.5	10	17.5	
12		1KG20CS057	Kumarswamy	15	70	10	95	9.5	10	19.5	
13	B19	1KG20CS061	M Rohini	15	70	15	100	10	10	20	M Rohini
14		1KG20CS081	Prajwal Gowda M	15	70	15	100	10	10	20	Prajwal
15	B28	1KG20CS077	Nitesh A	15	70	12	97	9.7	10	19.7	Nitesh
16		1KG20CS082	Prajwal R	13	50	10	73	7.3	10	17.3	Prajwal R
17		1KG20CS064	Mohammed Yaseen	12	70	05	87	8.7	10	18.7	Yaseen
18		1KG20CS068	Nagendra	15	70	10	95	9.5	10	19.5	Nagendra
19	B11	1KG20CS067	Monisha M	15	70	15	100	10	10	20	Monisha
20		1KG20CS074	Nischitha M	15	70	13	98	9.8	10	19.8	Nischitha
21		1KG20CS075	Nisha M	15	70	13	98	9.8	10	19.8	Nisha
22		1KG20CS088	Rakshitha A	15	70	13	98	9.8	10	19.8	Rakshitha

PS. Geethanjali
Faculty Incharge

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DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING

Session 2023-2024 (EVEN Semester)

INTERNET OF THINGS LABORATORY INTERNAL

Sem: VIII | BATCH:- B18, B22, B27, B32, B34, B12 | Subject Code:18CS81

DATE: 07-05-2024 | Time:- 12.30 PM To 3.30 PM

SL. NO.	BATCH	USN	STUDENT NAME	Part (30)			Total	Scale Down to 10	Report	Final Marks	Signature
				Writeup (15)	Execution (70)	Viva (15)					
1	B18	1KG20CS119	Vijayalakshmi D	15	70	13	98	9.8	10	19.8	
2		1KG20CS084	Prerana Kumari	15	70	13	98	9.8	10	19.8	
3		1KG20CS050	Jeevan Reddy R	15	70	10	95	9.5	10	19.5	
4		1KG20CS069	Nandan Kumar	15	70	12	97	9.7	10	19.7	
5	B22	1KG20CS071	Nandini V	15	70	12	97	9.7	10	19.7	
6		1KG20CS076	Nishmitha R	15	70	15	100	10	10	20	
7		1KG20CS078	Nithya A	15	70	12	97	9.7	10	19.7	
8		1KG20CS093	Roshan Kumar L	15	70	12	97	9.7	10	19.7	
9	B27	1KG20CS028	Dhanush SP	15	70	8	93	9.3	10	19.3	
10		1KG20CS027	Devi Shankar S Kauturi	15	70	12	97	9.7	10	19.7	
11		1KG20CS091	Ranjith Kumar GD	15	70	5	90	9	10	19	
12		1KG20CS025	Deekshith G	15	70	8	93	9.3	10	19.3	
13	B32	1KG20CS008	Bhanupriya B	15	65	7	87	8.7	10	18.7	
14		1KG20CS054	Kavya N	15	70	13	98	9.8	10	19.8	
15		1KG20CS011	Bhavani S	10	65	05	80	8.0	10	18	
16	B34	1KG20CS063	Meghana M	15	65	12	92	9.2	10	19.2	
17		1KG20CS113	Vaishnavi N Bhat	15	70	10	95	9.5	10	19.5	
18	B12	1KG20CS115	V. Laxmi Priya	15	70	12	97	9.7	10	19.7	
19		1KG20CS110	T Vyshnavi	15	70	13	98	9.8	10	19.8	
20		1KG20CS124	Yashwanth B	15	70	10	95	9.5	10	19.5	
21		1KG20CS062	M Yasaswani	15	70	13	98	9.8	10	19.8	

R Sreathan d.
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DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING

Session 2023-2024 (EVEN Semester)

INTERNET OF THINGS LABORATORY INTERNAL

Sem: VIII | BATCH:- B26, B9, B20, B5, B6, B35 | Subject Code:18CS81

DATE: 09-05-2024 | Time:- 8.40 AM To 11.3(

SL. NO.	BATCH	USN	STUDENT NAME	Part (100)			Total	Scale Down to 10	Report	Final Marks	Signature
				Writeup (15)	Execution (70)	Viva (15)					
1	B26	1KG20CS085	Prithviraj	15	70	13	98	9.8	10	19.8	
2		1KG20CS095	Sagar Naidu	14	68	15	97	9.7	10	19.7	
3		1KG20CS073	Nikhil	15	70	14	99	9.9	10	19.9	
4		1KG20CS086	Rahul	15	70	5	90	9	10	19	
5	B9	1KG20CS079	Nithya K	15	70	15	100	10	10	20	
6		1KG20CS089	Rakshitha H C	15	70	15	100	10	10	20	
7		1KG20CS070	Nandini M N	15	70	13	98	9.8	10	19.8	
8	B20	1KG20CS072	Naveen	15	70	15	100	10	10	20	
9		1KG20CS094	Dinesh S	15	70	13	98	9.8	10	19.8	
10		1KG20CS102	Siddharth Ganesan	15	70	10	95	9.5	10	19.5	
11		1KG20CS117	Venkatesh DJ	15	50	5	65	6.5	10	16.5	
12	B5	1KG20CS090	Rakshitha R	15	70	15	100	10	10	20	
13		1KG20CS096	Sahana H. S	15	70	13	98	9.8	10	19.8	
14		1KG20CS103	Sriraksha	15	68	13	96	9.6	10	19.6	
15		1KG20CS114	Vanditha	15	68	13	96	9.6	10	19.6	
16	B6	1KG20CS044	Harshal V Pai	15	70	15	100	10	10	20	
17		1KG20CS055	Kavya S	15	70	15	100	10	10	20	
18		1KG20CS060	M Jeswanth	15	68	13	96	9.6	10	19.6	
19		1KG20CS051	Joshna M J	15	70	13	98	9.8	10	19.8	
20	B35	1KG20CS083	Preetham NN	15	70	12	97	9.7	10	19.7	
21		1KG20CS106	Sujay C L	15	70	13	98	9.8	10	19.8	
22		1KG20CS107	Sumanth GG	15	70	12	97	9.7	10	19.7	
23		1KG20CS002	Akhilesh k A	15	70	12	97	9.7	10	19.7	

R.S. Geetha

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K. S. SCHOOL OF ENGINEERING AND MANAGEMENT- 560 109

DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING

Session 2023-2024 (EVEN Semester)

INTERNET OF THINGS LABORATORY INTERNAL

Sem: VIII

BATCH:- B21, B3, B4, B14, B23, B24

Subject Code: 18CS81

DATE: 09-05-2024

Time:- 10.30 AM To 1.30 PM

SL. NO.	BATCH	USN	STUDENT NAME	Part (100)			Total	Scale Down to 10	Report	Final Marks	Signature
				Writeup (15)	Execution (70)	Viva (15)					
1	B21	1KG20CS003	Ananya P	15	70	12	97	9.7	10	19.7	Ananya
2		1KG20CS007	Ashritha M	15	70	12	97	9.7	10	19.7	
3		1KG20CS010	Bhavana H S	15	70	12	97	9.7	10	19.7	
4		1KG20CS020	Chethana B M	15	70	12	97	9.7	10	19.7	
5	B3	1KG20CS024	Deeksha B	15	70	12	97	9.7	10	19.7	
6		1KG20CS019	Charishma C	15	70	12	97	9.7	10	19.7	
7		1KG20CS014	Boyapati Jyothsna	15	70	12	97	9.7	10	19.7	Jyothsna
8		1KG20CS012	Bhoomika T	13	65	7	85	8.5	10	18.5	Bhoomi
9	B4	1KG20CS039	Gautham Narkodu	15	70	15	100	10	10	20	Gautham
10		1KG20CS036	Eshwar Sai Chandra	15	70	15	100	10	10	20	Chandra
11		1KG20CS032	Divya Lakshmi J H	15	70	12	97	9.7	10	19.7	Divya
12		1KG20CS021	Chinmay N M	15	70	12	97	9.7	10	19.7	Chinmay
13	B14	1KG20CS092	Ranjithaa MA	15	70	12	97	9.7	10	19.7	
14		1KG20CS109	Thanushree R	15	70	12	97	9.7	10	19.7	
15		1KG20CS104	Suchitha R	15	70	12	97	9.7	10	19.7	
16	B23	1KG20CS087	Rajath K	15	70	12	97	9.7	10	19.7	Rajath
17		1KG20CS108	Shwetha M	15	70	12	97	9.7	10	19.7	Swetha
18		1KG20CS097	Sahana S Hegde	15	70	12	97	9.7	10	19.7	
19		1KG20CS099	Shreya S	15	70	12	97	9.7	10	19.7	
20	B24	1KG20CS120	Vikrama C	15	70	12	97	9.7	10	19.7	
21		1KG20CS111	Yashwant Naidu	15	70	12	97	9.7	10	19.7	
22		1KG20CS105	Suchitra MB	15	70	12	97	9.7	10	19.7	
23		1KG20CS122	Vishwanath vivek	15	70	12	97	9.7	10	19.7	

R.S.Geethanjali

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K. S. SCHOOL OF ENGINEERING AND MANAGEMENT- 560 109

DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING

Session 2023-2024 (EVEN Semester)

INTERNET OF THINGS LABORATORY INTERNAL

Sem: VIII | BATCH:- B7, B33, B1, B13, B31 | Subject Code:18CS81

DATE: 09-05-2024 | Time:- 12.30 PM To 3.30 PM

SL. NO.	BATCH	USN	STUDENT NAME	Part (100)			Total	Scale Down to 10	Report	Final Marks	Signature
				Writeup (15)	Execution (70)	Viva (15)					
1	B7	1KG20CS100	Shruthi M	15	70	12	97	9.7	10	19.7	
2		1KG20CS121	Vinay A	15	68	12	95	9.5	10	19.5	
3		1KG20CS112	Vadiraj R Nadig	15	50	10	75	7.5	10	17.5	
4		1KG20CS116	Veluru Bhanuprasad	15	70	14	99	9.9	10	19.9	
5	B33	1KG20CS049	Jatin singh	14	68	15	97	9.7	10	19.7	
6		1KG20CS065	Mohammed zayed	15	70	10	95	9.5	10	19.5	
7		1KG20CS043	Harsh	15	70	13	98	9.8	10	19.8	
8	B1	1KG20CS047	Chandan J R	15	70	8	93	9.3	10	19.3	
9		1KG20CS056	Kiran Chandrashekar	13	65	10	88	8.8	10	18.8	
10		1KG20CS052	Preetham K	15	70	7	92	9.2	10	19.2	
11		1KG20CS045	Hemanth Mahesh	15	70	10	95	9.5	10	19.5	
12	B13	1KG20CS026	Devanand M	15	70	13	98	9.8	10	19.8	
13		1KG20CS042	Inchara	15	70	7	92	9.2	10	19.2	
14		1KG20CS031	Disha R	14	68	10	92	9.2	10	19.2	
15		1KG20CS034	Druthi N	15	70	15	100	10	10	20	
16	B31	1KG20CS029	Dhikshith T	15	70	5	90	9.0	10	19	
17		1KG20CS038	Gautham BJ	12	68	5	85	8.5	10	18.5	
18		1KG20CS022	D Tejesh	15	65	5	85	8.5	10	18.5	
19		1KG20CS048	J Shashedhar	15	68	5	88	8.8	10	18.8	

R.S. Geethanjali
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DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING
Session 2023-2024 (EVEN Semester)
INTERNET OF THINGS (18CS81) INTERNAL AVERAGE MARKS
Class and Section : VIII A

Sl. No	USN	Name of the Student	IA1	IA2	IA3	IMP	TOTAL	Scale down to 20	LAB IA MARKS	FINAL AVERAGE	STUDENT SIGNATURE
1	1KG20CS001	ADITYA S R	18	0	15	23	56	13	19	32	
2	1KG20CS002	AKHILESH K A	0	9	18	26	53	12	20	32	
3	1KG20CS003	ANANYA P	30	30	28	0	88	20	20	40	
4	1KG20CS004	ANUPA M B	21	0	15	23	59	14	20	34	
5	1KG20CS005	ANURAG APPAJI PATIL	16	0	12	20	48	11	18	29	
6	1KG20CS006	ARAVIND M	14	7	12	0	33	8	20	28	
7	1KG20CS007	ASHRITHA M	24	0	23	24	71	16	20	36	
8	1KG20CS008	BHANUPRIYA B	21	0	16	26	63	14	19	33	
9	1KG20CS009	BHARANI B	29	30	28	0	87	20	20	40	
10	1KG20CS010	BHAVANA H S	22	0	24	26	72	16	20	36	
11	1KG20CS011	BHAVANI S	0	3	8	13	24	6	18	24	
12	1KG20CS012	BHOOMIKA T	12	8	24	0	44	10	19	29	
13	1KG20CS013	BHUSHAN P	0	0	15	29	44	10	17	27	
14	1KG20CS014	BOYAPATI JYOTHSNA	21	16	26	0	63	14	20	34	
15	1KG20CS015	C P OMKAR RAYA RAWAT	14	3	5	17	39	9	17	26	
16	1KG20CS016	CHANDANA B N	30	29	29	0	88	20	19	39	
17	1KG20CS017	CHANDRASHEKHAR	18	11	22	0	51	12	17	29	
18	1KG20CS018	CHARAN M J	20	13	19	0	52	12	20	32	
19	1KG20CS019	CHARISHMA C	22	11	17	0	50	12	20	32	
20	1KG20CS020	CHETHANA B M	22	20	0	28	70	16	20	36	
21	1KG20CS021	CHINMAY N M	17	0	19	17	53	12	20	32	
22	1KG20CS022	D THEJESH	0	2	5	20	27	6	19	25	
23	1KG20CS023	DARSHAN M	0	0	13	23	36	8	17	25	
24	1KG20CS024	DEEKSHA B	0	14	13	22	49	11	20	31	

25	1KG20CS025	DEEKSHITH G	15	0	8	20	43	10	20	30	
26	1KG20CS026	DEVANAND M	23	0	14	25	62	14	20	34	
27	1KG20CS027	DEVI SHANKAR K	0	10	12	28	50	12	20	32	
28	1KG20CS028	DHANUSH S P	19	1	15	0	35	8	20	28	
29	1KG20CS029	DHIKSHITH T	0	2	8	16	26	6	19	25	
30	1KG20CS030	DILIP N	20	0	21	21	62	14	17	31	
31	1KG20CS031	DISHA R	15	8	22		45	10	20	30	
32	1KG20CS032	DIVYA LAKSHMI J H	30	30	29	0	89	20	20	40	
33	1KG20CS033	DIVYALAKSHMI K	27	22	18	0	67	15	18	33	
34	1KG20CS034	DRUTHI N	27	0	21	27	75	17	20	37	
35	1KG20CS035	DURGA PRASHANTH	24	0	14	22	60	14	17	31	
36	1KG20CS036	ESHWAR SAI CHANDRA	29	0	27	29	85	19	20	39	
37	1KG20CS037	GAGAN R	0	14	15	0	29	7	18	25	
38	1KG20CS038	GAUTHAM B J	0	0	5	24	29	7	19	26	
39	1KG20CS039	GAUTHAM NARKODU	28	0	28	28	84	19	20	39	
40	1KG20CS040	GOVARDHAN A V	0	6	14	26	46	11	17	28	
41	1KG20CS041	GUNDARAPU JASWANTH	0	4	10	15	29	7	17	24	
42	1KG20CS042	H R INCHARA	23	9	21	0	53	12	20	32	
43	1KG20CS043	HARSH	0	0	26	29	55	13	20	33	
44	1KG20CS044	HARSHAL V PAI	0	25	13	27	65	15	20	35	
45	1KG20CS045	HEMANTH M	0	14	0	24	38	9	20	29	
46	1KG20CS046	J BINDU PRIYA	30	30	25	0	85	19	20	39	
47	1KG20CS047	J R CHANDAN	0	0	13	23	36	8	20	28	
48	1KG20CS048	J SASIDHAR	0	2	15	15	32	8	19	27	
49	1KG20CS049	JATIN SINGH	0	0	14	26	40	9	20	29	
50	1KG20CS050	JEEVAN REDDY R	0	6	9	18	33	8	20	28	
51	1KG20CS051	JOSHNA M J	0	18	20	28	66	15	20	35	
52	1KG20CS052	K PREETHAM	0	18	18	26	62	14	20	34	

53	1KG20CS053	KALPANA C	28	22	27	0	77	18	20	38	
54	1KG20CS054	KAVYA N	21	27	24	0	72	16	20	36	
55	1KG20CS055	KAVYA S	30	30	29	0	89	20	20	40	
56	1KG20CS056	KIRAN CHANDRASHEKAR DATAWAD	0	7	12	24	43	10	19	29	
57	1KG20CS057	KUMARASWAMY N	0	11	0	23	34	8	20	28	
58	1KG20CS058	LAVANYA M	0	25	24	29	78	18	18	36	
59	1KG20CS059	LIKITHA L MAHESH	0	16	26	29	71	16	18	34	
60	1KG20CS060	M JESWANTH	30	28	30	0	88	20	20	40	
61	1KG21CS400	ANJALI	28	27	22	0	77	18	19	37	
62	1KG21CS401	DAKSHAYINI	28	30	23	0	81	18	19	37	
63	1KG21CS402	PALLAVI	28	30	23	0	81	18	20	38	

K.S. SCHOOL OF ENGINEERING AND MANAGEMENT, BENGALURU
DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING
VIII A SEC FINAL AVERAGE MARKS (2023-2024)

SL. NO.	USN	NAME OF THE STUDENT	INTERNET OF THINGS (IOT) 18CS81	INTERNET OF THINGS (IOT) LABORATORY 18CS81	STORAGE AREA NETWORKS 18CS822	PROJECT WORK PHASE - II 18CSP83	TECHNICAL SEMINAR 18CSS84	INTERNSHIP 18CSI85	STUDENT SIGNATURE
1	1KG20CS001	ADITYA S R	32	19	22	39	98	40	
2	1KG20CS002	AKHILESH K A	32	20	31	39	96	39	
3	1KG20CS003	ANANYA P	40	20	37	39	98	40	
4	1KG20CS004	ANUPA M B	34	20	24	39	98	40	
5	1KG20CS005	ANURAG APPAJI PATIL	29	18	20	39	97	40	
6	1KG20CS006	ARAVIND M	28	20	26	39	96	39	
7	1KG20CS007	ASHRITHA M	36	20	38	39	98	40	
8	1KG20CS008	BHANUPRIYA B	33	19	31	37	97	37	
9	1KG20CS009	BHARANI B	40	20	40	39	99	40	
10	1KG20CS010	BHAVANA H S	36	20	37	39	98	40	
11	1KG20CS011	BHAVANI S	24	18	24	36	95	37	
12	1KG20CS012	BHOOMIKA T	29	19	28	37	95	39	
13	1KG20CS013	BHUSHAN P	27	17	29	39	99	39	
14	1KG20CS014	BOYAPATI JYOTHSNA	34	20	31	39	97	39	
15	1KG20CS015	C P OMKAR RAYA RAWAT	26	17	22	38	95	36	
16	1KG20CS016	CHANDANA B N	39	19	40	39	99	40	
17	1KG20CS017	CHANDRASHEKHAR	31	17	34	38	99	37	
18	1KG20CS018	CHARAN M J	32	20	33	39	95	39	
19	1KG20CS019	CHARISHMA C	32	20	34	38	95	39	
20	1KG20CS020	CHETHANA B M	36	20	38	39	98	40	
21	1KG20CS021	CHINMAY N M	32	20	34	36	95	38	
22	1KG20CS022	D THEJESH	25	19	19	36	97	36	
23	1KG20CS023	DARSHAN M	25	17	25	39	96	38	
24	1KG20CS024	DEEKSHA B	31	20	37	39	97	39	
25	1KG20CS025	DEEKSHITH G	30	20	34	38	96	36	

SL. NO.	USN	NAME OF THE STUDENT	INTERNET OF THINGS (IOT) 18CS81	INTERNET OF THINGS (IOT) LABORATORY 18CS81	STORAGE AREA NETWORKS 18CS822	PROJECT WORK PHASE - II 18CSP83	TECHNICAL SEMINAR 18CSS84	INTERNSHIP 18CSI85	STUDENT SIGNATURE
26	1KG20CS026	DEVANAND M	34	20	33	40	99	39	
27	1KG20CS027	DEVI SHANKAR K	32	20	32	38	97	37	
28	1KG20CS028	DHANUSH S P	28	20	29	38	95	37	
29	1KG20CS029	DHIKSHITH T	25	19	19	36	98	38	
30	1KG20CS030	DILIP N	31	17	23	39	96	38	
31	1KG20CS031	DISHA R	30	20	30	40	99	39	
32	1KG20CS032	DIVYA LAKSHMI J H	40	20	40	38	98	40	
33	1KG20CS033	DIVYALAKSHMI K	33	18	38	38	97	40	
34	1KG20CS034	DRUTHI N	36	20	38	40	99	40	
35	1KG20CS035	DURGA PRASHANTH	31	17	28	39	97	38	
36	1KG20CS036	ESHWAR SAI CHANDRA	39	20	40	40	99	40	
37	1KG20CS037	GAGAN R	25	18	23	39	97	38	
38	1KG20CS038	GAUTHAM B J	26	19	19	36	97	38	
39	1KG20CS039	GAUTHAM NARKODU	39	20	38	40	99	40	
40	1KG20CS040	GOVARDHAN A V	28	17	25	36	95	36	
41	1KG20CS041	GUNDARAPU JASWANTH	24	17	30	37	96	36	
42	1KG20CS042	H R INCHARA	32	20	38	40	99	39	
43	1KG20CS043	HARSH	33	20	36	37	99	37	
44	1KG20CS044	HARSHAL V PAI	35	20	34	39	99	40	
45	1KG20CS045	HEMANTH M	29	20	24	36	98	36	
46	1KG20CS046	J BINDU PRIYA	39	20	40	38	98	40	
47	1KG20CS047	J R CHANDAN	28	20	26	36	98	36	
48	1KG20CS048	J SASIDHAR	27	19	19	36	97	36	
49	1KG20CS049	JATIN SINGH	29	20	25	37	99	36	
50	1KG20CS050	JEEVAN REDDY R	28	20	23	36	96	38	
51	1KG20CS051	JOSHNA M J	35	20	29	38	95	38	
52	1KG20CS052	K PREETHAM	34	20	34	36	98	36	
53	1KG20CS053	KALPANA C	38	20	40	39	98	40	

SL. NO.	USN	NAME OF THE STUDENT	INTERNET OF THINGS (IOT) 18CS81	INTERNET OF THINGS (IOT) LABORATORY 18CS81	STORAGE AREA NETWORKS 18CS822	PROJECT WORK PHASE - II 18CSP83	TECHNICAL SEMINAR 18CSS84	INTERNSHIP 18CSI85	STUDENT SIGNATURE
54	1KG20CS054	KAVYA N	36	20	40	37	96	39	
55	1KG20CS055	KAVYA S	40	20	40	40	99	40	
56	1KG20CS056	KIRAN CHANDRASHEKAR DATAWAD	~~26~~ 29	19	28	36	98	36	
57	1KG20CS057	KUMARASWAMY N	28	20	21	39	98	36	
58	1KG20CS058	LAVANYA M	36	18	37	39	98	39	
59	1KG20CS059	LIKITHA L MAHESH	34	18	35	39	98	39	
60	1KG20CS060	M JESWANTH	40	20	40	40	99	40	
61	1KG21CS400	ANJALI	37	19	40	38	98	39	
62	1KG21CS401	DAKSHAYINI	37	19	40	38	98	39	
63	1KG21CS402	PALLAVI	38	20	40	38	98	39	
FACULTY SIGNATURE					NB				

CLASS TEACHER

HOD

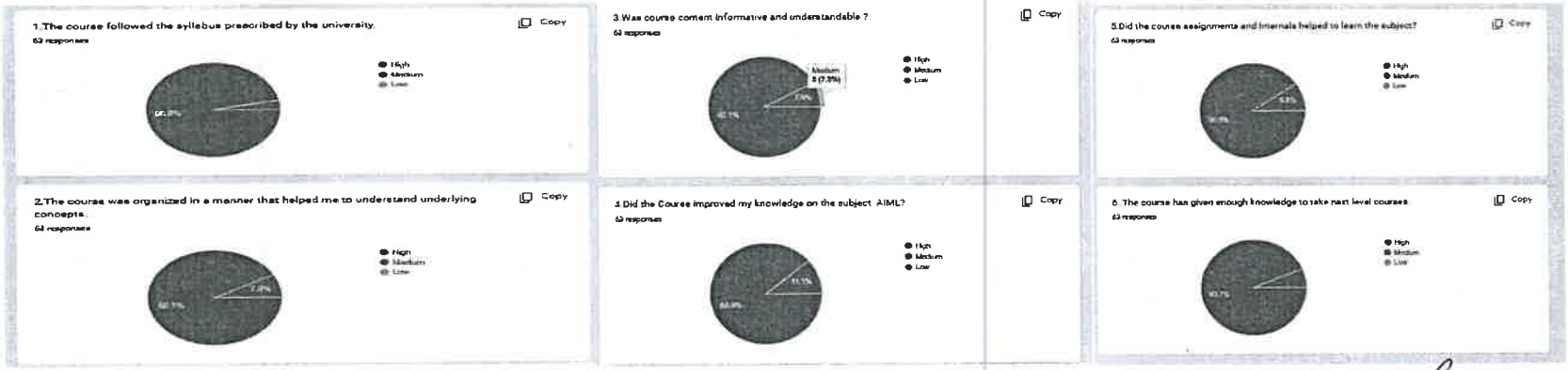
HOD
Department of Computer Science Engineering
K.S School of Engineering & Management
Bangalore-560109

K.S. SCHOOL OF ENGINEERING AND MANAGEMENT, BENGALURU-560109
DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING
COURSE END SURVEY

SUBJECT : IOT **SEM : VIII**

Timestamp	Email	USN	NAME	1.The course followed the syllabus prescribed by the university.	2.The course was organized in a manner that helped me to understand underlying concepts.	3.Was course content informative and understandable ?	4.Did the Course improved my knowledge on the subject AIML?	5.Did the course assignments and Internals helped to learn the subject?	6. The course has given enough knowledge to take next level courses.	Student Signature
12-28-2023 10:55:08	adithyasr7057@gmail.com	1KG20CS001	Adithya SR	High	High	High	High	High	High	
12-28-2023 11:01:14	kaakhilesh159@gmail.com	1KG20CS002	Akhilesh K A	High	High	High	High	High	High	
12-28-2023 10:52:49	ananyap0919@gmail.com	1KG20CS003	Ananya P	High	High	High	High	High	High	
12-28-2023 10:56:58	anupbadrinath177@gmail.com	1KG20CS004	Anupa MB	High	High	Medium	Medium	High	High	
1-1-2024 20:51:48	Anuragbest8@gmail.com	1kg20cs005	Anurag	High	High	High	High	High	High	
1-1-2024 10:46:13	maravind236@gmail.com	1kg20cs006	Aravind M	High	High	High	High	High	High	
1-2-2024 11:14:43	shrithagowda005@gmail.com	1KG20CS007	Ashritha M	High	High	High	High	High	High	
12-29-2023 17:15:38	bp4500183@gmail.com	1KG20CS008	Bhanupriya	High	High	High	High	High	High	
12-28-2023 12:18:37	alakabharanireddy@gmail.co	1KG20CS009	Bharani B	High	High	High	High	High	High	
12-29-2023 15:39:18	havanagowda214@gmail.com	1KG20CS010	Bhavana H S	High	Medium	Medium	Medium	High	Medium	
12-28-2023 16:50:52	avanisbhavanis705@gmail.c	1KG20CS011	Bhavani.S	High	High	High	High	High	High	
12-28-2023 12:16:46	oomikathyagaraj29@gmail.c	1KG20CS012	Bhoomika T	High	High	High	High	High	High	
1-2-2024 13:15:35	bp0546362@gmail.com	1KG20CS013	Bhushan	High	High	High	High	High	High	
1-1-2024 10:25:26	oyapatijyothsna99@gmail.co	1kg20cs014	Jyothsna Boyapati	High	High	High	High	High	High	
1-8-2024 10:09:37	Omkarrawath27@gmail.com	1kg20cs015	Omkar rawath	High	High	High	High	High	High	
1-1-2024 11:15:20	chandanabn828@gmail.com	1KG20CS016	Chandana B N	High	High	High	High	High	High	
12-29-2023 17:16:57	chandrashekhar6969@gmai	1KG20CS017	CHANDRASHEKHAR	High	High	High	High	High	High	
12-28-2023 11:14:32	Charanmj18@gmail.com	1KG20CS018	Charan MJ	High	High	High	High	High	High	
1-1-2024 11:00:58	rishmacharishma02@gmail.c	1KG20CS019	Charishma C	High	High	High	High	High	High	
12-28-2023 14:50:40	chethanagowda07@gmail.com	1KG20CS020	Chethana B M	High	High	High	High	High	High	
12-29-2023 8:33:26	chinmaynm34@gmail.com	1KG20CS021	Chinmay N M	High	High	High	High	High	High	
1-8-2024 10:01:42	jeshchowdary8688@gmail.co	1KG20CS022	Tejesh	High	High	High	High	High	High	
1-8-2024 10:27:25	arshan9482832622@gmail.co	1KG20CS023	Darshan.m	High	High	High	High	High	High	
1-1-2024 12:34:45	Deeksha.b	1kg20cs024	Deeksha.b	High	High	High	High	High	High	
1-8-2024 12:50:01	eekshithnaidu1923@gmail.co	1KG20CS025	Deekshith G	High	High	High	High	High	High	
12-29-2023 15:57:55	ickerdevanand993@gmail.co	1KG20CS026	Devanand M	High	High	High	High	High	High	
12-29-2023 15:46:51	vishankarkaaturi44@gmail.c	1KG20CS027	Devi Shankar S Kaatur	High	High	High	High	High	High	
12-29-2023 16:00:12	anushspdhanushsp@gmail.c	1KG20CS028	Dhanush Sp	High	High	High	High	High	High	
1-2-2024 13:07:54	thotadhikshith@gmail.com	1KG20CS029	Dhikshith T	High	High	High	High	High	High	
1-2-2024 11:11:32	dhilip7n@gmail.com	1KG20CS030	Dhilip N	High	High	High	High	High	High	
12-29-2023 15:42:57	dishagowda41@gmail.com	1KG20CS031	Disha R	High	High	High	High	High	High	
1-1-2024 10:57:55	divz3887@gmail.com	1kg20cs032	Divya Lakshmi J.H.	High	High	High	High	High	High	
12-28-2023 12:17:01	divy2003321@gmail.com	1KG20CS033	Divyalakshmi K	High	High	High	High	High	High	
12-29-2023 6:11:35	druthin2003@gmail.com	1KG20CS034	Druthi N	Medium	Medium	Medium	Medium	Medium	Medium	
12-28-2023 10:57:23	rgaprashanth1104@gmail.c	1KG20CS035	Durga Prashanth N	High	Medium	High	Medium	Medium	High	
12-28-2023 12:48:34	hwarsaichandra17@gmail.c	1KG20CS036	Eshwar Sai Chandra	High	High	High	High	High	High	
12-28-2023 10:56:28	gagangambhir21@gmail.com	1KG20CS037	Gagan R	High	High	High	High	High	High	

1-1-2024 11:53:50	12bjgautham@gmail.com	1kg20cs038	Gautham bj	High	High	High	High	High	High	
12-28-2023 12:16:41	gnarkod123@gmail.com	1KG20CS039	Gautham Narkodu	High	High	High	High	High	High	
1-1-2024 11:58:06	ovagovardhan479@gmail.co	1kg20cs040	Govardhan AV	High	High	High	High	High	High	
1-2-2024 11:10:29	aswanthjassu802@gmail.com	1kg20cs041	G Jaswanth	High	High	High	High	High	High	
12-28-2023 17:13:27	ncharainchu530@gmail.com	1KG20CS042	Inchara.h.r	High	Medium	High	Medium	High	Medium	
1-2-2024 9:27:16	harzh54325@gmail.com	1KG20CS043	Harsh	High	High	High	High	Medium	High	
1-1-2024 11:52:46	arshalvinayak9114@gmail.co	1KG20CS044	Harshal V Pai	High	High	High	High	High	High	
1-1-2024 21:47:07	emanthmahesh045@gmail.co	1KG20CS045	Hemanth M	High	High	High	High	High	High	
12-29-2023 17:42:59	dupriyajagarlamudi@gmail.c	1KG20CS046	J.Bindu Priya	High	High	High	High	High	High	
12-29-2023 15:43:06	chandan.jr4704@gmail.com	1KG20CS047	J R Chandan	High	High	High	High	High	High	
1-8-2024 9:59:29	sidharjagarlamudi03@gmail.c	1KG20CS048	J.sasidhar	High	High	High	High	High	High	
1-1-2024 10:25:24	ordanslathia1617@gmail.com	1kg20cs049	Jatin singh	High	High	High	Medium	Medium	High	
1-1-2024 10:51:55	jeevanani2733@gmail.com	1KG20CS050	Jeevan Reddy R	High	High	High	High	High	High	
1-8-2024 11:26:54	joshnamj959@gmail.com	1KG20CS051	Joshna MJ	High	High	High	High	High	High	
1-8-2024 10:00:43	preethamkudapa@gmail.com	1KG20CS052	K Preetham	High	High	High	High	High	High	
12-28-2023 16:17:23	kalpana.c803@gmail.com	1KG20CS053	KALPANA C	High	High	High	High	High	High	
12-31-2023 15:45:50	avyangowda2002@gmail.com	1KG20CS054	Kavya N	High	High	High	High	High	High	
12-28-2023 13:32:58	kavyadivya959@gmail.com	1KG20CS055	Kavya S	Medium	Medium	Medium	Medium	Medium	Medium	
12-28-2023 16:17:25	kirandatawad@gmail.com	1KG20CS056	Kiran Chandrashekar D	High	High	Medium	High	Medium	High	
12-28-2023 20:15:08	Kumarswamyrini@gmail.com	1KG20CS057	Kumaraswamy N	High	High	High	High	High	High	
12-28-2023 21:26:14	vanyamallesh2002@gmail.co	1kg20cs058	Lavanya M	High	High	High	High	High	High	
1-1-2024 12:32:14	likhithalika844@gmail.com	1KG20CS059	Likhitha L Mahesh	High	High	High	High	High	High	
12-28-2023 12:13:28	owdaryjeswanth26@gmail.co	1KG20CS060	M jeswanth	High	High	High	High	High	High	
1-1-2024 10:31:31	anjalirshastry@gmail.com	1KG21CS400	Anjali R Shastry	High	High	High	High	High	High	
12-28-2023 12:27:50	akshayinigowda18@gmail.co	1kg21cs401	Dakshayini D S	High	High	High	High	High	High	
12-29-2023 16:32:47	pallavinaidu2002@gmail.com	1kg21cs402	Pallavi E	High	High	High	High	High	High	



FACULTY INCHARGE

HOD

Department of Computer Science Engineering
.S School of Engineering & Management
Bangalore-560109

K. S. School of Engineering & Management, Bangalore - 560109

Department of Computer Science Engineering

Staff Feedback (2023-24) Even Sem

Eight Sem 'A' Section

Faculty Name: Mrs. Belji T

Course Name & Code: Internet of Things/18CS81

Class Strength:63

Sl. No.	1. Effective Planning & organisation	2. Punctuality / Class time Utilization	3. Ability to teach /explain / effective use of board	4. Interaction / Motivating students	5. Subject knowledge	6. Presentation of the subject / communication	7. Linking subject with practical application	8. Syllabus covearage / exam point of view	9. Evaluation of test / counselling	10. Attitude towards students
1	5	5	5	5	5	5	5	5	5	5
2	5	5	5	5	5	5	5	5	5	5
3	5	5	5	5	5	5	5	5	5	5
4	5	5	5	5	5	5	5	5	5	5
5	5	5	5	5	5	5	5	5	5	5
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35	5	5	5	5	5	5	5	5	5	5
36	5	5	5	5	5	5	5	5	5	5
37	5	5	5	5	5	5	5	5	5	5

38	5	5	5	5	5	5	5	5	5	5
39	4	4	4	4	4	4	4	4	4	4
40	5	5	5	5	5	5	5	5	5	5
41	5	4	4	4	4	4	4	5	5	5
42	5	5	5	5	5	5	5	5	5	5
43	4	4	4	4	4	4	4	4	4	4
44	5	5	5	5	5	5	5	5	5	5
45	5	5	5	5	5	5	5	5	5	5
46	5	5	5	5	5	5	5	5	5	5
47	5	5	5	5	5	5	5	5	5	5
48	5	5	5	5	5	5	5	5	5	5
49	5	5	5	5	5	5	5	5	5	5
50	5	5	5	5	5	5	5	5	5	5
51	5	5	5	5	5	5	5	5	5	5
52	5	5	5	5	5	5	5	5	5	5
53	5	5	5	5	5	5	5	5	5	5
54	2	2	2	2	2	2	2	2	2	2
55	2	4	2	1	2	3	2	3	1	1
56	2	4	2	2	2	3	2	3	1	1
57	2	4	2	2	2	3	2	3	1	1
58	5	5	5	5	5	5	5	5	5	5
59	5	5	5	5	5	5	5	5	5	5
60	5	5	5	5	5	5	5	5	5	5
61	5	5	5	5	5	5	5	5	5	5
62	5	5	5	5	5	5	5	5	5	5
63	5	5	5	5	5	5	5	5	5	5
64	5	5	5	5	5	5	5	5	5	5
Col. Total	303	309	302	301	300	306	300	306	299	300
Col. Avg.	4.73	4.83	4.72	4.70	4.69	4.78	4.69	4.78	4.67	4.69
Over all %	94.56									

Head of Department

HOD

Department of Computer Science Engineering
K.S School of Engineering & Management
Bangalore-560109

Principal