B. M. S. INSTITUTE OF TECHNOLOGY AND MANAGEMENT
YELAHANKA, BANGALORE-064
Department of Computer Science & Engineering

COURSE FILE CONTENTS

1. Calendar of Events
2. Time Table
3. Syllabus
4. Lesson Plan
5. Course Outcomes
6. CO – PO /PSO Mapping
7. Gap Analysis, Student activity plan & Articulation
8. List of Students
9. Internal Test Papers
10. Scheme of Evaluation
11. CO – PO Analysis-Excel sheet
12. Articulation for unattained PO`s
13. Three blue books,copy of assignment/Poster/PBL/reports etc

BMS INSTITUTE OF TECHNOLOGY AND MANAGEMENT

Avalahalli, Doddaballapur Road, Yelahanka, Bangalore - 560064

Tentative Calender of Events (CoE) 2020-21 (IV, VI, & VIII SEMESTER)

Department of Computer Science and Engineering

VISION OF THE DEPARTMENT	To develop technical professionals acquainted with recent trends and technologies of computer science to serve as valuable resource for the nation/society.
MISSION OF THE DEPARTMENT	Facilitating and exposing the students to various learning opportunities through dedicated academic teaching, guidance and monitoring.

Month	Week	Sun	Mon	Tue	Wed	Thu	Fri	Sat	Working Days	EVENTS					
APRIL						1	2	3		2-April: Good Friday					
		4	5	6	7	8	9	10							
	W-1	11	12	13	14	15	16	17		13-April: Chandramana Ugadhi	14-April: Dr. B. R. Ambedkar Jayanthi	17-April: PAC Meeting -1			
	W-2	18	19	20	21	22	23	24	6	19-April: Commencement of 2020-21 (Even Semester)	20-April: FIMS Update				
	W-3	25	26	27	28	29	30		5	26-April: PBL Team Formation	30- April.: IEEE Activity- Digital Storage for AI and Edge				
MAY	W-3							1	0	1-May: May Day					
	W-4	2	3	4	5	6	7	8	6	8-May: Employers Day	7 May: NBA Meeting				
	W-5	9	10	11	12	13	14	15	5	10-May: PBL Problem Identification	14-May: Basava Jayanti/Qutub-e-Ramzan	10-15 May: Faculty Development Programme			
	W-6	16	17	18	19	20	21	22	6	20-May: FIMS Update	21-May: PAC Meeting -2	22- May.: Academic Monitoring 1			
	W-7	23	24	25	26	27	28	29	5	27-29 May: Internal Assessment - 1 for IV, VI & VIII Sem.	23- May.: IEEE Activity- Edge Computing				
	W-8	30	31						1						
JUNE	W-8			1	2	3	4	5	5	4-June: IA-1 SMS Dispatch	1-5 June: Open Course 2021 (Even Semester)	4-June: Students Feedback - 1 on Faculty	5-June: IA-1 Parents-Teachers-Association - 1		
	W-9	6	7	8	9	10	11	12	6	10-June: PBL Evaluation - 1/ FY-Project Work Phase II Review - 1					
	W-10	13	14	15	16	17	18	19	6	19 June: Alumni Interaction 1					
	W-11	20	21	22	23	24	25	26	6	20-June: FIMS Update	23 June: NBA Meeting	26- June.: Academic Monitoring 2			
	W-12	27	28	29	30				3	28-30 June: Internal Assessment - 2 for IV, VI & VIII Sem.					
JULY	W-12					1	2	3	3						
	W-13	4	5	6	7	8	9	10	6	7-July: IA-2 SMS Dispatch	8-July: Students Feedback on Faculty - 2	10-July: IA-2 Parents-Teachers-Association - 2			
	W-14	11	12	13	14	15	16	17	6	12-July: PBL Evaluation - 2/ FY-Project Work Phase II Review - 2	15-July: PBL Patent Identification (CS & IS)	14-15 July: Sports Day for Faculty & Students	16-July: PBL Patent Identification (ME, CV, & EEE)	17-July: PBL Patent Identification (ECE & ETE)	17- July.: IEEE Activity- Girl Geeks on Cloud Computing
	W-15	18	19	20	21	22	23	24	5	17-19 July: Internal Assessment - 3 for VIII Semester	20-July: Farewell and Last Working Day for VIII Sem.	21-July: Bakrid	20-July: FIMS Update	24- July.: IEEE Activity- Girl Geeks on Cloud Computing	24- July.: Academic Monitoring 3
	W-16	25	26	27	28	29	30	31	6	26-28 July: Internal Assessment - 3 for IV & VI Sem.	30-31 July: BMSIT - Open-Day for FY & PBL Projects	31- July.: IEEE Activity- Girl Geeks on Cloud Computing	31- July: NBA Meeting		
AUGUST	W-17	1	2	3	4	5	6	7	6	4-Aug.: IA-3 SMS Dispatch	7-Aug.: Last Working Day for IV & VI Semester	7- Aug.: IEEE Activity- Girl Geeks on Cloud Computing			
	W-18	8	9	10	11	12	13	14		13 Aug: NBA Meeting					
	Total Number of Working Days								92						

CONTINUOUS INTERNAL EVALUATION

COURSE	SEM	START	END
INTERNAL ASSESSMENT TEST - I			
B.E	IV, VI, & VIII	27-05-2021	29-05-2021
INTERNAL ASSESSMENT TEST - II			
B.E	IV, VI, & VIII	28-06-2021	30-06-2021
INTERNAL ASSESSMENT TEST - III			
B.E	IV & VI	26-07-2021	28-07-2021
B.E	VIII	17-07-2021	19-07-2021

SEMESTER END EXAMINATIONS

COURSE	START OF EXAM	END OF EXAM
B.E. (IV, VI)	23-08-2021	09-09-2021
B.E. (VIII)	22-07-2021	30-07-2021
PRACTICAL EXAMINATION		
B.E. (IV, VI)	09-08-2021	19-08-2021
COMMENCEMENT OF ODD SEMESTER (2021-22)		
COURSE	SEM	DATE
B. E.	IV & VI	13-09-2021

LIST OF HOLIDAYS

02-04-2021	Good Friday	
13-04-2021	Chandramana Ugadhi	
14-04-2021	Dr. B. R. Ambedkar Jayanthi	
01-05-2021	May Day	
14-05-2021	Basava Jayanti/Qutub-e-Ramzan	
21-07-2021	Bakrid	
PTA	05-06-2021	10-07-2021
FEEDBACK	04-06-2021	08-07-2021

BMS INSTITUTE OF TECHNOLOGY & MANAGEMEN

AVALAHALLI, YELAHANKA, BENGALURU-560064

DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

INDIVIDUAL TIMETABLE FOR THE ACADEMIC YEAR 2020-21 (ODD SEMESTER)

Name	Subject	Semester-Section	Class Room Number	With Effect From
DR. MANOJ	UNIX, IOT	V-A, V-B, M.TECH-1	BSN CR 104, BSN CR 204, BSN TR 401	01 – 09 – 2020

	I 8.30-9.30	II 9.30-10.30	10.30- 10.50	III 10.50-11.50	IV 11.50.-12.50	12.50- 1.45	V 1.45-2.40	VI 2.40-3.35	VII 3.35-4
MONDAY			TEA BREAK	DSA		LUNCH BREAK		IOT (SDA)	
TUESDAY		DSA					IOT		
WEDNESDAY	IOT			DSL - A1				DSA	
THURSDAY				DSL - A2			DSA	DSA	
FRIDAY					DSA		PROCTORING		
SATURDAY		IOT					DSA LAB		

TTO

HOD

M.TECH IN COMPUTER SCIENCE AND ENGINEERING (SCS)
Choice Based Credit System (CBCS) and Outcome Based Education (OBE)
SEMESTER – I

INTERNET OF THINGS AND APPLICATIONS

Course Code	20SCS15, 20LNI22, 20SCE23, 20SCN14, 20SAM323, 20SIS14	CIE Marks	20+20 (IA test+ Mini project)
Teaching Hours/Week (L:P:S)	3:0:2	SEE Marks	60
Credits	04	Exam Hours	03

Note: CIE marks can be distributed as: IA test (20 marks) + Mini project (individual/Group) 20 Marks

Module-1

What is The Internet of Things? Overview and Motivations, Examples of Applications, IPV6 Role, Areas of Development and Standardization, Scope of the Present Investigation.Internet of Things Definitions and frameworks-IoT Definitions, IoT Frameworks, Basic Nodal Capabilities, Internet of Things Application Examples-Overview, Smart Metering/Advanced Metering Infrastructure-Health/Body Area Networks, City Automation, Automotive Applications, Home Automation, Smart Cards, Tracking, Over-The-Air-Passive Surveillance/Ring of Steel, Control Application Examples, Myriad Other Applications.

Module -2

Fundamental IoT Mechanism and Key Technologies-Identification of IoT Object and Services, Structural Aspects of the IoT, Key IoT Technologies, Evolving IoT Standards-Overview and Approaches, IETF IPV6 Routing Protocol for RPL Roll, Constrained Application Protocol, Representational State Transfer, ETSI M2M,Third Generation Partnership Project Service Requirements for Machine-Type Communications, CENELEC, IETF Ipv6 Over Low power WPAN, Zigbee IP(ZIP),IPSO

Module – 3

Layer ½ Connectivity: Wireless Technologies for the IoT-WPAN Technologies for IoT/M2M, Cellular and Mobile Network Technologies for IoT/M2M,Layer 3 Connectivity:Ipv6 Technologies for the IoT: Overview and Motivations, Address Capabilities,Ipv6 Protocol Overview, Ipv6 Tunnelling, Ipsec in Ipv6,Header Compression Schemes, Quality of Service in Ipv6, Migration Strategies to Ipv6.

Module-4

Case Studies illustrating IoT Design-Introduction, Home Automation, Cities, Environment, Agriculture, Productivity Applications.

Module-5

Data Analytics for IoT – Introduction, Apache Hadoop, Using HadoopMapReduce for Batch Data Analysis, Apache Oozie, Apache Spark, Apache Storm, Using Apache Storm for Real-time Data Analysis, Structural Health Monitoring Case Study.

Note: CIE marks can be distributed as: IA test (20 marks) + Mini project (individual/Group) 20 Marks

Course outcomes:

At the end of the course the student will be able to:

- Develop schemes for the applications of IOT in real time scenarios
- Manage the Internet resources
- Model the Internet of things to business
- Understand the practical knowledge through different case studies

Understand data sets received through IoT devices and tools used for analysis

Question paper pattern:
The SEE question paper will be set for 100 marks and the marks scored will be proportionately reduced to 60.

- The question paper will have ten full questions carrying equal marks.
- Each full question is for 20 marks.
- There will be two full questions (with a maximum of four sub questions) from each module.
- Each full question will have sub question covering all the topics under a module.
- The students will have to answer five full questions, selecting one full question from each module.

Textbook/ Textbooks

Sl No	Title of the book	Name of the Author/s	Publisher Name	Edition and year
1	Building the Internet of Things with Ipv6 and MIPv6:The Evolving World of M2M Communications	Daniel Minoli	Wiley	2013
2	Internet of Things: .A Hands-on Approach	ArshdeepBahga, Vijay Madisetti	Universities Press	2015

Reference Books

1	The Internet of Things	Michael Miller	Pearson	2015 First Edition
2	Designing Connected Products	Claire Rowland,Elizabeth Goodman et.al	O'Reilly	First Edition, 2015

BMS INSTITUTE OF TECHNOLOGY AND MANAGEMENT
YELAHANKA – BANGALORE - 64
DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING

Minutes of Meeting with PAC –Batch 2020-21

Date	12-08-2020	**Location**	Department of Computer Science and Engineering
Time	10:30 AM		
Course Name	**Internet of Things and Applications**		
Course Coordinator	Dr. MANOJ H M		

Sl.No	Discussion	Action By/ Responsible	Action Taken
1	**Agenda:** Course Outcomes, CO – PO Mapping, Gap Identification for Internet of Things and Applications (20SCS15)		

The **Course Outcomes (COs)** Internet of Things and Applications given in university curriculum are as follows: — Course Coordinator

CO No.	Course Outcome	BT Level
PCSE.115.1	Develop schemes for the applications of IOT in real time scenarios.	K6
PCSE.115.2	Manage the Internet resources	K2
PCSE.115.3	Model the Internet of things to business	K4
PCSE.115.4	Understand the practical knowledge through different case studies	K2
PCSE.115.5	Understand data sets received through IoT devices and tools used for analysis	K2

The Observations of the committee are as follows:

1. No COs is related to the research topic of Internet of things and practical aspects of the effective communication.
2. No COs is related to advance topics of data sets received through IoT devices

Gap identified:

Gaps are identified for PO1, PO2.

CO-PO Mapping

CO No.	Course Outcome	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6
PCSE.115.1	Develop schemes for the applications of IOT in real time scenarios.	3	3		3		
PCSE.115.2	Manage the Internet resources						
PCSE.115.3	Model the Internet of things to business			3			
PCSE.115.4	Understand the practical knowledge through different case studies						
PCSE.115.5	Understand data sets received through IoT devices and tools used for analysis						

Redefined COs-

CO No.	Course Outcome	BT Levels
PCSE.115.1	Apply the knowledge and skills acquired during the course for prototyping, programming and data analysis	K3
PCSE.115.2	Analyze the data sets received through IoT device, tools and manage the internet resources by acquiring practical knowledge through different case studies	K4
PCSE.115.3	Recommend schemes for the IoT applications for real life scenarios.	K5
PCSE.115.4	Develop and test IoT System	K6

CO-PO Mapping

CO No.	Course Outcome	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6
PCSE.115.1	Apply the knowledge and skills acquired during the course for prototyping, programming and data analysis	3		2			
PCSE.115.2	Analyze the data sets received through IoT device, tools and manage the internet resources by acquiring practical knowledge through different case studies				2		
PCSE.115.3	Recommend schemes for the IoT applications for real life scenarios.					3	
PCSE.115.4	Develop and Test IoT system						3

Articulation:

- CO1 is on applying the knowledge and skills acquired during the course to for prototyping, programming and data analysis using various IoT related technologies. Hence this is mapped high to PO1 and medium to PO3.
- CO2 is about analysing the data sets received through IoT device, tools and manage the internet resources by acquiring practical knowledge and this CO contribute medium to PO4.
- CO3 is to recommend schemes for the IoT applications for real life scenarios; hence the CO maps high to PO5.
- CO4 is to develop and test a complete IoT system. Hence this CO maps significantly high for PO6.

3	**Action planned to bridge the gap** • Course shall have project report or documentation as a part skill development activity, which shall compensate the gap observed in PO2. • In order to improve the mapping, webinar shall be used to enhance the mapping.		Research topics

CO-PO Mapping

CO No.	Course Outcome	PO1	PO2	PO3	PO4	PO5	PO6
PCSE.115.1	Apply the knowledge and skills acquired during the course for prototyping, programming and data analysis	3		2			
PCSE.115.2	Analyze the data sets received through IoT device, tools and manage the internet resources by acquiring practical knowledge through different case studies				2		
PCSE.115.3	Recommend schemes for the IoT applications for real life scenarios.					3	
PCSE.115.4	Develop and Test IoT system						3

Course Coordinator

19/1/2021
Program Coordinator

HOD

BMS Institute of Technology and Management

Doddaballapur Main Road, Avalahalli, Yelahanka, Bengaluru, Karnataka 560064

Department of Computer science and engineering

Date: 18-01-2021

M.Tech Batch 2020-21

Student list

USN	Name
1BY20SCS01	ADITHYA SHARMA
1BY20SCS02	ARUN KUMAR K BHAVIKATTI
1BY20SCS03	BHAVANA G V
1BY20SCS04	CHERUKURU YASASWINI
1BY20SCS05	PRAGNA M V
1BY20SCS06	PRIYANKA
1BY20SCS08	SRIDHAR H S
1BY20SCS09	TEJASWINI HALAKATE
1BY20SCS10	UMME AYMUN

18/2/2021

Course Coordinator

Dr. Manoj H M

BMS INSTITUTE OF TECHNOLOGY AND MANAGEMENT
YELAHANKA, BANGALORE - 560064
DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING

First Internal Test

Course Name	**Internet of Things and Application**	**Course Code**	**20SCS15**
Branch &Semester	**M.Tech (CSE) and 1st Semester**	**Date& Time**	**20/02/2021, 9:30 to 11: am**
Name of the Course Coordinator (s)	**Dr. Manoj H M**	**Max. Marks**	**50**

Note: *Answer* ***THREE*** *full questions from* ***Part A*** *and* ***Part B*** *questions are compulsory.*

Qn. No.		PART A	Marks	CO
1.		Define IoT. Depict the high level partitioning of the interaction space in an IoT environment with an illustrative example.	10 M	CO:1 K:1
		OR		
2.		Relate Internet of things is "just a concept" with a candidate definitions	10 M	CO:1 K:3
3.		Discuss the applications of Medical Body Area Network - MBAN in real life using IoT technology.	10 M	CO:1 K:2
		OR		
4.		Summarize the basic elements of an M2M application. Illustrate M2M domain with an example.	10 M	CO:1 K:2
5.		Write the technical differences between the contactless smart card and RFID tags under IoT environment	10 M	CO:1 K:2
		OR		
6.		Discuss the structural aspects of IoT.	10 M	CO:1 K:2
		PART B		
7.		Interpret, the biggest risks has associated with the Smart home solutions with respect to hardware, software, technical aspects in IoT.	10 M	CO:2 K:3
8.		Demonstrate, how a smart home can be a part of smart city as per the case study material, smart-home solutions a pedagogical perspective with industrial applications.	10 M	CO:3 K:5

CO1:	**Apply** the knowledge and skills acquired during the course for prototyping, programming and data analysis.
CO2:	**Analyze** the data sets received through IoT device, tools and manage the internet resources by acquiring practical knowledge through different case studies.
CO3:	**Recommend** schemes for the IoT applications for real life scenarios.
CO4:	**Develop** and Test IoT system.

BMS INSTITUTE OF TECHNOLOGY AND MANAGEMENT
YELAHANKA, BANGALORE - 560064
DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING

Course Outcomes (COs)

Remembering (K1)	Understanding (K2)	Applying (K3)	Analyzing (K4)	Evaluating (K5)	Creating (K6)

Bloom's Category

Signatures of the Question Paper Scrutiny Committee

		17/2/2021	
Course Coordinator(s)	**Module Coordinator**	**Program Coordinator**	**Head of the Department**

BMS INSTITUTE OF TECHNOLOGY AND MANAGEMENT
YELAHANKA, BANGALORE - 560064
DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING

First Internal Test

Course Name	Internet of Things and Application	Course Code	20SCS15
Branch &Semester	M.Tech (CSE) and 1st Semester	Date& Time	20/02/2021, 2:00 to 3:30 pm
Name of the Course Coordinator (s)	Dr. Manoj H M	Max. Marks	50

Note: *Answer* ***THREE*** *full questions from* ***Part A*** *and* ***Part B*** *questions are compulsory.*

Qn. No.		PART A	Marks	CO
1.		Define IoT. Depict the high level partitioning of the interaction space in an IoT environment with an illustrative example.	10 M	CO:1 K:1
		OR		
2.		Relate Internet of things is "just a concept" with a candidate definitions	10 M	CO:1 K:1
3.		Discuss the applications of Medical Body Area Network - MBAN in real life using IoT technology.	10 M	CO:1 K:2
		OR		
4.		Summarize the basic elements of an M2M application. Illustrate M2M domain with an example.	10 M	CO:1 K:2
5.		Write and differentiate technically the contactless smart card and RFID tags under IoT environment	10 M	CO:1 K:2
		OR		
6.		Discuss the structural aspects of IoT.	10 M	CO:1 K:2
		PART B		
7.		Interpret, the biggest risks has associated with the Smart home solutions with respect to hardware, software, technical aspects in IoT.	10 M	CO:2 K:3
8.		Demonstrate, how a smart home can be a part of smart city as per the case study material, smart-home solutions a pedagogical perspective with Industrial Applications.	10 M	CO:3 K:3

CO1:	**Apply** the knowledge and skills acquired during the course for prototyping, programming and data analysis.
CO2:	**Analyze** the data sets received through IoT device, tools and manage the internet resources by acquiring practical knowledge through different case studies.
CO3:	**Recommend** schemes for the IoT applications for real life scenarios.
CO4:	**Develop** and Test IoT system.

BMS INSTITUTE OF TECHNOLOGY AND MANAGEMENT
YELAHANKA, BANGALORE - 560064
DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING

Course Outcomes (COs)

Remembering (K1)	Understanding (K2)	Applying (K3)	Analyzing (K4)	Evaluating (K5)	Creating (K6)

Bloom's Category

Signatures of the Question Paper Scrutiny Committee

Course Coordinator(s)	Program Coordinator	Head of the Department

BMS INSTITUTE OF TECHNOLOGY AND MANAGEMENT
YELAHANKA, BANGALORE - 560064
DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING

First Internal Test - Scheme

Course Name	**Internet of Things and Application**	**Course Code**	**20SCS15**
Branch &Semester	**M.Tech (CSE) and 1st Semester**	**Date& Time**	**20/02/2021, 2:00 to 3:30 pm**
Name of the Course Coordinator (s)	**Dr. Manoj H M**	**Max. Marks**	**50**

Note: *Answer* ***THREE*** *full questions from* ***Part A*** *and* ***Part B*** *questions are compulsory.*

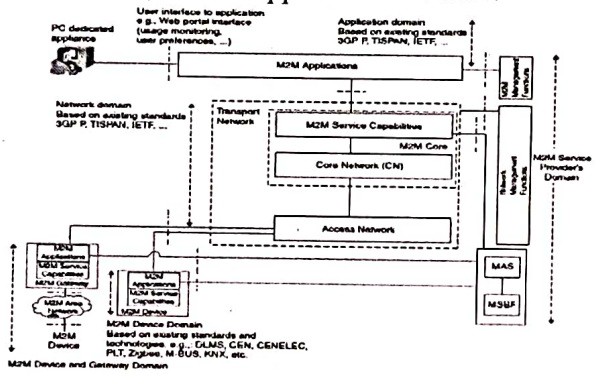
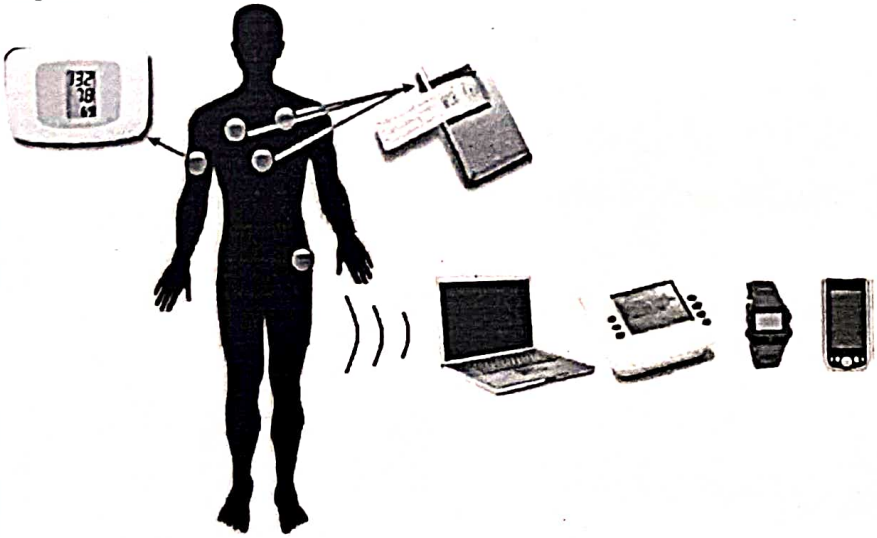
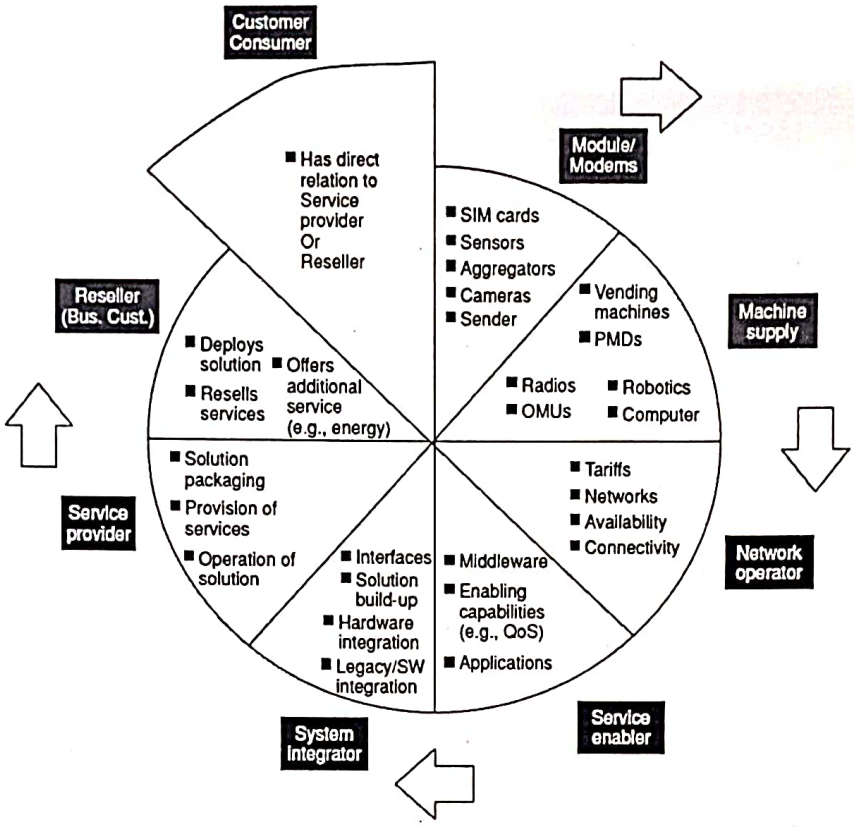
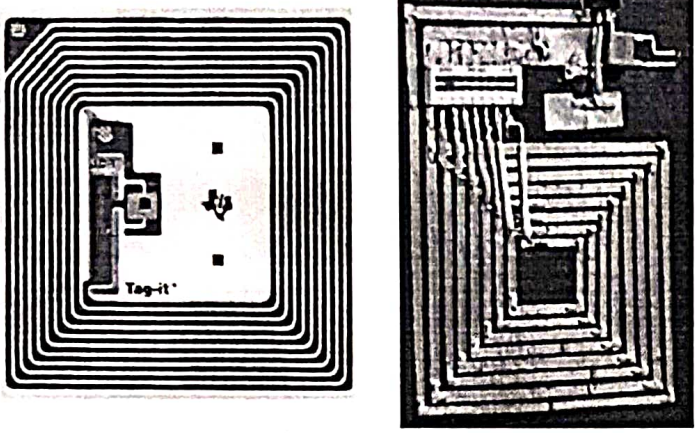
Qn. No.	PART A	Marks
1.	Define IOT. Depict the high level partitioning of the interaction space in an IoT environment with an illustrative example. Solution: Definition: 2 M • With help of High Level M2M System Architecture (HLSA) • The HLSA comprises the device and gateway domain, the network domain, and the applications domain.  FIGURE 2.8 M2M HLSA. Figure: 4 M Explanation: 4 M	10 M
	OR	
2.	Relate Internet of things is "just a concept" with a candidate definitions • Definition of the IoT is still evolving, the material that follows provides illustrative concept definitions rather than a tightly worded definition; nonetheless, a provisional "working definition"	10 M

TABLE 2.1 Examples of Definitions for Case A (IoT Is Just a Concept)

Candidate Definition	Reference
A technological revolution that represents the future of computing and communications, and its development depends on dynamic technical innovation in a number of important fields, from wireless sensors to nanotechnology	Source: ITU Internet Reports 2(The Internet of Things, Exec Summary
The networked interconnection of objects—from the sophisticated to the mundane—through identifiers such as sensors, RFID tags, and IP addresses	Margery Conner, Technical Edi of EDN Magazine, "Sensors empower the 'Internet of Things' ", May 2010
The Internet of things *links the objects of the real world with the virtual world*, thus enabling anytime, anyplace connectivity for anything and not only for anyone. It refers to a world where physical objects and beings, as well as virtual data and environments, all interact with each other in the same space and time	Cluster of European Research Projects on the Internet of Th "Vision and Challenges for Realizing the Internet of Thi March 2010
The IoT refers to as *ubiquitous networking or pervasive computing environments*, is *a vision* where all manufactured things can be network enabled, that is connected to each other via wireless or wired communication networks	European Network and Informa Security Agency (ENISA)
The IoT is *a world where physical objects are seamlessly integrated into the information network*, and where the physical objects can	SAS

3.	Discuss the applications of Medical Body Area Network - MBAN in real life using IoT technology. e-Health applications include health and fitness. Advocates envisage an environment where mobile health monitoring systems interoperate seamlessly and cohesively to reduce the lag time between the onset of medical symptoms in an individual and the diagnosis of the underlying condition.  Explanation: 3+4+3 M	10 M
	OR	

4.	Summarize the basic elements of an M2M application. Illustrate M2M domain with an example. Definition:  FIGURE 1.6 Stakeholder universe in the IoT/M2M world (representative, not complete view). Explanation: 3+4+3=10 M	10 M
5.	Write and differentiate technically the contactless smart card and RFID tags under IoT environment RFIDs are electronic devices associated with objects ("things") that transmit their identity (usually a serial number) via radio links. The RFID space is large and well documented.	10 M

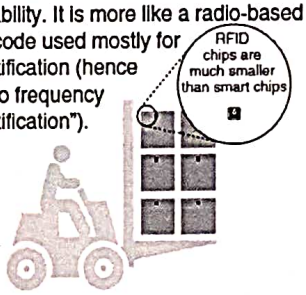


Illustrative examples of RFIDs.

Smart card: definition and features

The contactless smart card contains a microprocessor, a small but real computer that makes calculations, communicates both ways, remembers new information, and actively uses these capabilities for security and many other applications.

RFID tags are devices that typically have a read-only chip that stores a unique number but has no processing capability. It is more like a radio-based bar code used mostly for identification (hence "radio frequency identification").



Characteristics of a contactless card

- Strong security capacities:
  - mutual authentication before providing access to information
  - access can be further protected via PIN or biometric

Characteristics of an RFID tag

- Minimal security:
  - one-way authentication; card cannot protect itself
  - insufficient storage for biometrics
  - no on-chip calculations of new

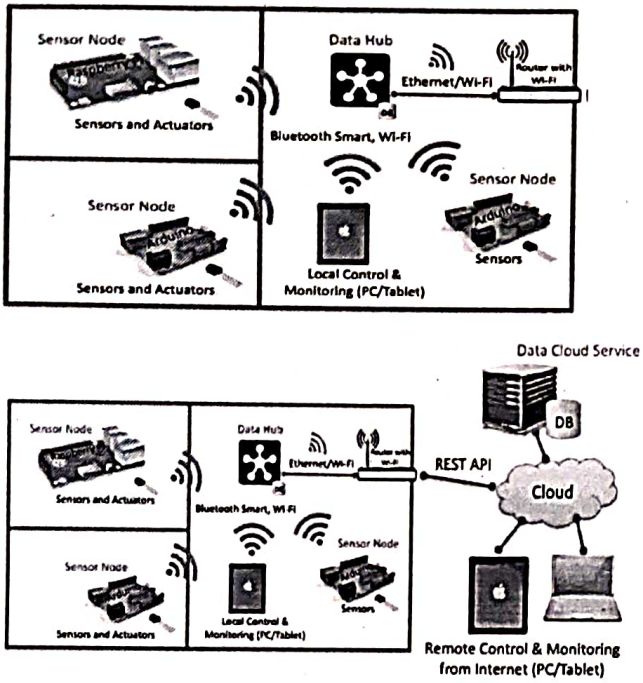
OR

6.	Discuss the structural aspects of IOT. STRUCTURAL ASPECTS OF THE IoT Environment Characteristics Traffic Characteristics Scalability Interoperability Security and Privacy Open Architecture	10 M

PART B

7.	Interpret, the biggest risks has associated with the Smart home solutions with respect to hardware, software, technical aspects in IoT. Solution: Challenges involved in developing Smart home need to be addressed. Different answers are expected.	10 M

BMS INSTITUTE OF TECHNOLOGY AND MANAGEMENT
YELAHANKA, BANGALORE - 560064
DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING

8.	Demonstrate, how a smart home can be a part of smart city as per the case study material, smart-home solutions a pedagogical perspective with Industrial Applications. smart home can be a part of smart city: Justification with the following figures.  	10 M

Course Coordinator
(Dr. Manoj H M)

BMS INSTITUTE OF TECHNOLOGY AND MANAGEMENT
YELAHANKA, BANGALORE - 560064
DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING

Second Internal Test, March, 2020 - 21

Course Name	**Internet of Things and Application**	**Course Code**	**20SCS15**
Branch &Semester	**M.Tech (CSE) and 1st Semester**	**Date& Time**	**17/03/2021, 9:30 to 11:00 am**
Name of the Course Coordinator (s)	**Dr. Manoj H M**	**Max. Marks**	**50**

Note: *Answer* ***THREE*** *full questions from* ***Part A*** *and* ***Part B*** *questions are compulsory.*

Qn. No.		PART A	Marks	CO
1.		Illustrate the working of routing protocol for LLN-RPL.	10 M	**CO:2 K:4**
		OR		
2.		Identify the main features of COAP. Show the request/response model used by COAP	10 M	**CO:2 K:4**
3.		Show the interaction between NFC interrogator and NFC device communication with neat sketch.	10 M	**CO:1 K:3**
		OR		
4.		Sketch the IEEE 802.15.4 acknowledgement frame format and data frame format.	10 M	**CO:1 K:3**
5.		Outline the IPv6 packet format and explain fields in IPv6 base header. Analyze the advantages of IPv6 over IPv4	4+6 M	**CO:2 K:4**
		OR		
6.		Identify QoS capabilities in IPv6 and explain in detail.	10 M	**CO:2 K:4**
		PART B		
7.		Predict the usage of bluetooth technology in a medical body area network with an example scenario.	10 M	**CO:3 K:5**
8.		Case Study: Describe how the NFC handover and NFC transmission take place in near field communication. Summarize the operating modes of NFC technology?	4+6 M	**CO:3 K:5**

CO1:	**Apply** the knowledge and skills acquired during the course for prototyping, programming and data analysis.
CO2:	**Analyze** the data sets received through IoT device, tools and manage the internet resources by acquiring practical knowledge through different case studies.
CO3:	**Recommend** schemes for the IoT applications for real life scenarios.
CO4:	**Develop** and Test IoT system.

BMS INSTITUTE OF TECHNOLOGY AND MANAGEMENT
YELAHANKA, BANGALORE - 560064
DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING

Course Outcomes (COs)

Remembering (K1)	Understanding (K2)	Applying (K3)	Analyzing (K4)	Evaluating (K5)	Creating (K6)

Bloom's Category

Signatures of the Question Paper Scrutiny Committee

Course Coordinator(s)	Module Coordinator	Program Coordinator	Head of the Department

BMS INSTITUTE OF TECHNOLOGY AND MANAGEMENT
YELAHANKA, BANGALORE - 560064
DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING

Second Internal Test Mar, 2020-21

Course Name	**Internet of Things and Application**	**Course Code**	**20SCS15**
Branch &Semester	**M.Tech (CSE) and 1st Semester**	**Date& Time**	**17/03/2021, 2:00 to 3:30 pm**
Name of the Course Coordinator (s)	**Dr. Manoj H M**	**Max. Marks**	**50**

Note: *Answer **THREE** full questions from **Part A** and **Part B** questions are compulsory.*

Qn. No.		PART A	Marks	CO
1.		Explain the working of routing protocol for LLN-RPL.	10 M	CO:2 K:2
		OR		
2.		Identify and list the main features of COAP. Show the request/response model used by COAP	10 M	CO:2 K:2
3.		Show the interaction between NFC interrogator and NFC device communication with neat sketch.	10 M	CO:2 K:3
		OR		
4.		Sketch the IEEE 802.15.4 acknowledgement frame format and data frame format.	10 M	CO:2 K:3
5.		Analyze and List the advantages of IPv6 over IPv4. Draw IPv6 packet format and explain fields in IPv6 base header.	4+6 M	CO:2 K:4
		OR		
6.		Identify QoS capabilities in IPv6 and explain in detail.	10 M	CO:2 K:4
		PART B		
7.		Predict the usage of bluetooth technology in a medical body area network with an example scenario.	10 M	CO:3 K:5
8.		Case Study: Explain how the NFC handover and NFC transmission take place in near field communication. Also explain the operating modes of NFC technology?	4+6 M	CO:3 K:5

CO1:	**Apply** the knowledge and skills acquired during the course for prototyping, programming and data analysis.
CO2:	**Analyze** the data sets received through IoT device, tools and manage the internet resources by acquiring practical knowledge through different case studies.
CO3:	**Recommend** schemes for the IoT applications for real life scenarios.
CO4:	**Develop** and Test IoT system.

12/3/2021

BMS INSTITUTE OF TECHNOLOGY AND MANAGEMENT
YELAHANKA, BANGALORE - 560064
DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING

Course Outcomes (COs)

Remembering (K1)	Understanding (K2)	Applying (K3)	Analyzing (K4)	Evaluating (K5)	Creating (K6)

Bloom's Category

Signatures of the Question Paper Scrutiny Committee

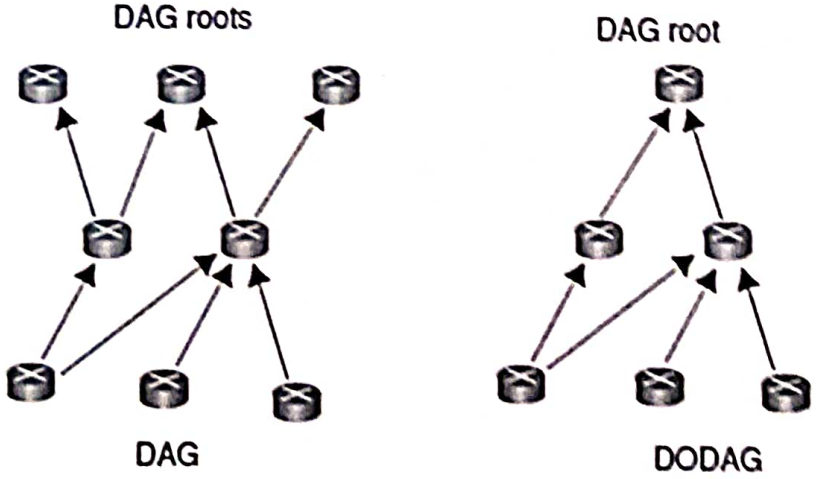
Course Coordinator(s)	Module Coordinator	Program Coordinator	Head of the Department

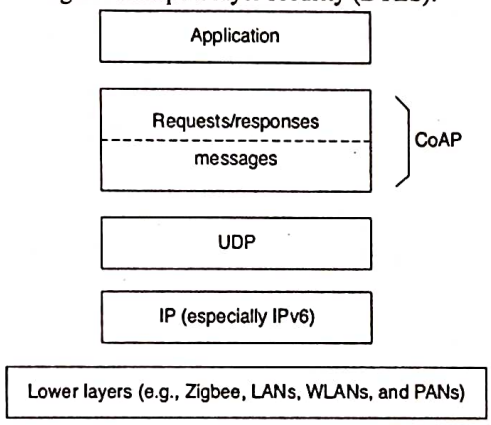
BMS INSTITUTE OF TECHNOLOGY AND MANAGEMENT
YELAHANKA, BANGALORE - 560064
DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING

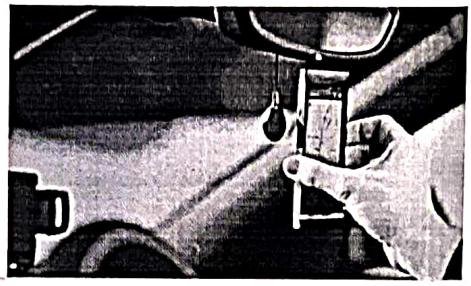
Second Internal Test - Scheme, March, 2020 - 21

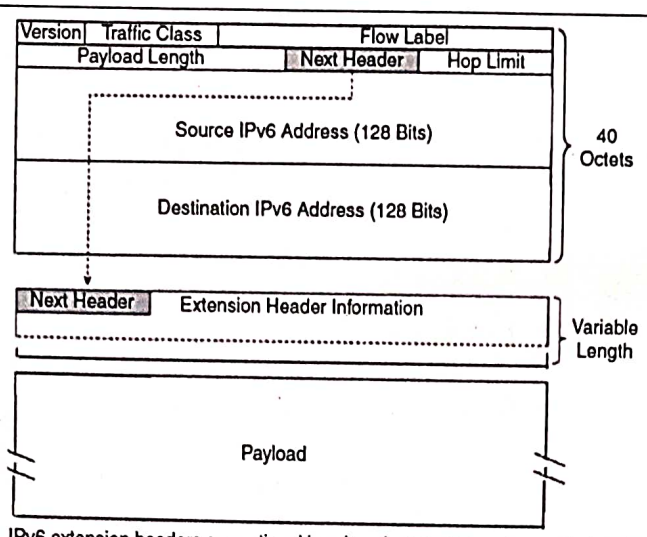
Course Name	Internet of Things and Application	Course Code	20SCS15
Branch &Semester	M.Tech (CSE) and 1st Semester	Date& Time	17/03/2021, 9:30 to 11:00 am
Name of the Course Coordinator (s)	Dr. Manoj H M	Max. Marks	50

Note: *Answer **THREE** full questions from **Part A** and **Part B** questions are compulsory.*

Qn. No.	PART A	Marks
1.	Illustrate the working of routing protocol for LLN-RPL. IETF IPv6 ROUTING PROTOCOL FOR RPL ROLL Low power and lossy networks (LLNs) are a class of networks in which both the routers and their interconnect are constrained. LLN routers typically operate with constraints on processing power, memory, and energy (battery power); their interconnects are characterized by high loss rates, low data rates, and instability. LLNs comprise a few dozen routers up to thousands of routers. Supported traffic flows include point-to-point (between devices inside the LLN), point-to-multipoint (from a central control point to a subset of devices inside the LLN), and multipoint-to-point (from devices inside the LLN toward a central control point). The IPv6 Routing Protocol for LLNs (RPL) is a mechanism proposed by the IETF to support multipoint-to-point traffic from devices inside the LLN toward a central control point, as well as pointto-multipoint traffic from the central control point to the devices inside the LLN (6). IoT applications include the following: _ Routing state memory space—limited memory resources of low power nodes; _ Loss response—what happens in response to link failures; _ Control cost—constraints on control traffic; _ Link and node cost—link and node properties are considered when choosing routes.  FIGURE 5.1 DAGs and DODAGs.	10 M
	OR	

2.	Identify the main features of COAP. Show the request/response model used by COAP **CONSTRAINED APPLICATION PROTOCOL (CoAP)** **Background** The IETF constrained RESTful environments (CoRE) Working Group has recently undertaken standardization work the CoAP. CoAP is a simple application layer protocol targeted to simple electronic devices (e.g., IoT/M2M things) to allow them to communicate interactively over the Internet. CoAP has the following main features: _ Constrained web protocol fulfilling M2M requirements; _ UDP binding with optional reliability supporting unicast and multicast requests; _ Asynchronous message exchanges; _ Low header overhead and parsing complexity; _ URI and content-type support; _ Simple proxy and caching capabilities; _ A stateless HTTP mapping, allowing proxies to be built providing access to CoAP resources via HTTP in a uniform way or for HTTP simple interfaces to be realized alternatively over CoAP; and _ Security binding to datagram transport layer security (DTLS).  FIGURE 5.2 Abstract layering of CoAP.	10 M
3.	Show the interaction between NFC interrogator and NFC device communication with neat sketch. • Contactless communication allows a user to wave the smartphone over an NFC-compatible device to send information without needing to touch the devices together or go through multiple steps setting up a connection. • NFC is an offshoot of radio frequency identification (RFID), with the exception that NFC is designed for use by devices within close proximity to each other. • NFC utilizes electromagnetic radio fields while technologies such as Bluetooth and Wi-Fi rely on radio transmissions.	10 M

	Pairing happens, when one device touch other in NFC (NFC – top 5 uses https://www.youtube.com/watch?v=6QJcyWouesg)     • The technology behind NFC allows a device, known as a reader, interrogator, or active device, to create an electromagnetic field that interacts with another NFC compatible device or a small NFC tag holding the information the reader requires. • Passive devices, such as the NFC tag in smart posters, store information, and communicate with the reader, but these devices do not actively read other devices. • Three forms of NFC technology exist— Type A, Type B, and FeliCa; all three types are similar, but communicate in slightly different ways. • NFC maintains interoperability between different wireless communication methods such as Bluetooth and other NFC standards	
	OR	
4.	Sketch the IEEE 802.15.4 acknowledgement frame format and data frame format. • IEEE 802.15.4, wireless links can operate in three unlicensed frequency bands, namely the 858 MHz band, the 902-to-928 MHz band, and the 2.4 GHz band • IEEE 802.15.4 *defines a robust radio PHY (physical) layer and MAC (medium access control) layer*, while *ZigBee defines the network, security, and application* framework for an IEEE 802.15.4-based system.	10 M



IPv6 extension headers are optional headers that may follow the basic IPv6 header. An IPv6 PDU may include zero, one, or multiple extension headers. When multiple extension headers are used, they form a chained list of headers identified by the Next Header field of the previous header.

FIGURE 7.4 IPv6 extension headers.

- The IPv6 specification defines a number of extension headers :
  - Routing header —Similar to the source routing options in IPv4. The header is used to mandate a specific routing.
  - AH —A security header that provides authentication and integrity.
  - Encapsulating security payload (ESP) header—A security header that provides authentication and encryption.
  - Fragmentation header—The Fragmentation Header is similar to the fragmentation options in IPv4.
  - Destination options header—Header that contains a set of options to be processed only by the final destination node. MIPv6 is an example of an environment that uses such a header.
  - Hop-by-hop options header—A set of options needed by routers to perform certain management or debugging functions.

OR

6.	Identify QoS capabilities in IPv6 and explain in detail.
	• QoS is supported in IPv6. The IPv6 header has two QoS-related fields:
	  • 20-bit flow label, usable in IntServ-based environments. In IntServ environments, performance guarantees to traffic and resource reservations are provided on per-flow basis. A guaranteed and controlled load service capability is supported. IntServ approaches have scalability issues;
	  • 8-bit traffic class indicator usable in DiffServ-based environments. DiffServ environments are more common. The traffic class field may be used to set specific
		10 M

	precedence or differentiated services code point (DSCP) values. These values are used in the exact same way as in IPv4. Performance guarantees are provided to traffic aggregates rather than to flows. DiffServ classifies all the network traffic into classes. Two distinct types (per hop behaviors) are supported: • Expedited forwarding (EF): aims at providing QoS for the class by minimizing jitter and is generally focused on providing stricter guarantees; • Assured forwarding (AF): inserts at most four classes with at most three levels of packets dropping categories. • There are no signaling protocol for resource allocation (admission control) and QoS mechanisms control. • The following priority levels are typical, but variances are possible: • Level 0—No specify priority • Level 1—Background traffic (news) • Level 2—Unattended data transfer (email) • Level 3—Reserved • Level 4—Attended bulk transfer (FTP) • Level 5—Reserved • Level 6—Interactive traffic (Telnet, Windowing) • Level 7—Control traffic (routing, network management)	
	PART B	
7.	Predict the usage of bluetooth technology in a medical body area network with an example scenario. Solution: Predict the usage of bluetooth technology in a medical body area network with an example scenario, need to be addressed. Different answers are expected.	10 M
8.	Case Study: Describe how the NFC handover and NFC transmission take place in near field communication. Summarize the operating modes of NFC technology? • The technology behind NFC allows a device, known as a reader, interrogator, or active device, to create an electromagnetic field that interacts with another NFC compatible device or a small NFC tag holding the information the reader requires. • Passive devices, such as the NFC tag in smart posters, store information, and communicate with the reader, but these devices do not actively read other devices. • Three forms of NFC technology exist— Type A, Type B, and FeliCa; all three types are similar, but communicate in slightly different ways.	4+6 M

	• NFC maintains interoperability between different wireless communication methods such as Bluetooth and other NFC standards	

BMS INSTITUTE OF TECHNOLOGY AND MANAGEMENT
YELAHANKA, BANGALORE - 560064
DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING

Third Internal Test, April, 2020 - 21

Course Name	**Internet of Things and Application**	**Course Code**	**20SCS15**
Branch &Semester	**M.Tech (CSE) and 1st Semester**	**Date& Time**	**21/04/2021, 9:30 AM to 11:00 AM**
Name of the Course Coordinator (s)	**Dr. Manoj H M**	**Max. Marks**	**50**

Note: *Answer* ***THREE*** *full questions from* ***Part A*** *and* ***Part B*** *questions are compulsory.*

Qn. No.		PART A	Marks	CO
1.		Analyze the weather monitoring IOT system and outline the deployment design aspects of it. Use appropriate diagram for the design.	10 M	CO:2 K:4
		OR		
2.		Examine the mode and state service for home automation IOT system with service specification.	10 M	CO:2 K:4
3.		Show the communication between various components of the web socket implementation of the weather monitoring system.	10 M	CO:2 K:3
		OR		
4.		Write a program in python for smart parking controller native service.	10 M	CO:1 K:3
5.		Outline the setup in setting up of Hadoop cluster in Java.	10 M	CO:2 K:4
		OR		
6.		Model the map reduce jobs in Apache Hadoop and show case the execution workflow.	10 M	CO:2 K:4
		PART B		
7.		Assess the usage of Arduino board and RFID technology in the home automation. Write appropriate diagrams.	10 M	CO:3 K:5
8.		Case Study: Construct the smart city application using IOT. Identify the strength and weakness of the same.	10 M	CO:4 K:6

CO1:	**Apply** the knowledge and skills acquired during the course for prototyping, programming and data analysis.
CO2:	**Analyze** the data sets received through IoT device, tools and manage the internet resources by acquiring practical knowledge through different case studies.
CO3:	**Recommend** schemes for the IoT applications for real life scenarios.
CO4:	**Develop** and Test IoT system.

BMS INSTITUTE OF TECHNOLOGY AND MANAGEMENT
YELAHANKA, BANGALORE - 560064
DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING

Course Outcomes (COs)

Remembering (K1)	Understanding (K2)	Applying (K3)	Analyzing (K4)	Evaluating (K5)	Creating (K6)

Bloom's Category

Signatures of the Question Paper Scrutiny Committee

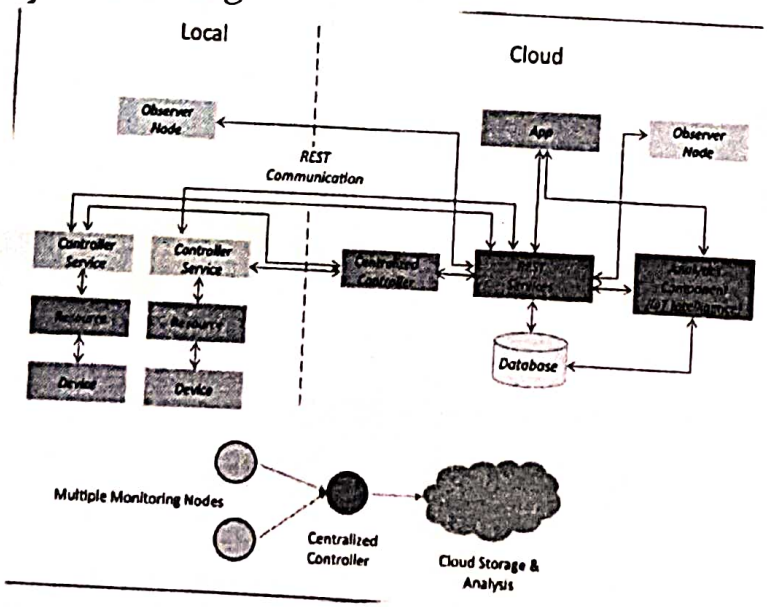
20/4/2021		20/4/2021	
Course Coordinator(s)	**Module Coordinator**	**Program Coordinator**	**Head of the Department**

BMS INSTITUTE OF TECHNOLOGY AND MANAGEMENT
YELAHANKA, BANGALORE - 560064
DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING

Third Internal Test - Scheme, April, 2020 - 21

Course Name	Internet of Things and Application	Course Code	20SCS15
Branch &Semester	M.Tech (CSE) and 1st Semester	Date& Time	21/04/2021, 9:30 to 11:00 am
Name of the Course Coordinator (s)	Dr. Manoj H M	Max. Marks	50

Note: *Answer* ***THREE*** *full questions from* ***Part A*** *and* ***Part B*** *questions are compulsory.*

Qn. No.		PART A	Marks
1.		Analyze the weather monitoring IOT system and outline the deployment design aspects of it. Use appropriate diagram for the design. Solution: Weather Monitoring System □ Deployment design □ Schematic diagram □ Controller Service □ Web application screenshot REST-based Implementation □ The purpose of the system is to collect data on environmental condition such as temperature, pressure , humidity and light in an area using multiple end nodes. □ The nodes send the data to the cloud where the data is aggregated and analyzed. Deployment design 	10 M
		OR	
2.		Examine the mode and state service for home automation IOT system with service specification	10 M

Solution:
Home Automation
- Incudes
- Smart Lighting
- Home Intrusion Detection

Smart Lighting
- Deployment design
- Service specification for the system
- Web application screenshot
- Schematic diagram
- Controller Service

Smart Lighting
- Control the lights in a typical home remotely using web application.
- The system includes auto and manual mode.
- In Auto mode, the system measures the light in room and switches on the light when it gets back.
- In manual mode system provide the option of manually remotely switching on/off the light

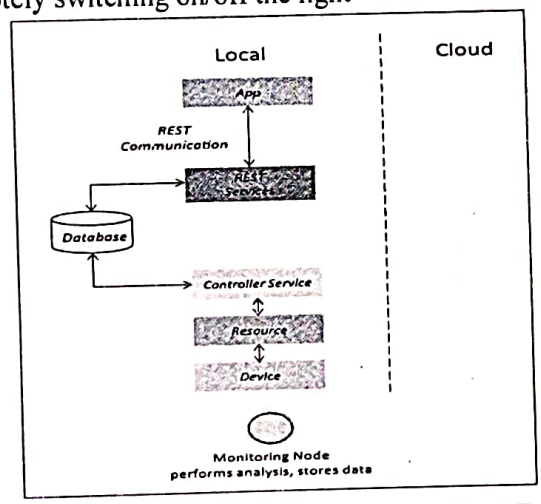
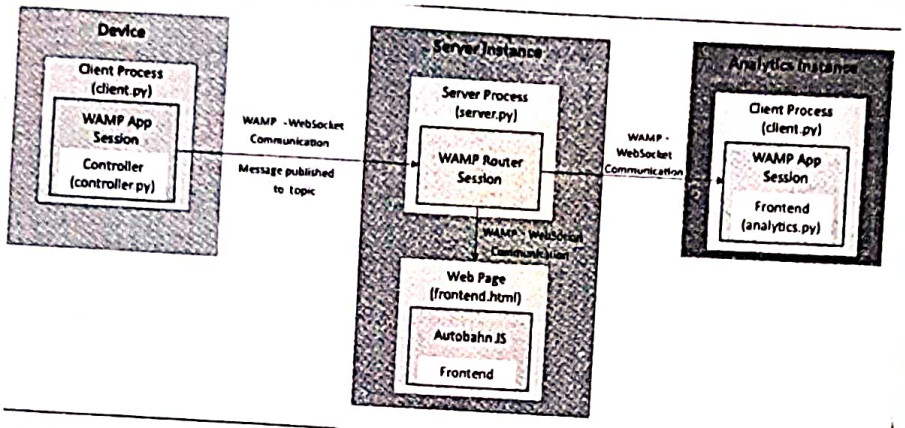
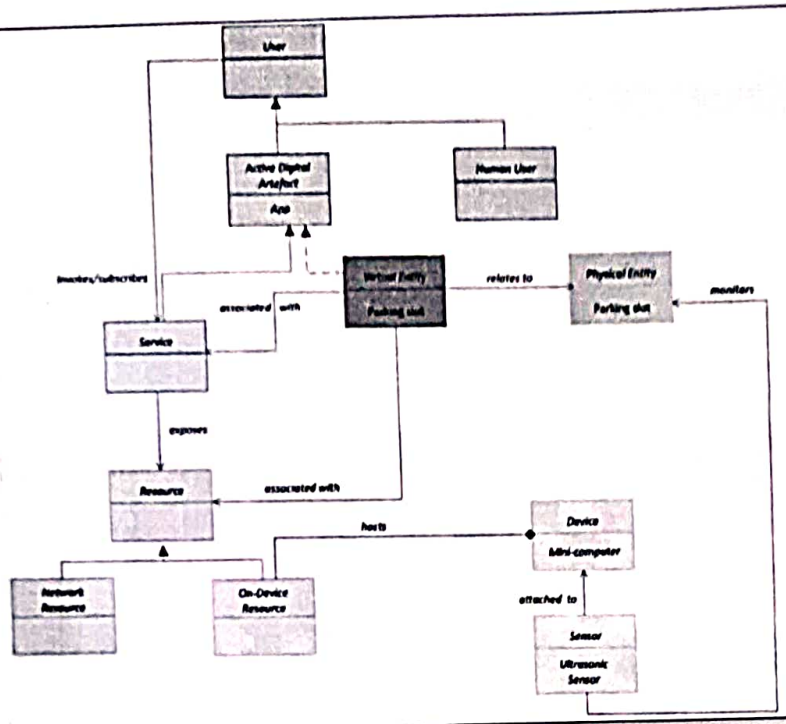


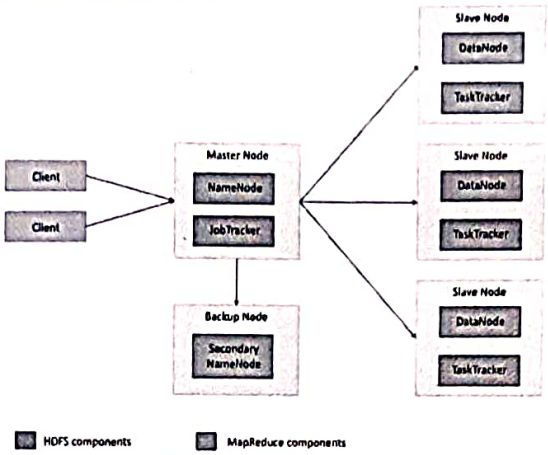
Figure 9.1: Deployment design of the home automation IoT system

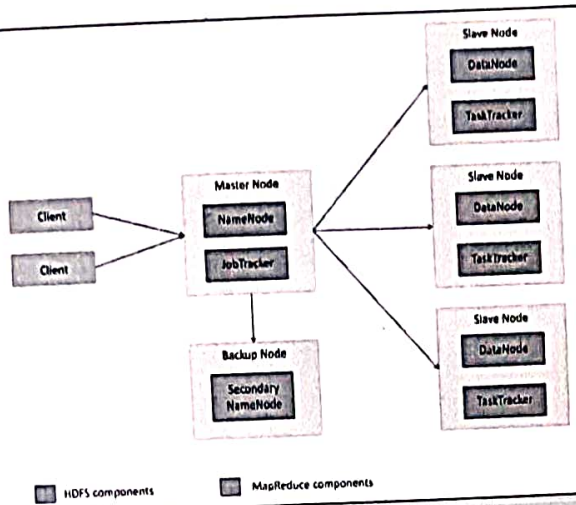
3.		Show the communication between various components of the web socket implementation of the weather monitoring system. Solution: WebSocket-based Implementation - It is based on Web application Massaging Protocol (WAMP). - The deployment design is same as Weather Monitoring System The controller in the websocket implemented in WAMP application component that runs over a WebSocket transport client on the IoT device. - WAMP router runs on a WebSocket. - The role of the client on the device is that of a Publisher, the role of	10 M

		Router is that Broker. □ Publisher publish message to the topics managed by the Broker. □ Subscriber subscribe to topic they are interested in with Brokers. □ Brokers decouple the publisher and Subscriber. □ The communication between Publisher-Broker and Broker-Subscriber happens over a WAMP-WebSocket session.  Explanation:	
		OR	
4.		Write a program in python for smart parking controller native service. Solution: Smart Parking □ To detect the number of empty parking slots and send the information over the Internet to smart parking application backend. □ This is accessed by drivers from smartphone. □ Sensors are used for each parking slot to detect whether the slot is empty or occupied. □ This information is aggregated by local controller and then send over the internet to a server. Smart Parking □ Process Specification □ Domain model □ Information model □ Service specification for the system □ Controller Service □ Service specification □ Deployment of sensors □ Schematic diagram □ Web application screenshot	10 M



5.		Outline setup in setting up a Hadoop cluster in Java. Solution: A Hadoop cluster comprises of a Master node, backup node and a number of slave nodes. The master node runs the NameNode and JobTracker processes and the slave nodes run the DataNode and TaskTracker components of Hadoop. The backup node runs the Secondary NameNode process. NameNode NameNode keeps the directory tree of all files in the file system, and tracks where across the cluster the file data is kept. It does not store the data of these files itself. Client applications talk to the NameNode whenever they wish to locate a file, or when they want to add/copy/move/delete a file. Secondary NameNode NameNode is a Single Point of Failure for the HDFS Cluster. An optional Secondary NameNode which is hosted on a separate machine creates checkpoints of the namespace. JobTracker The JobTracker is the service within Hadoop that distributes MapReduce tasks to specific nodes in the cluster, ideally the nodes that have the data, or at least are in the same rack.	10 M

			
		OR	
6.		Model the map reduce jobs in Apache Hadoop and show case the execution workflow. Solution: A Hadoop cluster comprises of a Master node, backup node and a number of slave nodes. The master node runs the NameNode and JobTracker processes and the slave nodes run the DataNode and TaskTracker components of Hadoop. The backup node runs the Secondary NameNode process. NameNode NameNode keeps the directory tree of all files in the file system, and tracks where across the cluster the file data is kept. It does not store the data of these files itself. Client applications talk to the NameNode whenever they wish to locate a file, or when they want to add/copy/move/delete a file. Secondary NameNode NameNode is a Single Point of Failure for the HDFS Cluster. An optional Secondary NameNode which is hosted on a separate machine creates checkpoints of the namespace. JobTracker The JobTracker is the service within Hadoop that distributes MapReduce tasks to specific nodes in the cluster, ideally the nodes that have the data, or at least are in the same rack.	10 M



PART B

7.		Assess the usage of Arduino board and RFID technology in the home automation & write appropriate diagrams. Solution: Predict the usage of of Arduino board and RFID technology in the home automation with an example scenario, need to be addressed. Different answers are expected.	10 M
8.		Case Study: Construct the smart city application using IOT. Identify the strength and weakness of the same. Solution: THE ACTUAL IOT APPLICATIONS FOR SMART CITIES A. Smart Traffic Management and Parking Lots, Urban Transportation (public and individual), logistics: B. Smart homes, Offices, and Buildings C. Smart Grid and Energy Efficient Operation: D. Environmental Pollution, Water, Weather, and Surveillance System:	10 M

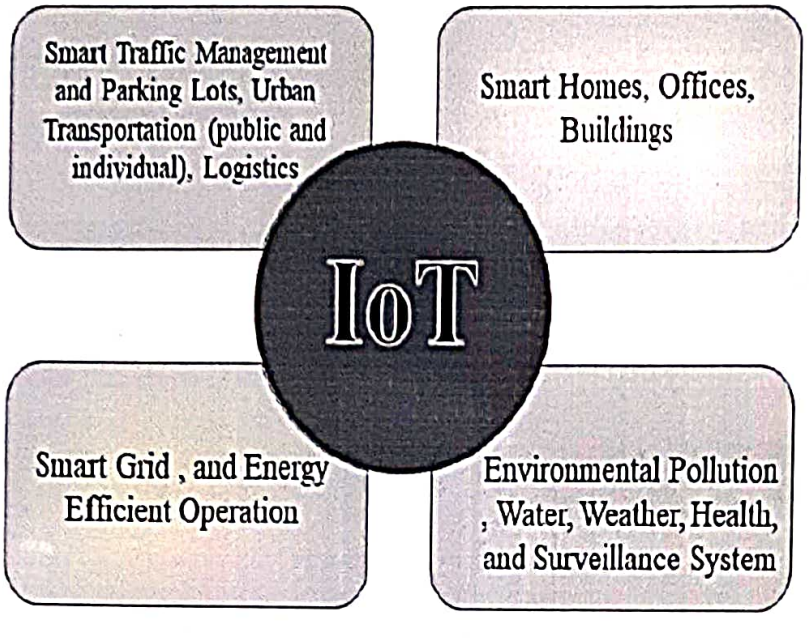


Figure 2. The Main Application of IoT for Smart City

Date: 17-04-2021

Course Name: Internet of Things and Applications

Faculty: Dr. Manoj H M

Type of Assignment: Skill Development Activity – Project Implementation

SDA list for IOT&A 20SCS15 – 2020-21

Sl. No.	Student Name	Project Title	POs	RBT
1	ADITHYA SHARMA	SMART TEMPERATURE AND HUMIDITY MONITORING SYSTEM	1,2,3	K5
2	ARUN KUMAR K BHAVIKATTI	HOME DOOR LOCK AUTOMATION SECURITY USING RFID AND ARDUINO	1,2,3	K5
3	BHAVANA G V	AIR POLLUTION MONITORING SYSTEM	1,2,3	K5
4	CHERUKURU YASASWINI	IOT BASED TRANSFORMER OIL LEVEL MONITORING AND PURITY CHECK	1,2,3	K5
5	PRAGNA M V	SMART PARKING SYSTEM	1,2,3	K5
6	PRIYANKA	SMART STREET LIGHTNING SYSTEM	1,2,3	K5
7	SRIDHAR H S	DISEASE DETECTION IN COTTON PLANTS USING IOT	1,2,3	K5
8	TEJASWINI HALAKATE	SMART TEMPERATURE AND HUMIDITY MONITORING SYSTEM	1,2,3	K5
9	UMME AYMUN	HOME AUTOMATION USING BLUETOOTH MODULE	1,2,3	K5

Grading policies:

- The last date for the submission of the SDA report is on or before 3rd May 2021 (hard deadline).
- The SDA is a project report which was allotted based on the student's interest.
- Grading will be based on submission of the SDA project report along with the demonstration.

SDA Evaluation: -

	20	18	15
Timely completion	Based on the project demonstration with result as per the objectives defined	Based on the project demonstration with result, if they take deviation from the objectives defined earlier	Based on the project demonstration with no proper result

Feed Back and Analysis:

- Students have undergone Skill Development Activity (SDA) project report with respect to Internet of Things domain. The SDA activity helped them to learn new concept and to build their career. Through this SDA students are enabled to attain CO3 and CO4, PO1, P2 and PO3.

Course Coordinator's Signature

B M S Institute of Technology & Management

Dept of Computer Science & Engineering

SESSION: JAN 2021-MAY 2021

PG COURSE

BATCH:	2020	SEM:	1
SUBJECT	20SCS15 INTERNET OF THINGS		
Faculty In-Charge:	DR. MANOJ H M		

	TARGET			LEVEL
60%	STUDENTS MUST SCORE	60%	& ABOVE	3-High
55%	STUDENTS MUST SCORE	60%	& ABOVE	2-Moderate
50%	STUDENTS MUST SCORE	60%	& ABOVE	1-Low

COURSE OUTCOMES	ATTAINMENT - IA	ATTAINMENT SEE	OVERALL ATTAINMENT
CO1	3.00	0.00	2.40
CO2	3.00	0.00	2.40
CO3	3.00	0.00	2.40
CO4	3.00	0.00	2.40

CLASS STRENGTH	9
SET IA TARGET	60%

TEST-1

Sl No.	USN	Name	Q1 (CO 1)	Q2 (CO 1)	Q3 (CO 1)	Q4 (CO 1)	Q5 (CO 1)	Q6 (CO 1)	Q7 (CO 2)	Q8 (CO 2)	9	#
		MAXIMUM MARKS PER QUESTION	10	10	10	10	10	10	10	10		
1	1BY20SCS01	ADITHYA SHARMA	10		10			10	9	10		
2	1BY20SCS02	ARUN KUMAR K BHAVIKATTI	10			10		10	10	10		
3	1BY20SCS03	BHAVANA G V	7			7	7		8	5		
4	1BY20SCS04	CHERUKURU YASASWINI	10		10			10	9	9		
5	1BY20SCS05	PRAGNA M V	10		10		10		9	10		
6	1BY20SCS06	PRIYANKA		6		8	8		8	8		
7	1BY20SCS08	SRIDHAR H S	10		10			10	9	9		
8	1BY20SCS09	TEJASWINI HALAKATE	10		9	10	9		9	9		
9	1BY20SCS10	UMME AYMUN	10		10		10		10	10		

TEST-2

Sl No.	Q1 (CO 2)	Q2 (CO 2)	Q3 (CO 1)	Q4 (CO 1)	Q5 (CO 2)	Q6 (CO 2)	Q7 (CO 3)	Q8 (CO 3)	9	10
Max	10	10	10	10	10	#	10	10		
1		10		10	10		9	8		
2		10	10			8	10	10		
3	10		10		10		8	10		
4		10		8	10		10	10		
5		10		5	10		8	10		
6		10	9		9		9	10		
7		9		5	10		10	9		
8	10			10	10		9	10		
9		10	10		10		9	10		

TEST-3

Sl No.	Q1 (CO 2)	Q2 (CO 2)	Q3 (CO 2)	Q4 (CO 1)	Q5 (CO 2)	Q6 (CO 2)	Q7 (CO 3)	Q8 (CO 4)	9	#	Seminar & Assignment (CO 2)
Max	10	10	10	#	#	10	10	10			20
1	10	6	9			10	10	9			20
2		10	8		8		10	9			19
3		9	9			9	9	9			17
4		10	9			9	10	10			19
5		10		8		10	10	10			18
6		9	9			9	8	8			17
7		10	10			10	9	9			18
8		9	9			9	9	9			17
9		10	10			10	10	8			20

Sl No.	CO1 TOTAL	CO1 PERCENT %	CO1 Target >=60%	CO2 TOTAL	CO2 PERCENT %	CO2 Target >=60%	CO3 TOTAL	CO3 PERCENT %	CO3 Target >=60%	CO4 TOTAL	CO4 PERCENT %	CO4 Target >=60%	CO5 TOTAL	CO5 PERCENT %	CO5 Target	ALL COs THEORY EXT (60)
1	40	100.00%	Y	94	[illegible]	Y	27	[illegible]	Y	9	[illegible]	Y				30
2	40	100.00%	Y	83	[illegible]	Y	30	100.00%	Y	9	[illegible]	Y				35
3	31	[illegible]	Y	77	[illegible]	Y	27	[illegible]	Y	9	[illegible]	Y				35
4	38	[illegible]	Y	85	[illegible]	Y	30	100.00%	Y	10	100.00%	Y				41
5	43	[illegible]	Y	77	[illegible]	Y	28	[illegible]	Y	10	100.00%	Y				29
6	31	[illegible]	Y	79	[illegible]	Y	27	[illegible]	Y	8	[illegible]	Y				28
7	35	[illegible]	Y	85	[illegible]	Y	28	[illegible]	Y	9	[illegible]	Y				27
8	48	[illegible]	Y	82	91.11%	Y	28	[illegible]	Y	9	[illegible]	Y				36
9	40	100.00%	Y	90	100.00%	Y	29	[illegible]	Y	8	[illegible]	Y				31
10	0	0.00%		0	0.00%		0	0.00%		0	0.00%					
11	0	0.00%		0	0.00%		0	0.00%		0	0.00%					
12	0	0.00%		0	0.00%		0	0.00%		0	0.00%					
13	0	0.00%		0	0.00%		0	0.00%		0	0.00%					
14	0	0.00%		0	0.00%		0	0.00%		0	0.00%					
15	0	0.00%		0	0.00%		0	0.00%		0	0.00%					

Target >=60%	9	Target >=60%	9	Target >=60%	9	Target >=60%	9
CO1	100.00%	CO2	100.00%	CO3	100.00%	CO4	100.00%

BATCH	2020
SEM	1
SUB	20SCS15: INTERNET OF THINGS
SESSION	JAN 2021-MAY 2021
Class Strength	9
Set Target I A	60%
Faculty	DR. MANOJ H M
Target >=60%	
3	60%
2	55%
1	50%
No. of COs	4
Set Target Ext Theory	60.00%
No of students who were present in EXAM	9

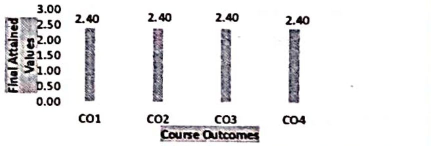
	CO RESULT	PO1	PO2	PO3	PO4	PO5	PO6
CO1: Apply the knowledge and skills acquired during the course for prototyping	3	3		2			
CO2: Analyze the data sets received through IoT devices, tools and manage the Internet resources by ...	3				2		
CO3: Recommend schemes for the IoT applications for real life scenarios.	3					3	
CO4: Develop and Test IoT system	3						3
SUM		3	0	2	2	3	3
CIII*		3	0	2	2	3	3

Delivery Mechanism
Lecture, PPT
Lecture, PPT
Lecture, Hands on, PPT
Lecture, Hands on, PPT
Lecture, Hands on, PPT

	CO RESULT	PO1	PO2	PO3	PO4	PO5	PO6
CO1: Apply the knowledge and skills acquired during the course for prototyping, programming and data analysis	2.40	2.4	0	1.6	0	0	0
CO2: Analyze the data sets received through IoT devices, tools and manage the internet resources by ...	2.40	0	0	0	2	0	0
CO3: Recommend schemes for the IoT applications for real life scenarios.	2.40	0	0	0	0	2.4	0
CO4: Develop and Test IoT system	2.40	0	0	0	0	0	2.4
SUM		2.4	0	1.6	2	2.4	2.4
FINAL ATTAINMENT		2.4	0	1.6	2	2.4	2.4

FINAL CO ATTAINMENT ANALYSIS - IOTA - 20SCS15 - 2020-21 - 2020 Batch

CO1	CO2	CO3	CO4
2.40	2.40	2.40	2.40



UNIVERSITY EXAM CONTRIBUTION

Attained all COs highly (=3) (meaning, 64 % of the students have scored more than 55% of marks)

ACTION TAKEN

Skill Development Activity project and technical report writing have been taken from students to attain PO2.

CONCLUSION

High Attainment: PO1 PO3, PO6 (=~3)

Moderate Attainment: PO3 PO4 (=~2)

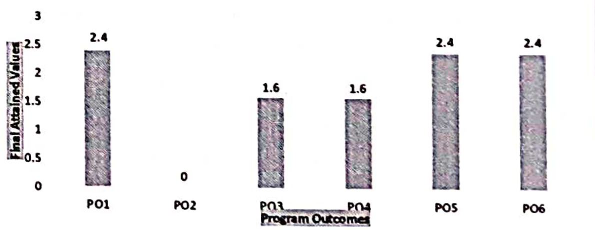
PO2 have not been mapped and hence Skill Development Activity project and technical report writing have been taken to attain PO2.

OBSERVATION

PO2 is attained

FINAL PO ATTAINMENT ANALYSIS - IOT- 20SCS15 - 2020-21 - 2020 Batch

PO1	PO2	PO3	PO4	PO5	PO6
2.4	0	2	2	2.4	2.4



	PO1	PO2	PO3	PO4	PO5	PO6
FINAL ATTAINMENT	2.4	0	1.6	1.6	2.4	2.4

B M S Institute of Technology & Management

Dept of Computer Science & Engineering

BATCH:	2020
SEM:	I
SUBJECT:	20SCS15: INTERNET OF THINGS
Faculty In-Charge:	DR. MANOJ H M

SESSION: JAN 2021-MAY 2021

PG COURSE

TARGET			LEVEL
60%	STUDENTS MUST SCORE	60% & ABOVE	3-High
55%	STUDENTS MUST SCORE	60% & ABOVE	2-Moderate
50%	STUDENTS MUST SCORE	60% & ABOVE	1-Low

COURSE OUTCOMES	ATTAINMENT - I A	ATTAINMENT - VTU	OVERALL ATTAINMENT
CO1	3.00	0.00	2.40
CO2	3.00	0.00	2.40
CO3	3.00	0.00	2.40
CO4	3.00	0.00	2.40

CLASS STRENGTH	9
SET IA TARGET	60%

			TEST-1										TEST-2										TEST-3											CO1			CO2			CO3			CO4			CO5			ALL COs	
		CO No.	1	1	1	1	1	1	2	2			2	2	1	1	2	2	3	3			2	2	2	1	2	2	3	4				2															THEORY EXT	
		Question No.	1	2	3	4	5	6	7	8	9	10	1	2	3	4	5	6	7	8	9	10	1	2	3	4	5	6	7	8	9	10	SDA - Seminar& Assignment Assignment	TOTAL	PERCENT	Target >=60%	TOTAL	PERCENT	Target >=60%	TOTAL	PERCENT	Target >=60%	TOTAL	PERCENT	Target >=60%	TOTAL	PERCENT	Target >=60%	Grade Point	60
		MAXIMUM MARKS FOR QUESTION	10	10	10	10	10	10	10	10			10	10	10	10	10	10	10	10			10	10	10	10	10	10	10	10			20		%			%			%			%			%		
SI No.	USN	Name																																														
1	1BY20SCS01	ADITHYA SHARMA	10		10			10	9	10				10		10	10		9	8			10	6	9			10	10	9				20	40	100.00%	Y	94	94.00%	Y	27	90.00%	Y	9	90.00%	Y					30
2	1BY20SCS02	ARUN KUMAR K BHAVIKAT	10			10		10	10	10				10	10			8	10	10				10	8		8		10	9				19	40	100.00%	Y	83	92.22%	Y	30	100.00%	Y	9	90.00%	Y					35
3	1BY20SCS03	BHAVANA G V	7			7	7		8	5			10		10		10		8	10				9	9			9	9	9				17	31	77.50%	Y	77	85.56%	Y	27	90.00%	Y	9	90.00%	Y					35
4	1BY20SCS04	CHERUKURU YASASWINI	10		10			10	9	9				10		8	10		10	10				10	9			9	10	10				19	38	95.00%	Y	85	94.44%	Y	30	100.00%	Y	10	100.00%	Y					41
5	1BY20SCS05	PRAGNA M V	10		10		10		9	10				10		5	10		8	10				10		8		10	10	10				18	43	86.00%	Y	77	96.25%	Y	28	93.33%	Y	10	100.00%	Y					29
6	1BY20SCS06	PRIYANKA		6		8	8		8	8				10	9		9		9	10				9	9			9	8	8				17	31	77.50%	Y	79	87.78%	Y	27	90.00%	Y	8	80.00%	Y					28
7	1BY20SCS08	SRIDHAR H S	10		10			10	9	9				9		5	10		10	9				10	10			10	9	9				18	35	87.50%	Y	85	94.44%	Y	28	93.33%	Y	9	90.00%	Y					27
8	1BY20SCS09	TEJASWINI HALAKATE	10		9	10	9		9	9			10			10	10		9	10				9	9			9	9	9				17	48	96.00%	Y	82	91.11%	Y	28	93.33%	Y	9	90.00%	Y					36
9	1BY20SCS10	UMME AYMUN	10		10		10		10	10				10	10		10		9	10				10	10			10	10	8				20	40	100.00%	Y	90	100.00%	Y	29	96.67%	Y	8	80.00%	Y					31
10																																		0	0.00%		0	0.00%		0	0.00%		0	0.00%						
11																																		0	0.00%		0	0.00%		0	0.00%		0	0.00%						
12																																		0	0.00%		0	0.00%		0	0.00%		0	0.00%						
13																																		0	0.00%		0	0.00%		0	0.00%		0	0.00%						
14																																		0	0.00%		0	0.00%		0	0.00%		0	0.00%						
15																																		0	0.00%		0	0.00%		0	0.00%		0	0.00%						
																																		Target >=60%	9		Target >=60%	9		Target >=60%	9		Target >=60%	9					292
																																		CO1	100.00%		CO2	100.00%		CO3	100.00%		CO4	100.00%					Avg.	32.4444
																																																22.22%

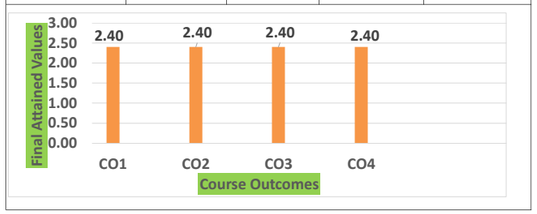
BATCH	2020
SEM	I
SUB	20SCS15: INTERNET OF THINGS
SESSION	JAN 2021-MAY 2021
Class Strength	9
Set Target I A	60%
Faculty	DR. MANOJ H M
Target >=60%	
3	60%
2	55%
1	50%
No. of COs	4
Set Target Uni Theory	60.00%
No of students who were present in EXAM	9

	CO RESULT	PO1	PO2	PO3	PO4	PO5	PO6
CO1: Apply the knowledge and skills acquired during the course for prototyping.	3	3		2			
CO2: Analyze the data sets received through IoT device, tools and manage the internet resources by acquiring practical	3				2		
CO3: Recommend schemes for the IoT applications for real life scenarios.	3					3	
CO4: Develop and Test IoT system	3						3
SUM		3	0	2	2	3	3
Ciii*		3	0	2	2	3	3
		1	0	1	1	1	1

Delivery Mechanism
Lecture, PPT
Lecture, PPT
Lecture, Hands on, PPT
Lecture, Hands on, PPT
Lecture, Hands on, PPT

FINAL CO ATTAINMENT ANALYSIS - IOTA - 20SCS15 - 2020-21 - 2020 Batch

CO1	CO2	CO3	CO4	
2.40	2.40	2.40	2.40	

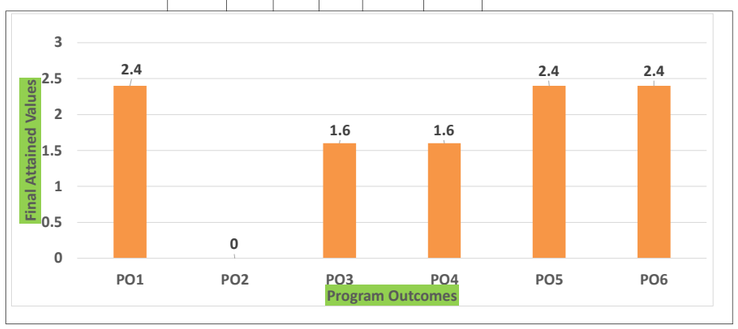


	CO RESULT	PO1	PO2	PO3	PO4	PO5	PO6
CO1: Apply the knowledge and skills acquired during the course for prototyping, programming and data analysis	2.40	2.4	0	1.6	0	0	0
CO2: Analyze the data sets received through IoT device, tools and manage the internet resources by acquiring practical	2.40	0	0	0	2	0	0
CO3: Recommend schemes for the IoT applications for real life scenarios.	2.40	0	0	0	0	2.4	0
CO4: Develop and Test IoT system	2.40	0	0	0	0	0	2.4
SUM		2.4	0	1.6	2	2.4	2.4
FINAL ATTAINMENT		2.4	0	1.6	2	2.4	2.4

UNIVERSITY EXAM CONTRIBUTION
Attained all COs highly (=3) (meaning, 64 % of the students have scored more than 55% of marks)
ACTION TAKEN
Skill Development Activity project and technical report writing have been taken from students to attain PO2.
CONCLUSION
High Attainment: PO1 PO3, PO6 (=~3)
Moderate Attainment: PO3 PO4 (=~2)
PO2 have not been mapped and hence Skill Development Activity project and technical report writing have been taken to attain PO2.
OBSERVATION
PO2 is attained by writing SDA report

FINAL PO ATTAINMENT ANALYSIS - IOT- 20SCS15 - 2020-21 - 2020 Batch

PO1	PO2	PO3	PO4	PO5	PO6
2.4	0	2	2	2.4	2.4



	PO1	PO2	PO3	PO4	PO5	PO6
FINAL ATTAINMENT	2.4	0	1.6	1.6	2.4	2.4