MUTHAYAMMAL COLLEGE OF ARTS AND SCIENCE

(An Autonomous College)

Affiliated to Periyar University, Salem | Accredited by **NAAC** with '**A**' Grade

Recognized by **UGC** under Section 2(f) & 12 (B)

MUTHAYAMMAL COLLEGE OF ARTS AND SCIENCE (Autonomous)

ESTD-1994

A UNIT OF VANETRA GROUP

Learn. Lead

DEGREE OF BACHELOR OF SCIENCE

Learning Outcomes - Based Curriculum Framework

- Choice Based Credit System

Syllabus for B.Sc., Internet of Things

(Semester Pattern)

(For Candidates admitted from the academic year 2023-2024 and onwards)

Vision

To redefine the scope of higher education by infusing into each of our pursuits, initiatives that will encourage intellectual, emotional, social and spiritual growth, there by nurturing a generation of committed, Knowledgeable and socially responsible citizens.

Mission:

*To Ensure State of the world learning experience

*To Espouse value based Education

*To Empower rural education

*To Instill the sprite of entrepreneurship and enterprise

*To create a resource pool of socially responsible world citizens

QUALITY POLICY

To Seek–To Strive–To Achieve greater heights in Arts and Science, Engineering, Technological and Management Education without compromising on the Quality of Education.

DEPARTMENT OF ELECTRONICS AND COMMUNICATION

Vision:

*To provide education that gives self-employment and builds a strong Academic industry.

Mission:

*To provide value and need based education

PREAMBLE

The Internet of Things (IoT) represents a revolutionary development in technology and connectivity, where everyday objects are embedded with sensors, software, and other technologies to collect and exchange data over the internet. This interconnected network enables objects to communicate with each other and with centralized systems, transforming the way we live, work, and interact with the world around us.

The concept of IoT extends beyond traditional computing devices to include a vast array of physical objects, from household appliances and wearable devices to industrial machinery and urban infrastructure. By integrating these objects into a cohesive network, IoT enhances efficiency, automation, and real-time decision-making across various sectors, including healthcare, agriculture, transportation, and smart cities. The Students completing this B.Sc., internet of Things programme will be able to present Software application clearly and precisely, make abstract ideas precise by formulating them in the Computer languages and processor Architecture. Completion of this programme will also enable the learners to join IOT cloud profession, Embedded developer, enhance their employability for government jobs, jobs in software industry, banking, insurance and investment sectors, data analyst jobs and jobs in various other public and private enterprises.

PROGRAMME LEARNING OUTCOME

NATURE AND EXTENT OF THE PROGRAMME

The undergraduate programme in Internet of things is the first level of college or University degree in the country as in several other parts of the world. After obtaining this degree, IOT professional may enter into the job market or opt for undertaking further higher studies in the subject. After graduation the students may join industry, academia, or public health departments and play their role as IOT cloud expert in a useful manner contributing their knowledge to the welfare of the society. Thus the under graduate level degree in Internet of things must prepare the students for all these objectives. The LOCF curriculum has been developed encompassing all the diversified aspects of Microbiology with reasonable depth of knowledge and skills as to specialize them in the various aspects of the subject. It also equips them with the expected professional expertise.

AIM OF THE PROGRAMME

The aim of the undergraduate degree in Internet of Things is to make students knowledgeable about the various basic concepts in a wide ranging context which involve the use of knowledge and skills of Internet of Things. Their understanding, knowledge and skills in Internet of Things needs to be developed through a teaching

learning process in the class, practical skills through the laboratory work, their presentation and articulation skills, exposure to industry and interaction with industry experts. Teaching learning process in the class, practical skills through the laboratory work, their presentation and articulation skills, exposure to industry and interaction with industry experts.

GRADUATE ATTRIBUTES

The students graduating in this degree must have an intricate knowledge of the fundamentals of IoT as applicable to wide ranging contexts. *Graduate Attributes* (GA) are the qualities, skills and understandings that students should develop during their time with the HEI. These are qualities that also prepare graduates as agents of social good in future. Graduate Attributes can be viewed as qualities in following subcategories. Knowledge of the discipline, Creativity, Intellectual Rigour, Problem Solving and Design, Ethical Practices, Lifelong Learning, Communication and Social Skills They should have the appropriate skills of Electronics and IOT so as to perform their duties as IOT expert. They must be able to analyze the problems related to Internet of things and come up with most suitable solutions. As IoT is an inter – disciplinary subject the students might have to take inputs from other areas of expertise. So the students must develop the spirit of team work. IoT is a very dynamic subject and practitioners might have to face several newer problems. To this end, the IoT engineer must be trained to be innovative to solve such newer problems. Several newer developments are taking place in IoT. The students are trained to pick up leads and see the possibility of converting these into products through entrepreneurship. Further more, the students are made to interact with industry experts so that they may able to see the possibility of their transition into entrepreneurs. They are also made aware of the requirements of developing a IoT enterprise by having knowledge of patents, copyrights and various regulatory processes to make their efforts a success.

Besides attaining the attributes related to the Profession of IoT, the graduates in this discipline should also develop ethical awareness which is mandatory for practicing a scientific discipline including ethics of working in a laboratory and ethics followed for scientific publishing of their research work in future. The students graduating in Iot should also develop excellent communication skills both in the written as well as spoken language which is in dispensible for them to pursue higher studies from some of the best and internationally acclaimed universities and research institutions spread across the globe.

GA1 Analytical Reasoning

GA2 Critical Thinking

GA3 Problem Solving Skills

GA4 Communication Skills

GA 5 Leadership Quality

GA 6 Teamwork

GA 7 Lifelong Learning

PROGRAMME EDUCATIONAL OBJECTIVES (PEOs):

PEO1: Graduates will be able to promote learning environment to meet the industry expectation

PEO2: Graduates will be incorporated the critical thinking with Good Communication and Leader ship skills to become a self-employed

PEO3: Graduates will be up hold the human values and environmental sustenance for The better men to the society.

PROGRAMME OUTCOMES (POs)

PO1: Graduates will acquire dynamic skills through proper perception of the course Objectives that leads to scientific and analytical comprehension of the concepts.

PO2: Graduates will focus on sustainable goals that might bring about spherical developments

PO3: Graduates will infuse a spirit converging on bricking a team work, interpersonal and administrative skills to think critically and execute effectively

PO4: Graduates will apply reasoning appropriately to scale the humps in learning and solute them to the core.

PO5: Graduates will engage the skills obtained in independent and collaborative Learning as a perennial process.

PROGRAMMESPECIFICOUTCOMES(PSOs)

PSO-1: Apply proficiency in use of software and hardware required to practice electronics and communication profession.

PSO-2: Graduates will be able to apply fundamentals of electronics in various aspects of analog and digital systems.

PSO-3: Design and analyze specific engineering problems of communication, electronic circuits, computer programming, embedded systems and VLSI design and semiconductor technology by applying the knowledge of basic sciences, engineering mathematics and engineering fundamentals.

PSO-4: Graduates will be able to communicate effectively with excellent interpersonal skills and demonstrate the practice of professional ethics for societal benefit.

PSO-5: Graduates will be able to apply fundamentals of electronics in various domains of analog and digital systems and also use embedded system concepts for developing IoT application

REGULATIONS (2023-2024)

1. DURATION OF THE PROGRAME

1.1. Three years(six semesters)

1.2. Each academic year shall be divided into two semesters. The odd semesters shall consist of the period from June to November of each year and the even semesters from December to May of each year.

1.3. There shall be not less than 90 working days for each semester.

2. ELIGIBILITY FOR ADMISSION

2.1. Candidate for admission to the first year of B.Sc. Degree Course in Internet of Things shall be required to have passed the Higher Secondary Examination with Mathematics as one of the Subject. Or Higher Secondary pass with Computer Science / Computer Applications / Information Technology / Computer Technology / Business Mathematics/ Statistics as one of the courses and have not studied Mathematics should undergo a bridge course on Mathematics for a minimum duration of 15 days.

3. CREDIT REQUIRMENTS AND ELIGIBILITY FORAWARD OF DEGREE

3.1. A Candidate shall be eligible for the award of the Degree only if he/she has under gone the prescribed course of study in a College affiliated to the University for a period of not less than three academic years and passed the examinations of all the Six Semesters prescribed earning a minimum of 140 credits as per the distribution given in Regulation for Part I, II, III, IV & V and also fulfilled such other conditions as have been prescribed there of.

4. COURSE OF STUDY, CREDITS AND SCHEME OF EXAMINATION

The Course Components and Credit Distribution shall consist of the following:

(Minimum Number of Credits to be obtained)

Part Wise Distribution	Study Components	Credit Distribution
PARTI	Tamil or Other Languages	12
PARTII	English	12
PARTIII	Core, Allied, Elective and Project Courses	91
PARTIV	i. Basic Tamil/Advanced Tamil/NME	04
	ii. Soft Skill Courses/SBEC	10
	iii. Environmental Studies	02
	iv. Value Education	02
	v. Internship	02
	vi. Foundation Course	02
	vii. Professional Competency Skills	02
PARTV	Extension Activity	01
Total Credits		140

4.2 DETAILS OF COURSE OF STUDY OF PARTS I-V

4.2.1 PARTI: Tamil and Other Languages Hindi or French at the option of candidates and according to the syllabus and text-books prescribed from time to time:

4.2.2 PART II: English: According to the syllabus and text-books prescribed from time to time

4.2.3 PART III: Core, Allied Project and Elective Courses: As prescribed by the concerned Board of Studies

4.2.4 PART IV:

i. Basic Tamil/Advanced Tamil/NME:

a. Students who have not studied Tamil up to XII STD and have taken any Language other than Tamil in Part I shall take Basic Tamil comprising of Two Courses (level will be at 6thStandard).
b. Students who have studied Tamil up to XII STD and have taken any Language other than Tamil in Part – I shall take Advanced Tamil comprising of Two Courses.
c. Students who have studied Tamil up to XII STD and also have taken Tamil in Part–I shall take Non-Major Elective comprising of Two Courses.

i. Soft Skill Courses/SBEC
ii. Environmental Studies
iii. Value Education
iv. Internship
v. Foundation Course
vi. Professional Competency Skills(Online)

4.2.5 PARTV: Extension Activity:

Students shall be awarded a maximum of 1 Credit for Compulsory Extension Service. All the Students shall have to enroll for NSS /NCC/ NSO (Sports & Games) Retract / Youth Red Cross or any other Service Organizations in the College and shall have to put in compulsory minimum attendance of 40 hours which shall be duly certified by the Principal of the College before 31st March in a year. If a student lacks40 hour's attendance in the first year, he or she shall have to compensate the same during the sub sequent years.

Those students who complete minimum attendance of 40 hours in one year will get 'half-a- credit and those who complete the attendance of 80 or more hours in Two Years will get 'one credit'. Literacy and Population Education and Field Work shall be compulsory components in the above extension service activities.

4.3. Inclusion of the Massive Open Online Courses (MOOCs)available on SWAYAM and NPTEL

4.3.1 Students can choose the MOOC Course Available on SWAYAM and NPTEL under Core, Elective or Soft skill category. He/ she will be awarded degree only after producing valid certificate of the MOOC course for credit Mobility

5. REQUIREMENTS FOR PROCEEDING TO SUBSEQUENT SEMESTER

5.1 Eligibility: Students shall be eligible to go to subsequent semester only if they earn sufficient attendance as prescribed by the Periyar University.

5.2. Attendance: All Students must earn 75% and above of attendance for appearing for the End Semester Examination.(Theory/Practical)

5.3. Condonation of shortage of attendance: If a Student fails to earn the minimum attendance (Percentage stipulated), the Principals shall condone the shortage of attendance up to a maximum limit of 10% (i.e. between 65% and above and less than75%)after collecting the prescribed fee for Theory/Practical examination separately, towards the condonation of shortage of attendance. Such fees collected and should be remitted to the University.

5.4. Non-eligibility for condonation of shortage of attendance: Students who have secured less than 65% but more than 50% of attendance are NOTELIGIBLE for condonation of shortage of attendance and such Students will not be permitted to appear for the regular examination, but will be allowed to proceed to the next year/next semester of the program and they may be permitted to take next University examination by paying the prescribed condonation fee

5.5. Detained students for want of attendance: Students who have earned less than 50% of attendance shall not be permitted to proceed to then next semester and to complete the Program of study. Such Students shall have to repeat the semester, which they have missed by rejoining after completion of final semester of the course, by paying the fee for the break of study as prescribed by the College from time to time.

5.6. Condonation of shortage of attendance for married women students: Inrespect of married women students undergoing UG programs, the minimum attendance for condonation (Theory/Practical) shall be relaxed and prescribed as 55%instead of 65% if they conceive during their academic career. Medical certificate from the Doctor (D.G.O) from the Government Hospital and the prescribed fee along with attendance details shall be forwarded to the college to consider the condonation of attendance mentioning the category

5.7. Zero Percent (0%) Attendance: The Students, who have earned 0% of attendance, have to repeat the program (by rejoining) without proceeding to succeeding semester and they have to obtain prior permission from the College/University immediately to rejoin the program.

5.8.1 Transfer of Students is permitted from one Institution to another Institution for the same program with same nomenclature.

Provided, there is a vacancy in the respective program of Study in the Institution where the transfer is requested.

Provided the Student should have passed all the courses in the Institution from where the transfer is requested.

5.8.2 The marks obtained in the courses will be converted and grades will be assigned as per the College norms.

5.8.3 The transfer students are eligible for classification.

5.8.4 The transfer students are not eligible for Ranking, Prizes and Medals.

5.8.5 Students who want to go to foreign Universities up to two semesters or Project Work with the prior approval of the Departmental/College Committee are allowed to get transfer of credits and marks which will be converted in to Grades as per the University norms and are eligible to get CGPA and Classification; they are not eligible for Ranking, Prizes and Medals.

5.9 Students are exempted from attendance requirements for online courses of the College and MOOC's.

6. EXAMINATION AND EVALUATION

6.1 Register for all subjects: Students shall be permitted to proceed from the First Semester up to Final Semester irrespective of their failure in any of the Semester Examination. For this purpose, Students shall register for all the arrear subjects of earlier semesters along with the current (subsequent) Semester Subjects.

6.2 Marks for Internal and End Semester Examinations for PARTI, II, III, and IV

Category	Theory	Practical
Internal Assessment	25	**40**
End semester Examination	**75**	**60**

6.3 Procedure for Awarding Internal Marks

Internal Examination Marks-Theory

Components	Marks
CIA I & II	**15**
Attendance	**5**
Assignment/Quiz	**5**
Total	**25**

6.4 Awarding Marks for Attendance (out of 5)

PercentageofAttendance	Marks
Below 60%	0 marks
60% to 75%	3 marks
75% to 90%	4 marks
Above 90%	5 marks

6.5 Components for Practical CIA.

Components	Marks
CIA-I	**15**
CIA- II	**15**
Observation Note	**05**
Attendance	**5**
Total	**40**

6.6 Components for Practical ESE.

Components	Marks
Completion of Experiments	**50**
Record	**05**
Viva voce	**05**
Total	**60**

6.7 Guidelines for Value Education Yoga and Environmental Studies(Part IV)

6.7.1. The Course Value Education Yoga is to be treated as 100% CIA course which is offered in V Semester for I year UG students.

6.7.2. The Course Environmental Studies is to be treated as 100% CIA course which is offered in IV Semester for I year UG students.

6.7.3 Total Marks for the Course =100

Components	Marks
Two Tests(2x30)	**60**
Field visit and report (10+10)	**20**
Two assignments(2x10)	**20**
Total	**100**

The passing minimum for this course is 40%

6.7.3 Incase, the candidate fails to secure 40% passing minimum, he/she may have to reappear for the same in the subsequent odd/even semesters.

6.8 Internship/Industrial Training, Mini Project and Major Project Work

Internship/IndustrialTraining		MiniProject	Major Project Work		
Components	**Marks**	**Marks**	**Components**		Marks
CIA*2			**CIA** a) Attendance b) Review /Work Diary*1	10 Marks 30 Marks	**40**
Work Diary	25	-			
Report	50	50			
Viva-voce	25	50			
Examination					
Total	**100**	**100**	**ESE*2** a) Final Report 40 Marks b)Viva-voce 20 Marks		**60**
			Total		100

*1.Review is for Individual Project and Work Diary is for Group Projects (Group consisting of minimum 3 and maximum 5)

*2 Evaluation of report and conduct of viva voce will be done jointly by Internal and External Examiners

6.9 Guidelines for Professional Competency Skill-Online Mode (Part IV)- Online Exam 3 hours

Components	Marks
100 Objective Type Questions 100*1=100Marks	**100**

Objective type Questions from Question Bank.

- The passing minimum for this paper is 40%
- Incase, the candidate fails to secure 40% passing minimum, he/she may have to reappear for the same in the subsequent semesters.

Objective type Questions from Question Bank.

- The passing minimum for this paper is 40%
- Incase, the candidate fails to secure 40% passing minimum, he/she may have to reappear for the same in the subsequent semesters.

QUESTION PAPER PATTERN FOR CIAI, II AND ESE	
(3HOURS)	**MAXIMUM:75Marks**
SECTION-A (**Objective Type**) **Answer ALL Questions** ALL Questions Carry EQUAL Marks	(10x1=10marks)
SECTION-B(**Either or Type**) **Answer ALL Questions** ALL Questions Carry EQUAL Marks	(5x5=25marks)
SECTION-C (**Either or Type**) **Answer ALL Questions** ALL Questions Carry EQUAL Marks	(5x8=40marks)
(Syllabus for CIA-I2.5 Unit, Syllabus for CIA-II All 5Unit)	

6.10 PASSING MINIMUM

6.10.1 There shall be no passing minimum for Internal.

6.10.2 For external examination, passing minimum shall be40% [Forty Percentage] of the maximum marks prescribed for the course for each Course/Practical/Project and Viva-Voce.

6.10.3 In the aggregate [External/Internal] the passing minimum shall be of 40%.

6.10.4 He/ She shall be declared to have passed the whole examination, if he/ she passes in all the Courses and Practical wherever prescribed as per the scheme of the examinations by earning 140 CREDITS in Part I, II, III, IV& V. He/she shall also fulfill the extension activities prescribed earning a minimum of 1 credit to qualify for the Degree.

6.11 SUPPLIMENTARY EXAMINATION:

Supplementary Examinations is conducted for the students who appeared in the final semester examinations. Eligible criteria for appearing in the Supplementary Examinations are as follows:

6.11.1 Eligibility: A Student who is having arrear of only one theory course in any of the semester or two theory course in the Final semester of the UG degree programme alone is eligible for Supplementary Examinations.

6.11.2 Non-eligibility for those completed the program: Students who have completed their Program duration but having arrears are not eligible to appear for Supplementary Examinations.

6.12 RETOTALLING, REVALUATION AND PHOTOCOPY OF THE ANSWER SCRIPTS:

6.12.1 Re-totaling: All UG Students who appeared for their Semester Examinations are eligible for applying for re-totaling of their answer scripts.

6.12.2 Revaluation: All current batch Students who have appeared for their Semester Examinations are eligible for Revaluation of their answer scripts. Passed out candidates are not eligible for Revaluation.

6.12.3 Photo copy of the answer scripts: Students who have applied for revaluation can apply for the Photocopy of answer scripts by paying prescribed fee.

7. CLASSIFICATION OF SUCCESSFUL STUDENTS

RANGE OF MARKS	GRADE POINTS	LETTERGRADE	DESCRIPTION
90-100	9.0-10.0	O	Outstanding
80-89	8.0-8.9	D+	Excellent
75-79	7.5-7.9	D	Distinction
70-74	7.0-7.4	A+	Very Good
60-69	6.0-6.9	A	Good
50-59	5.0-5.9	B	Average
40-49	4.0-4.9	C	Satisfactory
00-39	0.0	U	Re-appear
ABSENT	0.0	AAA	**ABSENT**

7

7.1 Computation of Grade Point Average (GPA) in a Semester, Cumulative Grade Point Average (CGPA) and Classification

GPA for a Semester:=∑iCiGi,∑iCi

That is, GPA is the sum of the multiplication of grade points by the credits of the courses divided by the sum of the credits of the courses in a semester.

CGPA for the entire programme: = ∑n∑iCniGni ,∑n∑iCni That is, CGPA is the sum of the multiplication of grade points by the credits of the entire programme divided by the sum of the credits of the courses of the entire programme

Where,

Ci=Credits earned for course in any semester,

Gi=Grade Points obtained for course in any semester=Semester in which such courses were credited.

7.2 Letter Grade and Classification

CGPA	GRADE	CLASSIFICATIONOFFINALRESULT
9.5-10.0	O+	First Class-Exemplary*
9.0 and above but below9.5	O	
8.5 and above but below9.0	D++	First Class with Distinction*
8.0 and above but below8.5	D+	
7.5 and above but below8.0	D	
7.0 and above but below7.5	A++	First Class
6.5 and above but below7.0	A+	
6.0and above but below6.5	A	
5.5 and above but below6.0	B+	Second Class
5.0 and above but below5.5	B	
4.5 and above but below5.0	C+	Third Class
4.0 and above but below4.5	C	
0.0 and above but below4.0	U	Re-appear

*The Students who have passed in the first appearance and within the prescribed semester of the UG Programme (Major, Allied and Elective courses only) are eligible.

8. RANKING

Students who pass all the examinations prescribed for the Program in the FIRST APPEARANCE ITSELF ALONE are eligible for Ranking I,II and III.

9. MAXIMUM PERIOD FOR COMPLETION OF THE PROGRAM TO QUALIFY FOR A DEGREE

9.1 A Student who for whatever reasons is not able to complete the program within the normal period (N) or the Minimum duration prescribed for the programme, may be allowed two years period beyond the normal period to clear the backlog to be qualified for the degree.(Time Span=N+2 years for the completion of programme.)

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B .Sc., Internet Of Things abstract under LOCF-CBCS Pattern with effect from 2023-2024 Onwards

Structure of Credit Distribution as per the TANSCHE / UGC Guidelines

S.No.	Study Components	Part	Sem.I		Sem. II		Sem. III		Sem. IV		Sem. V		Sem. VI		No.of Paper	Total Credit
			No.of Paper	Credit	No.of Paper	Credit	No.of Paper	Credit	No.of Paper	Credit	No.of Paper	Credit	No.of Paper	Credit		
1	LANGUAGE - I	I	1	3	1	3	1	3	1	3					4	12
2	LANGUAGE - II	II	1	3	1	3	1	3	1	3					4	12
3	DISCIPLINE SPECIFIC COURSE(DSC)-THEORY	III	1	5	1	5	1	5	1	5	3	15	1	5	8	40
4	DSC - PRACTICAL	III	I	3	1	3	1	3	1	3	1	3	1	3	6	18
5	GENERIC ELECTIVE COURSES (GEC)- THEORY	III	1	3	1	3	1	3	1	3					4	12
6	GEC PRACTICAL	III													0	0
7	DISCIPLINE SPECIFIC ELECTIVE COURSES (DSE)	III									2	8	2	8	4	16
8	PROJECT WORK	III											1	5	1	5
9	INTERNSHIP	IV									1	2			1	2
10	PROFESSIONAL COMPETENCY SKILL	IV											1	2	1	2
11	SKILL ENHANCEMENT COURSES (SEC)	IV			1	2	2	4	2	4					1	2

12	NON MAJOR ELECTIVE COURSES (NMEC)	IV	1	2	1	2									5	10
13	FOUNDATION COURSE (FC)	IV	1	2											2	4
14	ABILITY ENHANCEMENT COMPULSORY COURSES (AECC)-EVS	IV							1	2					1	2
15	ABILITY ENHANCEMENT COMPULSORY COURSES (AECC)- VALUE EDUCATION - YOGA	IV									1	2			1	2
16	EXTENSION ACTIVITY	V											1	1	1	1
	Cumulative Credits		7	21	7	21	7	21	8	23	8	30	7	24	44	140

Total No. of Subjects	44
Marks	**4300**

PART	No.of Credits
PART - I	12
PART - II	12
PART - III	91
PART - IV	24
PART - V	1
Grand Total	**140**

Extra Credit	4
	144

Scheme of Examinations LOCF-CBCS Pattern
(for the Students Admitted from the Academic Year:2023-2024 Onwards)
Programme : B.Sc. INTERNET OF THINGS

S.No.	PART	STUDY COMPONENTS	COURSE_CODE	TITLE OF THE COURSE	Hrs./W		CREDIT POINTS	MAX.MARKS		
					Lect.	Lab.		CIA	ESE	TOTAL
SEMESTER - I										
1	I	LANGUAGE-I	23M1UFTA01	TAMIL-I	6	-	3	25	75	100
2	II	LANGUAGE-II	23M1UFEN01	ENGLISH-I	6	-	3	25	75	100
3	III	DSC THEORY-I	23M1UIOC01	PRINCIPLES OF ELECTRONIC CIRCUITDESIGN	5	-	5	25	75	100
4	III	DSC PRACTICAL-I	23M1UIOP01	PRACTICAL: CIRCUIT DESIGN	-	5	3	40	60	100
5	III	GEC THEORY -I	23M1UMAA03	ALLIED:DISCRETE MATHEMATICS -1	4	-	3	25	75	100
6	IV	NMEC -I		FUNDAMENTALS OF INFORMATION TECHNOLOGY	2	-	2	25	75	100
7	IV	FC THEORY-1	23M1UIOFC1	FUNDAMENTALS OF IOT AND APPLICATIONS	2	-	2	25	75	100
				TOTAL	**25**	**5**	**21**	**190**	**510**	**700**

SEMESTER - II										
1	I	LANGUAGE - I	23M2UFTA02	TAMIL - II	6		3	25	75	100
2	II	LANGUAGE - II	23M2UFEN02	ENGLISH - II	6		3	25	75	100
3	III	DSC THEORY-II	23M2UIOC02	EMBEDDED SYSTEM AND MICROCONTROLLER	5	-	5	25	75	100
4	III	DSC PRACTICAL-II	23M2UIOP02	PRACTICAL: EMBEDDED SYSTEMS	-	5	3	40	60	100
5	III	GEC THEORY -II	23M2UMAA04	DISCRETE MATHEMATICS II	4	-	3	25	75	100
6	IV	NMEC -II	23M2UCSN02	INTRODUCTION TO HTML	2	-	2	25	75	100
7	IV	SEC-I		ELECTIVE - I	2	-	2	25	75	100
				TOTAL	**25**	**5**	**21**	**190**	**510**	**700**
SEMESTER - III										
1	I	LANGUAGE - I	23M3UFTA03	TAMIL - III	6		3	25	75	100
2	II	LANGUAGE - II	23M3UFEN03	ENGLISH - III	6		3	25	75	100
3	III	DSC THEORY-III	23M3UIOC03	RFID AND SENSOR NETWORK	5	-	5	25	75	100
4	III	DSC PRACTICAL-III	23M3UIOP03	PRACTICAL: NETWORK SIMULATOR	-	5	3	40	60	100

5	III	GEC THEORY -III	23M3UCSA01	OBJECT ORIENTED PROGRAMMING USINGC++	4	-	3	25	75	100
6	IV	SEC - II		ELECTIVE - II	2	-	2	25	75	100
7	IV	SEC-III		ELECTIVE - II	2	-	2	25	75	100
				TOTAL	**25**	**5**	**21**	**190**	**510**	**700**
SEMESTER - IV										
1	I	LANGUAGE - I	23M4UFTA04	TAMIL - IV	6		3	25	75	100
2	II	LANGUAGE - II	23M4UFEN04	ENGLISH - IV	6		3	25	75	100
3	III	DSC THEORY-IV	23M4UIOC04	ARDUINO AND SENSORS	6	-	5	25	75	100
4	III	DSC PRACTICAL-IV	23M4UIOP04	PRACTICAL: ARDUINO AND SENSORS	-	4	3	40	60	100
5	III	GEC THEORY -IV	23M4UCSA02	MACHINE LEARNING	4	-	3	25	75	100
6	IV	SEC -IV		ELECTIVE - IV	2	-	2	25	75	100
7	IV	SEC - V		ELECTIVE - V	2	-	2	25	75	100
8	IV	AECC-ENVIRONMENTAL STUDIES (EVS)*	23M4UEVS01	ENVIRONMENTAL STUDIES	-	-	2	100	-	100
				TOTAL	**26**	**4**	**23**	**290**	**510**	**800**

SEMESTER - V										
1	III	DSC THEORY-V	23M5UIOC05	PYTHON PROGRAMMING	5	-	5	25	75	100
2	III	DSC THEORY-VI	23M5UIOC06	NETWORK COMMUNICATION AND SECURITY	5	-	5	25	75	100
3	III	DSC THEORY-VII	23M5UIOC07	ENERGY HARVESTING FOR IOT	5	-	5	20	80	100
4	III	DSC PRACTICAL-V	23M5UIOP05	PRACTICAL: PYTHON PROGRAMMING	-	5	3	40	60	100
5	III	DSE THEORY - I	23M5UIOE01	CLOUD COMPUTING	4	-	4	25	75	100
6	III	DSE THEORY - II	23M5UIOE02	WIRELESS SENSORS NETWORK	4	-	4	25	75	100
7	IV	AECC-VALUE EDUCATION	23M5UVED01	YOGA	2	-	2	100	-	100
8	IV	INTERNSHIP	23M5UIOIN1	INTERNSHIP (15 DAYS)	-	-	2	100	-	100
				TOTAL	**25**	**5**	**30**	**360**	**440**	**800**
SEMESTER - VI										
1	III	DSC THEORY-VIII	23M6UIOC08	IMPLIMENTING IOT WITH RASPBERRY PI	6	-	5	25	75	100
2	III	DSC PRACTICAL-VI	23M6UIOP06	PRACTICAL: RASPBERRY PI	-	6	3	40	60	100
3	III	PROJECT WORK	23M6UIOPR1	PROJECT WORK	-	6	5	25	75	100

4	III	DSE THEORY - III	23M6UIOE04	INDUSTRIAL AND MEDICAL IOT	5	-	4	25	75	100
5	III	DSE THEORY - IV	23M6UIOE05	ANDROID APPLICATION DEVELOPMENT	5	-	4	25	75	100
6	IV	PROFESSIONAL COMPETENCY SKILL	23M6UIOOE1	INTERNET OF THINGS FOR COMPETITIVE EXAMS	2	-	2	25	75	100
7	V	EXTENSION ACTIVITY	23M6UEXT1	EXTENSION ACTIVITY	-	-	1	-	-	-
				TOTAL	**18**	**12**	**24**	**165**	**435**	**600**
				OVER ALL TOTAL	**144**	**36**	**140**	**1385**	**2915**	**4300**
1	V	EXTRA CREDIT COURSE - ONLINE		MOOC Courses offered in SWAYAM/NPTEL	-	-	2	-	-	-
2	V	VALUE ADDED COURSE		VALUE ADDED COURSE	-	-	2	-	-	-

HOD **MEMBER SECRETARY ACADEMIC COUNCIL** **PRINCIPAL**

B.Sc-Internet of Things Syllabus LOCF-CBCS with effect from 2023-2024 Onwards								
Course Code	**Course Title**	**Course Type**	**Sem**	**Hours**	**L**	**T**	**P**	**C**
23M1UIOC01	PRINCIPLES Of ELECTRONIC CIRCUIT DESIGN	DSC THEORY- I	I	5	5	-	-	5
Objective	Enable the students to understand and gain the knowledge on Electronic Circuit Design Principles and to acquaint the students with construction, theory and characteristics of the various kinds of electronic devices.							

Unit	Course Content	Knowledge Level	Session
I	**Fundamentals of Electronics:** AC and DC Fundamentals- Resistors – Capacitors – Inductors – Series and parallel connections – Ohms Law – KCL- KVL – Super position theorem - Maximum power transfer theorem. Semiconductors- Types - Energy band Structure- Working and characteristics of PN Junction Diode- BJT- JFET- MOSFET- LED – LDR- Solar Cell- Photo Diode, LCD	K2	10
II	**Rectifiers and power supply:** Rectifier – Half wave rectifier– full wave rectifier – bridge rectifier Comparison - Filters – Capacitor Filter, Inductor Filter, L section and π section filters – Regulators –78XX and 79XX IC regulators – Single and Dual regulated power supply design using IC regulators.	K3	12
III	Amplifier: Definition – feedbacks – effect of negative feedback in amplifiers – Common emitter amplifier – Multistage amplifiers – RC Coupled amplifiers – Transformer coupled amplifier – Direct coupled amplifier – frequency response.	K4	12
IV	Oscillator and Wave Shaping circuits: Condition for Oscillation – Barkhausen criterion – Types of Oscillators – Hartley oscillator – Colpitt's oscillator – Crystal oscillator - RC phase shift oscillator – Astable Multivibrator – Monostable Multivibrator – Bistable multivibrator – Schmitt trigger – UJT Relaxation oscillator - Clippers- Clampers.	K2	13
V	Linear ICs: OpAmp: Ideal OpAmp – OpAmp Stages - OpAmp parameters – inverting and non inverting amplifiers – Adder and Subtractor – Multiplier and Divider – Differentiator – integrator - V to I and I to V converter – sample and hold circuit – Instrumentation amplifier.IC555 Timer: Pin details of IC 555 – Block Diagram – Astable multivibrator - Mono stable multivibrator – Bistable Multivibrator	K4	13
	CO1: Recognize the fundamental concepts of solid state devices	K1	
	CO2: Understand the types and characteristics of various rectifiers Filters and regulators.	K2	

Course Outcome	**CO3:** Apply the operation of the devices on various amplifier designs	K3	
	CO4: Illustrate the functionality of different kinds of oscillator and Wave shaping circuits	K3	
	CO5: Analyze the characteristics of the Linear IC's in different aspects.	K4	

Learning Resources				
Text Books	1. V.K. Metha, Rohit Metha - Principles of Electronics-S.Chand 12th edition 2. R.S Sedha –A Textbook of Applied Electronics - Revised Edition – 2008. 3. A. Sudhakar, Shyammohan S. Palli -Circuits and Networks: Analysis and Synthesis - 5th Edition 2017			
Reference Books	1.S. Salivahanan, N. Suresh Kumar-Electronic Devices and Circuits –4th Edi -2017 B.L.Theraja, "Basic Electronics-Solid State Devices", S.Chand Company			
Website Link	1.https://www.edx.org/course/principle-of-semiconductor-devices-part-i-semicond 2.https://www.edx.org/course/principles-of-electronic-biosensors			
	L-Lecture	T-Tutorial	P-Practical	C-Credit

B.Sc-Internet of Things S llabus LOCF-CBCS with effect from 2023-2024 Onwards								
Course Code	**Course Title**	**Course Type**	**Sem**	**Hours**	**L**	**T**	**P**	**C**
23M1UIOC01	PRINCIPLES Of ELECTRONIC CIRCUIT DESIGN	DSC THEORY-I	I	5	5	-	-	5

CO-PO Mapping

CO Number	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	M	L	L	L	S	S	S	M	L	S
CO2	M	M	L	L	S	M	S	M	L	S
CO3	S	M	L	M	M	S	S	M	L	M
CO4	M	M	L	M	M	S	S	S	L	S
CO5	M	M	L	M	S	M	M	S	L	S
Level of Correlation between CO and PO	L-LOW					M-MEDIUM			S-STRONG	

Tutorial Schedule	Group discussion, Lab Visit, Problem Solving, Brain Storming & Quiz
Teaching and Learning Methods	Audio Video lecture, Chalk and Board class PPT Presentation and Video presentation
Assessment Methods	Class Test, Unit Test, Assignment, CIA-I, CIA-II and ESE

Designed By	**Verified By**	**Approved By Member Secretary**
Mr .I. BALAKRISHNAN	**Mr.S.ARULMANI**	**Dr. S. SHAHITHA**

B.Sc-Internet of Things Syllabus LOCF-CBCS with effect from 2023-2024 Onwards								
Course Code	**Course Title**	**Course Type**	**Sem**	**Hours**	**L**	**T**	**P**	**C**
23M1UIOP01	PRACTICAL: CIRCUIT DESIGN	DSC PRACTICAL - I	I	5	-	-	5	3

Objective	The students get familiarized with the various analog and digital electronics instruments and components which basically equip them to construct complex circuits in near future.

S. No	**List of Experiments / Programmes (Any 10)**	**Knowledge Level**	**Session**
1	Colour coding of resistors.	K2	3
2	Measurement of Amplitude, Phase Angle, Frequency using CRO	K4	3
3	Half wave rectifier with and without Filter	K4	3
4	Full wave rectifier with and without Filter	K4	3
5	Positive and Negative clipper	K4	3
6	Positive and Negative Clamper	K4	3
7	Astable Multivibrator using IC 555	K4	3
8	Monostable Multivibrator using IC 555	K4	3
9	Bistable Multivibrator using IC 555	K4	3
10	Inverting and Non Inverting Amplifier using IC 741	K4	3
11	Summing Amplifier and Differential Amplifier using IC 741	K4	3
12	Integrator and Differentiator using passive components	K4	3
13	Dual Regulated Power Supply Design using IC 78XX and 79XX ICs	K5	3

Course Outcome	CO1: Understand the basic gates function	K1
	CO2: Analyze and Develop simple wave shaping circuits	K4
	CO3: Design and Evaluate the operations of various gates and Combinational Logic circuits.	K5
	CO4: Evaluate and Justify the working of special digital ICs	K5
	CO5: Build the DC regulated power supply	K6

Learning Resources

Text Books	1. Electronics Lab Manual(Volume 1) – 5th Edision – by K.A. Navas- PHI 2. Electronics Lab Manual(Volume 2) – 6th Edision – by K.A. Navas- PHI
ReferenceBooks	1. Basic Electronics: A Text Lab Manual7th Edision – Paul Zbar, Albert MAlvino Michele Miller – Tata McGraw Hill
Website Link	1.https://ae-iitr.vlabs.ac.in/List%20of%20experiments.html

B.Sc-Internet of Things Syllabus LOCF-CBCS with effect from 2023-2024 Onwards									
Course Code	**Course Title**	**Course Type**	**Sem.**	**Hours**	**L**	**T**	**P**	**C**	
23M1UIOP01	PRACTICAL: CIRCUIT DESIGN	DSC PRACTICAL - I	I	5	-	-	5	3	

CO-PO Mapping

CO Number	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	M	L	L	M	M	M	S	M	L	M
CO2	S	M	L	M	M	M	S	S	L	M
CO3	S	M	L	M	H	M	S	S	L	H
CO4	S	M	L	M	H	M	S	S	L	H
CO5	S	M	L	M	H	M	S	S	L	H
Level of Correlation between CO and PO	L-LOW					M-MEDIUM			S-STRONG	

Tutorial Schedule	Group discussion, Lab Visit, Problem Solving, Brain Storming & Quiz
Teaching and Learning Methods	Demonstration, Hands on Training and Practical Sessions
Assessment Methods	Observation, CIA-I, CIA-II and ESE

Designed By	Verified By	Approved By Member Secretary
MrS. P.VIJAYALAKSHMI	**Mr .S. ARULMANI**	**Dr.S.SHAHITHA**

B.Sc-Internet of Things Syllabus LOCF-CBCS with effect from 2023-2024 Onwards								
Course Code	**Course Title**	**Course Type**	**Sem**	**Hours**	**L**	**T**	**P**	**C**
23M2UIOC02	EMBEDDED SYSTEMS AND PIC MICROCONTROLLER	DSC THEORY- II	II	5	5	-	-	5

Objective	Students can get knowledge about various instruction architecture of PIC microcontroller working and applications, and develop the programming skills in PIC16F877 and microcontroller concept the RTOS.

Unit	Course Content	Knowledge Level	Session
I	**Embedded Systems:** Definition and classification – Overview of microprocessor, Microcontroller, and DSP – exemplary high performance processors – CISC and RISC architecture – hardware unit in an embedded System- software embedded into a system – exemplary applications– embedded systems on a chip and in VLSI circuit	K1	12
II	**PIC 16F877 Architecture and Instruction Set:** Device Overview - Architecture - Memory Organization - Status Register - Option Register - INTCON Register - PCON Register - I/O Ports - Data EEPROM. Instruction Set: Byte Oriented Operations - Bit Oriented Operations Literal and Control Operations.	K2	12
III	PIC Peripheral Features: TIMER 0 Module - TIMER 1 Module - TIMER 2 Module - Capture/Compare/ PWM Modules - I2C transmission and reception - USART – SPI - ADC Module. Special features of the CPU: Oscillator Selection — Power on Reset — Power up Timer — Oscillator Startup Timer — Brownout Reset— Interrupts — Watchdog Timer —Sleep.	K3	12
IV	**Interfacing And Applications:** Interfacing of Switch and LEDs – Relay and Solenoid Interfacing – Hex Keyboard Interfacing - 7 Segment Display Interfacing - LCD interfacing – DAC interfacing – Stepper motor interfacing – DC motor interfacing -ADC application - PWM applications. (Use Embedded C Programming)	K4	12
V	**Embedded Software Architecture & Operating System:** Round Robin — Round Robin with Interrupts — Function Queue Scheduling Architecture— Real Time Operating Systems (RTOS) — Tasks and Data —Semaphores and Shared Data— Message Queues, Mail Box and Pipes —Timer Function — Events — Memory Management - Types of RTOS – Study of Micro C/OS-II - Vx Works.	K4	12

Course Outcome	**CO1:** Understand the core concepts of Embedded systems and theirapplications	K1
	CO2: Describe the hardware details of PIC16F87X microcontrollerfamily.	K2
	CO3: Identify and practice the various instruction set, programmingtechniques of PIC microcontroller.	K3
	CO4: Illustrate the concept of software architecture for embedded systems.	K4
	CO5: Demonstrate the design and development tools of RTOS.	K4

Learning Resources	
Text Books	1. Embedded Systems Architecture, Programming and Design-3rd Edission Rajkamal, TATA McGraw- Hill -2017. 2. PIC 16F87X data book, Microchip Technology Inc.,
Reference Books	1. Programming 8 bit PIC microcontroller in C- Martin P. Bates 2. Embedded Controller Hardware Design - Ken Arnold 3. Designing Embedded Systems with PIC Microcontrollers Principles and applications – Tim Wilmshurst. 4. Programming and customizing PIC micro controllers- by Mykepredrco – 2nd edition –Tata McGraw Hill .
Website Link	1.https://embeddedschool.in/architecture-and-applications-of-pic-microcontroller/ 2.https://www.sciencedirect.com/book/9781856177504/designing-embedded- 3.https://www.amazon.in/Designing-Embedded-Systems-PIC-Microcontrollers/dp/0750667559

L-Lecture, T-Tutorial, P-Practical, C-Credit

B.Sc-Internet of Things Syllabus LOCF-CBCS with effect from 2023-2024 Onwards										
Course Code	**Course Title**			**Course Type**	**Sem**	**Hours**	**L**	**T**	**P**	**C**
23M2UIOC02	EMBEDDED SYSTEMS AND PIC MICROCONTROLLER			DSCTHEORY- II	II	5	5	-	-	5
CO-PO Mapping										
CO Number	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PSO1**	**PSO2**	**PSO3**	**PSO4**	**PSO5**
CO1	S	L	M	S	M	S	M	M	S	M
CO2	M	S	L	S	M	M	M	S	M	L
CO3	S	L	L	S	M	S	M	S	S	L
CO4	M	S	L	L	M	L	M	S	L	S
CO5	L	M	M	S	M	S	M	S	M	S
Level of Correlation between CO and PO	L-LOW					M-MEDIUM			S-STRONG	
Tutorial Schedule	Group discussion, Lab Visit, Problem Solving, Brain Storming & Quiz									
Teaching and Learning Methods	Audio Video lecture, Chalk and Board class PPT Presentation and Video presentation									
Assessment Methods	Class Test, Unit Test, Assignment, CIA-I, CIA-II and ESE									
Designed By	**Verified By**					**Approved By Member Secretary**				
Mr. I. BALAKRISHNAN	**Mr.S.ARULMANI**					**Dr.S.SHAHITHA**				

B.Sc-Internet of Things Syllabus LOCF-CBCS with effect from 2023-2024 Onwards								
Course Code	**Course Title**	**Course Type**	**Sem**	**Hours**	**L**	**T**	**P**	**C**
23M2UIOP02	PRACTICAL:EMBEDDED SYSTEMS	DSC PRACTICAL- II	II	5	-		5	3

Objective	To develop the ability to design Microcomputer-based Embedded systems. This class allows students to learn Microcomputer interfacing from both a Hardware and Software perspective.

S.No.	**List of Experiments / Programmes (Any 10)**	**Knowledge Level**	**Session**
1	Addition and Subtraction of 8 Bit Numbers (Use ALP)	K3	5
2	Multiplication and Division of 8 Bit Numbers (Use ALP)	K4	5
3	Sum of 'N' 8-Bit Numbers(Use ALP)	K4	5
4	Interfacing of Switch	K4	5
5	Interfacing of LEDs	K4	5
6	Interfacing of Relays	K5	5
7	Interfacing of Single Seven segment Display	K5	5
8	Interfacing of Multiple Seven segment Display	K5	5
9	Interfacing of DAC	K5	5
10	Interfacing of LCD	K5	5
11	Interfacing of Stepper motor	K5	5
12	Speed Control of DC motor	K5	5
13	Interfacing of temperature Sensor LM35	K5	5

Course Outcome	**CO1:** Identify the functionality of development boards to implementembedded application.	K1
	CO2: Understand basic concepts in the embedded computing systemsarea	K2
	CO3: Apply knowledge and demonstrate the various addressing modesand data transfer instructions.	K3
	CO4: Analyze assembly language programs; select appropriate assemble into machine a cross assembler utility microcontroller.	K4
	CO5: Evaluate assembly language programs and download the machine code that will provide solutions real-world controlproblems.	K5

Learning Resources

Text Books	1. Custom Pic Microcontroller Lab Manual Paperback – 1 January 2007 by Huang Han-Way
Reference Book	1.Pic Experiments Lab Book With Pic16f877a And Xc8 By Innocent Okoloko
Website Link	1.https://www.youtube.com/watch?v=qFKnzxdRy2s 2.https://www.youtube.com/watch?v=Ha5pFv_05Ug 3.https://www.youtube.com/watch?v=rJE1C0MXTSs

MUTHAYAMMAL COLLEGE OF ARTS AND SCIENCE
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Rasipuram - 637408.

B.Sc-Internet of Things Syllabus LOCF-CBCS with effect from 2023-2024 Onwards									
Course Code	**Course Title**	**Course Type**	**Sem**	**Hours**	**L**	**T**	**P**	**C**	
23M2UIOP02	PRACTICAL:EMBEDDED SYSTEMS	DSC PRACTICAL- II	II	5	-	-	5	3	

CO-PO Mapping

CO Number	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	M	M	M	M	M	M	S	L	L	L
CO2	M	M	S	L	S	S	S	M	M	M
CO3	S	M	M	S	M	S	M	L	L	L
CO4	M	L	S	M	L	M	S	M	M	S
CO5	S	S	S	S	L	M	M	M	M	S
Level of Correlation between CO and PO	L-LOW					M-MEDIUM			S-STRONG	

Tutorial Schedule	Group discussion, Lab Visit, Problem Solving, Brain Storming & Quiz
Teaching and Learning Methods	Demonstration, Hands on Training and Practical Sessions
Assessment Methods	Observation, CIA-I, CIA-II and ESE

Designed By	Verified By	Approved By Member Secretary
Mr. S. SATHISHKUMAR	**Mr.S. ARULMANI**	**Dr.S.SHAHITHA**

B.Sc-Internet of Things Syllabus LOCF-CBCS with effect from 2023-2024 Onwards								
Course Code	**Course Title**	**Course Type**	**Sem**	**Hours**	**L**	**T**	**P**	**C**
23M3UIOC03	RFID AND SENSOR NETWORKS	DSC THEORY-III	III	5	5	-	-	5

Objective	Students understand and designing Radio frequency identification (RFID) systems, middle ware architectures for real-world applications.		
Unit	**Course Content**	**Knowledge Level**	**Session**
I	**Introduction of RFID:** Automatic Identification Systems -A Comparison of Different ID Systems Components of an RFID System – Differentiation Features of RFID Systems - Transponder Construction Formats - Frequency, Range and Coupling, Active and Passive Transponders –Information Processing in the Transponder –Selection Criteria for RFID Systems – Fundamental Operating Principles.	K2	12
II	Frequency Ranges and Radio Licensing Regulations- Coding and Modulation- Data Integrity - Multi-Access Procedures – Anti-collision - Security of RFID Systems - Attacks on RFID Systems	K3	12
III	**Wireless Sensor Networks:** Introduction - Challenges and Constraints – Applications - Node Architecture - Operating Systems - Physical Layer	K3	12
IV	**Medium Access Control:** Characteristics of MAC Protocols in Sensor Networks – Contention - Free MAC Protocols – Contention - Based MAC Protocols - Network Layer - Various Routing Protocols.	K4	12
V	**Security in WSN:** Challenges of Security in Wireless Sensor Networks- Security Attacks in Sensor Networks- Protocols and Mechanisms for Security- IEEE 802.15.4 and ZigBeeSecurit ***Current trends** Improved RFID Technology	K4	12
Course Outcome	**CO1:** Memorize the frequency ranges and radio licensing regulations associated with RFID		K1
	CO2: Describe the construction formats of RFID transponders		K2
	CO3: Implement a basic wireless sensor network node architecture		K3
	CO4: Evaluates the effectiveness of various MAC protocols wireless sensor		K4
	CO5: Evaluate the r liability of different MAC protocols in addressing network congestion in WSNs.		K4
Text Books	1. Klaus Finken zeller, WILEY& SONS, RFID Handbook – 3rd Edition 2010 2. Waltenegus Dargie, Christian Poellabauer, Fundamentals of Wireless SensorNetworks -1st Edition 2010		
Reference	1. Yan Zhang, LaurenceT. Yang, Jining, RFID and Sensor Networks Architecture,Protocols, Security and integration		

Books	2. Ian F. Akyildiz, and Mehmet Can Vuran, Wireless Sensor Networks,2010,Wiley, USA. 3.Kazemsohraby, Daniel minolita iebznati, Johnwiley &Sons, Inc Publication Wireless Sensor Networks Technology, protocols and applications
Website Link	1.http://www.redbooks.ibm.com/redpapers/pdfs/redp5242.pdf
Self Study Material	1. https://lowrysolutions.com/blog/what-is-the-future-of-rfid-technology/

-Lecture, T-Tutorial, P-Practical, C-Credit

B.Sc-Internet of Things Syllabus LOCF-CBCS with effect from 2023-2024 Onwards										
Course Code	**Course Title**		**Course Type**		**Sem.**	**Hours**	**L**	**T**	**P**	**C**
23M3UIOC03	RFID AND SENSOR NETWORKS		DSC THEORY-III		III	5	5	-	-	5
CO-PO Mapping										
CO Number	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PSO1**	**PSO2**	**PSO3**	**PSO4**	**PSO5**
CO1	S	M	S	M	S	S	S	M	M	L
CO2	M	S	M	S	S	S	S	S	S	S
CO3	M	M	S	M	L	L	M	L	M	M
CO4	S	L	M	S	S	M	L	S	M	S
CO5	S	S	L	M	S	S	S	M	M	M
Level of Correlation between CO and PO	L-LOW			M-MEDIUM			S-STRONG			
Tutorial Schedule	Group discussion, Lab Visit, Problem Solving, Brain Storming & Quiz									
Teaching and Learning Methods	Audio Video lecture, Chalk and Board class PPT Presentation and Video presentation									
Assessment Methods	Class Test, Unit Test, Assignment, CIA-I, CIA-II and ESE									
Designed By	**Verified By**					**Approved By Member Secretary**				
Mr. S. SATHISHKUMAR	**Mr. S. ARULMANI**					**Dr. S. SHAHITHA**				

B.Sc-Internet of Things Syllabus LOCF-CBCS with effect from 2023-2024 Onwards								
Course Code	**Course Title**	**Course Type**	**Sem**	**Hours**	**L**	**T**	**P**	**C**
23M3UIOP03	PRACTICAL:NETWORK SIMULATOR	DSC PRACTICAL -III	III	5	-	-	5	3

Objective	To study various trace file formats of network simulators and implement variousMAC layer and routing protocols.		
S. No.	**List of Experiments / Programmes**	**Knowledge Level**	**Session**
1	Introduction to network simulators used for wireless Ad H c and Sensor Networks.	K1	3
2	Introduction to TCL scripting: demonstration of one small network simulation script.	K3	3
3	To study various trace file formats of network simulators.	K2	3
4	To implement and compare various MAC layer protocols	K4	3
5	To implement and compare AODV and DSR routing algorithms in MANET	K4	3
6	To implement DSDV routing algorithms in MANET	K4	3
7	To implement signal strength-based link management routing protocols.	K4	3
8	To calculate and compare average throughput for various TCP variants	K4	3
9	To implement and compare various routing protocols for wireless sensor networks	K4	3
Course Outcome	**CO1:** Identify the functionality of development boards to implementembedded application.		**K1**
	CO2: Understand basic concepts in the embedded computing systems area		**K2**
	CO3: Apply knowledge and demonstrate the various addressing modes and data transfer instructions.		**K3**
	CO4: Analyze assembly language programs; select appropriate assembleinto machine a cross assembler utility microcontroller.		**K4**
	CO5: Evaluate assembly language programs and download the machinecode that will provide solutions real-world control problems.		**K5**

Learning Resources	
Text Books	1. Emad Aboelela "Network Simulation Experiments Manual"
Reference Books	1. Jing Deng, Yang Xiao, and Fei Hu Wireless Ad Hoc and Sensor Networks: Protocols, Performance, and Control
WebsiteLink	1.https://www.tutorialsweb.com/ns2/index.htm

	B.Sc-Internet of Things Syllabus LOCF-CBCS with effect from 2023-2024 Onwards												
Course Code	**Course Title**			**Course Type**		**Sem**	**Hours**		**L**	**T**	**P**	**C**	
23M3UIOP03	PRACTICAL:NETWORK SIMULATOR			DSCPRACTICAL - III		III	5		-	-	5	3	
	CO-PO Mapping												
CO Number	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PSO1**	**PSO2**	**PSO3**	**PSO4**	**PSO5**			
CO1	S	S	L	M	L	M	S	S	S	L			
CO2	S	M	L	S	S	L	M	S	S	L			
CO3	M	S	S	M	M	S	S	S	M	M			
CO4	S	S	L	S	M	M	L	S	L	S			
CO5	S	M	M	S	S	M	M	S	S	S			
Level of Correlation between CO and PO	L-LOW					M-MEDIUM				S-STRONG			
Tutorial Schedule	Group discussion, Lab Visit, Problem Solving, Brain Storming & Quiz												
Teaching and Learning Methods	Demonstration, Hands on Training and Practical Sessions												
Assessment Methods	Observation, CIA-I, CIA-II and ESE												
Designed By	**Verified By**								**Approved By Member Secretary**				
Mr.S. SATHISHKUMAR	**Mr.S. ARULMANI**								**Dr.S.SHAHITHA**				

B.Sc-Internet of Things Syllabus LOCF-CBCS with effect from 202 -2024 Onwards								
Course Code	**Course Title**	**Course Type**	**Sem.**	**Hours**	**L**	**T**	**P**	**C**
23M4UIOC04	ARDUINO AND SENSORS	DSC THEORY -IV	IV	6	4	2	-	5
Objective	Students will be explored to the interconnection and integration of the physical world and the cyber space. They are also able to design & develop IOT Devices.							

Unit	Course Content	Knowledge Level	Session
I	**Introduction to Arduino:** Pin configuration and architecture Device and platform features - Concept of digital and analog ports - Familiarizing with Arduino Interfacing Board Introduction to Embedded C and Arduino platform – Arduino data types - Variables and constants - Operators - ControlStatements - Arrays - Functions.	K3	15
II	**Arduino i/o Functions**: Pins Configured as INPUT - Pull-up Resistors - Pins Configured as OUTPUT- pinMode() Function-digitalWrite() Function – analogRead() function - Arduino Interrupts.	K4	12
III	**Arduino Displays:** Working with Serial Monitor - Line graph via serial monitor- Interfacing a 8 bit LCD to Arduino - Fixed one line static message display – Running Message display –Using the LCD Library of Arduino.	K4	15
IV	**Analog and Digital Sensors:** Analog Sensors: Resistance-based sensors Voltage-based sensors Current-based sensors. Digital Sensors: Buttons and switches On/off devices I2C Devices SPI devices RS-232 devices Other sensors.	K3	15
V	**Interfacing Sensors and Actuators:** Interfacing Sensors: Button 60 - Analog input 61- I2C 65 -SPI 77 - Other protocols. Interfacing Actuators: Switching devices - DC motors - Servos Stepper motors - Analog voltages - Human attention actuators. ***Current Trend:** Human Machine Interface (HMI)	K3	15
Course Outcome	**CO1:** To understand the concept of Arduino Boards and tools	K1	
	CO2: To learn input and output function of ATmega Microcontroller	K2	
	CO3: To understand the knowledge of Display Interfacing with Arduino board	K3	
	CO4: To handle the Analog/Digital sensors application and interfacing	K4	
	CO5: To learn and understand the connection of motor functions	K5	

Learning Resources	
Text Books	1. Veneri, Giacomo, and Antonio Capasso- Hands-on Industrial Internet of Things:Create a Powerful Industrial IoT Infrastructure Using Industry 4.0, 1stEd., Packt Publishing Ltd, 2018 2. D. Jude Hemanth and J. Anitha George A. Tsihrintzis- Internet of Medical Things Remote Healthcare Systems and Applications, covered by Scopus.
Reference Books	1. Alasdair Gilchrist- Industry 4.0: The Industrial Internet of Things, 1st Ed., Apress,2017. 2. Reis, Catarina I., and Marisa da Silva Maximiano, eds.- Internet of Things andadvanced application in Healthcare, 1st Ed., IGI Global, 2016.
WebsiteLink	1.https://books.google.com/books?id=PxrzQEACAAJ&dq=arduino+book&hl=en&newbks=1&newbks_redir=0&sa=X&ved=2ahUKEjd34WU6Jn9AhUM7jgGHdx8Dd0Q6wF6BAgKEA 2.https://www.pdfdrive.com/arduino-home-automation-projects-automate-your-home- using-the- 3. powerful-arduino-platform-d182643833.html
Self Study Material	1. https://www.udemy.com/topic/hmi/

L-Lecture, T-Tutorial, P-Practical, C-Credit

B.Sc-Internet of Things Syllabus LOCF-CBCS with effect from 2023-2024 Onwards									
Course Code	**Course Title**	**Course Type**	**Sem.**	**Hours**	**L**	**T**	**P**	**C**	
23M4UIOC04	ARDUINO AND SENSORS	DSC THEORY -IV	IV	6	4	2	-	5	

CO-PO Mapping

CO Number	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	S	M	M	M	M	S	S	M	M	L
CO2	S	S	M	M	L	S	S	M	M	M
CO3	S	S	M	L	M	S	M	M	S	M
CO4	S	M	M	M	M	M	M	M	M	M
CO5	S	M	M	L	M	M	M	M	M	M
Level of Correlation between CO and PO	L-LOW					M-MEDIUM				S-STRONG

Tutorial Schedule	Group discussion, Lab Visit, Problem Solving, Brain Storming & Quiz	
Teaching and Learning Methods	Audio Video lecture, Chalk and Board class PPT Presentation and Video presentation	
Assessment Methods	Class Test, Unit Test, Assignment, CIA-I, CIA-II and ESE	
Designed By	**Verified By**	**Approved By Member Secretary**
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MUTHAYAMMAL COLLEGE OF ARTS AND SCIENCE

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B.Sc-Internet of Things Syllabus LOCF-CBCS with effect from 2023-2024 Onwards								
Course Code	**Course Title**	**Course Type**	**Sem**	**Hours**	**L**	**T**	**P**	**C**
23M4UIOP04	PRACTICAL:ARDUINO AND SENSORS	DSC PRACTICAL-IV	IV	4	-	1	3	3

Objective	To Impart the students in design and Analysis of a various Communication Circuits.		
S.No.	**List of Experiments / Programmes (Any 10)**	**Knowledg eLevel**	**Session**
1	LED blinking using Arduino	K4	3
2	Switch interface using Arduino	K4	3
3	4X4 Keypad Interfacing	K5	3
4	LCD interface using Arduino	K5	3
5	DC motor speed control using Arduino	K5	3
6	Servo motor control	K5	3
7	Stepper Motor Interfacing	K5	3
8	PWM generation with Arduino	K5	3
9	LDR with Arduino	K5	3
10	Ultra Sonic sensor interfacing for distance measurement	K5	3
11	Temperature and Humidity sensor interfacing	K5	3
12	PIR sensor interfacing	K5	3
Course Outcome	**CO1:** To be able to design hardware for IoT on different platforms for devices that can be connected to internet	K1	
	CO2: To be able to design software for IoT nodes and system	K3	
	CO3: To develop understanding for IoT based system design for different situations	K3	
	CO4: Recognize the functionality of micro controller, latestversion processors and its applications	K4	
	CO5: Acquire design thinking capability, ability to design a Component with realistic constraints,to solve real worldengineering problems and analyse the results.	K5	

Learning Resources	
Text Books	1.Adrian McEwen and Hakim Cassimally, Designing the Internet of Things, Wiely, 2015
Reference Books	1. Arduino ProjectHandbook: 25 Practical Projects to Get YouStarted aperback – Illustrated, 1 June 2016 by Mark Geddes
Website Link	1.https://www.edx.org/course/introduction-to-the-internet-of-

	2.things?index=product&queryID=0c40906dba069e0ec82666d5f1f17264&position=1

B.Sc-Internet of Things Syllabus LOCF-CBCS with effect from 2023-2024 Onwards										
Course Code	**Course Title**	**Course Type**	**Sem.**	**Hours**	**L**	**T**	**P**	**C**		
23M4UIOP04	PRACTICAL:ARDUINO AND SENSORS	DSC PRACTICAL-IV	IV	4	-	1	3	3		

CO-PO Mapping

CO Number	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	M	M	L	L	L	M	M	M	M	M
CO2	M	M	L	M	M	M	S	M	M	S
CO3	M	M	L	M	M	L	M	L	L	L
CO4	M	M	L	S	M	M	L	L	L	M
CO5	M	M	L	S	M	S	S	L	M	M
Level of Correlation between CO and PO	L-LOW					M-MEDIUM			S-STRONG	

Tutorial Schedule	Group discussion, Lab Visit, Problem Solving, Brain Storming & Quiz	
Teaching and Learning Methods	Demonstration, Hands on Training and Practical Sessions	
Assessment Methods	Observation, CIA-I, CIA-II and ESE	
Designed By	**Verified By**	**Approved By Member Secretary**
Mr.S. ARULMANI	**Mr.S. ARULMANI**	**Dr.S.SHAHITHA**

B.Sc-Internet of Things Syllabus LOCF-CBCS with effect from 2023-2024 Onwards								
Course Code	**Course Title**	**Course Type**	**Sem**	**Hours**	**L**	**T**	**P**	**C**
23M4UIOS04	IOT COMMUNICATION PROTOCOLS	SEC - IV	IV	2	2	-	-	2

Objective	To acquaint the students to understand and gain the knowledge on IoT communication protocol

Unit	Course Content	Knowledge Level	Session
I	**Introduction:** IoT architecture outline, standards - IoT Technology Fundamentals- Devices and gateways - Local and wide area networking - Data management - Business processes in IoT- Everything as a Service (XaaS)	K2	5
II	**IoT Reference Architecture:** Introduction - Functional View - Information View - Deployment and Operational View - Other Relevant Architectural views - Real-World Design Constraints- Introduction, Technical Design constraints.	K3	5
III	**IoT Data Link Layer:** PHY/MAC Layer - 3GPP MTC - IEEE 802.11- IEEE 802.15 - Wireless HART – Z Wave - Bluetooth Low Energy - Zigbee Smart Energy, DASH7, LoRa WAN	K3	4
IV	**Network Layer Protocols:** Network Layer-IPv4 - IPv6 - 6LoWPAN- 6TiSCH- ND- DHCP- ICMP- RPL- CORPL- CARP.	K4	4
V	**IoT Transport and Session** Layer: Transport Layer – TCP - MPTCP – UDP – DCCP – SCTP – TLS – DTLS - Session Layer – HTTP – CoAP - XMPP - AMQP - MQTT. ***Current Trends** Constrained Application Protocol	K4	6
Course Outcome	**CO1:** Understand the basic concepts of IOT		K1
	CO2: Understand and remember the different layers of IOT Architecture		K2
	CO3: Able to interpret the data link protocols		K3
	CO4: Demonstrate the functionality of network layer protocols		K4
	CO5: Analyze the data in end application		K4

Learning Resources	
Text Books	1. Simone Cirani,Gianluigi Ferrari, Marco Picone, Luca Veltri, Internet of Things: Architectures, Protocols and Standards, First edition 2018. 2. BK Tripathy and J Anuradha, Taylor & Francis "Internet Of Things (IoT)Technologies Applications Challenges And Solutions", first Edition 2017. 3. ISBN: 978-1-118-47347-4, Willy Publications "Building the Internet of Things with IPv6 and MIPv6: The Evolving World of M2MCommunications",2016
Reference Books	1. Peter Waher, PACKT publishing, "Learning Internet of Things"– 2015. 2. Jan Holler, Vlasios Tsiatsis, Catherine Mulligan, Stefan Avesand, Stamatis Karnouskos, David Boyle, "From Machine-to-Machine to the Internet of Things: Introduction to a New Age of Intelligence", Academic Press, 2015
Website Link	1.https://www.edx.org/course/iot-networks-and- 2.https://www.edx.org/course/build-your-first-iot-application-with-

Self Study Material	1. https://www.geeksforgeeks.org/constrained-application-protocol-coap/

B.Sc-Internet of Things Syllabus LOCF-CBCS with effect from 2023-2024 Onwards								
Course Code	**Course Title**	**Course Type**	**Sem**	**Hours**	**L**	**T**	**P**	**C**
23M4UIOS04	IOT COMMUNICATION PROTOCOLS	SEC - IV	IV	2	2	-	-	2

CO-PO Mapping

CO Number	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PSO1**	**PSO2**	**PSO3**	**PSO4**	**PSO5**
CO1	S	M	S	M	S	S	S	M	M	M
CO2	M	S	M	S	S	S	S	S	S	S
CO3	M	M	S	M	L	L	M	L	S	M
CO4	S	L	M	S	S	M	L	S	S	M
CO5	S	S	L	M	S	S	S	M	M	M
Level of Correlation between CO and PO	L-LOW					M-MEDIUM			S-STRONG	

Tutorial Schedule	Group discussion, Lab Visit, Problem Solving, Brain Storming & Quiz
Teaching and Learning Methods	Audio Video lecture, Chalk and Board class PPT Presentation and Video presentation
Assessment Methods	Class Test, Unit Test, Assignment, CIA-I, CIA-II and ESE

Designed By	**Verified By**	**Approved By Member Secretary**
Mr. S.SATHISHKUMAR	**Mr.S. ARULMANI**	**Dr.S.SHAHITHA**

B.Sc. – Internet of Things Syllabus LOCF - CBCS with effect from 2023-2024 Onwards								
Course Code	**Course Title**	**Course Type**	**Sem**	**Hours**	**L**	**T**	**P**	**C**
23M5UIOC05	PYTHONPROGRAMMING	DSE-V	V	5	5	-	-	5
Objective	To make the students understand the concepts of python programming. Learn to solve basic programming problems and to apply OOPs concepts in Python programming							

Unit	Course Content	Knowledge Level	Session
I	**Basics of Python Programming:** History of Python-Features of Python-Literal-Constants-Variables - Identifiers–Keywords-Built-in Data Types-Output Statements – Input Statements-Comments – Indentation-Operators-Expressions-Type conversions. Python Arrays: Defining and Processing Arrays – Array methods	K3	12
II	**Control Statements:** Selection/Conditional Branching statements: if, if-else, nested if and if-elif-else statements. Iterative Statements: while loop, for loop, else suite in loop and nested loops. Jump Statements: break, continue and pass statements.	K4	12
III	**Functions:** Function Definition – Function Call – Variable Scope and its Lifetime-Return Statement. Function Arguments: Required Arguments, Keyword Arguments, Default Arguments and Variable Length Arguments-Recursion. Python Strings: String operations- Immutable Strings - Built-in String Methods and Functions - String Comparison. Modules: import statement- The Python module – dir() function – Modules and Namespace – Defining our own modules.	K4	13
IV	**Lists:** Creating a list -Access values in List-Updating values in Lists-Nested lists -Basic list operations-List Methods. Tuples: Creating, Accessing, Updating and Deleting Elements in a tuple – Nested tuples– Difference between lists and tuples. Dictionaries: Creating, Accessing, Updating and Deleting Elements in a Dictionary – Dictionary Functions and Methods - Difference between Lists and Dictionaries.	K3	11
V	**Python File Handling:** Types of files in Python - Opening and Closing files-Reading and Writing files: write () and writelines () methods-append () method – read () and readlines () methods – with keyword – Splitting words – File methods - File Positions- Renaming and deleting files. ***Current Trends- Developing AI systems for Transportation**	K3	12

	*** Self Study.**		
Course Outcome	**CO1:** Outline the basic concepts in python language.	K1	
	CO2: Interpret different looping and conditional statements in python language	K2	
	CO3: Apply the various data types and identify the usage of control statements, loops, functions and Modules in python for processing the data.	K3	
	CO4: Analyze and solve problems using basic constructs and techniques of python.	K4	
	CO5: Assess the approaches used in the development of interactive application.	K5	

Learning Resources	
Text Books	1. Reema Thareja, Python Programming using problem solving approach, Oxford University Press. First Edition (2017) 2. Dr. R. Nageswara Rao, Core Python Programming, Dream tech Publishers, First Edition (2017)
Reference Books	1. VamsiKurama, Python Programming: A Modern Approach, Pearson Education. 2. Mark Lutz," Learning Python", Orielly.
WebsiteLink	1.https://onlinecourses.swayam2.ac.in/cec22_cs20/preview 2.https://onlinecourses.swayam2.ac.in/ntr24_ed07/preview
Self Study Material	1.https://nlist.inflibnet.ac.in/search/Search/Results?lookfor=Developing+AI+Systems+for+Transportation

B.Sc-Internet of Things Syllabus LOCF-CBCS with effect from 2023-2024 Onwards								
Course Code	**Course Title**	**Course Type**	**Sem**	**Hours**	**L**	**T**	**P**	**C**
23M5UIOC05	PYTHON PROGRAMMING	DSE-V	V	5	5	-	-	5

CO-PO Mapping

CO Number	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	M	M	L	L	L	M	M	L	L	M
CO2	M	S	L	S	M	S	S	S	S	S
CO3	L	M	L	L	S	S	S	S	S	M
CO4	S	L	L	M	S	S	S	S	S	M
CO5	M	M	L	M	M	L	M	M	S	M

Level of Correlation between CO and PO	L-LOW	M-MEDIUM	S-STRONG

Tutorial Schedule	Group discussion, Lab Visit, Problem Solving, Brain Storming & Quiz
Teaching and Learning Methods	Audio Video lecture, Chalk and Board class PPT Presentation and Video presentation
Assessment Methods	Class Test, Unit Test, Assignment, CIA-I, CIA-II and ESE

Designed By	Verified By	Approved By Member Secretary
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B.Sc-Internet of Things Syllabus LOCF-CBCS with effect from 2023-2024 Onwards								
Course Code	**Course Title**	**Course Type**	**Sem**	**Hours**	**L**	**T**	**P**	**C**
23M5UIOC06	NETWORK COMMUNICATION AND SECURITY	DSC THEORY-VI	V	5	5	-	-	5

Objective	The students should know the Various communications networks and their components, and how it keeps a computer secure and safe from viruses.		
Unit	**Course Content**	**Knowledge Level**	**Session**
I	**Transmission Methods:** Digital Signal Analog Transmission – Baud Rate - Analog Signal Digital Transmission – Parallel & Serial Communication – Asynchronous & Synchronous Communication – Simplex – Half Duplex - Full Duplex – Multiplexing - De-multiplexing - Types of Multiplexing.	K3	10
II	**Network Topologies:** Mesh Topology – Star Topology – Tree Topology – Ring – Bus – Hybrid – Basics of Switching – Router & Routing – Internet Topology – Architecture of an ISP – Logical Types of Topology.	K2	12
III	**Network Protocols:** OSI Model – Physical Layer – Data Link Layer – Network Layer – Transport Layer – Session Layer – Presentation Layer – Application Layer – Overview of Network Protocols.	K3	12
IV	**LAN Topologies:** Introduction – LAN Hardware – Implementing LAN – Fast LANS - Nonstandard LANS – Extending LANS – Virtual LANS – Token Passing Networks – FDDI – MAN – WAN..	K3	12
V	**Internet access & network security:** Introduction – Dial up Access – Leased lines – DSL - Cable Modems – DTE – DCE Interface – RS-232 & RS-449 Interface – SONET .Network Security: Introduction – Types of Computer Attacks – Firewall – Virtual Private Network-Cryptography. ***Current Trends: Edge Computing**	K5	14
	*** Self Study.**		
Course Outcome	**CO1:** Identify the components associated with Transmission methods.	**K1**	
	CO2: Understand the complete network architecture Topology and switching and routing technologies.	**K2**	
	CO3: Illustrate the operations of various electronic circuits and their applications.	**K3**	
	CO4: Demonstrate the various networks protocols and network management skills	**K4**	
	CO5: Evaluate the issues in providing Quality-Of-Service for network	**K5**	

Learning Resources				
Text Books	1. Roberta Bragg, Mark Rhodes-Ousley, Keith Strassberg "Network Security: The Complete Reference" July 2017, McGraw Hill Education 2. Suresh Chandra Satapathy • Vikrant Bhateja K. Srujan Raju • B. Janakiramaiah "Computer Communication,Networking and Internet Security" Springer Nature Singapore Pte Ltd. 2017			
Reference Books	1. Behrouz and Forouzan,(2006), Data Communication and Networking‖, 4th Edition, TMH. 2. Ajit Pal,(2014), Data Communication and Computer Networks, PHI.			
Website Link	1.http://www.tutorialspoint.com/data_communication_computer_network/ 2. http://www.slideshare.net/zafar_ayub/data-communication-and-network-1190385			
Self Study Material	1. http://www.freetechbooks.com/data-communication-and-networks-f31.html			
	L-Lecture	T-Tutorial	P-Practical	C-Credit

B.Sc-Internet of Things Syllabus LOCF-CBCS with effect from 2023-2024 Onwards									
Course Code	**Course Title**	**Course Type**	**Sem**	**Hours**	**L**	**T**	**P**	**C**	
23M5UIOC06	NETWORK COMMUNICATION AND SECURITY	DSC THEORY-VI	V	5	5	-	-	5	

Course Code										
CO Number	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PSO1**	**PSO2**	**PSO3**	**PSO4**	**PSO5**
CO1	S	S	M	M	S	S	S	M	M	M
CO2	S	S	S	M	M	S	M	S	M	S
CO3	S	S	M	S	M	S	S	S	M	S
CO4	M	M	L	L	L	M	L	L	S	M
CO5	M	M	L	M	L	S	S	M	M	M
Level of Correlation between CO and PO	L-LOW					M-MEDIUM				S-STRONG

Tutorial Schedule	Group discussion, Lab Visit, Problem Solving, Brain Storming & Quiz
Teaching and Learning Methods	Audio Video lecture, Chalk and Board class PPT Presentation and Video presentation
Assessment Methods	Class Test, Unit Test, Assignment, CIA-I, CIA-II and ESE

Designed By	**Verified By**	**Approved By Member Secretary**
Mr. S.SATHISHKUMAR	**Mr.S. ARULMANI**	**Dr.S.SHAHITHA**

B.Sc-Internet of Things Syllabus LOCF-CBCS with effect from 2023-2024 Onwards								
Course Code	**Course Title**	**Course Type**	**Sem**	**Hours**	**L**	**T**	**P**	**C**
23M5UIOC07	ENERGY HARVESTING FOR IOT	DSC THEORY-VII	V	5	5	-	-	5

Objective	The students can able to understand the various energy sources and energy harvesting basedsensor networks		
Unit	**Course Content**	**Knowledge Level**	**Session**
I	**Energy Harvesting Systems:** Introduction – Energy sources – energy harvesting based sensor networks – photovoltaic cell technologies – generation of electric power in Thermal Energy Conversion, solar energy, biomass, biochemical conversion, biogas generation	K3	14
II	**Piezo-Electric and Electro mechanical Modeling:** Piezoelectric materials – transducers – harvesters – micro generators – strategies for enhancing the performance of energy harvesters characteristics of photovoltaic (PV) systems, PV models and equivalent circuits, and sun tracking systems.	K2	12
III	**Electromagnetic and Non-Linear Techniques:** Basic principles – micro fabricated coils and magnetic materials – scaling – power maximizations – micro and macro scale implementations. Non-linear techniques – vibration control & steady state cases	K3	12
IV	**Energy Harvesting Wireless Sensors:** Power sources for WSN – Power generation – conversion – examples – case studies. Harvesting microelectronic circuits – powerconditioning and losses.	K5	14
V	**Applications Of Energy Harvesting Systems:** Case studies for implanted medical devices – Bio-MEMS based applications – harvesting for RF sensors and ID tags – powering wireless SHM sensor nodes. ***Current Trends:** Energy Harvesting in Smart Cities	K4	8
	*** Self Study.**		
Course Outcome	CO1: Recognize the various energy requirements and needs of an IoT based system	**K1**	
	CO2: Understand the limitations and advantages of the energy sources and energy harvesting based sensor networks for IoT	**K2**	
	CO3: Analyse about the various Piezoelectric materials and Non-linear techniques of energy harvesting.	**K3**	
	CO4: Apply the various Power sources for Wireless Sensor Networks	**K4**	
	CO5: Design an application of Energy harvesting systems for an IoT based system.	**K4**	

Learning Resources				
Text Books	1. Kheng Tan, Mark Wong, "Energy Harvesting Systems for IoT Applications: Generation, Storage, andPower Management"2019 2. Arij Naser Abougreen, Shashi Kant Gupta, Shilpa Mehta," Emerging Materials, Technologies, and Solutions for Energy Harvesting" IGI Global-2024ED			
Reference Books	1. "Micro Energy Harvesting" By Danick Briand, Eric Yeatman, Shad RoundyJohn Wiley & Sons -2015 2. Poonam Sharma, Swati Rajput "Sustainable Smart Cities in India Challenges and Future Perspectives" Springer International Publishing-2017			
Website link	1. https://en.wikipedia.org/wiki/Energy_harvesting 2. https://www.energyharvestingjournal.com/			
Self Study Material	1. https://ieeexplore.ieee.org/			
	L-Lecture	T-Tutorial	P-Practical	C-Credit

B.Sc-Internet of Things Syllabus LOCF-CBCS with effect from 2023-2024 Onwards										
Course Code	**Course Title**		**Course Type**		**Sem**	**Hours**	**L**	**T**	**P**	**C**
23M5UIOC07	ENERGYHARVESTING FOR IOT		DSC THEORY-VII		V	5	5	-	-	5

CO-PO Mapping										
CO Number	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PSO1**	**PSO2**	**PSO3**	**PSO4**	**PSO5**
CO1	M	M	S	L	L	M	M	L	L	S
CO2	M	S	L	S	M	S	S	S	S	S
CO3	L	M	M	L	S	S	S	S	S	S
CO4	S	L	M	M	S	S	S	S	S	M
CO5	S	S	M	M	M	M	M	M	S	M

Level of Correlation between CO and PO	L-LOW	M-MEDIUM	S-STRONG

Tutorial Schedule	Group discussion, Lab Visit, Problem Solving, Brain Storming & Quiz
Teaching and Learning Methods	Audio Video lecture, Chalk and Board class PPT Presentation and Video presentation
Assessment Methods	Class Test, Unit Test, Assignment, CIA-I, CIA-II and ESE

Designed By	**Verified By**	**Approved By Member Secretary**
Mr. S. SANTHOSH	**Mr.S. ARULMANI**	**Dr.S.SHAHITHA**

B.Sc.-Internet of Things Syllabus LOCF-CBCS with effect from 2023-2024 Onwards								
Course Code	**Course Title**	**Course Type**	**Sem**	**Hours**	**L**	**T**	**P**	**C**
23M5UIOP05	PRACTICAL: PYTHON PROGRAMMING	DSC PRACTICAL-V	V	5	-	-	5	3

Objective	The students can understand the fundamentals of programming using Python, such as variables, data types, control structures, functions and best practices for debugging and testing code.

S. No.	**List of Experiments / Programmes (Any 12)**	**Knowledge Level**	**Session**
1	Program using variables, constants, I/O statements in Python.	K5	3
2	Program using Operators in Python	K5	3
3	Program using Conditional Statements.	K4	3
4	Program using Loops.	K4	3
5	Program using Jump Statements.	K4	3
6	Program using Functions.	K4	3
7	Program using Recursion.	K4	3
8	Program using Arrays.	K4	3
9	Program using Strings.	K4	3
10	Program using Modules.	K4	3
11	Program using Lists.	K2	3
12	Program using Tuples.	K2	3
13	Program using Dictionaries.	K2	3
14	Program for File Handling.	K2	3
Course Outcome	**CO1:** Understand the significance of control statements, loops and functions in creating Simple programs.		K1
	CO2: Interpret the core data structures available in python to store, process and sort the data.		K3
	CO3: Develop the real time applications using python programming language.		K3
	CO4: Analyze the real time problem using suitable python concepts.		K4
	CO5: Assess the complex problems using appropriate concepts in python.		K5

Learning Resources	
Text Books	1. Maurice J. Thompson , "Python Programming", Kindle Edition (2020)
Reference Books	1. Kevin Wilson - Absolute beginners python programming full colour guide with lab Exercises, Elluminent press (2022)
Website Link	1.https://onlinecourses.swayam2.ac.in/cec22_cs20/preview 2.https://onlinecourses.swayam2.ac.in/aic20_sp33/preview

L-Lecture, T-Tutorial, C-Credit

B.Sc-Internet of Things Syllabus LOCF-CBCS with effect from 2023-2024 Onwards										
Course Code	**Course Title**		**Course Type**	**Sem**	**Hours**	**L**	**T**	**P**	**C**	
23M5UIOP05	PRACTICAL:PYTHON PROGRAMMING		DSC PRACTICAL-V	V	5	-	-	5	3	
CO-PO Mapping										
CO Number	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PSO1**	**PSO2**	**PSO3**	**PSO4**	**PSO5**
CO1	S	M	L	L	M	M	L	M	L	L
CO2	S	S	L	M	L	M	S	M	L	L
CO3	M	M	S	S	S	M	S	S	M	M
CO4	M	S	L	M	M	M	M	M	L	M
CO5	M	M	L	M	M	S	S	S	M	M
Level of Correlation between CO and PO	L-LOW					M-MEDIUM				S-STRONG
Tutorial Schedule	Group discussion, Lab Visit, Problem Solving, Brain Storming & Quiz									
Teaching and Learning Methods	Demonstration, Hands on Training and Practical Sessions									
Assessment Methods	Observation, CIA-I, CIA-II and ESE									
Designed By	**Verified By**					**Approved By Member Secretary**				
Mrs.P.VIJAYALAKSHMI	**Mr.S. ARULMANI**					**Dr.S.SHAHITHA**				

B.Sc-Internet of Things Syllabus LOCF-CBCS with effect from 2023-2024 Onwards								
Course Code	**Course Title**	**Course Type**	**Sem**	**Hours**	**L**	**T**	**P**	**C**
23M6UIOC08	IMPLEMENTING IOT WITH RASPBERRY PI	DSC THEORY-VIII	VI	6	5	-	-	5
Objective	The students should know with a solid theoretical foundation, systematic and professional knowledge and strong practical skills in the Raspberry Pi.							

Unit	**Course Content**	**Knowledge Level**	**Session**
I	Getting Started with Raspberry Pi: Basic functionality of Raspberry Pi - B+ board - setting up the board - configuration and use - implications of an operating system on the behavior of the Raspberry Pi as an IoT device - Booting Raspberry Pi 3 - Downloading an Operating System - format an SD card and booting the OS.	K3	15
II	Interfacing Hardware with the Raspberry Pi: Raspberry Pi Remote Access - Operate the Raspberry Pi in “headless mode” - Bash Command line - Operating Raspberry Pi without needing a GUI interface - Basics of the Python programming language, programming on the Raspberry Pi.	K3	15
III	Device Communications: Communication with devices through the pins of the Raspberry Pi – Rpi GPIO library - Python Functions, setting up the pins, General purpose I/O Pins, Protocol Pins, GPIO Access, applying digital voltages, and generating Pulse Width Modulated signals, Tkinter Python library, accessing pins through a graphic user interface.	K3	13
IV	IoT Physical Servers and Cloud Offerings: Introduction to Cloud Storage models and communication APIs. Webserver – Web server for IoT, Cloud for IoT, Python web application framework. Designing a RESTful web API. Connecting to APIs	K4	14
V	IoT Design using Raspberry Pi: IoT Applications based on Pi, LAMP Web-server, GPIO Control over Web Browser, Creating Custom Web Page for LAMP, Communicating data using on-board module, Home automation using Pi, Node-RED, MQTT Protocol, Using Node-RED Visual Editor on Rpi. ***Current Trend: MQTT Protocol**	K5	15
	*Self Study		
Course Outcome	CO1: Understanding concepts basics of Raspberry Pi Components		K1
	CO2: Illustrate the various libraries used for Raspberry Pi in python		K2
	CO3: Compare and analyze the various communication methods in R-Pi		K3
	CO4: Understand and Develop the skills on python to program the R-Pi		K4
	CO5: Design the real time IoT application using Raspberry Pi.		K5

Learning Resources	
Text Books	1. Simon Monk, "Programming the Raspberry Pi: Getting Started with Python", January 2012, McGraw Hill Professional 2. Michael Margolis, "Arduino Cookbook", First Edition, March 2011, O'Reilly Media, Inc
Reference Books	1. Eben Upton and Gareth Halfacree, "Raspberry Pi User Guide", August 2016, 4th edition, John Wiley & Sons 2. Alex Bradbury and Ben Everard, "Learning Python with Raspberry Pi", Feb 2014, JohnWiley & Sons
Website Link	1.https://www.raspberrypi.org/magpi- issues/Project Book v1.pdf
Self Study Material	1.https://www.instructables.com/Installing-MQTT-BrokerMosquitto-on-Raspberry-Pi/

L-Lecture	T-Tutorial	P-Practical	C-Credit

B.Sc-Internet of Things Syllabus LOCF-CBCS with effect from 2023-2024 Onwards										
Course Code	**Course Title**		**Course Type**		**Sem**	**Hours**	**L**	**T**	**P**	**C**
23M6UIOC08	IMPLEMENTING IOT WITH RASPBERRY PI		DSC THEORY-VII		VI	6	5	-	-	5

CO-PO Mapping

CO Number	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	S	S	M	M	S	S	M	S	S	S
CO2	S	S	M	M	S	S	M	S	S	S
CO3	S	S	S	S	S	S	S	S	S	S
CO4	S	S	S	S	S	S	S	S	S	M
CO5	S	S	S	S	S	S	S	S	S	S

Level of Correlation between CO and PO	L-LOW	M-MEDIUM	S-STRONG

Tutorial Schedule	Group discussion, Lab Visit, Problem Solving, Brain Storming & Quiz
Teaching and Learning Methods	Audio Video lecture, Chalk and Board class PPT Presentation and Video presentation
Assessment Methods	Class Test, Unit Test, Assignment, CIA-I, CIA-II and ESE

Designed By	Verified By	Approved By Member Secretary
Mrs.S.ARULMANI	**Mr.S. ARULMANI**	**Dr.S.SHAHITHA**

B.Sc-Internet of Things Syllabus LOCF-CBCS with effect from 2023-2024 Onwards								
Course Code	**Course Title**	**Course Type**	**Sem**	**Hours**	**L**	**T**	**P**	**C**
23M6UIOP06	PRACTICAL: RASPBERRY PI	DSC PRACTICAL-VI	VI	6	-	-	6	3

Objective	The students impart practical skill to learn in raspberry pi programming and IoT system development process.

S. No.	**List of Experiments / Programmes**	**Knowledge Level**	**Session**
1	Studying architecture of Raspberry Pi board	K1	3
2	Installing OS for Raspberry-Pi	K2	6
3	Interfacing of Switch / Push button with Raspberry Pi	K3	6
4	Interfacing of LEDs with Raspberry Pi	K4	6
5	Interfacing of Relay with Raspberry Pi	K5	6
6	Interfacing of 7 segment display with Raspberry Pi	K5	6
7	Interfacing of 16X2 LCD display with Raspberry Pi	K5	6
8	Interfacing of stepper motor with Raspberry Pi	K5	6
9	Temperature measurement using DHT 11 Sensor and Raspberry Pi	K5	6
10	Speed Control of DC motor using Raspberry Pi	K5	6
11	Distance measurement using Raspberry Pi and Ultrasonic Sensor	K5	6
Course Outcome	**CO1:** Recall the basic concepts and architecture of raspberry pi		K1
	CO2: Interpret the programming skills on raspberry pi		K2
	CO3: Apply the basic knowledge peripheral programming		K3
	CO4: Acquire knowledge on IoT development technologies		K4
	CO5: Design a real time IoT based system using raspberry Pi		K5

Learning Resources	
Text Books	1. Eben Upton and Gareth Halfacree, “Raspberry Pi User Guide”, August 2016, 4th edition, John Wiley & Sons
Reference Books	1. Simon Monk, “Programming the Raspberry Pi: Getting Started with Python”, January 2012, McGraw Hill Professional
Website Link	1. https://www.raspberrypi.org/magpi- issues/Projects_Book_v1.pdf 2. https://www.pdfdrive.com/arduino-home-automation-projects-automate-your-home- using-the-powerful-arduino-platform-d182643833.html

B.Sc-Internet of Things Syllabus LOCF-CBCS with effect from 2023-2024 Onwards									
Course Code	**Course Title**	**Course Type**	**Sem**	**Hours**	**L**	**T**	**P**	**C**	
23M6UIOP06	PRACTICAL:RASPBERRY PI	DSC PRACTICAL-VI	VI	6	-	-	6	3	

CO-PO Mapping

CO Number	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	S	M	L	M	M	M	M	S	S	S
CO2	L	L	L	L	S	S	S	L	M	S
CO3	M	M	L	S	L	S	S	M	L	S
CO4	M	M	L	L	S	M	L	S	L	M
CO5	S	S	L	S	M	S	S	S	M	S
Level of Correlation between CO and PO	L-LOW					M-MEDIUM				S-STRONG

Tutorial Schedule	Group discussion, Lab Visit, Problem Solving, Brain Storming & Quiz
Teaching and Learning Methods	Demonstration, Hands on Training and Practical Sessions
Assessment Methods	Observation, CIA-I, CIA-II and ESE

Designed By	Verified By	Approved By Member Secretary
Mrs.S.ARULMANI	**Mr.S. ARULMANI**	**Dr.S.SHAHITHA**

MUTHAYAMMAL COLLEGE OF ARTS AND SCIENCE
(Autonomous)
Rasipuram - 637408.

List of Foundation Course (FC) offered by the B.Sc., Internet of Things SYLLABUS - LOCF-CBCS Pattern
EFFECTIVE FROM THE ACADEMIC YEAR 2023-2024 Onwards

S.No.	SEM	COURSE_CODE	TITLE OF THE COURSE
1	I	23M1UIOFC1	FUNDAMENTALS OF IOT AND APPLICATIONS

B. Sc –Internet of Things Syllabus LOCF - CBCS with effect from 2023-2024 Onwards								
Course Code	**Course Title**	**Course Type**	**Sem.**	**Hours**	**L**	**T**	**P**	**C**
23M1UIOFC1	FUNDAMENTALS OF IOT AND APPLICATIONS	FC	I	2	2	-	-	2

Objective	To acquire the basic knowledge of students in Internet of Things and design mini projects based on its application.		
Unit	**Course Content**	**Knowledge Level**	**Session**
I	**Fundamentals of IoT:** Introduction, Definitions & Characteristics of IoT, IoT Architectures, Physical & Logical Design of IoT, Enabling Technologies in IoT, History of IoT, About Things in IoT, The Identifiers in IoT, About the Internet in IoT, IoT frameworks, IoT and M2M.	K1	4
II	**Sensors Networks :**Definition, Types of Sensors, Types of Actuators, Examples and Working, IoT Development Boards: Arduino IDE and Board Types, Raspberry Pi Development Kit, RFID Principles and components, Wireless Sensor Networks: History and Context, The node, Connecting nodes, Networking Nodes, WSN and IoT.	K2	5
III	**Wireless Technologies for IoT:** WPAN Technologies for IoT: IEEE 802.15.4, Zigbee, HART, NFC, Z-Wave, BLE, Bacnet, Modbus. IP Based Protocols for IoT: IPv6, 6LowPAN, RPL, REST, AMPQ, CoAP, MQTT. Edge connectivity and protocols, LoRa WAN	K3	5
IV	**Data Handling& Analytics:** Introduction, Big data, Types of data, Characteristics of Big data, Data handling Technologies, Flow of data, Data acquisition, Data Storage, Introduction to Hadoop. Introduction to data Analytics, Types of Data analytics, Local Analytics, Cloud analytics and applications.	K4	5
V	**Applications of IoT:** Home Automation, Smart Cities, Energy, Retail Management, Logistics, Agriculture, Healthand Lifestyle, Industrial IoT, Legal challenges, IoT design Ethics, IoT in Environmental Protection.	K3	5
Course Outcome	**CO1:** Recognize and understand the fundamentals of IoT Architecture and layer	K1	
	CO2: Understand the concept of sensor network	K2	
	CO3: Demonstrate the design procedures wireless access technologies	K3	
	CO4: Evaluating the various data handling problems	K4	
	CO5: Categorize and analyze the applications of IOT	K4	

Learning Resources	
Text Books	1. Olivier Hersent, David Boswarthick, and Omar Elloumi, — "The Internet ofThings: Key Applications and Protocols", Wiley Publications 2. Vijay Madisetti and Arshdeep Bahga, — "Internet of Things (A Hands-on-Approach)",

	1st Edition, VPT, 2014. 3. Hakima Chaouchi, — "The Internet of Things Connecting Objects to theWeb''ISBN :978-1-84821-140-7, Wiley Publications
Reference Books	1. Pethuru Raj and Anupama C. Raman, "The Internet of Things: EnablingTechnologies, Platforms, and Use Cases", CRC Press
Website Link	https://www.edx.org/course/build-your-first-iot-application-with-arm?index=product&queryID=5909fc91a84332af2fd85a3475af41b8&position=1 https://www.edx.org/course/iot-systems-and-industrial-applications-with-design-thinking?index=product&queryID=5909fc91a84332af2fd85a3475af41b8&position=2

	L-Lecture	T-Tutorial	P-Practical	C-Credit

B.Sc.–Internet of Things Syllabus LOCF - CBCS with effect from 2023-2024 Onwards

Course Code	Course Title	Course Type	Sem.	Hours	L	T	P	C
23M1UIOFC1	FUNDAMENTALS OF IOT AND APPLICATIONS	FC	I	2	2	-	-	2

CO-PO Mapping

CO Number	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	M	L	L	M	M	M	S	M	L	M
CO2	S	M	L	M	M	M	S	S	L	M
CO3	S	M	L	M	H	M	S	S	L	H
CO4	S	M	L	M	H	M	S	S	L	H
CO5	S	M	L	M	H	M	S	S	L	H

Level of Correlation between CO andPO	L-LOW	M-MEDIUM	S-STRONG

Tutorial Schedule	Group discussion, Lab Visit, Problem Solving, Brain Storming & Quiz
Teaching and Learning Methods	Audio Video lecture, Chalk and Board class PPT Presentation and Video presentation
Assessment Methods	Class Test, Unit Test, Assignment, CIA-I, CIA-II and ESE

Designed By	Verified By	Approved By Member Secretary
MR.S.SANTHOSH	**MR.S.ARULMANI**	**Dr.S.SHAHITHA**

List of Elective Course (DSE) Details for B.Sc., Internet of Things
SYLLABUS - LOCF-CBCS Pattern
EFFECTIVE FROM THE ACADEMIC YEAR 2023-2024 Onwards

S.No.	SEM	COURSE_CODE	TITLE OF THE COURSE
1	V	23M5UIOE01	CLOUD COMPUTING
2	V	23M5UIOE02	WIRELESS AND SENSOR NETWORKS
3	V	23M5UELE03	PROGRAMMABLE LOGIC CONTROLLER
4	VI	23M6UIOE04	INDUSTRIAL AND MEDICAL IOT
5	VI	23M6UIOE05	ANDROID APPLICATION DEVELOPMENT
6	VI	23M6UIOE06	BLOCK CHAIN TECHNOLOGY

B.Sc –Internet of Things Syllabus LOCF - CBCS with effect from 2023-2024 Onwards								
Course Code	**Course Title**	**Course Type**	**Sem.**	**Hours**	**L**	**T**	**P**	**C**
23M5UIOE01	CLOUD COMPUTING	DSE I	V	4	4	-	-	4
Objective	Students will explore cloud computing architectures, deployment models, and business models. The course also examines the characteristics of cloud computing and strategies for cloud adoption.							

Unit	**Course Content**	**Knowledge Level**	**Session**
I	**Introduction to cloud computing:** Evolution of cloud-Essentials-Benefits and challenges-Limitations - Identifiers–Usage and applications-Business model around cloud computing-Characteristics – Cloud Adoption - Applications	K1	10
II	**Cloud Insights Architectural influences:** High performance computing, Utility and Enterprise grid computing – Cloud Scenarios-Benefits - Sensitive information – Scalability - Simplicity- Vendors-Security-Limitations- Sensitive information – Application development – Security level of third party – Security benefits – Regularity issues – Government policies.	K2	10
III	**Cloud services:** Introduction to service – IaaS, PaaS, SaaS Storage as a service – Database as service-Information as service - Process as a service – Application as a service – Management/Government as service – Platform as a service – Security as a service – Testing as a service – Integration as a service - Infrastructure as a service	K3	10
IV	**Virtualization of cloud:** Introduction - Pros and Cons of virtualization – Virtualization Architecture-Virtualization machine -Virtualization in clusters/Grid context – Virtual Network - Types of virtualizations – Virtual machine monitor – Virtual Desktop Infrastructure	K3	9
V	**Cloud simulators: Cloud simulators** – Cloudsim and Green cloud–Cloudsim Architecture – Working platforms of cloudsim ***Current Trends- Artificial Intelligence (AI) and Machine Learning (ML) in the Cloud**	K4	9
Course Outcome	**CO1:** Outline the basic concepts in Cloud computing..	K1	
	CO2: Articulate the main concepts, key technologies, strengths and limitations of cloud computing..	K2	
	CO3: Implement and illustrate cloud services for specific use cases, such as deploying a web application on a PaaS platform	K3	
	CO4: Analyse the security implications of virtualization in cloud environments.	K4	
	CO5: Evaluate the impact of various parameters (e.g., workload, network conditions) on cloud simulation results.	K4	

Learning Resources	
Text	1. Cloud computing–M.N.Rao –PHI Learning Pvt.Ltd 92015)

Books	2. Cloud computing A practical approach for learning and implementation - Srinivasan & Suresh – Pearson Education-India (2014)
Reference Books	1. Cloud computing for Dummies-Judith Hurwitz-Wiley is publishing (2010). Cloud computing Web-based applications That change the way you wor collaborate online (2008)-Michael Miller
Website Link	https://onlinecourses.nptel.ac.in/noc23_cs90/preview https://onlinecourses.nptel.ac.in/noc22_cs18/preview
***Self Study Material**	https://nlist.inflibnet.ac.in/search/Search/Results?lookfor=Artificial+Intelligence+%28AI%29+and+Machine+Learning+%28ML%29+in+the+Cloud

	L-Lecture	T-Tutorial	P-Practical	C-Credit

B.Sc –Internet of Things Syllabus LOCF - CBCS with effect from 2023-2024 Onwards									
Course Code	**Course Title**	**Course Type**	**Sem.**	**Hours**	**L**	**T**	**P**	**C**	
23M5UIOE01	CLOUD COMPUTING	DSE I	V	4	4	-	-	4	

CO-PO Mapping

CO Number	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PSO1**	**PSO2**	**PSO3**	**PSO4**	**PSO5**
CO1	S	M	L	L	L	M	M	L	L	L
CO2	M	S	L	S	M	S	S	S	S	M
CO3	S	M	L	S	S	M	S	S	S	M
CO4	S	L	L	M	S	S	M	M	S	M
CO5	M	S	L	M	M	L	S	S	S	M

Level of Correlation between CO and PO	L-LOW	M-MEDIUM	S-STRONG

Tutorial Schedule	Group discussion, Lab Visit, Problem Solving, Brain Storming & Quiz
Teaching and Learning Methods	Audio Video lecture, Chalk and Board class PPT Presentation and Video presentation
Assessment Methods	Class Test, Unit Test, Assignment, CIA-I, CIA-II and ESE

Designed By	**Verified By**	**Approved By Member Secretary**
MR. S. SANTHOSH	**MR. S. ARULMANI**	**DR.S.SHAHITHA**

B.Sc –Internet of Things Syllabus LOCF - CBCS with effect from 2023-2024 Onwards								
Course Code	**Course Title**	**Course Type**	**Sem.**	**Hours**	**L**	**T**	**P**	**C**
23M5UIOE02	WIRELESS AND SENSOR NETWORKS	DSE II	V	4	4	-	-	4

Objective	The students should study the basic fundamentals of wireless sensor and Ad-hoc Networks and theoperation, WSN protocols and Quality of Services		
Unit	**Course Content**	**Knowledge Level**	**Session**
I	**Introduction:** Single-Node Architecture -Hardware Components - Network Characteristics -unique constraints and challenges-Enabling Technologies for Wireless Sensor Networks -Types of wireless sensor networks.	K2	9
II	**Architectural Framework**: Network Architecture Sensor Networks Scenarios - Design Principle-Physical Layer and Transceiver Design Considerations-Optimization Goals and Figures of Merit-Gateway Concepts-Operating Systems and Execution Environments - Introduction to Tiny OS and nesC Internet to WSN Communication.	K3	9
III	**Medium Access Control:** Wireless MAC Protocols Characteristics of MAC Protocols in Sensor Networks, Contention-Free MAC Protocols - Contention-Based MAC Protocols-and Hybrid MAC Protocols.-Location discovery, quality- other issues-S-MAC-IEEE 802.15.4.	K3	10
IV	**Network Layer:** Routing Metrics-Flooding and Gossiping- Data-Centric Routing-Proactive Routing-On-Demand Routing-Hierarchical Routing-Location-Based Routing.	K5	10
V	**QoS Based Routing Protocols**: Node and Network Management - Power Management - Local Power Management aspects - - Conceptual Architecture. ***Current Trends:** Dynamic Power Management	K4	10
Course Outcome	**CO1:** Understand challenges and technologies for wireless networks	K1	
	CO2: Understand the design, operation and the performance of MAC layer protocols of Ad Hoc wireless networks.	K2	
	CO3: Analyse the operation and the performance of routing protocol ofAd Hoc wireless sensors network.	K3	
	CO4: Analyse operation and the performance of transport layer protocol of Ad Hoc wireless sensor networks	K4	
	CO5: Develop a sensor network Architecture and distinguish the Ad hoc networks and WSN	K5	

Learning Resources	
TextBooks	1.Mohammad S. Obaidat, Sudip Misra, "Principles of Wireless Sensor Networks", Cambridge, 2014th ed 2.Waltenegus Dargie , Christian Poellabauer, "Fundamentals of Wireless Sensor Networks" - Theory and Practice", John Wiley & Sons Publications, 2011

Reference Books	1. Ian F. Akyildiz, Mehmet Can Vuran, "Wireless Sensor Networks", Wiley 2010 2. Feng ZHAO, Leonidas GUIBAS, " Wireless Sensor Networks", ELSEVIER , 2004
Website Link	https://nptel.ac.in/courses/106105160, . https://cse.iitkgp.ac.in/~smisra/course/wasn.html
***Self Study Material**	https://nlist.inflibnet.ac.in/search/Record/EBC3020026 https://nlist.inflibnet.ac.in/search/Record/EBC1765084 https://www.tutorialspoint.com/what-are-wireless-sensor-networks

	L-Lecture	T-Tutorial	P-Practical	C-Credit

B.Sc –Internet of Things Syllabus LOCF - CBCS with effect from 2023-2024 Onwards									
Course Code	**Course Title**	**Course Type**	**Sem.**	**Hours**	**L**	**T**	**P**	**C**	
23M5UIOE02	WIRELESS AND SENSOR NETWORKS	DSE II	V	4	4	-	-	4	

CO-PO Mapping

CO Number	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PSO1**	**PSO2**	**PSO3**	**PSO4**	**PSO5**
CO1	M	M	S	L	L	M	M	L	L	L
CO2	M	S	L	S	M	S	S	S	S	M
CO3	S	M	M	M	S	S	S	S	S	L
CO4	S	L	M	M	S	S	S	S	M	M
CO5	S	M	M	M	M	S	S	M	M	L
Level of Correlation between CO and PO	L-LOW					M-MEDIUM			S-STRONG	

Tutorial Schedule	Group discussion, Lab Visit, Problem Solving, Brain Storming & Quiz
Teaching and Learning Methods	Audio Video lecture, Chalk and Board class PPT Presentation and Video presentation
Assessment Methods	Class Test, Unit Test, Assignment, CIA-I, CIA-II and ESE

Designed By	**Verified By**	**Approved By Member Secretary**
MR. S.SANTHOSH	**MR. S. ARULMANI**	**DR.S.SHAHITHA**

B.Sc –Internet of Things Syllabus LOCF - CBCS with effect from 2023-2024 Onwards								
Course Code	**Course Title**	**Course Type**	**Sem.**	**Hours**	**L**	**T**	**P**	**C**
23M5UELE03	PROGRAMMABLE LOGIC CONTROLLER	DSE III	V	4	4	-	-	4
Objective	Students will explore the fundamentals of Automation and various Automation systems used in Industry and understand the working of these systems and should be able to determine Hardware and Software's requirements of PLC,DCS and SCADA.							

Unit	Course Content	Knowledge Level	Session
I	**Introduction to PLC:** Automation–Types of Automation– Advantages of Automation-PLC Introduction- Definition –Block diagram of PLC– Principle of Operation –Modes of Operating System–PLCS can-Hard wire Control System compared with PLC System - Advantages and Disadvantages of PLCs-Criteria for selection of suitable PLC –Memory Organization –Input Types–Discrete input–Analog input and outputs - Elements of Power Supply Unit - PLC Types - List of various PLCs available–Applications of PLC.	K1	10
II	**Input / Output Modules:** The I/O Section - Discrete I/O Modules and types– Analog I/O Modules- Special I/O Modules– I/O Module Specification - Typical Discrete and Analog I/O field Devices –Sensors – Limit Switch– Reed Switch – Proximity Sensor and types-Types of Photo Electric Sensor-Sinking and Sourcing I/O Modules–TTL Output Module–Relay Output Module–Isolated Output Module– Input/ Output Addressing Scheme in important commercial PLCs.	K2	10
III	**PLC Programming:** Types of Programming Methods – Types of Programming Devices – Logic Functions – AND Logic – OR Logic – NOT Logic - Relay Type instructions –Timer Instructions – ON Delay and OFF Delay Timer-(PLC Programming) Retentive Timer Instruction – Cascading Timers – Counter Instruction – UP Counter–DOWN Counter–UP/DOWN Counter– CascadingCounters– ProgramControlInstructions–DataManipulationInstruction – Data Compare Instructions – Math Instructions –Sequencer Instructions-PID Instruction–PWM Function–Simple programs using above instructions - Develop ladder logic for: Bottle Filling System–Automatic Car Parking System- EB To Generator Changeover System – Batch Process – Elevator System-DOL Starter-Automatic Star-Delta Starter–Traffic Light Control.	K3	10
IV	**Networking:** Levels of Industrial Network – Network Topology – Network Protocol–OSI Reference Model-Networking with TCP / IP Protocol - I/O Bus networks – Block diagram of I/O Bus networks – Types of I/O Bus networks. Protocol standards –Advantages of I/O Bus networks - Gateway – Token passing –Data Highway–Serial	K5	10

	Communication–Device Net–Control Net – Ethernet – Modbus – Fieldbus – Profibus- Sub Netting –Sub net mask - File transfer protocol.		
V	**Data Acquisition Systems:** Computers in Process Control–Types of Processes -Structure of Control system–ON/OFF Control – Closed loop Control - PID Control – Motion Control –Block diagram of Direct Digital Control. Supervisory Control and Data Acquisition (SCADA)–Block diagram of SCADA – Features of SCADA–Functions of SCADA-SCADA software-Data Loggers– Tags–Alarms-land lines for SCADA–use of modems in SCADA. ***Current Trends- AI Enabled PLCs**	K4	8
Course Outcome	**CO1:** Identify and understand the basics of PLC programming**.**	K1	
	CO2: Discuss the different parameters of PLC	K2	
	CO3: Demonstrate and apply the concept of electrical adder logic programming.	K3	
	CO4: Analyze and explain the different functions of PLC.	K4	
	CO5: Design and program basic PLC circuits for entry-level PLC applications.	K5	

Learning Resources	
Text Books	1. Frank Petruzella, Programmable Logic Controllers, Tata Mc Graw Hill Education(2010) 2. Samuel M. Herb, Understanding Distributed processor systems for control international society of Automation publication, First Edition (1999) 3. Prof.Rajesh Mehra and Er.Vikrant Vij, PLC sand SCADA: theory and practice, Laxmi Publications Pvt.Ltd, First Edition (2016)
Reference Books	1. Gary Dunning, Introduction to Programmable Logic controllers homes Learning, First Edition (2001) 2.Madhuchhanda Mitra and Samarjit Sen Gupta, Programmable Logic Controllers and Industrial Automation: An Introduction, Pen ram International Publishing India Pvt.Ltd, Mumbai, Second Edition (2014)
Website Link	https://www.nielit.gov.in/calicut/content/online-course-industrial-automation-plc-scadahttps://www.youtube.com/playlist?list=PLFMTYDiI8tCxDkXGut8riotm8D6TzQ2zD
Self study material	1. https://nlist.inflibnet.ac.in/search/Search/Results?lookfor=AI+Enabled+PLCs

	L-Lecture	T-Tutorial	P-Practical	C-Credit

B.Sc –Internet of Things Syllabus LOCF - CBCS with effect from 2023-2024 Onwards										
Course Code	**Course Title**		**Course Type**		**Sem.**	**Hours**	**L**	**T**	**P**	**C**
23M5UELE03	PROGRAMMABLE LOGIC CONTROLLER		DSE III		V	4	4	-	-	4

CO-PO Mapping

CO Number	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	M	M	L	L	L	M	M	L	L	M
CO2	M	S	L	S	M	S	S	S	S	M
CO3	L	M	L	L	S	S	S	S	S	L
CO4	S	L	L	M	S	S	S	S	S	S
CO5	M	M	L	M	M	L	M	M	S	M
Level ofCorrelation between CO and PO	L-LOW					M-MEDIUM			S-STRONG	

Tutorial Schedule	Group discussion, Lab Visit, Problem Solving, Brain Storming & Quiz
Teaching and Learning Methods	Audio Video lecture, Chalk and Board class PPT Presentation and Video presentation
Assessment Methods	Class Test, Unit Test, Assignment, CIA-I, CIA-II and ESE

Designed By	Verified By	Approved By Member Secretary
MRS. P.VIJAYALAKSHMI	**MR. S. ARULMANI**	**DR.S.SHAHITHA**

B.Sc –Internet of Things Syllabus LOCF - CBCS with effect from 2023-2024 Onwards								
Course Code	**Course Title**	**Course Type**	**Sem.**	**Hours**	**L**	**T**	**P**	**C**
23M6UIOE04	INDUSTRIAL AND MEDICAL IOT	DSE IV	VI	5	3	2	-	4
Objective	Provide students with good depth of knowledge in designing of Industrial and medical IoT systems for various application.							

Unit	Course Content	Knowledge Level	Session
I	**Introduction to Industrial IoT**: Technical requirements, IoT background - History and definition, IoT enabling factors, IoT applications, IoT key technologies – Industrial IoT, IoT and IIoT – similarities and differences, Industry environments and scenarios covered by IIoT	K1	12
II	**Industrial Process and Devices:** Introduction - Technical requirements - The industrial process - Automation in the industrial process - Control and measurement systems - Types of industrial processes.	K2	12
III	**Industrial Data Flow and Devices :** The IIoT data flow in the factory - Measurements and the actuator chain - Sensors - ADC - DAC – Actuators – Embedded Microcontrollers - Microcontrollers with external memory, DSP's. Industrial protocols -Automation networks - The Field bus - Introduction to the IIoT platform and architectures – OSGi - micro service - containers and server less computing - The standard IIoT flow.	K3	12
IV	**Internet of Medical Things:** Introduction and system architecture - IoMT Devices - On-Body Devices, In Home Devices - Community Devices - In-Clinic Devices – In Hospital Devices ,IoMT System Architecture – Data Collection Layer, Data Management Layer - Medical Server Layer.	K3	12
V	**IoMT Security:** Threats - Security - Challenges and Potential Solutions - IoMT Attack Types, Challenges in IoMT Security Schemes, Current Security Plans for IoMT, Potential Solutions for Security Vulnerabilities. ***Current Trends:** Role of IoT in Health care Industries	K4	12
Course Outcome	**CO1:** Recognize and understand the basics of Industrial IOT and Medical IOT	K1	
	CO2: Identify the technical and industrial requirement procedures for IIOT applications	K2	
	CO3: Develop various applications using IIOT architectures.	K3	
	CO4: Selection and development of different IIOT and IOMT architectures using different things.	K4	
	CO5: Analyze privacy and security measures for industry and medical standard solutions in IoT.	K5	

Learning Resources	
Text Books	1. Veneri, Giacomo, and Antonio Capasso- Hands-on Industrial Internet of Things: Create a Powerful Industrial IoT Infrastructure Using Industry 4.0, 1st Ed., Packt Publishing Ltd, 2018

	2. D. Jude Hemanth and J. Anitha George A. Tsihrintzis- Internet of Medical Things Remote Healthcare Systems and Applications, covered by Scopus.
Reference Books	1. Alasdair Gilchrist- Industry 4.0: The Industrial Internet of Things, 1st Ed., Apress, 2017. 2. Reis, Catarina I., and Marisa da Silva Maximiano, eds.- Internet of Things and advanced application in Healthcare, 1st Ed., IGI Global, 2016.
Website Link	1. https://www.coursera.org/specializations/developing-industrial-iot#courses 2. https://www.coursera.org/learn/industrial-internet-of-things 3. https://www.coursera.org/learn/internet-of-things-sensing-actuation
***Self Study Material**	https://hashstudioz.com/blog/the-role-of-iot-in-healthcare-industry-application-and benefits/

	L-Lecture	T-Tutorial	P-Practical	C-Credit

B.Sc –Internet of Things Syllabus LOCF - CBCS with effect from 2023-2024 Onwards									
Course Code	**Course Title**	**Course Type**	**Sem.**	**Hours**	**L**	**T**	**P**	**C**	
23M6UIOE04	INDUSTRIAL AND MEDICAL IOT	DSE IV	VI	5	3	2	-	4	

CO-PO Mapping

CO Number	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PSO1**	**PSO2**	**PSO3**	**PSO4**	**PSO5**
CO1	S	S	L	M	M	S	S	M	M	L
CO2	S	S	L	S	M	S	M	M	S	L
CO3	S	S	L	L	M	S	S	M	M	L
CO4	S	S	L	M	M	S	S	M	M	M
CO5	S	S	L	M	L	S	S	L	L	M
Level of Correlation between CO and PO	L-LOW					M-MEDIUM			S-STRONG	

Tutorial Schedule	Group discussion, Lab Visit, Problem Solving, Brain Storming & Quiz
Teaching and Learning Methods	Audio Video lecture, Chalk and Board class PPT Presentation and Video presentation
Assessment Methods	Class Test, Unit Test, Assignment, CIA-I, CIA-II and ESE

Designed By	**Verified By**	**Approved By Member Secretary**
MR.I.BALAKRISHNAN	**MR. S. ARULMANI**	**DR.S.SHAHITHA**

B.Sc –Internet of Things Syllabus LOCF - CBCS with effect from 2023-2024 Onwards								
Course Code	**Course Title**	**Course Type**	**Sem.**	**Hours**	**L**	**T**	**P**	**C**
23M6UIOE05	ANDROID APPLICATION DEVELOPMENT	DSE V	VI	5	3	2	-	4
Objective	To provide the students with the basics of Android Software Development tools and development of software on mobile platform.							

Unit	Course Content	Knowledge Levels	Sessions
I	Introduction to Android: Background – Platform for Mobile Development – Native Android Applications – Android SDK Features – Open Handset Alliance – Android in Mobile –Introducing the Development Framework: Android Software Stack – The Dalvik Virtual Machine – Android Application Architecture.	K1	12
II	Developing for Android: Downloading and Installing the Android SDK – Developing with Eclipse – Using the Android Developer tools Plug-In for Eclipse – Support Package. First Android Application: New Android Project – Android Virtual Device – Launch Configurations – Running and Debugging Android Application – Types of Android Applications – Android Development Tools.	K2	12
III	Mobile and Embedded Devices: Hardware-Imposed Design Considerations- User's Environment - Developing for Android – Introduction to Android Development Tools - Role of Android Application – Application Manifest File–Manifest Editor in Android Application Lifecycle – Application's priority and its process states.	K3	12
IV	Audio, Video and Camera: Playing Audio and Video – Manipulating Raw Audio – Creating a Sound Pool – Using Audio Effects – Camera for taking Pictures – Recording Video – Adding Media to the Media Store.	K3	12
V	Real time Applications: Bluetooth – Network and Internet Connectivity –Wi-Fi – Transferring Data using Wi-Fi Direct – Near Field Communication (NFC) – Online ticket booking – Online payment options – e-Electronics & Simulations – Online shopping – Government oriented applications – Bank Applications – Other Applications. *Current Trend: Introduction to iOS	K4	12
Course Outcome	CO1: Understanding concepts of android tools	K1	
	CO2: Justification of debugging and its applications.	K2	
	CO3: Compare and analyze the various tools and its priorities	K3	
	CO4: Understand and Develop the skills of Audio and video media interfaces.	K4	
	CO5: Design the real time applications using the development tools.	K5	

Learning Resources	
Text Books	1. Karen Lang and Selim Tezel, (2022), Become an App Inventor The official guide from MIT App Inventor, Miteen Press, Walker Books Limited. 2. Paul Deitel, Harvey Deitel, Abbey Deitel and Michael Morgano. Android for Programmers An

	App-Driven Approach.
Reference Books	1. Wei – Meng Lee, (2012), Beginning Android 4 Application Development, Wiley India Edition. 2. Frank Ableson, W., Robi Sen, Chris King and Enrique Ortiz, C. 2012. Android in Action. [Third Edition]. Manning Publications, U.S Charlie Collins and Michael Galpin. 2012. Android in Practice. Manning Publications Co.
Website Link	1. http://ai2.appinventor.mit.edu/reference/ 2. http://appinventor.mit.edu/explore/paint-pot-extended-camera
***Self-Study Material**	https://www.mygreatlearning.com/ios/tutorials/introduction-to-ios

	L-Lecture	T-Tutorial	P-Practical	C-Credit

B.Sc –Internet of Things Syllabus LOCF - CBCS with effect from 2023-2024 Onwards									
Course Code	**Course Title**	**Course Type**	**Sem**	**Hours**	**L**	**T**	**P**	**C**	
23M6UIOE05	ANDROID APPLICATION DEVELOPMENT	DSE V	VI	5	3	2	-	4	

CO-PO Mapping

CO Number	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PSO1**	**PSO2**	**PSO3**	**PSO4**	**PSO5**
CO1	S	M	L	S	M	S	S	S	M	S
CO2	S	S	L	M	M	S	S	S	S	M
CO3	S	M	L	M	S	S	M	S	M	M
CO4	S	M	L	S	S	M	M	S	M	S
CO5	S	S	L	S	S	S	M	S	S	S

Level of Correlation between CO and PO	L-LOW	M-MEDIUM	S-STRONG

Tutorial Schedule	Group discussion, Lab Visit, Problem Solving, Brain Storming & Quiz
Teaching and Learning Methods	Audio Video lecture, Chalk and Board class PPT Presentation and Video presentation
Assessment Methods	Class Test, Unit Test, Assignment, CIA-I, CIA-II and ESE

Designed By	**Verified By**	**Approved By Member Secretary**
Mr. I. BALAKRISHNAN	**Mr. S. ARULMANI**	**DR.S.SHAHITHA**

B.Sc –Internet of Things Syllabus LOCF - CBCS with effect from 2023-2024 Onwards								
Course Code	**Course Title**	**Course Type**	**Sem.**	**Hours**	**L**	**T**	**P**	**C**
23M6UIOE06	BLOCK CHAIN TECHNOLOGY	DSE VI	VI	5	4	-	-	4
Objective	Make the Students to learn Expertise in programming, basic knowledge of computer security, cryptography, networking, concurrent							

Unit	Course Content	Knowledge Level	Session
I	**Introduction**–History: Digital Money to Distributed Ledgers -Design Primitives: Protocols-Security, Consensus- Permissions, Privacy- : Block chain Architecture and Design-Basic crypto primitives: Hash-Signature Hash chain to Block chain-Basic consensus mechanisms.	K1	12
II	Requirements for the consensus protocols-Proof of Work (PoW)-Scalability aspects of Block chain consensus protocols: Permissioned Block chains-Design goals-Consensus protocols for Permissioned Block chains	K2	12
III	Decomposing the consensus process-Hyper ledger fabric components-Chain code Design and Implementation: Hyper ledger Fabric II:-Beyond Chain code: fabric SDK and Front End-Hyper ledger-composer tool.	K3	12
IV	Block chain in Financial Software and Systems (FSS): -Settlements, -KYC, -Capital markets-Insurance Block chain in trade/supply chain: Provenance of goods, visibility, trade/supply chain finance, invoice management/discounting. Blockchain 3.0	K4	12
V	Block chain for Government: Digital identity, land records and other kinds of record keeping between government entities, public distribution system / social welfare systems: Block chain Cryptography: Privacy and Security on Block chain**.** ***Current Trends:** Block chain and IoT Integration	K4	12
Course Outcome	**CO1:** To memorize the Basic Cryptographic primitives used in Blockchain	**K1**	
	CO2: Demonstrate the distributed consensus and atomic broadcast	**K2**	
	CO3: Illustrate the Plug-and-play mechanisms for consensus and Hyper ledger fabric platform	**K3**	
	CO4: Distinguish the advanced features of Blockchain 3.0	**K3**	
	CO5: Discriminate the Applications of blockchain in cyber security	**K4**	

Learning Resources	
Text Books	1. Mark Gates, "Block chain: Ultimate guide to understanding block chain, bit coin, crypto currencies, smart contracts and the future of money", Wise Fox Publishing and Mark Gates 2017 2. Salman Baset, Luc Desrosiers, Nitin Gaur, Petr Novotny, Anthony O'Dowd, Venkatraman Ramakrishna, "Hands-On Block chain with Hyper ledger: Building decentralized applications with Hyperledger Fabric and Composer", 2018

Reference Books	1.Andreas Antonopoulos, “Mastering Bitcoin: Unlocking Digital Crypto currencies”, O'Reilly Media, Inc. 2014. 2.Melanie Swa, “Block chain ”,O'Reilly Media 2014
Website Link	NPTEL & MOOC courses titled blockchain technology blockgeeks.comguide/what-is-block-chain-technology https://nptel.ac.in/courses/106105184/
*** Self Study Material**	https://www.ncbi.nlm.nih.gov/books/NBK262/

	L-Lecture	T-Tutorial	P-Practical	C-Credit

B.Sc –Internet of Things Syllabus LOCF - CBCS with effect from 2023-2024 Onwards									
Course Code	**Course Title**	**Course Type**	**Sem.**	**Hours**	**L**	**T**	**P**	**C**	
23M6UIOE06	BLOCK CHAIN TECHNOLOGY	DSE VI	VI	5	4	-	-	4	

CO-PO Mapping

CO Number	**PO1**	**PO2**	**PO 3**	**PO4**	**PO5**	**PSO1**	**PSO 2**	**PSO3**	**PSO4**	**PSO5**
CO1	S	M	S	M	L	S	M	S	M	L
CO2	S	S	M	S	M	M	M	S	M	L
CO3	S	M	S	S	S	L	S	L	S	M
CO4	M	S	M	L	M	M	S	M	M	S
CO5	L	M	S	M	M	S	M	S	M	L

Level of Correlation between CO and PO	L-LOW	M-MEDIUM	S-STRONG

Tutorial Schedule	Group discussion, Lab Visit, Problem Solving, Brain Storming & Quiz
Teaching and Learning Methods	Audio Video lecture, Chalk and Board class PPT Presentation and Video presentation
Assessment Methods	Class Test, Unit Test, Assignment, CIA-I, CIA-II and ESE

Designed By	**Verified By**	**Approved By Member Secretary**
MR. S. SANTHOSH	**MR. S. ARULMANI**	**DR.S.SHAHITHA**

MUTHAYAMMAL COLLEGE OF ARTS AND SCIENCE
(Autonomous)
Rasipuram - 637408.

List of Skill Based Elective Course (SEC) for B.Sc., Internet of Things
SYLLABUS - LOCF-CBCS Pattern
EFFECTIVE FROM THE ACADEMIC YEAR 2023-2024 Onwards

S.No.	SEM	COURSE_CODE	TITLE OF THE COURSE
1	II	23M2UIOS01	PRINCIPLES OF DIGITAL DESIGN
2	III	23M3UIOS02	COMPETITIVE SKILLS
3	III	23M3UIOS03	INTERNET AND WEB TECHNOLOGY
4	IV	23M4UIOS04	IOT COMMUNICATION PROTOCOLS
5	IV	23M4UIOS05	LINUX ESSENTIALS

B.Sc –Internet of Things Syllabus LOCF - CBCS with effect from 2023-2024 Onwards								
Course Code	**Course Title**	**Course Type**	**Sem.**	**Hours**	**L**	**T**	**P**	**C**
23M2UIOS01	PRINCIPLES OF DIGITAL DESIGN	SEC-I	II	2	2	-	-	2

Objective	To equip students with the basic knowledge of Number system, Digital logic circuits and its application and to outline the formal procedures for the analysis and design of combinational and sequential circuits, implementation and design of data conversion circuits.

Unit	**Course Content**	**Knowledge Level**	**Session**
I	**Boolean Algebra And Logic Gates:** Number Systems - Arithmetic Operations - Binary Codes- Boolean Algebra and Logic Gates - Theorems and Properties of Boolean Algebra - Boolean Functions - Canonical and Standard Forms - Simplification of Boolean Functions using Karnaugh Map - Logic Gates – NAND and NOR Implementations – 1's and 2's complement subtraction – 9's and 10's complement subtraction	K1	4
II	**Combinational Logic:** Combinational Circuits – Analysis and Design Procedures – Half Adder- Half Subtractor - Full Adder – Full subtractor - Binary Multiplier - Magnitude Comparator - Decoders IC 7447– Encoders IC 74138 – Multiplexers IC 74151 –Demultiplexers IC 74155 - Introduction to HDL – HDL Models of Combinational Circuits	K3	6
III	**Synchronous Sequential Logic:** Sequential Circuits - Storage Elements: Latches, Flip-Flops - Analysis of Clocked Sequential Circuits - State Reduction and Assignment - Design Procedure - Registers and Counters - HDL Models of Sequential Circuits.	K4	5
IV	**Asynchronous Sequential Logic:** Analysis and Design of Asynchronous Sequential Circuits – Reduction of State and Flow Tables – Race-free State Assignment – Hazards.	K3	5
V	**Memory And Programmable Logic:** RAM – Memory Decoding – Error Detection and Correction - ROM - Programmable Logic Array – Programmable Array Logic – Sequential Programmable Devices.	K3	4
Course Outcome	**CO1:** Recognize and outline the various number systems and Boolean Algebra.	**K1**	
	CO2: Understand and apply the design procedure of digital circuits.	**K2**	
	CO3: Demonstrate the design procedures over synchronous sequential circuits.	**K3**	
	CO4: Demonstrate the design procedures over asynchronous sequential circuits.	**K3**	
	CO5: Illustrate and analyze the digital memory allocation	**K4**	

Learning Resources	
Text	1. M. Morris R. Mano, Michael D. Ciletti, —Digital Design: With an Introduction to the

Books	Verilog HDL, VHDL, and System Verilog, 6th Edition, Pearson Education, 2017 2. John F. Wakerly, Digital Design Principles and Practices, Fifth Edition, PearsonEducation, 2017.G. K. Kharate, Digital Electronics, Oxford University Press, 2010
Reference Books	3. Charles H. Roth Jr, Larry L. Kinney, Fundamentals of Logic Design, Sixth Edition, CENGAGE Learning, 2013 4. Donald D. Givone, Digital Principles and Design, Tata McGraw Hill, 2003.
Website Link	1. https://onlinecourses.nptel.ac.in/noc22_ee110/preview 2. https://onlinecourses.swayam2.ac.in/cec21_cs16/preview 3. https://onlinecourses.swayam2.ac.in/cec22_cs17/preview

	L-Lecture	T-Tutorial	P-Practical	C-Credit

B.Sc –Internet of Things Syllabus LOCF - CBCS with effect from 2023-2024 Onwards

Course Code	Course Title	Course Type	Sem.	Hours	L	T	P	C
23M2UIOS01	PRINCIPLES OF DIGITAL DESIGN	SEC-I	II	2	2	-	-	2

CO-PO Mapping

CO Number	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	S	M	L	S	M	M	M	M	M	L
CO2	S	M	L	S	M	S	M	M	M	M
CO3	L	M	L	H	M	S	M	M	M	M
CO4	M	M	L	M	H	L	M	S	S	M
CO5	M	M	L	M	H	S	M	S	M	H

Level of Correlation between CO and PO	L-LOW	M-MEDIUM	S-STRONG

Tutorial Schedule	Group discussion, Lab Visit, Problem Solving, Brain Storming & Quiz
Teaching and Learning Methods	Audio Video lecture, Chalk and Board class PPT Presentation and Video presentation
Assessment Methods	Class Test, Unit Test, Assignment, CIA-I, CIA-II and ESE

Designed By	Verified By	Approved By Member Secretary
MRS.P.VIJAYALAKSHMI	**MR.S. ARULMANI**	**DR.S.SHAHITHA**

MUTHAYAMMAL COLLEGE OF ARTS AND SCIENCE

(Autonomous)

Rasipuram - 637408.

B.Sc-Internet of Things Syllabus LOCF-CBCS with effect from 2023-2024 Onwards								
Course Code	**Course Title**	**Course Type**	**Sem.**	**Hours**	**L**	**T**	**P**	**C**
23M3UIOS02	COMPETITIVE SKILLS	SEC-II	III	2	2	-	-	2

Objective	To provide students with solid foundation in CSE so that they are able to use this knowledge in getting jobs and maintaining their jobs.		
Unit	**Course Content**	**Knowledge Level**	**Session**
I	**VERBAL REASONING:** Analogy – Classification – Direction Sense Test –Coding Decoding – Logical Sequence of Words – Inserting the Missing Character – Situation Reaction Test –Venn Diagrams.	K1	6
II	**NONVERBAL REASONING:** Analytical Reasoning – Mirror Images – Water Images – Completion of Incomplete Pattern –Cubes and Dice	K3	4
III	**ARITHMATICAL ABILITY:** Percentage– Average– HCF & LCM – Ratio & Proportion – Profit &Loss – Time and Work– Problems on Age – Simple Interest– Compound Interest	K2	4
IV	Chain Rule– Time & Distance – Problems on Trains – Logarithms – Calendar – Clocks – Probability	K4	5
V	**DATA INTERPRETATION:** Tabulation– Bar Graphs –Pie Charts–Line Graphs	K4	5
Course Outcome	**CO1:** Remember and understand the basic concept of verbal nonverbal reasoning methods	K1	
	CO2: Understand the Verbal and numerical aptitude concepts and shortcuts	K2	
	CO3: Analyze the Problems logically and approach the problems in a different manner.	K3	
	CO4: Apply the shortcuts and practice the various methods to solve the competitive exam questions.	K4	
	CO5: Draw conclusions or make decisions in quantitatively based situations that are dependent upon multiple factors.	K5	

Learning Resources	
Text Books	1. S. Chand, R.S. Aggarwal Quantitative Aptitude - Revised Edition 2024 2. S. Chand, R.S. Aggarwal A Modern Approach to Verbal & Non Verbal Reasoning - Revised Edition –2024
Reference Books	1. R.S. Aggarwal – S. Chand An Advanced Approach to Data Interpretation
Website Link	1. https://www.indiabix.com/

	L-Lecture	T-Tutorial	P-Practical	C-Credit

B.Sc-Internet of Things Syllabus LOCF-CBCS with effect from 2023-2024 Onwards									
Course Code	**Course Title**	**Course Type**	**Sem.**	**Hours**	**L**	**T**	**P**	**C**	
23M3UIOS02	COMPETITIVE SKILLS	SEC-II	III	2	2	-	-	2	

CO-PO Mapping

CO Number	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	S	M	S	M	S	S	S	M	M	L
CO2	M	S	M	S	S	S	S	S	S	S
CO3	M	S	S	M	L	L	M	L	M	M
CO4	S	L	M	S	S	M	M	S	M	S
CO5	S	S	S	M	S	S	S	M	M	M
Level of Correlation between CO and PO	L-LOW					M-MEDIUM			S-STRONG	

Tutorial Schedule	Group discussion, Lab Visit, Problem Solving, Brain Storming & Quiz
Teaching and Learning Methods	Audio Video lecture, Chalk and Board class PPT Presentation and Video presentation
Assessment Methods	Class Test, Unit Test, Assignment, CIA-I, CIA-II and ESE

Designed By	Verified By	Approved By Member Secretary
MR.S.SATHISHKUMAR	**MR.S. ARULMANI**	**DR.S.SHAHITHA**

B.Sc-Internet of Things Syllabus LOCF-CBCS with effect from 2023-2024 Onwards								
Course Code	**Course Title**	**Course Type**	**Sem.**	**Hours**	**L**	**T**	**P**	**C**
23M3UIOS03	INTERNET AND WEB TECHNOLOGY	SEC - III	III	2	2	-	-	2
Objective	To make the students learn about the basic knowledge in Internet and accessing the web essentials							

Unit	Course Content	Knowledge Level	Session
I	**Web Essentials:** Clients, Servers, and Communication. The Internet-Basic Internet Protocols The World Wide Web- HTTP request message-response message-Web Clients Web Servers-Case Study. Markup Languages: XHTML. An Introduction to HTML History-Versions-Basic XHTML Syntax and Semantics Some Fundamental HTML Elements-Relative URLs-Lists-tables-Frames-Forms-XML Creating HTML Documents	K1	5
II	**Style Sheets:** CSS-Introduction to Cascading Style Sheets- Features-Core Syntax-Style Sheets and HTML Style Rle Cascading and Inheritance-Text Properties-Box Model Normal Flow Box Layout-Beyond the Normal Flow-Other Properties-Case Study.	K2	5
III	**Client- Side Programming:** The JavaScript Language- History and Versions Introduction JavaScript in Perspective- Syntax Variables and Data Types-Statements Operators- Literals-Functions-Objects-Arrays-Built-in Objects-Java Script Debuggers.	K3	5
IV	**Host Objects:** Browsers and the DOM-Introduction to the Document Object Model DOM History and Levels-Intrinsic Event Handling-Modifying Element Style-The Document Tree-DOM Event Handling Accommodating Noncompliant Browsers Properties of window-Case Study.	K3	3
V	**Server-Side Programming**: Java Servlets- Architecture -Overview-A Servelet-Generating Dynamic Content-Life Cycle-Parameter Data-Sessions-Cookies- URL Rewriting- Other Capabilities-Data Storage Servelets and Concurrency-Case Study- Related Technologies. ***Current Trend** : **Web3**	K4	6
Course Outcome	**CO1:** Analyze a web page and identify its elements and attributes.	K1	
	CO2: Create web pages using XHTML and Cascading Style Sheets.	K2	
	CO3: Build dynamic web pages using Client side programming	K3	
	CO4: Create XML documents and Schemes	K4	
	CO5: Design dynamic web pages using server side programming	K5	

Learning Resources				
Text Books	1. Jeffrey C. Jackson, "Web Technologies--A Computer Science Perspective", Pearson Education, 2006. 2. Robert. W. Sebesta, "Programming the World Wide Web", Fourth Edition,Pearson Education, 2007.			
Reference Books	1. Deitel, Deitel, Goldberg, "Internet & World Wide Web How To Program", ThirdEdition, Pearson Education, 2006. 2. Marty Hall and Larry Brown,"Core Web Programming" Second Edition, Volume Iand II, Pearson Education, 2001.			
Website Link	https://www.edx.org/course/web-accessibility-introduction?index=product&queryID=9d6f9b6435a433da9d5a7b4c7e0f81e3&position=4			
***Self-Study Material**	1. https://www.freecodecamp.org/news/learn-web3js-basics//			
	L-Lecture	T-Tutorial	P-Practical	C-Credit

B.Sc-Internet of Things Syllabus LOCF-CBCS with effect from 2023-2024 Onwards										
Course Code	**Course Title**		**Course Type**		**Sem.**	**Hours**	**L**	**T**	**P**	**C**
23M3UIOS03	INTERNET AND WEB TECHNOLOGY		SEC - III		III	2	2	-	-	2
23M4UELC04										
CO Number	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PSO1**	**PSO2**	**PSO3**	**PSO4**	**PSO5**
CO1	M	L	L	L	L	M	M	L	M	M
CO2	M	M	L	M	M	S	M	M	M	L
CO3	M	M	L	L	M	M	S	M	S	M
CO4	M	L	L	M	M	M	M	L	M	M
CO5	M	M	L	M	M	S	S	S	M	M
Level of Correlation between CO and PO	L-LOW					M-MEDIUM			S-STRONG	

Tutorial Schedule	Group discussion, Lab Visit, Problem Solving, Brain Storming & Quiz
Teaching and Learning Methods	Audio Video lecture, Chalk and Board class PPT Presentation and Video presentation
Assessment Methods	Class Test, Unit Test, Assignment, CIA-I, CIA-II and ESE

Designed By	**Verified By**	**Approved By Member Secretary**
MR.S. ARULMANI	**MR.S. ARULMANI**	**DR.S.SHAHITHA**

B.Sc-Internet of Things Syllabus LOCF-CBCS with effect from 2023-2024 Onwards								
Course Code	**Course Title**	**Course Type**	**Sem.**	**Hours**	**L**	**T**	**P**	**C**
23M4UIOS04	IOT COMMUNICATION PROTOCOLS	SEC – IV	IV	2	2	-	-	2
Objective	To acquaint the students to understand and gain the knowledge on IoT communication protocol							

Unit	**Course Content**	**Knowledge Level**	**Session**
I	**Introduction:** IoT architecture outline, standards - IoT Technology Fundamentals- Devices and gateways - Local and wide area networking - Data management - Business processes in IoT- Everything as a Service (XaaS)	K1	5
II	**IoT Reference Architecture:** Introduction - Functional View - Information View - Deployment and Operational View - Other Relevant Architectural views - Real-World Design Constraints- Introduction, Technical Design constraints.	K2	5
III	**IoT Data Link Layer:** PHY/MAC Layer - 3GPP MTC - IEEE 802.11- IEEE 802.15 - Wireless HART – Z Wave - Bluetooth Low Energy - Zigbee Smart Energy, DASH7, LoRa WAN	K2	5
IV	**Network Layer Protocols:** Network Layer-IPv4 - IPv6 - 6LoWPAN- 6TiSCH- ND- DHCP- ICMP- RPL- CORPL- CARP.	K4	5
V	**IoT Transport and Session Layer:** Transport Layer – TCP - MPTCP – UDP – DCCP – SCTP – TLS – DTLS - Session Layer – HTTP – CoAP - XMPP - AMQP - MQTT.	K3	4
Course Outcome	**CO1:** Understand the basic concepts of IOT	K1	
	CO2: Understand and remember the different layers of IOT Architecture	K2	
	CO3: Able to interpret the data link protocols	K3	
	CO4: Demonstrate the functionality of network layer protocols	K4	
	CO5: Analyze the data in end application	K4	

Learning Resources	
Text Books	1. Simone Cirani, Gianluigi Ferrari, Marco Picone, Luca Veltri, Internet of Things: Architectures, Protocols and Standards, First edition 2018. 2. BK Tripathy and J Anuradha, Taylor & Francis "Internet Of Things (IoT) Technologies Applications Challenges And Solutions", first Edition 2017. 3. ISBN: 978-1-118-47347-4, Willy Publications "Building the Internet of Things with IPv6 and

	MIPv6: The Evolving World of M2MCommunications",2016
Reference Books	1. Peter Waher, PACKT publishing, "Learning Internet of Things"– 2015. 2. Jan Holler, Vlasios Tsiatsis, Catherine Mulligan, Stefan Avesand, Stamatis Karnouskos, David Boyle, "From Machine-to-Machine to the Internet of Things: Introduction to a New Age of Intelligence", Academic Press, 2015
Website Link	1. https://www.edx.org/course/iot-networks-and-protocols?index=product&queryID=b8e541228cb7273b46f87af1d1bcb48d&position=1 2. https://www.edx.org/course/build-your-first-iot-application-with-arm?index=product&queryID=b8e541228cb7273b46f87af1d1bcb48d&position=2

	L-Lecture	T-Tutorial	P-Practical	C-Credit

B.Sc –Internet of Things Syllabus LOCF - CBCS with effect from 2023-2024 Onwards

Course Code	Course Title	Course Type	Sem.	Hours	L	T	P	C
23M4UIOS04	IOT COMMUNICATION PROTOCOLS	SEC – IV	IV	2	2	-	-	2

CO-PO Mapping

CO Number	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	S	M	S	M	S	S	S	M	M	L
CO2	M	S	M	S	S	S	S	S	S	S
CO3	M	M	S	M	L	L	M	L	M	M
CO4	S	L	M	S	S	M	L	S	M	S
CO5	S	S	L	M	S	S	S	M	M	M

Level of Correlation between CO and PO	L-LOW	M-MEDIUM	S-STRONG

Tutorial Schedule	Group discussion, Lab Visit, Problem Solving, Brain Storming & Quiz
Teaching and Learning Methods	Audio Video lecture, Chalk and Board class PPT Presentation and Video presentation
Assessment Methods	Class Test, Unit Test, Assignment, CIA-I, CIA-II and ESE

Designed By	Verified By	Approved By Member Secretary
MR.S.SATHISHKUMAR	**MR.S.ARULMANI**	**DR.S.SHAHITHA**

B.Sc-Internet of Things Syllabus LOCF-CBCS with effect from 2023-2024 Onwards								
Course Code	**Course Title**	**Course Type**	**Sem.**	**Hours**	**L**	**T**	**P**	**C**
23M4UIOS05	LINUX ESSENTIALS	SEC – V	IV	2	2	-	-	2
Objective	To learn students make effective use of Linux utilities and shell scriptinglanguage to solve problems and to understand the basic system programming using process, signals and inter process communication							

Unit	Course Content	Knowledge Level	Session
I	**Introduction To Linux And Linux Utilities:** A brief history of LINUX, architecture of LINUX, features of LINUX, introduction to vi editor. Linux commands- PATH, man, echo, printf, script, passwd, uname, who, date, stty, pwd, cd, mkdir, rmdir, ls, cp, mv, rm, cat, more, wc, lp, od, tar, gzip, file handling utilities, security by file permissions, process utilities, disk utilities, networking commands, unlink, du, df, mount, umount, find, unmask, ulimit, ps, w, finger, arp, ftp, telnet, rlogin.Text Processing utilities and backup utilities , tail, head , sort, nl, uniq, grep, egrep, fgrep, cut, paste, join, tee, pg, comm, cmp, diff, tr, awk, cpio	K1	5
II	**Introduction to Shells:** Linux Session, Standard Streams, Redirection, Pipes, Tee Command, Command Execution, Command-Line Editing, Quotes, Command Substitution, Job Control, Aliases, Variables, Predefined Variables, Options, Shell/Environment Customization. Filters: Filters and Pipes, Concatenating files, Display Beginning and End of files, Cut and Paste, Sorting, Translating Characters, Files with Duplicate Lines, Count Characters, Words or Lines, Comparing Files.	K2	5
III	**UNIX File Structure And Management:** Grep Operation, grep Family, Searching for File Content. Sed :Scripts, Operation, Addresses, commands, Applications, grep and sed. Introduction to UNIX file system, inode (Index Node), file descriptors, system calls and device drivers-File Structures, System Calls for File Management – create, open, close, read, write, lseek, link, symlink, unlink, stat, fstat, lstat, chmod, chown, Directory API – opendir, readdir, closedir, mkdir, rmdir, umask.	K3	5
IV	**PROCESS AND SIGNALS:** Process, process identifiers, process structure: process table, viewing processes, system processes, process scheduling, starting new processes: waiting for a process, zombie processes, orphan process, fork, vfork, exit, wait, waitpid, exec, signals functions, unreliable signals, interrupted system calls, kill, raise, alarm, pause, abort, system, sleep functions, signal sets. File locking: creating lock files, locking regions, use of read and write with locking, competing locks, other lock commands, deadlocks.	K3	5
V	**INTER PROCESS COMMUNICATION AND SOCKETS:** Pipe, process pipes, the pipe call, parent and child processes, and named pipes: fifos, semaphores: semget, semop, semctl, message queues: msgget,	K4	4

	msgsnd, msgrcv, msgctl, shared memory: shmget, shmat, shmdt, shmctl, ipc status commands. Socket, socket connections - socket attributes, socket addresses, socket, connect, bind, listen, accept, socket communications		
Course Outcome	**CO1:** Understand the fundamentals of operating systems, functions andtheir structure and functions.	K1	
	CO2: Implement concept of process management policies,CPUScheduling and thread management.	K2	
	CO3: Understand and implement the requirement of process synchronization and apply deadlock handling algorithms.	K3	
	CO4: Evaluate the memory management and its allocation policies.	K3	
	CO5: Understand and analyze disk scheduling and real time application.	K4	

Learning Resources

Text Books	1. "The Complete Referance 'Linux' Richard Petersen, TMH, 2. Begining Linux Programming, 4th Edition, N. Matthew, R.Stones, Wrox, WileyIndia Edition. 3. Unix for Programmers 3rd Ed, Graham Glass & King Ables, Pearson Education.
Reference Books	1. Shell Scripting, S.Parker, Wiley India Pvt. Ltd. 2. Advanced Programming in the Unix Environment, 2nd Ed, W.R.Stevens,Pearson Education.
Website Link	https://nptel.ac.in/courses/117106113

	L-Lecture	T-Tutorial	P-Practical	C-Credit

B.Sc –Internet of Things Syllabus LOCF - CBCS with effect from 2023-2024 Onwards

Course Code	Course Title	Course Type	Sem.	Hours	L	T	P	C
23M4UIOS05	LINUX ESSENTIALS	SEC – V	IV	2	2	-	-	2

CO-PO Mapping

CO Number	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	M	M	L	L	L	M	M	L	L	L
CO2	M	S	L	S	M	S	S	S	S	M
CO3	L	M	L	L	S	S	S	S	S	M
CO4	S	L	L	M	S	S	S	S	S	M
CO5	M	M	L	M	M	L	M	M	S	M

Level of Correlation between CO and PO	L-LOW	M-MEDIUM	S-STRONG

Tutorial Schedule	Group discussion, Lab Visit, Problem Solving, Brain Storming & Quiz
Teaching and Learning Methods	Audio Video lecture, Chalk and Board class PPT Presentation and Video presentation
Assessment Methods	Class Test, Unit Test, Assignment, CIA-I, CIA-II and ESE

Designed By	Verified By	Approved By Member Secretary
MR.S.SATHISHKUMAR	**MR.S. ARULMANI**	**DR.S.SHAHITHA**

B.Sc-Internet of Things Syllabus LOCF-CBCS with effect from 2023-2024 Onwards								
Course Code	**Course Title**	**Course Type**	**Sem.**	**Hours**	**L**	**T**	**P**	**C**
23M5UIOIS1	INTERNSHIP	INTERNSHIP	V	-	-	-	-	2

Objective	To give some industrial work experiences during the period of study, by which improving the critical thinking and problem solving ability of the students, and also to make them to identify needs of industry in which they have to improve their knowledge and skills.

Unit	Course Content	Knowledge Level	Session
1	**Embedded Systems:** Definition and classification – Overview of microprocessor, Microcontroller, and DSP – exemplary high performance processors – CISC and RISC architecture – hardware unit in an embedded System- software embedded into a system – exemplary applications – embedded systems on a chip and in VLSI circuit **PIC 16F877 Architecture and Instruction Set:** Device Overview - Architecture - Memory Organization - Status Register - Option Register - INTCON Register - PCON Register - I/O Ports - Data EEPROM - Byte Oriented Operations - Bit Oriented Operations Literal and Control Operations. **Features of PIC:** TIMER 0 Module - TIMER 1 Module - TIMER 2 Module - Capture/Compare/ PWM Modules - I^2C transmission and reception - USART – SPI - ADC Module - Oscillator Selection - Power on Reset — Power up Timer — Oscillator Startup Timer — Brownout Reset— Interrupts — Watchdog Timer —Sleep. **Interfacing And Applications:** Interfacing of Switch and LEDs – Relay and Solenoid Interfacing – Hex Keyboard Interfacing - 7 Segment Display Interfacing - LCD interfacing – DAC interfacing – Stepper motor interfacing – DC motor interfacing -ADC application -PWM applications. (Use Embedded C Programming) **Embedded Software Architecture & Operating System:** Round Robin — Round Robin with Interrupts — Function Queue Scheduling Architecture— Real Time Operating Systems (RTOS) — Tasks and Data —Semaphores and Shared Data— Message Queues, Mail Box and Pipes —Timer Function — Events — Memory Management - Types of RTOS – Study of Micro C/OS-II - Vx Works. ***Current Trends:** RTOS for IoT Systems	K4-K5	-
Course Outcome	**CO1:** Recognize the suitable industry based on the skill set.	K1	
	CO2: Understand the work protocols and environmental nature of an industry / Company/institute.	K2	
	CO3: Apply their skill sets to the assignment given by the industry / Company/institute.	K3	

	CO4: Analyze the problems in the given assignments and trying to resolve it using their skill set.	K4	
	CO5: Evaluate the work done and prepare documentations for the work.	K5	

Learning Resources	
Text Books	1. Aniket Singh-"The Complete Book Of Internships in India: Intern Abroad This Summer"
Reference Books	1. Aniket Singh – " The Complete Book Of International Internships"
Website Link	1. https://internshala.com/

	L-Lecture	T-Tutorial	P-Practical	C-Credit

B.Sc –Internet of Things Syllabus LOCF - CBCS with effect from 2023-2024 Onwards								
Course Code	**Course Title**	**Course Type**	**Sem.**	**Hours**	**L**	**T**	**P**	**C**
23M5UIOIN1	INTERNSHIP	INTERN	V	-	-	-	-	2

CO-PO Mapping

CO Number	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PSO1**	**PSO2**	**PSO3**	**PSO4**	**PSO5**
CO1	S	S	M	M	S	S	M	S	S	S
CO2	S	S	M	M	S	S	M	S	S	S
CO3	S	S	S	S	S	S	S	S	S	S
CO4	S	S	S	S	S	S	S	S	S	S
CO5	S	S	S	S	S	S	S	S	S	S

Level of Correlation between CO and PO	L-LOW	M-MEDIUM	S-STRONG

Tutorial Schedule	15 Days of training in a selected Industry/Company/Institute
Teaching and Learning Methods	Dairy of Work done and documentation
Assessment Methods	Evaluation of Report and Viva voce

Designed By	**Verified By**	**Approved By Member Secretary**
MR.S. ARULMANI	**MR.S. ARULMANI**	**DR.S.SHAHITHA**

B.Sc – Internet of Things Syllabus LOCF-CBCS with effect from 2021-2022 Onwards								
Course Code	**Course Title**	**Course Type**	**Sem.**	**Hours**	**L**	**T**	**P**	**C**
23M6UIOPR1	PROJECT WORK	PROJECT WORK	VI	4	-	-	4	3
Objective	To apply the knowledge of analog and digital electronic systems in the design to solve some real time problems of industrial and social needs. And to impart the experience to the students in the industrial Field work.							

Details	**Course Content**	**Knowledge Level**	**Session**
Format for the preparation of Project Report:	The final stage of work consists of the 1. Title Page 2. Bonafide Certificate 3. Acknowledgement/Preface 4. Table of contents 5. List of table and charts 6. Abbreviation	K4	-
Text of the Project	The following structure of project work should be followed to maintain the uniformity in preparation and presentation. **Chapter 1 – Introduction:** In this chapter Selection and relevance problem, historical background of the problem, definitions of related aspects, characteristics, different concepts pertaining to the problem etc can be covered by the candidate. **Chapter 2 - Research Methodology**: This chapter will include Objectives, Hypothesis, Scope of the study, Selection of the problem, Sample size, Data collection, Tabulation of data, Techniques and tools to be used, limitations of the study, significance of the study etc. **Chapter 3 - Literature Review:** This chapter will provide information about studies done on the respective issue. This would assist students to undertake further study on the same issue. **Chapter 4 - Data Presentation and Data Analysis:** This chapter is the core part of the study. The analysis pertaining to collect data will be done by the students. The application of selected tools or techniques will be used to arrive at findings. In this table of	K6	-

	information, presentation of graph etc. should be provided by the students. **Chapter 5- Conclusion:** In this unit, findings of work will be covered by the candidate and suggestion will be mentioned by the candidate to validate the objectives and hypotheses. **If required, more chapters of data analysis could be added.** **6. Bibliography** **7. Appendix**		
Headings and Titles	1. Heading and Section headings should be capitalized and centered– 14 font sizes with Bold. 2. Subdivision headings should be typed from the left hand margin sentence case -12 font sizes with Bold. 3. Paragraphs should be indented seven space for pica type and nine for elite type.	K3	-
Typing Instruction	**Paper:** 8 ½ * 11 inches in size (A4).Only one side of the sheet should be typed. **Margin:** The left side margin should not be less than 1.5 inches (or 40 mm) the right, top and Bottom Margin one inch (or 25 mm). **Font:** Times New Roman, subject matter -12 font size in running format, Heading and Section headings should be capitalized – 14 font size.	K3	-
Tables, Graphs and Diagrams	1. The table number (Example: TABLE 1.5) typed in capitals, should be separated from the text by two or three spaces. 2. If an explanatory note to a time is necessary, an asterisk should be used. 3. The note should be placed immediately below the table.	K3	-
Numbering and Spacing	**Line Spacing:** The text of the thesis should be 1.5 lines spacing **Pagination:** Pages of the text are numbered continuously in Arabic numerals.	K3	-
Bibliography	The format for bibliographical listing for books, reports, articles are the same for footnote also. Books and articles can be arranged either chronological order or year wise. **For citing Books:** Mann, R.S Social Change and Social Research, New Delhi: Concept Publishing Company, 2018, p.27 **Publication of Government and Public Organization:** Government of India, India 2016: A Reference Annual, New Delhi: Publication Division, 201, p.127 **For Citing Journal:** Goel Ranjan, "Achievement through Human Engineering", Indian Management, 28, No.8, July, 2016, pp.14-16. **For Citing Thesis or Dissertation:** Ganapathy ,A study of organizational and Individual Characteristics in R & D Organizations, unpublished Ph.D Thesis, Bangalore: Indian Institute of Science, 2016. **For Citing Seminar Paper:** Krishnaswami O.R., "Towards Excellence in Cooperative Management" (Paper Presented at a Seminar on "Excellence in Management", Cooperative Training	K4	-

	College, Bangalore, July 2019).		
Schedule	**VI Semester:** 1. December: Identification of problem &Selection of topic. 2. January: Review of Literature & Finalization of Questionnaire. 3. February: Data collection& Analysis and preparation of Project report. 4. March: First, Second draft and Final draft Correction. 5. April: Review Presentation & Submission of Project.	-	-
Course Outcome	CO1: Understand the Selection of the problem.		K2
	CO2: Interpret Hypothesis and Objectives.		K3
	CO3: Analyze the literature review based on the research problem.		K4
	CO4: Evaluate the data collection.		K5
	CO5: Create and conclude the Project report.		K6

L-Lecture	T-Tutorial	P-Practical	C-Credit

Course Code	Course Title	Course Type	Sem.	Hours	L	T	P	C
21M6UIOPR1	PROJECT VIVA VOCE	PROJECT WORK	VI	4	-	-	4	3

CO-PO Mapping

CO Number	P01	P02	P03	P04	P05	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	S	S	M	M	S	S	M	S	S	S
CO2	S	S	M	M	S	S	M	S	S	S
CO3	S	S	S	S	S	S	S	S	S	S
CO4	S	S	S	S	S	S	S	S	S	S
CO5	S	S	S	S	S	S	S	S	S	S

Level of Correlation between CO and PO: **L**-LOW, **M**-MEDIUM, **S**-STRONG

Tutorial Schedule	-
Teaching and Learning Methods	-

Assessment Methods	**EA - 100%** 1. Project Report - 150 Marks 2. Viva-Voce - 50 Marks 3. Total - 200 Marks		
Designed By		**Verified By**	**Approved By Member Secretary**
MR.S.ARULMANI		**MR.S. ARULMANI**	**DR.S.SHAHITHA**

B.Sc- Internet of Things Syllabus LOCF-CBCS with effect from 2023-2024 Onwards								
Course Code	**Course Title**	**Course Type**	**Sem.**	**Hours**	**L**	**T**	**P**	**C**
23M6UIOOE1	INTERNET OF THINGS FOR COMPETITIVE EXAMINATION	ONLINE-COMPETITIVE	VI	2	2	-	-	2
Objective	To learn about the IC fabrication process and the fundamental building blocks of linear integrated circuits, as well as to become acquainted with linear integrated circuit applications.							

Unit	**Course Content**	**Knowledge Level**	**Session**
-	Arrangement of different topics related to Semiconductor physics, Circuit Analysis and theorems, Electronic device, ICs and Instrumentation. Digital Principles, Communication Systems, Microcontroller like Advanced concepts etc., Major emphasis has been put forth to include recent developments in the subjects. This course aims to give a holistic view of all the topics which comprised of some factual text points, multiple choice questions (MCQ), it is extremely suitable for students pursuing their higher degree in University/institute for their entrance exams, students preparing for various national and state level competitive entrance exams such as UGC-JRF/SRF/NET, ISRO, DRDO, BSNL, SAIL, BHEL, SBI, IBPS, etc. to get admission in Ph.D. in Electronics. In addition, it is also useful for UPSC and states PSC. **Rules for creating MCQ pattern:** 1. Objective type online examination will be conducted at the end of 4th semester. 2. Questions must be taken from all previous question papers of UGC-NET, SET, DRDO, BSNL JTO, UPSC, IBPS and Common Entrance Test for Ph.D of various Universities. 3. Test critical thinking. ✓ Multiple choice questions to test the superficial knowledge. ✓ Learners to interpret facts, evaluate situations, explain cause and effect, make inferences, and predict results.	K5	

4. Emphasize Higher-Level Thinking

- ✓ Use memory-plus application oriented questions. These questions require students to recall principles, rules or facts in a real life context.

Example 1:

Ability to analyze statements and justify it :

1. *Which of the following statement not suitable for semiconductors?*

a) Semiconductors are having 4 valance electrons
b) At 0°C it behaves like an insulator.
c) The energy gap is large.
d) Si and Ge are the commonly used Semiconductors

Eg.2

Ability to incorporate the facts with real time problems

2. *Which kind of power supplies are suitable for computer systems design.*

a) Regulated power supply
b) Uninterrupted power supply
c) Variable regulated power supply
d) *Switch mode Power supply*

5. Mix up the order of the correct answers:

- ✓ Keep correct answers in random positions and don't let them fall into a pattern that can be detected

6. Use a Question Format:

- ✓ Multiple-choice items to be prepared as questions (rather than incomplete statements)

Incomplete Statement Format:

The Astable multivibrator is also known as_____

: This in Direct Question Format and it will be Less effective.

Select another name of an Astable multivibrator.

a) One shot Multivibrator
b) Two shot Multiibrator
c) Free running Multivibrator
d) No shot Multivibrator

: This is Best format.

7. Keep Option Lengths Similar

- ✓ Avoid making your correct answer the long or short answer

8. Avoid the "All the Above" and "None of the Above" Options

- ✓ Students merely need to recognize two correct options to get

	the answer correct 9. HOD's instruct to the faculty to prepare minimum 500 questions booklet (cumulatively for each Programme) with solutions and circulate among the students. 10. Each Department to prepare the Questions (MCQ pattern with four answers) and submit to ICT.		
Course Outcome	**CO1:** Recall and understand the various fundamentals of Electronics and communication.		K1
	CO2: Describe the various concepts and Methodologies of Analog and Digital electronic system design principles		K2
	CO3: Demonstrate the various applications and advantages of discrete components and ICs in the circuit design process.		K3
	CO4: Analyze and optimize the complex circuits using various theorems and principles.		K4
	CO5: Design and evaluate the different analog and digital circuits for controlling and communication process.		K5

Learning Resources	
Text Books	1. Objective Electronics with solutions for IMD,DRDO, ISRO etc. by Rakesh Pateland Priyanka Kumari – July 2022 2. Trueman's UGC-NET Electronic Sciences - Danika Publication –Jan 23 3. GATE 2023 : Electronics & Communication Engineering - 36 Years' Topic-wise Previous Solved Papersby G.K. Publications (P) Ltd.-March 2022
Reference Books	1. Handbook Series of Electronics & Communication Engineering by Experts CompilationJan 2013 2. Objective Electronics & Telecommunication Engineering by M.P.Sinha , Neetu Singh- Jan 2012
Website Link	1. http://www.sanfoundry.com 2. https://www.geeksforgeeks.org

L-Lecture	T- Tutorial	P-Practical	C-Credit

Course Code	**Course Title**	**Course Type**	**Sem.**	**Hours**	**L**	**T**	**P**	**C**
23M6UIOOE1	ELECTRONICS AND COMMUNICATION FOR COMPETITIVE EXAM	ONLINE-COMPETITIVE	VI	2	2	-	-	2

CO-PO Mapping:

CO Number	P01	P02	P03	P04	P05	PSO1	PSO2	PSO3	PSO 4	PSO5
CO1	M	M	S	S	S	M	S	S	S	S
CO2	S	S	S	S	S	S	S	S	S	S
CO3	S	S	S	S	S	S	S	S	S	S
CO4	S	S	S	S	S	M	S	S	S	S
CO5	S	S	S	S	S	S	S	S	S	S

Level of Correlation between CO and PO: L-LOW , M-MEDIUM, S-STRONG

Tutorial Schedule	NET/SET/GATE/CET/TRB Old question papers –solutions –online mock test
Teaching and Learning Methods	Self-study, Group discussion ,Chalk and Talk, Audio-Video Learning, learning through mock test
Assessment Methods	100 multiple choice questions through computer based online examinations passing minimum is 50%

Prepared By	Verified By	Approved By Member Secretary
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