SYLLABUS

DIPLOMA IN
Computer Engineering and IoT
FULL TIME (1058)

2022-23

N - SCHEME

DIRECTORATE OF TECHNICAL EDUCATION

STATE BOARD OF TECHNICAL EDUCATION & TRAINING, TAMILNADU

DIPLOMA IN ENGINEERING / TECHNOLOGY SYLLABUS (II / III YEAR)

<u>N SCHEME</u>

(Implemented from the Academic year 2022 - 2023 onwards)

<u>Chairperson</u>

Tmt. R LALITHA, I.A.S.,

Director, Directorate of Technical Education, Guindy, Chennai.

Diploma in Computer Engineering and IoT (1058)	
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GOVERNMENT OF TAMILNADU

DIPLOMA COURSES IN ENGINEERING / TECHNOLOGY

(SEMESTER SYSTEM)

(Implemented from 2022 - 2023)

N – SCHEME

R E G U L A T I O N S*

*Applicable to the Diploma Courses other than Diploma in Hotel Management & Catering Technology.

1. **Description of the Course:**

   a. **Full Time (3 years)**

   The Course for the Full Time Diploma in Engineering shall extend over a period of three academic years, consisting of 6 semesters* and the First Year is common to all Engineering Branches.

   b. **Sandwich (3½ years)**

   The Course for the Sandwich Diploma in Engineering shall extend over a period of three and half academic years, consisting of 7 semesters* and the First Year is common to all Engineering Branches. The subjects of three year's full time diploma course being regrouped for academic convenience.

   During 4th and/or during 7th semester the students undergo industrial training for six months / one year. Industrial training examination will be conducted after completion of every 6 months of industrial training.

   c. **Part Time (4 years)**

   The course for the Part Time Diploma in Engineering shall extend over a period of 4 academic years containing of 8 semesters*, the subjects of 3 years' full time diploma courses being regrouped for academic convenience.

   * *Each Semester will have 16 weeks' duration of study with 35 hrs. / Week for Regular Diploma Courses and 18 hrs. / Week for Part-Time Diploma Courses.*

   The Curriculum for all the 6 Semesters of Diploma courses (Engineering & Special Diploma Courses Viz. Textile Technology, Leather Technology, Printing Technology, Chemical Technology etc.) have been revised and revised curriculum is applicable for the candidates admitted from 2020 – 2021 academic year onwards.

2. Condition for Admission:

Condition for admission to the Diploma courses shall be required to have passed in The S.S.L.C Examination of the Board of Secondary Education, Tamil Nadu.

(Or)

The Anglo Indian High School Examination with eligibility for Higher Secondary Course in Tamil Nadu.

(Or)

The Matriculation Examination of Tamil Nadu.

(Or)

Any other Examinations recognized as equivalent to the above by the Board of

Secondary Education, Tamil Nadu.

Note: In addition, at the time of admission the candidate will have to satisfy certain minimum requirements, which may be prescribed from time to time.

3. Admission to Second year (Lateral Entry):

A pass in HSC (academic) or (vocational) courses mentioned in the Higher Secondary Schools in Tamil Nadu affiliated to the Tamil Nadu Higher Secondary Board with eligibility for University Courses of study or equivalent examination & Should have studied the following subjects.

A pass in 2 Years ITI with appropriate Trade or Equivalent examination.

Sl. No	Courses	H.Sc Academic	H.Sc Vocational		Industrial Training Institutes Courses
		Subjects Studied	Subjects Studied		
			Related subjects	Vocational subjects	
1.	All the Regular and Sandwich Diploma Courses	Physics and Chemistry as compulsory along with Mathematics / Biology	Maths / Physics / Chemistry	Related Vocational Subjects Theory& Practical	2 years course to be passed with appropriate Trade
2.	Diploma Course in Commercial Practice	English & Accountancy English & Elements of Economics English & Elements of Commerce	English & Accountancy, English & Elements of Economics, English & Management Principles & Techniques, English & Typewriting	Accountancy & Auditing, Banking, Business Management, Co-operative Management, International Trade, Marketing & Salesmanship, Insurance & Material Management, Office Secretary ship.	-

- For the Diploma Courses related with Engineering/Technology, the related / equivalent subjects prescribed along with Practical's may also be taken for arriving the eligibility.

- Branch will be allotted according to merit through counseling by the respective Principal as per communal reservation.
- For admission to the Textile Technology, Leather Technology, Printing Technology, Chemical Technology and Commercial Practice Diploma courses the candidates studied the related subjects will be given first preference.
- *Candidates who have studied Commerce Subjects are not eligible for Engineering Diploma Courses.*

4. Age Limit: No Age limit.

5. Medium of Instruction: English

6. Eligibility for the Award of Diploma:

No candidate shall be eligible for the Diploma unless he/she has undergone the prescribed course of study for a period of not less than 3 academic years in any institution affiliated to the State Board of Technical Education and Training, Tamil Nadu, when joined in First Year and two years if joined under Lateral Entry scheme in the second year and passed the prescribed examination.

The minimum and maximum period for completion of Diploma Courses are as given below:

Diploma Course	Minimum Period	Maximum Period
Full Time	3 Years	6 Years
Full Time (Lateral Entry)	2 Years	5 Years
Sandwich	3½ Years	6½ Years
Part Time	4 Years	7 Years

This will come into effect from N Scheme onwards i.e. from the academic year 2020-2021.

7. Subjects of Study and Curriculum outline:

The subjects of study shall be in accordance with the syllabus prescribed from time to time, both in theory and practical subjects.

The curriculum outline is given in Annexure – I.

8. Examinations:

Board Examinations in all subjects of all the semesters under the scheme of examinations will be conducted at the end of each semester.

The internal assessment marks for all the subjects will be awarded on the basis of continuous internal assessment earned during the semester concerned. For each subject 25 marks are allotted for internal assessment. Board Examinations are conducted for 100 marks and reduced to 75.

The total marks for result are 75 + 25 = 100 Marks.

9. Continuous Internal Assessment:

A. For Theory Subjects:

The Internal Assessment marks for a total of 25 marks, which are to be distributed as follows:

i) Subject Attendance   5   Marks

(Award of marks for subject attendance to each subject Theory/Practical will be as per the range given below)

80% - 83%	1 Mark
84% - 87%	2 Marks
88% - 91%	3 Marks
92% - 95%	4 Marks
96% - 100%	5 Marks

ii) Test #   10 Marks

2 Tests each of 2 hours' duration for a total of 50 marks are to be conducted. Average of the these two test marks will be taken and the marks to be reduced to: 05 Marks

The Test – III is to be the Model Examination covering all the five units and the marks obtained will be reduced to :   05 Marks

TEST	UNITS	WHEN TO CONDUCT	MARKS	DURATION
Test I	Unit – I & II	End of 6th week	50	2 Hrs
Test II	Unit – III & IV	End of 12th week	50	2 Hrs
Test III	**Model Examination:** Covering all the 5 Units. (Board Examinations-question paper-pattern).	End of 16th week	100	3 Hrs

From the Academic Year 2022 – 2023 onwards.

Question Paper Pattern for the Test - I and Test – II is as follows. The tests should be conducted by proper schedule. Retest marks should not be considered for internal assessment.

Without Choice:

Part A Type questions:	3 Questions × 3 mark	21 marks
Part B Type questions:	2 Questions × 14 / 15 marks	29 marks
	Total	**50 marks**

iii) Assignment   5 Marks

For each subject Three Assignments are to be given each for 20 marks and the average marks scored should be reduced for 5 marks.

iv) Seminar Presentation   5 Marks

The students have to select the topics either from their subjects or general subjects which will help to improve their grasping capacity as well as their capacity to express the subject in hand. The students will be allowed to prepare the material for the given topic using the library hour and they will be permitted to present seminar (For First and Second Year, the students will be permitted to present the seminar as a group not exceeding six members and each member of the group should participate in the presentation. For the Third Year, the students should present the seminar individually.) The seminar presentation is mandatory for all theory subjects and carries 5 marks for each theory subject. The respective subject faculty may suggest topics to the students and will evaluate the submitted materials and seminar presentation. (2 ½ marks for the material submitted in writing and 2 ½ marks for the seminar presentation). For each subject minimum of two seminars are to be given and the average marks scored should be reduced to 5 marks.

All Test Papers, Assignment Papers / Notebooks and the seminar presentation written material after getting the signature with date from the students must be kept in safe custody in the department for verification and audit. It should be preserved for one semester after publication of Board Exam results and produced to the flying squad and the inspection team at the time of inspection/verification.

B. For Practical Subjects:
The Internal Assessment mark for a total of 25 marks which are to be distributed as follows:-

a) Attendance   : **5 Marks**
                        (Award of marks same as theory subjects)

b) Procedure/ observation and tabulation/

   Other Practical related Work   : **10 Marks**

c) Record writing   : **10 Marks**

      TOTAL   : **25 Marks**

- *All the Experiments/Exercises indicated in the syllabus should be completed and the same to be given for final Board examinations.*

- The observation note book / manual should be maintained for 10 marks. The observation note book / manual with sketches, circuits, programme, reading and calculation written by the students manually depends upon the practical subject during practical classes should be evaluated properly during the practical class hours with date.

- The Record work for every completed exercise should be submitted in the subsequent practical classes and marks should be awarded for 10 marks for each exercise as per the above allocation.

- At the end of the Semester, the average marks of all the exercises should be calculated for 20 marks (including Observation and Record writing) and the marks awarded for attendance is to be added to arrive at the internal assessment mark for Practical. (20+5=25 marks)

- Only regular students, appearing first time have to submit the duly signed bonafide record note book/file during the Practical Board Examinations.

All the marks awarded for Assignments, Tests, Seminar presentation and Attendance should be entered periodically in the Personal Theory Log Book of the staff, who is handling the theory subject.

The marks awarded for Observation, Record work and Attendance should be entered periodically in the Personal Practical Log Book of the staff, who is handling the practical subject.

10. **Communication Skill Practical, Computer Application Practical and Physical**

   Education:

   The Communication Skill Practical and Computer Application Practical with more emphasis are being introduced in First Year. Much Stress is given to increase the Communication skill and ICT skill of students.
   As per the recommendation of MHRD and under Fit India scheme, the Physical education is introduced to encourage students to remain healthy and fit by including physical activities and sports.

11. **Project Work and Internship:**

   The students of all the Diploma Courses have to do a Project Work as part of the Curriculum and in partial fulfillment for the award of Diploma by the State Board of Technical Education and Training, Tamil Nadu. In order to encourage students to do worthwhile and innovative projects, every year

prizes are awarded for the best three projects i.e. institution wise, region wise and state wise. **The Project work must be reviewed twice in the same semester. The project work is approved during the V semester by the properly constituted committee with guidelines.**

a) Internal assessment mark for Project Work & Internship:

Project Review I	…	**10 marks**
Project Review II	…	**10 marks**
Attendance	…	**05 marks** (Award of marks same as theory subject pattern)
Total	…	**25 marks**

Proper record should be maintained for the two Project Reviews and preserved for one semester after the publication of Board Exams results. It should be produced to the flying squad and the inspection team at the time of inspection/verification.

b) Allocation of Marks for Project Work & Internship in Board Examinations:

Demonstration/Presentation	25 marks
Report	25 marks
Viva Voce	30 marks
Internship Report	20 marks
Total	**100* marks**

*Examination will be conducted for 100 marks and will be converted to 75 marks.

c) Internship Report:

The internship training for a period of two weeks shall be undergone by every candidate at the end of IV / V semester during vacation. The certificate shall be produced along with the internship report for evaluation. The evaluation of internship training shall be done along with final year "Project Work & Internship" for 20 marks. The internship shall be undertaken in any industry / Government or Private certified agencies which are in social sector / Govt. Skill Centres / Institutions / Schemes.

A neatly prepared PROJECT REPORT as per the format has to be submitted by individual student during the Project Work & Internship Board examination.

12. Scheme of Examinations:

The Scheme of examinations for subjects is given in Annexure - II.

13.Criteria for Pass:

1. No candidate shall be eligible for the award of Diploma unless he/she has undergone the prescribed course of study successfully in an institution approved by AICTE and affiliated to the State Board of Technical Education & Training, Tamil Nadu and pass all the subjects prescribed in the curriculum.

2. A candidate shall be declared to have passed the examination in a subject if he/she secures not less than *40% in theory subjects* and *50% in practical subjects* out of the total prescribed maximum marks including both the Internal Assessment and the Board Examinations marks put together, subject to the condition that he/she secures at least a minimum of 4*0 marks out of 100 marks in the Board Theory Examinations and a minimum of 50 marks out of 100 marks in the Board Practical Examinations.*

14. **Classification of successful candidates:**

Classification of candidates who will pass out the final examinations from April 2023 onwards (Joined first year in 2020 -2021) will be done as specified below.

First Class with Superlative Distinction:

A candidate will be declared to have passed in **First Class with Superlative Distinction** if he/she secures not less than 75% of the marks in all the subjects and passes all the semesters in the first appearance itself and passes all subjects within the stipulated period of study 2 / 3 / 3½ / 4 years [Full time (lateral entry)/Full Time/Sandwich/Part Time] without any break in study.

First Class with Distinction:

A candidate will be declared to have passed in **First Class with Distinction** if he/she secures not less than 75% of the aggregate marks in all the semesters put together and passes all the semesters except the I and II semester in the first appearance itself and passes all subjects within the stipulated period of study 2 / 3 / 3½ / 4 years [Full time(lateral entry)/Full Time/Sandwich/Part Time] without any break in study.

First Class:

A candidate will be declared to have passed in **First Class** if he/she secures not less than 60% of the aggregate marks in all the semesters put together and passes all the subjects within the stipulated

period of study 2 / 3 / 3½ / 4 years [Full time (lateral entry)/Full Time/Sandwich/Part Time] without any break in study.

Second Class:

All other successful candidates will be declared to have passed in **Second Class.**

The above classifications are also applicable for the Sandwich / Part-Time students who pass out Final Examination from October 2023 /April 2024 onwards (both joined First Year in 2020 -2021)

15. **Duration of a period in the Class Time Table:**

The duration of each period of instruction is 1 hour and the total period of instruction hours excluding interval and lunch break in a day should be uniformly maintained as 7 hours corresponding to 7 periods of instruction (Theory & Practical).

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Board Examination-Question Paper Pattern

Time: 3 Hrs.   Max.Marks:100

PART - A   Ten questions will be asked covering all units. All questions are to be answered. Each question carries 3 mark.

PART-B   Five questions will be asked Either or type. One question from every unit. Answer either A or B. Each question carries 14 marks. A and B have subdivisions.

The questions are to be numbered from 1 to 15. All the units are to be covered with equal weightage.

PART A Definitions and Statements. Question Number 1 to 10	10 X 3 = 30 Marks
PART B Descriptive answer type questions (Either A or B) Question number 11 to 15	5 X14 = 70 Marks
TOTAL	100 Marks

Note: Board Examinations will be conducted for 100 Marks and converted to 75 Marks.

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BRANCH CODE: DIPLOMA IN COMPUTER ENGINEERING AND IoT

SYLLABUS

CURRICULUM OUTLINE

III Semester

Subject Code	SUBJECT	HOURS PER WEEK			
		Theory hours	Drawing hours	Practical hours	Total hours
4058310	**Fundamentals of Electrical and Electronics Engineering**	5	-	-	5
4052320	Operating System*	5	-	-	5
4052330	C Programming and Data structures*	6	-	-	6
4058340	**Fundamentals of Electrical and Electronics Engineering Practical**	-	-	4	4
4052350	Linux Practical*	-	-	4	4
4052360	C Programming and Data Structures Practical*	-	-	4	4
4058370	**E Publishing & Multimedia System Practical**	-	-	4	4
	Library & Physical Education	-	-	-	3
Total		**16**		**16**	**35**

* - Common with Computer Engineering

IV Semester

Subject Code	SUBJECT	HOURS PER WEEK			
		Theory hours	Drawing hours	Practical hours	Total hours
4058410	**Sensors and Actuators**	5	-	-	5
4058420	**Digital Electronics and Microcontrollers**	5	-	-	5
4052430	Object Oriented Programming with Java*	5	-	-	5
4052533	Mobile Computing*	5	-	-	5
4058450	**Digital Electronics and Microcontrollers Practical**	-	-	4	4
4052460	Java Programming Practical*	-	-	4	4
4052563	Mobile Computing Practical*	-	-	4	4
	Library & Physical Education	-	-	-	3
Total		**20**	**-**	**12**	**35**

* - Common with Computer Engineering

V Semester

Subject Code	SUBJECT	HOURS PER WEEK			
		Theory hours	Drawing hours	Practical hours	Total hours
4052510	Python Programming *	5	-	-	5
4058520	**Internet of Things**	6	-	-	6
4052633	Data science and Big Data *	5	-	-	5
4058540	**Programming in Python Practical**	-	-	4	4
4052653	Data science and Big Data Practical*	-	-	4	4
4058560	**IoT & Cloud Computing Practical**	-	-	4	5
4058570	Entrepreneurship and Startup#	-	-	4	4
	Library & Physical Education	-	-	-	3
Total		**16**	**-**	**16**	**35**

* - Common with Computer Engineering
 # - Common with all branches

VI Semester

Subject Code	SUBJECT	HOURS PER WEEK			
		Theory hours	Drawing hours	Practical hours	Total hours
4058610	**Robotics and Artificial Intelligence**	5	-	-	5
4058620	**Industrial IoT**	6	-	-	6
4052620	Computer Networks and Security *	5	-	-	5
4052640	Computer Hardware and Networking Practical*	-	-	5	5
4058650	**Industrial IoT Practical**	-	-	5	5
4058660	**Project work and internship#**	-	-	6	6
	Library & Physical Education	-	-	-	3
Total		**16**		**16**	**35**

* - Common with Computer Engineering

SCHEME OF EXAMINATIONS

STATE BOARD OF TECHNICAL EDUCATION & TRAINING, TAMILNADU DIPLOMA IN ENGINEERING / TECHNOLOGY SYLLABUS

N – SCHEME

SCHEME OF EXAMINATION

1058 DIPLOMA IN COMPUTER ENGINEERING AND IOT (FULL TIME)

III Semester

Subject Code	SUBJECT	Examination Marks			Minimum for Pass	Duration of Exam Hours
		Internal Assessment marks	Board Exam Marks	Total Marks		
4058310	**Fundamentals of Electrical and Electronics ngineering**	**25**	**100***	**100**	**40**	**3**
4052320	Operating System*	**25**	**100***	**100**	**40**	**3**
4052330	C Programming and Data structures*	**25**	**100***	**100**	**40**	**3**
4058340	**Fundamentals of Electrical and Electronics Engineering Practical**	**25**	**100***	**100**	**50**	**3**
4052350	Linux Practical*	**25**	**100***	**100**	**50**	**3**
4052360	C Programming and Data Structures Practical*	**25**	**100***	**100**	**50**	**3**
4058370	**E Publishing & Multimedia System Practical**	**25**	**100***	**100**	**50**	**3**
	Total	**175**	**700**	**700**		

* Examinations will be conducted for 100 marks and it will be reduced to 75 marks.

IV Semester

Subject Code	SUBJECT	Examination Marks			Minimum for Pass	Duration of Exam Hours
		Internal Assessment marks	Board Exam Marks	Total Marks		
4058410	**Sensors and Actuators**	**25**	**100***	**100**	**40**	**3**
4058420	**Digital Electronics and Microcontrollers**	**25**	**100***	**100**	**40**	**3**
4052430	Object Oriented Programming with Java*	25	100*	100	40	3
4052533	Mobile Computing*	25	100*	100	40	3
4058450	**Digital Electronics and Microcontrollers Practical**	**25**	**100***	**100**	**50**	**3**
4052460	Java Programming Practical*	25	100*	100	50	3
4052563	Mobile Computing Practical*	25	100*	100	50	3
	Total	**175**	**700**	**700**		

* Examinations will be conducted for 100 marks and it will be reduced to 75 marks.

V Semester

Subject Code	SUBJECT	Examination Marks			Minimum for Pass	Duration of Exam Hours
		Internal Assessment marks	Board Exam Marks	Total Marks		
4052510	Python Programming *	25	100*	100	40	3
4058520	**Internet of Things**	**25**	**100***	**100**	**40**	**3**
4052633	Data science and Big Data *	25	100*	100	40	3
4058540	**Programming in Python Practical**	**25**	**100***	**100**	**50**	**3**
4052653	Data science and Big Data Practical*	25	100*	100	50	3
4058560	**IoT & Cloud Computing Practical**	**25**	**100***	**100**	**50**	**3**
4058570	Entrepreneurship and Startup#	**25**	**100***	**100**	**50**	**3**
	Total	**175**	**700**	**700**		

* Examinations will be conducted for 100 marks and it will be reduced to 75 marks.

VI Semester

Subject Code	SUBJECT	Examination Marks			Minimum for Pass	Duration of Exam Hours
		Internal Assessment marks	Board Exam Marks	Total Marks		
4058610	**Robotics and Artificial Intelligence**	**25**	**100***	**100**	**40**	**3**
4058620	**Industrial IoT**	**25**	**100***	**100**	**40**	**3**
4052620	Computer Networks and Security *	25	100*	100	40	3
4052640	Computer Hardware and Networking Practical*	25	100*	100	50	3
4058650	**Industrial IoT Practical**	**25**	**100***	**100**	**50**	**3**
4058660	**Project work and internship#**	**25**	**100***	**100**	**50**	**3**
	Total	**150**	**600**	**600**		

* Examinations will be conducted for 100 marks and it will be reduced to 75 marks.

DIRECTORATE OF TECHNICAL EDUCATION

DIPLOMA IN COMPUTER ENGINEERING AND IoT

II YEAR

N SCHEME

III SEMESTER

2022-23 onwards

FUNDAMENTALS OF ELECTRICAL AND ELECTRONICS ENGINEERING

CURRICULUM DEVELOPMENT CENTRE

ANNEXURE- III

STATE BOARD OF TECHNICAL EDUCATION &TRAINING, TAMILNADU

DIPLOMA IN ENGINEERING/TECHNOLOGY SYLLABUS

N SCHEME

(Implemented from the Academic year 2022 - 2023 onwards)

Course Name   : Diploma in Computer Engineering and IoT

Subject Code   : 4058310

Semester   : III Semester

Subject Title   : **FUNDAMENTALS OF ELECTRICAL AND ELECTRONICS ENGINEERING**

TEACHING AND SCHEME OF EXAMINATION

No of weeks/ semester: 16 weeks

Subject	Instruction		Examination				
	Hours /Week	Hours /Semester	Marks				Duration
			Internal Assessment	Board Examination	Total		
Fundamental of Electrical and Electronics Engineering	5	80	25	100*	100		3 Hrs

* Examinations will be conducted for 100 marks and it will be reduced to 75 marks.

Topics and allocation of hours

UNIT	TOPIC	Hrs
I	DC FUNDAMENTALS & CIRCUITS	14
II	AC FUNDAMENTALS,BATTERIES AND UPS	16
III	TRANSFORMER AND MOTORS	16
IV	SEMICONDUCTOR DEVICES	14
V	SPECIAL SEMICONDUCTING DEVICES	13
	Tests and Model Exam	7
	Total	80

RATIONALE:

Diploma Engineers from all branches of engineering are expected to have some basic knowledge of electrical and electronics engineering. Also the technicians working in different engineering fields have to deal with various types of electrical equipments. Various types of electronic circuits are used in different electrical equipments. Hence it is necessary to study electric circuits, different types of electrical machines and electronic devices their principles and working characteristics. The basic concepts studied in this subject will be very useful for understanding of higher level subjects in further study.

OBJECTIVES:

On completion of the following units of syllabus contents, the students must be able to:

- ➢ Understand the Safety in while working in Electrical

- ➢ Understand the DC & AC fundametals

- ➢ Connect the series, parallel and series & parallel in resistor and capacitor

- ➢ Understand the batteries and UPS

- ➢ Understand the Transformer, motors princuiples, construction and working

- ➢ Understand the characteristics of Diode, Transisitor and Thyristors

- ➢ Understand the application of Rectifier, semiconductor act as switch and speed control of DC and AC motor

DETAILED SYLLABUS

Contents: Theory

Unit	Name of the topics	Hours
I	**DC Circuits** **1.1 Electrical Safety:** Electric shock – need for earthing - types of earthing, fuses- need – types of fuses **1.2 DC Circuits** Types of Sources – Ideal voltage & Current Source, Branch, Node, loop, Mesh, Network – Basic Electrical Terms & its Definitions – Work, Power, Energy (Only Definition) **1.3 Resistance in Circuits** Priorities of Resistance – Effect of Temperature changes – Law of Resistance – Resistance in Series, Parallel and Series & Parallel – Simple Problem – Ohms Law, Kirchoff Law – Simple network problems **1.4 Electric Fields and Capacitors** Coulomb's Law, Electric Field Strength, Electric Flux and Flux Density - Capacitance (C) – Capacitor Series & Parallel – Energy Stored in Capacitor	14
II	**2.1 AC Fundamental** Difference between AC and DC - Advantages of AC over DC Wave form of sinusoidal A.C - Cycle–Generation of single phase A.C. by elementary alternator - Definition of cycle, frequency, time period, amplitude, peak value, average value and rms value – Define peak factor and form factor -Concept of phase, phase difference and phase angle. Single phase and 3 phase (Definition) - Meaning of lagging and leading sine wave- Advantages of three phase over single phase **2.2 Batteries** Classification of cells - Construction of Lead acid cell – Methods of charging – Care and Maintenance of Lead acid battery – Indications of a fully charge battery – Maintenance free batteries. **2.3 UPS** Need for UPS - Online and Offline UPS – Definition – Block Diagram – Explanation of each block– Merits and demerits of online and offline	16

	UPS–Need of heat sink-Specification and ratings– Maintenance of UPS including batteries.	
III	**Transformer & Motors** **3.1 Single Phase transformer** Working Principle and Construction of transformer – EMF equation of transformer (No derivation) – Voltage and current ratio of a transformer - Efficiency - Losses in a transformer – Auto transformer - Applications – Step up and Step down transformer (Definition only) **3.2 DC Machines** DC generators – construction, principle of operation, types and application - DC motors: - construction, principle of operation, types and application - speed control of DC motor-applications **3.3 Single phase Induction motor** Single phase induction motor – principle of operation – Types – capacitor start motors – Applications **3.4 Special Machines** Stepper motor and Servo motor (construction and working principle) - applications	16
IV	**SEMICONDUCTOR DEVICES** **4.1 Diodes** PN Junction diode– Forward biased and Reverse biased Junction – Working principle – Applications of diode – Zener Diode: Construction-Characteristics (Forward and Reverse) – Applications of Zener diode. Light Emitting Diodes-operation, construction and characteristics – LDR: Principle of operation and Characteristics – Photo Diode–Principle of operation (concept only) - Photo transistor and Opto- coupler **4.2 Rectifiers** Definition – Need of Rectification – Circuit diagram, Operation, i/p and o/p Waveforms of Half wave - Full wave- Bridge rectifiers (without filters) - Uses of filters in rectifier circuit – Comparison - SMPS **4.3 Bipolar Junction Transistor** Definition- Principle of NPN and PNP transistor- Symbol – Transistor terminals - Operating principle (NPN transistor only) -Configurations of transistor.	14

V	**SPECIAL SEMICONDUCTING DEVICES** Thyristor Family – Symbol, Working, Characteristics and Applications - UJT, SCR, DIAC, TRIAC, IGBT and MOSFET **Application Circuits** SCR & MOSFET act as Switch - DC motor using Thyrsitor – AC Speed Control using Thyrsitor - Stepper motor drive	13

Text Books:

1. Fundamental of Electrical and Electronics Principles by Christopher R Robertson, 3rd Edition,

2. Electronics Devices & Circuits by Salivahanan S, N.Suresh Kumar, A.Vallavaraj Tata McGraw Publication 3rd Edition 2016

Reference Books:

1. Fundamentals of Electrical Engineering by Giorgio Rizzoni, Published by McGraw-Hill

2. Fundamental of Electrical and Electronics Engineering by

DIRECTORATE OF TECHNICAL EDUCATION

DIPLOMA IN COMPUTER ENGINEERING AND IoT

II YEAR

N SCHEME

III SEMESTER

2022-23 onwards

OPERATING SYSTEM

CURRICULUM DEVELOPMENT CENTRE

STATE BOARD OF TECHNICAL EDUCATION &TRAINING, TAMILNADU

DIPLOMA IN ENGINEERING/TECHNOLOGY SYLLABUS

N SCHEME
(Implemented from the Academic year 2022 - 2023 onwards)

Course Name   : Diploma in Computer Engineering and IoT

Subject Code   : 4052320

Semester   : III Semester

Subject Title   : **OPERATING SYSTEM**

TEACHING AND SCHEME OF EXAMINATION

No of weeks/ semester: 16 weeks

Subject	Instruction		Examination				Duration
	Hours /Week	Hours /Semester	Marks				
			Internal Assessment	Board Examination	Total		
Operating System	5	80	25	100*	100		3 Hrs

* Examinations will be conducted for 100 marks and it will be reduced to 75 marks.

Topics and allocation of hours

UNIT	TOPIC	Hrs
I	Introduction to Operating System	16
II	Process Management	17
III	Memory Management	13
IV	I/O and File Management, Security and Protection	13
V	Linux–Case study	14
	Tests and Model Exam	7
Total		**80**

RATIONALE:

Students have to be conversant with computer, its terminology and functioning. The heart of a computer is based around its Operating System. The processor deals with request coming from all directions asynchronously. The operating system has to deal with the problems of contention, resource management and both program and user data management, and provide a useful no-wait user interface. The course provides clear vision, understanding and working of Operating Systems.

OBJECTIVES:
- On completion of the following units of syllabus contents, the students must be able to
- Understand the purpose, goals, functions and evolution of Operating Systems.
- Understand the concept of process, process states and their scheduling.
- Classify different types of schedulers and scheduling algorithms.
- Identify the significance of inter-process communication and synchronization.
- Know about the usage of semaphore in inter-process communication.
- Understand the condition for a dead lock, ways to prevent or recover from the deadlock.
- Know about memory protection against unauthorized access and sharing.
- Compare and contrast paging and segmentation techniques.
- Define virtual memory and its underlying concepts.
- Describe page replacement policies and disk scheduling techniques.
- Describe the features and brief history of Linux
- Compare Unix and Linux
- Explain Linux architecture
- Describe the process management, memory management handled by LINUX
- Describe file management, device drivers handled by Linux
- Learn to manage accounts in Linux OS.
- Learn to write shell script.

DETAILED SYLLABUS

Contents: Theory

Unit	Name of the topics	Hours
I	**INTRODUCTION TO OPERATINGSYSTEMS**	16
	Basics of Operating Systems	
	Definition–Types of Operating Systems: Mainframe, Desktop, Multiprocessor, Distributed, Clustered, Multiprogramming, Real time, Embedded and Timesharing, Mobile OS (Android, iOS).	
	Operating System Components	
	Process Management component– Memory Management component - I/O	
	Management component – File Management Component-Protection System– Networking Management component– Command interpreter.	
	Operating System Services	
	Process Execution – I/O operations– File manipulations – Communications–Error detection and recovery–Resource allocation–Accounting–System Protection-System Calls–System call Execution.	
	Operating System Structures	
	Simple structure, Layered, Monolithic, Microkernel Operating Systems – Hybrid Operating System – Views – User, System view –Concept of Virtual Machine–Booting.	
	User Interface	
	Command Line Interface(CLI)based OS–DOS, Unix–Graphic User Interface (GUI) based OS–Windows, Linux–Difference between CLI and GUI.	
II	**PROCESSMANAGEMENT**	
	2.1 Processes	17
	Definition–Process Relationship-Process states–Process State transitions	
	Process Control Block–Context switching–Threads – Concept of multithreads –Benefits of threads–Types of threads.	
	2.2.Process Scheduling	
	Definition–Scheduling objectives–Types of Schedulers–Scheduling criteria – CPU utilization, Throughput, Turnaround Time, Waiting Time,	

	Response Time (Definition only)–Scheduling algorithms – Preemptive and Non – pre emptive - FCFS – SJF –SRT–PS–RR-MQMultiprocessor scheduling– Types-Performance evaluation of the scheduling. **2.3.Inter-process Communication and Synchronization** Definition – Shared Memory System – Message passing–Critical section – Mutual Exclusion-Semaphores. **2.4 Deadlocks** Definition –Deadlock characteristics–Deadlock Prevention–Deadlock Avoidance –Deadlock detection and Recovery.	
III	**MEMORYMANAGEMENT** **Basic Memory Management** Definition – Logical and Physical address map – Memory allocation – Contiguous Memory allocation – Partition allocation -Single, Fixed and Variable partition–Internal and External fragmentation and Compaction – Swapping - Paging – Principle of operation – Page allocation – Hardware support for paging – Protection and sharing – Disadvantages of paging. **Virtual Memory** Basics of Virtual Memory – Hardware and control structures – Locality of reference, Page fault , Working Set , Dirty page/Dirty bit – Demand paging, Segmentation **Page Replacement Algorithms** Optimal (OPT), First In First Out (FIFO), Second Chance (SC), Not Recently Used (NRU) and Least Recently Used (LRU), Advantages and Disadvantages of Virtual Machine.	13
IV	**I/O AND FILEMANAGEMENT** **Disk Management** Disk Structure – Physical structure, Logical structure, Disk formatting, Disk Scheduling and its algorithms, RAID structure of disk, RAID levels0-6. **File Management** File concept – File attributes – Name, Identifier, Type, Location, Size, Time, Date, user identification–File Operations-File system structure–Byte sequence, Record sequence and Tree-based Directory Structure–Single level, Two levels, Tree structured Directory. **Access Methods**	13

		Sequential, Random access – File allocation methods – Contiguous, Linked, Indexed.	
		Security and Protection	
		Security threats–Security Policies and mechanisms – Authentications	
V		**Linux–Case study**	14
		Introduction	
		History of Linux – Features of Linux – Components of Linux system – User space – Kernel space - Linux Architecture - Popular Flavors of Linux- FSF/GNU-Linux Desktop: GNOME- KDE.	
		File System	
		Second extended file system – ext2 – Virtual File System – Different types of files - File Management – File Security – 3 levels – Mounting file system– Unmounting	
		Managing Accounts	
		Types of accounts–Root, System, User–Manage Users and Groups – Create, Modify, Delete a Group – Create, Modify, Delete an account.	
		Shell Programming	
		Linux shell – Types – Graphical, Command Line – Characteristics of Various shells – Bash, Csh / Tcsh, Zsh, Fish – Shell Prompt – Shell scripting–Need for Shell script– Shell script advantages and disadvantages–Script example.	

REFERENCE BOOKS

1. "Operating System Internal and Design Principles", William Stallings, Pearson Education, 7th Edition
2. "Operating System, Principles & Design", Pal Chaudhury, PHILearning, FirstEdition
3. "Operating System",Rohit KhuranaI TLESE, Vikas Publishing Ltd, First Edition 2011
4. "Operating System concepts", Abraham Siberschatz Galvin, Gagne, Wiley Publishers, 9thEdition
5. "Operating Systems", Harvey M. Deiteland Paul J.Deitel, David R.Choffnes,
6. Pearson Education, NewDelhi, Third Edition,2007

Learning Websites

https://en.wikipedia.org/wiki/Operting_system

https://computer.howstuffworks.com/operating-system.htm

https://www.tutorialspoint.com/operating_system/index.htm

https://www.geeksforgeeks.org/operating-systems/

https://codescracker.com/operating-system/

https://www.computerhope.com/os.htm

Shell Script Programs Website links

http://www.codepoc.io/blog/unix

https://books.google.co.in

DIRECTORATE OF TECHNICAL EDUCATION

DIPLOMA IN COMPUTER ENGINEERING AND IoT

II YEAR

N SCHEME

III SEMESTER

2022-23 onwards

C PROGRAMMING & DATA STRUCTURES

CURRICULUM DEVELOPMENT CENTRE

DIPLOMA IN ENGINEERING/TECHNOLOGY SYLLABUS

Course Name   : Diploma in Computer Engineering and IoT

Subject Code   : 4052330

Semester   : III

Subject title   : C Programming and Data Structures

TEACHING AND SCHEME OF EXAMINATION

No. of weeks per Semester: 16 weeks

Subject	Instructions		Examination			
	Hours /Week	Hours/ Semester	Marks			Duration
			Internal Assessment	Board Examinations	Total	
C Programming and Data Structures	6	96	25	100*	100	3Hrs

*Examinations will be conducted for 100 marks and it will be reduced to 75 marks.

Topics and Allocation of Hours

Unit	Topics	Hours
I	Program Development & Introduction To C	18
II	Decision Making, Arrays , Strings, Functions	18
III	Structures, Unions And Pointers	17
IV	Introduction To Data Structures, Stack, Queues	17
V	Linked List, Trees, Sorting, Searching	19
	Test and Model Exam	7
	TOTAL	**96**

RATIONALE:

C' is the most widely used computer language, which is being taught as a core course. C is general purpose structural language that is powerful, efficient and compact, which combines features of high level language and low-level language. It is closer to both Curriculum Development Centre, DOTE.

Man and Machine. Due to this inherent flexibility and tolerance it is suitable for different development environments. Due to these powerful features, C has not lost its importance and popularity in recently developed and advanced software industry. C can also be used for system level programming and it is still considered as first priority programming language. This course covers the basic concepts of C. This course will act as "Programming concept developer" for students. It will also act as "Backbone" for subjects like OOPS, Visual Basic, Windows Programming, JAVA etc.

Data structures are the techniques of designing the basic algorithms for real-life projects. In the present era, it is very essential to develop programs and organize data in such a way that it solves a complex problem efficiently. Understanding of data structures is essential and this facilitates to acquire sound knowledge of the insight of hardware requirement to any problem base. The practice and assimilation of data structure techniques is essential for programming.

OBJECTIVES:

At the end of the Course, the Students will able to

- ➢ Define Program, Algorithm and flow chart
- ➢ List down and Explain various program development steps
- ➢ Write down algorithm and flow chart for simple problems.
- ➢ Describe the concepts of Constants, Variables, Data types and operators.
- ➢ Develop programs using input and output operations.
- ➢ Use of command line arguments.
- ➢ Explain compiler controlled directives.
- ➢ Understand the structure and usage of different looping and branching statements.
- ➢ Define arrays and string handling functions.
- ➢ Explain user-defined functions, structures and union.
- ➢ Define pointers and using the concept of Pointers.
- ➢ Define Linear and non-linear data structures.
- ➢ List and discuss the different types of linear data structures.
- ➢ Define a tree and the different terms related with trees.
- ➢ Write the algorithm for different types of sorting and searching.

DETAILED SYLLABUS

Contents: Theory

Unit	Name of the Topics	Hours
I	**PROGRAM DEVELOPMENT & INTRODUCTION TO C** **1.1 Program** Program Definition - Program development cycle – Programming Language levels & features. Algorithm – Properties & classification of Algorithm, flowchart – symbols, importance & advantage of flow chart.	3
	1.2 Introduction to C History of C - Features of C Language - Structure of a C program – Execution of C Program : Compiling, Link and Run a program – Diagrammatic representation of program execution process.	3
	1.3 Variables, Constants & Data types C character set – Tokens – Constants - Keywords – identifiers and Variables - Data types and storage – Data type Qualifiers – Declaration of variables – Assigning values to variables – Escape sequences - Defining symbolic constants	5
	1.4 C operators Arithmetic, Logical, Assignment, Relational, Increment and Decrement, Conditional, Bitwise, Special Operator precedence and Associativity. C expressions – Arithmetic expressions, Evaluation of expressions- Type cast operator. Simple Programs using Operators.	5 .
	1.5 I/O statements Formatted input, formatted output, Unformatted I/O statements	2
II	**DECISION MAKING, ARRAYS, STRINGS, FUNCTIONS** **2.1 Control Statements** Simple if statement – if-else, else-if-ladder statements, switch statement, Looping Statements – while, do _ while and for loop, go to, continue and break statements. Simple programs.	5
	2.2 Arrays Definition – Array element and subscript - Declaration – Initialization of one dimension array elements - Two dimensional arrays – initialization of elements. Simple Programs.	4

		2.3 Strings Introduction – Declaring and Initializing string variables, Reading strings ,Writing strings, String handling functions ─ strlen() , strcpy() , strcmp() ,strcat() and strrev() functions. Simple Programs.	3
		2.4.Built in Functions Declaration and definition of function. Math functions – Console I/O functions – Standard I/O functions – Character Oriented functions – Simple programs.	3
		2.5.User defined functions Defining functions & Needs-, Scope and Life time of Variables, Function call, return values, Recursion – Simple programs	3
III		**STRUCTURES, UNIONS AND POINTERS** **3.1 Structures and Unions** Structure Definition – Variable declaration – initialization – Accessing and giving values to structures, Structures within structures, Arrays within structures. Unions: Declaration – initialization. Difference between Union and Structure. Simple programs.	7
		3.2 Pointers Introduction – Advantages of pointers – Accessing the address of a variable – Declaring and Initializing pointers – Accessing a variable through its pointer –Pointer Expressions. Simple programs	4
		3.3 Dynamic memory allocation Advanatges – malloc(), calloc(), realloc() and free() functions. Simpleprograms	2
		3.4 File Management Introduction ─ Defining and Opening a file, Closing a file, Input/output operations on files. **Command line arguments :**Introduction – argv and argc arguments . Simple programs.	4
IV		**INTRODUCTION TO DATA STRUCTURES, STACK, QUEUES** **4.1 Introduction to Data Structures** Introduction - Data and Information - Elementary data structure organization - Types of data structures - Primitive and Non Primitive data structures, Operations on data structures: Traversing, Inserting, Deleting, Searching, Sorting, Merging, Different Approaches to designing an algorithm: Top-Down approach, Bottom-up approach (Definition and examples only) **4.2 Definition of a Stack**	8.

	Operations on Stack (PUSH & POP) - Implementing Push and Popperations - Implementation of stack through arrays – Applications of Stack : Reversing a list - Polish notations — Conversion of infix to postfix expression, Evaluation of postfix expression.	6
	4.3 Queues Definition – Representation of Queue using arrays – Circular Queue, Dequeue (Definition and Examples only)	3
V	**LINKED LIST, TREES, SORTING, SEARCHING** **5.1 Terminologies** Node, Address, Pointer, Information, Null Pointer, Empty list -. Type of lists : Singly linked list , Doubly linked list, Circular list - Representation of singly linked lists in Memory-Difference between Linked & sequential List — Advantages and Disadvantages of Linked list. (Concepts only, no implementations)	7
	5.2. Trees Terminologies: Degree of a node, degree of a tree, level of a node, leaf node, Depth / Height of a tree, In-degree & out-Degree, siblings. In order traversal, Preorder traversal, Post order traversal. (Concepts only, no implementations)	6
	5.4. Sorting Introduction, Types of sorting - Bubble sort, Quick Sort - Examples. Simple programs.	2 .
	5.4 Searching Definition – Algorithms and "C" programs for Linear search and Binary search.	3

TEXT BOOKS:

SI.No	TITLE	AUTHOR	PUBLISHER
1.	Programming in ANSI C	Prof. E. Balagurusamy	Tata Mc-Graw Hill, New Delhi, 4th Edition

REFERENCE BOOKS:

S.No	TITLE	AUTHOR	PUBLISHER
1.	A Text Book on C	E. Karthikeyan	PHI Private Limited, New Delhi
2.	Programming with C	Byron Gottfried.	Schaum Series -TMGH
3.	Programming and Problem solving using C	ISRD Group, Lucknow	Tata Mc-GrawHill, NewDelhi
4.	Let us C	Yashavent Kanethar	BPB Publication, 2005, New Delhi
5.	Introduction to Data structures with applications.	Trembley and Sorenson	Tata Mc-GrawHill, NewDelhi
6.	Fundamentals of Data structures in C	Horowitz , sahni Anderson- freed	University Press, Hyderabad
7.	Introduction to Data structures	Bhagat Singh	TMGH, New Delhi
8.	Data Structures and Algorithms	G.A. Vijayalakshmi Pai	TMGH, New Delhi

DIRECTORATE OF TECHNICAL EDUCATION

DIPLOMA IN COMPUTER ENGINEERING AND IoT

II YEAR

N SCHEME

III SEMESTER

2022-23 onwards

FUNDAMENTALS OF ELECTRICAL AND ELECTRONICS ENGINEERING PRACTICAL

CURRICULUM DEVELOPMENT CENTRE

ANNEXURE- III

DIPLOMA IN ENGINEERING / TECHNOLOGY SYLLABUS

Course Name   : Diploma in Computer Engineering and IoT

Subject code   : 4058340

Semester   : III

Subject title   : **Fundamentals of Electrical and Electronics Engineering Practical**

TEACHING AND SCHEME OF EXAMINATION:

No. of weeks/ Semester: 16weeks

Subject	Instruction		Examination				
	Hours /week	Hours /semester	Mark				Duration
			Internal Assessment	Board Examination	Total		
Fundamentals of Electrical and Electronics Engineering Practical	4	64	25	100*	100		3 Hours

*Examination will be conducted for 100 marks and it will be reduced to 75 marks.

OBJECTIVES:

At the end of the semester, students will be able to

- ➢ Verify the Simple Electrical Laws
- ➢ Measure the voltage, current and power in Single phase circuit
- ➢ Verify power supply of SMPS
- ➢ Test the DC motor and Transformer
- ➢ Study the characteristics of SCR
- ➢ Function of Rectifier circuit
- ➢ Test the performance of LED, LDR
- ➢ Know about the function of a Transistor
- ➢ Control the DC and AC motor Speed using MOSFET / SCR

DETAILED SYLLABUS

Contents: Practical

List of experiments

1.	Verify Kirchhoff's current Law and Voltage Law
2.	Calibration of given ammeter and voltmeter
3	Measurement of power and power factor of single phase load
4	Load test on DC shunt motor
5	Conduct Load test on Single phase transformer
6	Checking of power supply in SMPS
7	Construct the circuit for Half wave and Full wave Rectifier with and without filter
8	Construct the circuit and draw the VI characteristics of LED and LDR
9	Construct and test the circuit for Transistor act as an amplifier
10	Construct and test the circuit for MOSFET act as a switch
11	Speed control of DC motor using SCR / MOSFET
12	Speed control of AC motor using SCR / MOSFET
13	Testing of Stepper motor drive

BOARDEXAMINATION

DETAILED ALLOCATION OF MARKS SCHEME OF VALUATION	
Writing any one Experiment (CIRCUIT DAIGRAM,TABULAR COLUMN, EQUATION / FORMULA)	45 Marks
Construction	40 Marks
Result	10 Marks
VIVA–VOCE	05 Marks
Total	100 Marks

List of Equipment

EQUIPMENTS/COMPONENTS REQUIRED

SI. No	Name of the Equipment	Range	Required Quantity
1.	DC Voltmeter	0-5/10V, 0-30V, 0-300V	Each 5 No's

2.	AC Voltmeter	0-150V, 0-300V,	Each 5 No's
3.	AC Ammeter – various ranges	0-1/2 A, 0 -5 /10 A, 0 -10 / 20A	Each 5 No's
4.	DC Ammeter – various ranges	0-2A,0-5A,0-10A	Each 5 No's
5.	Wattmeter – various ranges	UPF 150 / 300 V ,5 / 10A	5 No's
6.	Single phase Lamp Load	1 kW	1 No
7.	DC Shunt motor with Loading arrangement	3 / 5 kW	1 No
8.	Single phase Transformer	1 kVA, 220V / 110V	1 No
9.	Auto Transformer	(0-250) V, 15 A	1 No
10.	SMPS Trainer Kit	-	1 No
11.	DC Motor Speed control trainer kit	-	1 No
12.	AC motor speed control trainer kit	-	1 No
13.	Stepper motor Trainer kit	-	1 No
14.	Dual Regulated Power Supply	0-30V/2A	5 No's
15.	Tachometer Digital type	-	1 No

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II YEAR

N SCHEME

III SEMESTER

2022-23 onwards

OPERATING SYSTEMS PRACTICAL

CURRICULUM DEVELOPMENT CENTRE

ANNEXURE- III

DIPLOMA IN ENGINEERING / TECHNOLOGY SYLLABUS

Course Name   : Diploma in Computer Engineering and IoT

Subject code   : 4052350

Semester   : III

Subject title   : **Operating System Practical**

TEACHING AND SCHEME OF EXAMINATION:

No. of weeks/ Semester: 16weeks

Subject	Instruction		Examination				
	Hours /week	Hours /semester	Mark				Duration
			Internal Assessment	Board Examination	Total		
Operating System Practical	4	64	25	100*	100	3 Hours	

*Examination will be conducted for 100 marks and it will be reduced to 75 marks.

RATIONALE:

- Linux is an open-source Operating System which offer a variety of functions, programs or applications and Linux software to choose from, to the users, most of them are free. It has a good graphical user interface (GUI) and almost all the functionality that other proprietary OS offer.

- This practical enables to learn the commands used to perform various operations in a Linux system and write shell scripts for various functions. One of the top practical uses for Linux is web application development.

OBJECTIVES:

On completion of the following exercises, the students must be able to

- Login and logoff Procedures
- Use of General purpose commands
- Explain the use of simple filters and advanced filters.
- Know the details of process status
- Use Various communication Commands Search patterns
- Use of shell scripts and define the elements of the shell script
- Write shell script for various problems.

DETAILEDSYLLABUS

Contents: Practical

Units	Topics	Hours
I	**Basics of Linux OS:** Entering and Exiting from a Linux system– User Accounts- General understanding of various application programs–Different shells	**2**
II	**Linux Commands:** Learn the syntax and usage of :Directory Management Commands-File Management Commands-General Purpose Commands-Simple Filters– Advanced Filters-Communication Commands-Check the Process Status-Process Management Commands-Search Patterns- Exercises.	**28**
III	**Text Editor:** File operations (New, Open, Close, Save, Save and Exit, Print) –Text Editing operations (Inserting, deleting, finding, replacing, copying and moving).	**2**
IV	**Shell Scripts:** Use of shell scripts –Numerical operations - Looping– Swapping Technique-String operations– Using Command line arguments – Filters – Date Functions – Relational operations-Logical operations-Boolean operations-Basic arithmetic operations – Case statement – Search Directory or File - Exercises.	**32**

LAB EXERCISES

Contents: Practical

PART–A LINUX COMMANDS

Write down the syntax and usage of the following exercise with all options.

Check the commands with the system

1 Usage of Directory Management commands: ls, cd, pwd, mkdir, rmdir

2 Usage of File Management commands: cat, chmod, cp, mv, rm, more

3 Use the General Purpose commands: wc, cal, date, who, tty, ln

4 Using the Simple filters: pr, head, tail, cut, paste, nl ,sort

5 Advanced filters: Search for a pattern using grep, egrep, fgrep, uniq

Communication Commands: write, wall

6 Check the details of process name, PID, status using ps command. Process Management commands:&,nohup, kill, nice

7 Device pattern using meta character to match each of the following situation:

    All three character filenames.

    All filenames that contains the characters 'a 'or 'b 'or' c.'

    All filenames beginning with a particular string.

    All filenames beginning with 'ca' and ending with two digits.

    All filenames beginning with 's 'and having 'a' at somewhere.

PART– BSHELL SCRIPTS

1 Write a shell script that accepts a numerical value N. Then display the   Decrementing value of N till it reaches 0.

2 Write a shell script to search a string and display it.

3 Write a shell script that takes three command line arguments. The first argument is the name of the destination file and the other two arguments are Names of files to be placed in the destination file.

4 Write a shell script to print contents of file from given line number to next given Number of lines.

5 Write a shell script that print out date information in this order: time, day of The week, day number, year– that is like this.21:18:00 IST Mon16 Aug2021

6 Develop a Basic math Calculator using case statement

7 Write a shell script that represents a multiple choice question, gets the user's

Answer and report back whether the answer is right, wrong or not one of the choices.

8 Write a shell script that takes a command line argument and reports on Whether it is a directory, a file or something else.

DETAILED ALLOCATION OF MARKS
SCHEME OF VALUATION

Correctness of Commands in Part-A	20 Marks
Execution of Commands in Part-A	20 Marks
Writing program in Part-B	20 Marks
Execution of program in Part-B 2	5 Marks
Printed Output (Part–A)	5 Marks
Printed Output (Part–B)	5 Marks
VIVA– VOCE	5 Marks
TOTAL	**100 Marks**

HARDWARE AND SOFTWARE REQUIREMENTS

Minimum Hardware Requirements:

Desktop Computers   :   20 Nos

Laser Printer   :   1No.

Minimum Software Requirements:

Operating System: Any Linux Based GUI Operating System

DIRECTORATE OF TECHNICAL EDUCATION

DIPLOMA IN COMPUTER ENGINEERING AND IoT

II YEAR

N SCHEME

III SEMESTER

2022-23 onwards

C PROGRAMMIG AND DATA STRUCTURES PRACTICAL

CURRICULUM DEVELOPMENT CENTRE

ANNEXURE- III

DIPLOMA IN ENGINEERING / TECHNOLOGY SYLLABUS

Course Name   : Diploma in Computer Engineering and IoT

Subject code   : 4052360

Semester   : III

Subject title   : **C Programming and Data Structures Practical**

TEACHING AND SCHEME OF EXAMINATION

No. of weeks per Semester: 16 weeks

Subject	Instructions		Examination				Duration
	Hours / Week	Hours / Semester	Marks				
			Internal Assessment	Board Examinations	Total		
C Programming and Data Structures Practical	4	64	25	100*	100		3Hrs.

 * **Examinations will be conducted for 100 marks and it will be reduced to 75 marks.**

OBJECTIVES:

At the end of the Course, the Students will able to

- ➢ Analyze the given problem.
- ➢ Think the logic to solve the given problem.
- ➢ Describe the concepts of constants, variables, data types and operators.
- ➢ Develop programs using input and output operations.
- ➢ Write programs using command line arguments.
- ➢ Write programs using compiler control directives.
- ➢ Write programs using different looping and branching statements.
- ➢ Write programs based on arrays.
- ➢ Write Programs using string handling functions.
- ➢ Write programs using user-defined functions, Structures and Union.
- ➢ Write programs using the concept of Pointers.
- ➢ Understand the use of arrays

> ➢ Implement linear data structure algorithms using C language.

> ➢ Implement non - linear data structure algorithms using C language.

> ➢ Write programs for traversing a binary tree.

> ➢ Write programs for searching and sorting.

DETAILED SYLLABUS

Contents: Practical

PART – A

1. Write a simple C Program

> a. Print your Name and Address

> b. Find Simple interest and Compound interest.

2. Write a C program to swap two variable's using

> (i) third variable and (ii) without using a third variable.

3. Write a program to find the largest number between given three numbers.

4. Write a program to print all prime numbers from 1 to N.

5. Write a program to prepare the total marks for N students by reading the

> Reg.No, Name, Mark1 to Mark6 by using array of structures.

6. Write a program using the function power (a,b) to calculate the value of a raised to b.

7. Write a program to find the length of the given string using pointers.

8. Write a program to find factorial of a number using recursion.

PART – B

9. Write a program in 'C' to create a singly linked list containing at least five

> elements. Make necessary assumptions.

10. Write a "C" program to perform operations in stack using array.

11. Write a "C" propgram to convert an infix expression into post fix expression.

12. Write a "C" program to perform operations in queue using array.

13. Write a "C" program to add two 3 x 3 matrices and display the result in Matrix form.

14. Write a "C" program to read 10 elements and sort the above numbers

> using bubble sort.

15. Write a "C" Program for binary searching.

BOARD EXAMINATION

DETAILED ALLOCATION OF MARKS

SCHEME OF VALUATION

Writing any one program from PART – A	20 Marks
Writing any one program from PART – B	25 Marks
Executing program (PART – A)	20 Marks
Executing program (PART – B)	20 Marks
Result with printout (PART – A)	05 Marks
Result with printout (PART – B)	05 Marks
VIVA – VOCE	05 Marks
Total	**100 Marks**

HARDWARE REQUIREMENT:

Desktop Computers - 30 No's

Laser Printer - 1 No

SOFTWARE REQUIREMENT:

C – Compiler with Editor.

DIRECTORATE OF TECHNICAL EDUCATION

DIPLOMA IN COMPUTER ENGINEERING AND IoT

II YEAR

N SCHEME

III SEMESTER

2022-23 onwards

E PUBLISHING & MULTIMEDIA SYSTEM PRACTICAL

CURRICULUM DEVELOPMENT CENTRE

ANNEXURE- III

DIPLOMA IN ENGINEERING / TECHNOLOGY SYLLABUS

Course Name   : Diploma in Computer Engineering and IoT

Subject code   : 4058370

Semester   : III

Subject title   : E Publishing & Multimedia System Practical

TEACHING AND SCHEME OF EXAMINATION

No. of weeks per Semester: 16 weeks

Subject	Instructions		Examination				
	Hours / Week	Hours / Semester	Marks				Duration
			Internal Assessment	Board Examinations	Total		
E Publishing & Multimedia System Practical	4	64	25	100*	100		3Hrs.

* **Examinations will be conducted for 100 marks and it will be reduced to75 marks.**

OBJECTIVES:

On completion of the following exercises, the students must be able to

➢ Learn all tools and options in CorelDraw.

➢ Create designs like Bit Notice, Notebook Wrapper, Invitation and Calendar in

➢ CorelDraw or any open source software.

➢ Learn all tools and options in Photo Shop.

➢ Create designs using layers, tools, text effects and filters in Photoshop or any equivalent open source software.

➢ Learn to use character styles, paragraph styles, text effects and text frame in Adobe in design or any equivalent open source software

➢ Create master page, multipage document and monthly calendar in Adobe in Design.

➢ Create Audio / Video hardware & software applications.

➢ Record & edit digital audio using sound editing software.

➢ Learn about video editing.

➢ Apply various filters & Compression techniques in Multimedia Applications.

    o Learn photo editing software.

    o Learn about 2D, 3D and cloud animation.

DETAILED SYLLABUS

Contents: Practical

PART – A (E – Publishing)

1. Create a design using all basic tools and make changes using shape tool.
2. Create a notebook wrapper design using fountain filling and pattern filling tools.
3. Create an invitation using arrange menu commands like transformations, align and distribute and order.
4. Transform one object into another object using blend tool.
5. Create a calendar with the help of Grid Tool, Power clip and import commands.
6. Create a design by applying the various filtering effects.
7. Create a simple layout and master page by using master page palette and Character Styles.
8. Using multiple layers, create a design with the use of masking various images.

PART – B (Multimedia)

9. Use a audio processing software and perform the audio editing tasks – Import audio, select and edit the sound, create fade-in and fade-out effects, label audio segments, use noise remove filter, mix multiple sound sources, change stereo to mono tracks, export audio to different format and save.
10. Use a video processing software to perform – Trim video clips, rotate video, merge video, split video, add titles, add special effects and edit video dimensions, bit rate, frame rate, sample rate, channel.
11. Create a movie from video clips to demonstrate – Audio-Video mixing, add music, video effects, video transition and titles.
12. Create a moving cloud animation using any animation software.
13. Create a 2D animation using motion guide layer and masking.
14. Design a metallic text using 3D animation tool

BOARD EXAMINATION

DETAILED ALLOCATION OF MARKS

SCHEME OF VALUATION

Writing any one program from PART – A	20 Marks
Writing any one program from PART – B	25 Marks
Executing program (PART – A)	20 Marks
Executing program (PART – B)	20 Marks
Result with printout (PART – A)	05 Marks
Result with printout (PART – B)	05 Marks
VIVA – VOCE	05 Marks
Total	**100 Marks**

HARDWARE REQUIREMENT:

I Desktop PCs– 30 Nos

II Laser Printer Monochrome, Color – 1 No

III Digital (Video) Camera - 1No.

IV Flat bed A4 size Scanner - 1 No.

SOFTWARE REQUIREMENT:

Any Open Source Software (E –Publishing)

- GIMP
- Scribus
- Inkscape
- Krita
- Pinta
- Shotwell or any equivalent open source software. [or]
- Corel draw, Photoshop, Adobe in design**. (optional)**

[Open source software usage is recommended than proprietary for doing lab exercises]

Multimedia:

Operating system: Windows 7, Windows 10, Linux

Software tools: Open Source Software or Commercial Software.

The following is the suggestive list of open source software and their commercial replacement. Experiments may be done using either open source software or commercial software.

3D Graphics and Animation

1. Art of Illusion Replaces: AutoDesk Maya
2. Blender Replaces: AutoDesk Maya

Audio Players

3. aTunes, Audacious, Clementine are Replaces: iTunes
4. CoolPlayer, MPH-HC Replaces: Windows Media Player
5. Zing Replaces: Windows Media Player

Audio Recorders and Editors

6. Audacity Replaces: Sonar X1, Sony ACID, Adobe Audition
7. Frinika Replaces: Sonar X1, Sony ACID

Audio Ripping and Conversion

8. fre:ac, BonkEnc Exact Audio Copy, Audio Convertor Studio
9. CUERipper, CDex Exact Audio Copy
10. MMConvert Exact Audio Copy

Multimedia Players

11. VLC Media Player Replaces: Windows Media Player
12. Mplayer Replaces: Windows Media Player
13. KODI Replaces: Windows Media Player
14. MediaPortal Replaces: Windows Media Player

Video Editing

15. Cinelerra Replaces: Adobe Premiere
16. OpenShot Video Editor Replaces: Adobe Premiere Pro CS5
17. Avidemux Replaces: Adobe Premiere
18. Kdenlive Replaces: Adobe Premiere Pro CS5
19. CineFX Replaces: Adobe Premiere Pro CS5

Video File Conversion

20. DVDx Replaces: Movavi Video Converter, Zamzar
21. DVD Flick Replaces: Movavi Video Converter, Zamzar
22. FFDShow Replaces: Movavi Video Converter, Zamzar

Video Player

23. Miro Replaces: Windows Media Player

DIRECTORATE OF TECHNICAL EDUCATION

DIPLOMA IN COMPUTER ENGINEERING AND IoT

II YEAR

N SCHEME

IV SEMESTER

2022-23 onwards

SENSORS AND ACTUATORS

CURRICULUM DEVELOPMENT CENTRE

ANNEXURE- III

DIPLOMA IN ENGINEERING / TECHNOLOGY SYLLABUS

Course Name : Diploma in Computer Engineering and IoT

Subject code : 4058410

Semester : III

Subject title : **Sensors and Actuators**

TEACHING AND SCHEME OF EXAMINATION

No of weeks/ semester: 16 weeks

Subject	Instruction		Examination				
			Marks				
	Hours /Week	Hours /Semester	Internal Assessment	Board Examination	Total	Duration	
Sensors and Actuators	5	80	25	100*	100	3 Hrs	

Examinations will be conducted for 100 marks and it will be reduced to 75 marks.

Topics **and allocation of hours**

UNIT	TOPIC	Hrs
I	INTRODUCTION BASIC OF MEASUREMENTS	14
II	INDUSTRIAL SENSORS AND TRANSDUCERS	16
III	SENSORS FOR IOT APPLICATIONS	14
IV	ACTUATORS	14
V	SIGNAL CONDITIONING AND DATA ACQUISITION	16
	Tests and Model Exam	7
	Total	80

OBJECTIVES

At the end of the Semester, Students will be able to

➢ Explain static and dynamic characteristics and operating principle of Inductive, capacitive, magnetic, piezo electric, radiation, electro chemical sensors.

➢ Illustrate the importance of standard of calibration.

➢ Describe about actuators.

➢ Select suitable sensor for a given automobile, aeronautics, machine tools and manufacturing application

DETAILED SYLLABUS

Unit	Name of the Topic	Hours
I	**Sensors and Actuators: Introduction** Definition – Sensor, Transducer & Actuator - Classification of sensors – Difference between sensor, transmitter and transduce – Three elements of a sensor - Selection and Characteristics: Range; resolution, Sensitivity, error, repeatability, linearity and accuracy - Requirements for sensor interfacing Sensors for IOT Applications, Structure of IOT – IOT Map Device, Sensor Grid and Wireless Sensor network.	14
II	**Industrial sensors and Transducers** Inductive Transducer: LVDT - Principle of operation, construction details, characteristics and applications Capacitive Transducer: Capacitive pressure sensor Resistance, Proximity sensor. Resistance Transducer: Principle of operation, construction details and applications of Potentiometer, Resistance temperature sensor. Optical sensor **–** Photodiodes, Photovoltaic cell, Phototransistor, PIR sensor, AFIR (Active Far IR) sensor.	16
III	**Sensors for IOT Applications:** Humidity sensor DHT11, Ultrasonic sensor for distance measurement, Level sensor (Float switch), Motion detection sensor, Voltage sensor Piezoelectric accelerometer – Principle of operation and applications Hall Effect sensor – Principle of operation and applications MEMS: Definition, Pressure sensor, Inertial sensor	14

	Smart Sensors: Flexible electronics – Overview and applications, Thin film sensor, Wearable senor – Introduction, Types (Invasive and Non-invasive)	
IV	**Actuators** **Classification of Actuators, Electrical Actuators:** Relay, Solid state relay, Solenoids**,** BLDC Motors – Principle of operation, Stepper drive, Servo drive (Construction, Working and Applications) Electro – Pneumatic Actuators: Control of electro-pneumatic actuators (Block Diagram), Servo valves and Proportional Valves. Magnetostrictive actuator, MEMS actuator – Piezoelectric actuation, Shape Memory Alloys (SMAs)	14
V	**Signal Conditioning and Data Acquisition** Introduction, Functions of Signal Conditioning System, Amplification, Types of Amplifiers, Mechanical Amplifiers Fluid Amplifiers, Optical Amplifiers, Electronic Amplifiers – Types and Principle of Operation Principle of Operation – 2 wire and 4 wire transmitter, Smart transmitters Data Acquisition Systems and Conversion: Introduction, Objectives and Configuration of Data Acquisition System, Block diagram of Digital Data Acquisition Systems Data Conversion: A/D conversion – Principle of Digitization, Types of ADC, Successive Approximation ADC D/A conversion – Types, Resistive ladder type DAC	16

Text Books

1.Patranabis D.," Sensor and Actuators", Prentice Hall of India (Pvt) Ltd., 2005.

2. Renganathan S.," Transducer Engineering", Allied Publishers (P) Ltd., 2003.

3. Nathan. Ida, Sensors, Actuators and Their Interfaces, Scitech Publishers, 2014

5. Bolton W, "Mechatronics", Thomson Press, 2003.

Reference Books

1. Dr. Guillaume Girardin , Antoine Bonnabel, Dr. Eric Mounier, 'Technologies & Sensors for the Internet of Things Businesses & Market Trends 2014 - 2024',Yole Development Copyrights ,2014

2. Peter Waher, 'Learning Internet of Things', Packt Publishing, 2015

3. Editors OvidiuVermesan Peter Friess,'Internet of Things – From Research and Innovation to Market

4. Edward Sazonov and Michael R. Neuman, "Wearable Sensors Fundamentals, Implementation and Applications", Elsevier Inc., 2014.

5. "Wearable and Autonomous Biomedical Devices and Systems for Smart Environment", by Aime Lay-Ekuakille and Subhas Chandra Mukhopadhyay, Springer 2010.

6. William S. Wong, Alberto Salleo, Flexible Electronics: Materials and Applications, 2011, 1st Edition, Springer, New

DIRECTORATE OF TECHNICAL EDUCATION

DIPLOMA IN COMPUTER ENGINEERING AND IoT

II YEAR

N SCHEME

IV SEMESTER

2022-23 onwards

DIGITAL ELECTRONICS & MICROCONTROLLER

CURRICULUM DEVELOPMENT CENTRE

STATE BOARD OF TECHNICAL EDUCATION &TRAINING, TAMILNADU

DIPLOMA IN ENGINEERING/TECHNOLOGY SYLLABUS

N SCHEME

(Implemented from the Academic year 2021 - 2022 onwards)

Course Name   : Diploma in Computer Engineering and IoT

Subject Code   : 4058420

Semester   : IV Semester

Subject Title : **DIGITAL ELECTRONICS AND MICROCONTROLLER**

TEACHING AND SCHEME OF EXAMINATION

No of weeks/ semester: 16 weeks

Subject	Instruction		Examination				
	Hours /Week	Hours /Semester	Marks				Duration
			Internal Assessment	Board Examination	Total		
Digital Electronics and Microcontroller	5	80	25	100*	100		3 Hrs

 * Examinations will be conducted for 100 marks and it will be reduced to 75 marks.

Topics and allocation of hours

UNIT	TOPIC	Hrs
I	BOOLEAN ALGEBRA AND ARITHMETIC OPERATIONS	14
II	COMBINATIONAL AND SEQUENTIAL LOGIC CIRCUITS	16
III	8051 MICROCONTROLLER	16
IV	PERIPHERALS OF 8051	14
V	ADVANCED MICROCONTROLLERS	13
	Tests and Model Exam	7
	Total	80

RATIONALE:

The subject Digital Electronics holds applications in all branches of engineering instrumentation and Industrial Automation. This will impart in depth knowledge of Number Systems, Logics of Combinational &Sequential circuits and memories.

This subject also will enable the students to learn about microcontroller 8051 architecture, Pin details, Instruction sets, Programming and interfacing. This subject enables the students to do the project effectively. It also helps the students to choose the field of interest. If the student is aiming for higher studies, this subject is foundation.

OBJECTIVES:

On completion of the following units of syllabus contents, the students must be able to:

➢ Understand various Number Systems used in Digital Circuits
➢ Understand basic Boolean postulates and laws.
➢ Understand the concept of Karnaugh Map.
➢ Learn about Basic logic Gates.
➢ Learn the different digital logic families
➢ Learn arithmetic circuits- Adder/Subtractor
➢ Understand the encoder/decoder & MUX / DEMUX
➢ Understand the concept of parity Generator and checker
➢ Understand various types of flip-flops.
➢ Understand various types of counters and shift registers
➢ Know the difference between microprocessor and microcontroller.
➢ Understand the architecture of 8051.
➢ Understand the programming of I/O ports and TimerProgramming.
➢ Use the interfacing techniques
➢ Know the types of microcontrollers

DETAILED SYLLABUS

Contents: Theory

Unit	Name of the topics	Hours
I	**BOOLEAN ALGEBRA AND ARITHMETIC OPERATIONS** **1.1: NUMBER SYSTEMS** Decimal – Binary – Octal – Hexadecimal – BCD – Conversion from one number system to other using Calculator – Boolean Algebra – Basic laws and Demorgan's Theorems **1.2: UNIVERSAL GATES** Realization of basic logic gates using universal gates NAND and NOR – Tristate Buffer circuit **1.3: PROBLEMS USING 2 AND 3 VARIABLES** Boolean expression for outputs – Simplification of Boolean expression using Karnaugh map (up to 3 variable)- Constructing logic circuits for the Boolean expressions **1.4: ARITHMETIC CIRCUITS** Half Adder-Full Adder-Half Subtractor-Full Subtractor	14
II	**COMBINATIONAL AND SEQUENTIALLOGIC CIRCUITS** **2.1: Combinational Circuits** Parity Generator and Checker, Encoder, Decoder, 4 to 1 Multiplexer, 1 to 4 De-multiplexer **2.2: FLIP-FLOPS (FF)** RS FF– JKMS FF – D and T FF **2.3: COUNTERS** 4 bit Asynchronous Up Counter – Mod N counter **2.4: SHIFT REGISTER** 4 bit shift register – Serial in Serial out **2.5 Memories** Classification of Memories Devices – RAM, ROM, Flash memeory (Only Defination)	16
III	**8051 Microcontroller** **3.1: Architecture** Architecture diagram of microcontroller 8051 - Functions of each block	16

	- Pin details of 8051 – Memory organization of 8051- Special function registers – ALU - Program counter - PSW register – Stack – IP & IE		
	3.2 Instruction Set		
	Instruction set of 8051 - Classification of 8051 instructions - data transfer instructions - Arithmetic Instructions - Logical Instructions -Branching Instructions		
	3.3 Assembly language programs		
	16-bit addition and 16-bit subtraction - 8-bit multiplication and 8-bit division		
IV	**Peripherals of 8051**		
	4.1: I/O Ports		
	Bit addresses for I/O ports-I/O port programming-I/O bit manipulation programming.		
	4.2: Timer / Counter	14	
	SFRS for Timer- Modes of Timers/counters- Programming 8051 Timer – Program for Square wave generation		
	4.3 Interfacing Techniques		
	LED / Relay interfacing - Sensor interfacing - DC motor interfacing using PWM - LCD interfacing (Without Program)		
V	**Advanced Microcontrollers**	13	
	Selection of Microcontroller - PIC microcontroller - General Block diagram – Features – Applications – Arduino - General Block diagram – Variants – Features – Applications - Raspberry pi-General Block diagram – Features –Applications - Comparison of microcontrollers		

Text Books:

1. Publication 3rd Edition 2016

Reference Books:

1. Fundamentals of Electrical Engineering by Giorgio Rizzoni, Published by McGraw-Hill

DIRECTORATE OF TECHNICAL EDUCATION

DIPLOMA IN COMPUTER ENGINEERING AND IoT

II YEAR

N SCHEME

IV SEMESTER

2022-23 onwards

OBJECT ORIENTED PROGRAMMING WITH JAVA

CURRICULUM DEVELOPMENT CENTRE

ANNEXURE- III

DIPLOMA IN ENGINEERING / TECHNOLOGY SYLLABUS

Course Name : Diploma in Computer Engineering and IoT

Subject code : 4052430

Semester : IV

Subject title : **Object Oriented Programming with Java**

TEACHING AND SCHEME OF EXAMINATION

No of weeks per semester: 16 weeks

Subject	Instructions		Examination				
			Marks				
	Hours / Week	Hours / Semester	Internal Assessment	Board Examinations	Total	Duration	
Object Oriented Programming with Java	5	80	25	100*	100	3 Hrs.	

* Examinations will be conducted for 100 marks and it will be reduced to 75 marks.

Topics and Allocation of Hours

UNIT	Topic	Hrs.
I	FUNDAMENTALS OF OOPS & JAVA	15
II	CONTROL STRUCTURES, ARRAYS, VECTORS AND STRINGS	13
III	CLASSES, INTERFACES AND PACKAGES	15
IV	EXCEPTION HANDLING, MULTITHREADING AND FILES	15
V	APPLETS, GRAPHICS PROGRAMMING AND AWT CONTROLS	15
	Test and Model Exam	7
Total		**80**

OBJECTIVES:

On completion of the following units of syllabus contents, the students must be able to

➢ Understand the basic concepts and applications of Object Oriented Programming.

➢ Know the history & features Java.

➢ Use of control structures in Java Program.

➢ Use of Arrays and Vectors in Java Program.

➢ Demonstrate the use of string and String Buffers.

➢ Define Class with the attributes and methods.

➢ Know the types of inheritances.

➢ Define and Implement Interfaces.

➢ Create and access packages.

➢ Handle the errors using exceptions.

➢ Creating own exceptions

➢ Understand the concepts of multithreading.

➢ Develop multithreaded programs in Java.

➢ Develop File programs

➢ Develop simple Applets.

➢ Use of Graphics, Color & Font class

➢ List the types of AWT Components and types of event listeners.

DETAILED SYLLABUS

Contents: Theory

Unit	Name of the Topics	Hours
I	**FUNDAMENTALS OF OOPS & JAVA** **Basics of OOPs** Introduction to Object Oriented Programming - Basic concepts of Object Oriented Programming –Objects and Classes – Data abstraction and Encapsulation, Inheritance, Polymorphism, Dynamic binding, Message communication – Application of OOPs. **Introduction to Java** History of Java – Java features – Java Environment – JDK – API- Types of Java program – Creating and Executing a Java program – Java Tokens: Keywords, Character set, Identifiers, Literals, Separator – Java Virtual Machine (JVM) – Comments in Java program. **Elements** Constants – Variables – Data types – Type casting – Scope of variables – Operators - Types – Expressions – Evaluation of Expressions.	15
II	**CONTROL STRUCTURES, ARRAYS, VECTORS AND STRINGS** **Decision making and Branching** Decision making: Simple if statement – if – else statement – Nesting if – else – else if Ladder – switch statement, Looping: While loop – do – While loop - for loop – break – labeled loop – continue Statement. **Arrays & Vectors** Arrays: One Dimensional Array – Creating an array – Array processing – Multidimensional Array, Vectors: Definition- Creation - Methods **Strings** String Class – Creation – Methods, String Buffer Class -- Creation - Methods– Difference between String and String Buffer.	13
III	**CLASSES, INTERFACES AND PACKAGES** **3.1 Class and object**	15

Defining a class – Creating objects – Accessing class members – Constructors – Method overloading – Static members – Nesting of Methods – this keyword – Command line argument.

Inheritance

Definition –Types -- Single Inheritance – Multilevel Inheritance – Hierarchical Inheritance – Overriding methods – Final variables and methods – Final classes – Final methods - Abstract methods and classes – Visibility Control: Public, Private, friendly and protected.

Interfaces: Multiple Inheritance -- Defining interface – Extending interface - Implementing Interface.

Package

Java API Packages – System Packages – Naming Conventions – Creating & Accessing a Package – Adding Class to a Package – Hiding Classes.

IV	**EXCEPTION HANDLING, MULTITHREADING AND FILES**	15
	Exception Handling	
	Types of Errors – Exception -- Advantages of Exception Handling – Basics of Exception Handling – try blocks – throwing an exception – catching an exception – finally statement – built in exceptions, creating own exception sub classes.	
	Multithreading	
	Introduction – Life cycle of a Thread – Thread Methods – Creating Threads – Extending Thread class -- Implementing Runnable interface - Thread Priority – Thread Scheduling.	
	FILES	
	File – Streams – Advantages – The stream classes – Byte stream classes –Character stream classes – Random Access files.	

V	**APPLETS, GRAPHICS PROGRAMMING AND AWT CONTROLS**	15
	Applets	
	Introduction – Applet Life cycle – Creating & Executing an Applet – Applet tags in HTML – Parameter tag.	
	Graphics programming	
	Graphics class –Lines -- Rectangles – Circles – Arcs -- Polygon – Filling objects – Color class - Selecting a color - Font class - Selecting a font - Drawing Bar charts.	
	5.3 AWT Components and Event Handlers	
	Abstract window tool kit – AWT Controls – Labels – Text Field – Buttons - Checkboxes – Choice – Scrollbars – Event handling: Events, Event sources, Event Listeners, Input Events – Layout Managers – Menus.	

Reference Books

1. "E. Balagurusamy ", "Programming with Java", Tata Mc-Graw Hill, New Delhi.
2. "Herbert schildt ", "Java - The complete reference", Tata Mc graw Hill, New Delhi.
3. "Java 2,J2SE1.4 Complete", BPB Publications.

DIRECTORATE OF TECHNICAL EDUCATION

DIPLOMA IN COMPUTER ENGINEERING AND IoT

II YEAR

N SCHEME

IV SEMESTER

2022-23 onwards

MOBILE COMPUTING

CURRICULUM DEVELOPMENT CENTRE

ANNEXURE- III

DIPLOMA IN ENGINEERING / TECHNOLOGY SYLLABUS

Course Name   : Diploma in Computer Engineering and IoT

Subject code   : 4052533

Semester   : IV

Subject title   : **Mobile Computing**

TEACHING AND SCHEME OF EXAMINATION

No. of weeks per Semester 16 Weeks

Subject	Instructions		Examination			
Mobile Computing	Hours/ Week	Hours/ Semester	Marks			Duration
			Internal Assessment	Board Examination	Total	
	5	80	25	100 *	100	3 Hrs

* Examinations will be conducted for 100 marks and it will be reduced to 75 marks.

Topics and Allocation of Hours

Unit No.	Topic	No. of Hours
I	INTRODUCTION TO MOBILE COMPUTING	14
II	MOBILE AND SMART TV OS	14
III	ANDROID DEVELOPMENT ENVIRONMENT	15
IV	BASIC AND ADVANCED VIEWS	15
V	LOCATION BASED SERVICES AND SQLITE	15
Test and Revision		**07**
Total		**80**

OBJECTIVES:

Students will be able

➢ To introduce the characteristics, basic concepts and systems issues in mobileComputing

➢ To illustrate architecture and protocols in Mobile computing and to identify the trends and latest development of the technologies in the area

➢ To understand the network protocols governing the mobile communication

➢ To know the different kinds of mobile OS prevailing in the market

➢ To know Android OS in detail

➢ To know Apple iOS and Smart TV OS

➢ To understand the components of a Mobile App.

➢ To give practical experience in the area through the development of Mobile apps

➢ To design successful mobile computing applications and services

➢ To evaluate critical design tradeoffs associated with different mobile technologies,architectures, interfaces and business models and how they impact the usability, security, privacy and commercial viability of mobile and pervasive computingservices and applications

➢ To know the development of Mobile apps using SQLite database

➢ To know the cross platform application development tools

DETAILED SYLLABUS

Contents : Theory

Unit	Name of the Topics	Hours
I	**Introduction to Mobile Computing**	**14**
	Chapter 1.1 Introduction to Mobile Computing Evolution of Mobile Computing - Important terminologies	4
	Chapter 1.2 Wireless LAN and Protocols WI-FI and WI-MAX, Bluetooth, RFID, Wi-Fi-Direct, Li-Fi, LTE, and 6LoWPAN, VoLTE	5
	Chapter 1.3 Cellular Network Generations: Features of 1G,2G ,3G ,4G ,5G	5
II	**Mobile and Smart TV Operating System**	**14**
	Chapter 2.1 Mobile Operating Systems : Evaluation of Mobile Operating System-Handset Manufactures and their Mobile OS- Mobile OS and their features. Linux Kernel based Mobile OS	4
	Chapter 2.2 Apple Mobile Operating Systems : History and features of Apple Operating Systems - iPadOS, tvOS, and watchOS	3
	Chapter 2.3 Smart TV operating systems Smart TV Operating System development History - versions and their features	3
	Chapter 2.4 Android Operating System : Android Operating System development History - versions and its feature - The various Android devices on the market , The Android Market application store	4
III	**Android Development Environment**	**16**
	Chapter 3.1 Android Development Environment System Requirements, Android SDK, Installing Java, and ADTbundle - Eclipse Integrated Development Environment (IDE), Creating Android Virtual Devices (AVDs) – Android Studio	4

	Chapter 3.2 Android Architecture		4
	Android Architecture - The Linux Kernel, Android Runtime - Dalvik Virtual Machine, Android Runtime – Core Libraries, Dalvik VM Specific Libraries, Java Interoperability Libraries, Android Libraries, Application Framework,		
	Chapter 3.3 Creating a New Android Project		4
	Defining the Project Name and SDK Settings, Project Configuration Settings, Configuring the Launcher Icon,		
	Chapter 3.4Activity		4
	Creating an Activity, Running the Application in the AVD, Stopping a Running Application, Modifying the Example Application, Reviewing the Layout and Resource Files		
IV	**Basic and Advanced Views**		**16**
	Chapter 4.1 Basic Views :		4
	Text View, Button, Image Button, EditText, CheckBox, Toggle Button, Radio Button and Radio Group Views, Progress Bar View, Auto Complete Text View		
	Chapter 4.2 Advanced Views :		4
	Time Picker View and Date Picker View – List Views – Image View – Menus – Analog and Digital View – Dialog Boxes		
	Chapter 4.3 Displaying Pictures & Menus with Views:		5
	Image View – Gallery View – ImageSwitcher – GridView –Creating the Helper Methods – Options Menu – Context Menu		
	Chapter 4.4 SMS and Dailer :		3
	Sending SMS – Receiving SMS – Making phone call		
V	**Location Based Services and SQLite**		**16**

Chapter 5.1 Location Based Services: Obtaining the Maps API Key- Displaying the Map – Zoom Control –Navigating to a specific location – Adding Marker – Geo Codingand reverse Geo coding	5
Chapter 5.2 Content Provider and Storage: Sharing data – view contacts – Add contacts – Modify contacts –Delete Contacts - Store and Retire data's in Internaland External Storage – SQLite - Creating and using databases **Chapter 5.3 Android Service**:	5
Consuming Web service using HTTP, downloading binary Data –Downloading Text Content – Accessing Web Service	4
Chapter 5.4 Cross Platform App Development: Cross platform application development tools and their features:	2

REFERENCE BOOK:

1. J. F. DiMarzio (Author) -Beginning Android Programming with Android Studio,4th Edition (2016) - Wiley

2. Wei-MengLee -Beginning Android 4 Application Development,2012 -Wiley India Edition

3.Asoke K Talukder,Hasan Ahmed, Roopa R Yavagal Mobile Computing,2005 -MGH

DIRECTORATE OF TECHNICAL EDUCATION

DIPLOMA IN COMPUTER ENGINEERING AND IoT

II YEAR

N SCHEME

IV SEMESTER

2022-23 onwards

DIGITAL ELECTRONICS AND MICROCONTROLLERS PRACTICAL

CURRICULUM DEVELOPMENT CENTRE

STATE BOARD OF TECHNICAL EDUCATION &TRAINING, TAMILNADU

DIPLOMA IN ENGINEERING / TECHNOLOGY SYLLABUS

N-SCHEME

(Implemented from the Academic year 2022-2023 onwards)

Course Name   : Diploma in Computer Engineering and IoT

Subject Code   : 4058450

Semester   : IV Semester

Subject Title   : **Digital Electronics and microcontroller Practical**

TEACHING AND SCHEME OFEXAMINATION:

No. of weeks/ Semester: 16 weeks

Subject	Instructions		Examination			
	Hours / Week	Hours / Semester	Marks			Duration
			Internal Assessment	Board Examinations	Total	
Digital Electronics and Microcontroller Practical	4	64	25	100*	100	3 Hrs.

 * Examinations will be conducted for 100 marks and it will be reduced to 75 marks.

RATIONALE:

Every Engineer should have sound knowledge about the ICs used in Electronics Industry. This is vital in R&D Department for Chip level troubleshooting. To meet the industrial needs, diploma holders must be taught about the most fundamental subject, Digital Electronics and Microcontroller

Practical. By doing practical experience in this, they will be skilled in handling all types of ICs and able to apply the skill in electronic system design and the designing of PCBs.

This subject also will enable the students to have hands on experience in using 8051 trainer kits. The students are exposed to learn simple programs using assembly language. They can also get familiar with the C compiler platform. They also gain knowledge by using application specific interfacing boards.

OBJECTIVES:

On completion of the following experiments, the students must be able to

- ➢ Know the Verification of truth table of OR, AND, NOT, NOR, NAND, EX-OR gates
- ➢ Know the Realization of basic gates using NAND & NOR gates.
- ➢ Know the verification of Half Adder and Full Adder using IC's.
- ➢ Know the verification of Half Subtractor and Full Subtractor using IC's.
- ➢ Know the Verification of Truth Table for Decoder/Encoder.
- ➢ Know the Verification of truth table for RS, D, T & JK flip-flop.
- ➢ Understand the use of instruction set by writing and executing simple ALP.
- ➢ Know the connection details between microcontroller and peripherals

4058450 DIGITAL ELECTRONICS AND MICROCONTROLLER PRACTICAL

DETAILED SYLLABUS

Contents: **Practical**

Name of the Topics:

Digital Electronics

1. Realization of basic gates using NAND & NOR gates.
2. Realization of logic circuit for De-Morgans Theorems
3. Test the performance of Half Adder and Full Adder.
4. Test the performance of Decoder/Encoder.
5. Test the performance of RS & JK flip-flops.

8051 ALP or C Programming

6. Write a program for Multiplication and Division of two numbers and execute the same in the 8051 trainer kit
7. Write a program to generate square wave signal of 10 kHz using Timer 0

8. Write a program to interface a switch and LED with 8051 and test it
9. Write a program to interface a Sensor (proximity sensor) and relay with 8051 and test it
10. Write a Program for interfacing DC motor and test it.
11. Write a Program for interfacing STEPPER MOTOR and test it.
12. Write a program to display the string to 16 x 2 LCD display to 8051
13. Write a program to interface temperature sensor using 8051
14. Write a program to interface voltage and current sensor with 8051

DETAILED ALLOCATION OF MARKS

Sl. No	Name of the Activity	Mark Allocation
1.	CIRCUIT DIAGRAM AND CONNECTION / PROGRAM	40 marks
2.	EXECUTION & HANDLING OF EQUIPMENT	30 marks
3.	OUTPUT / RESULT	20 marks
4.	VIVA – VOICE	10 marks
Total		**100 marks**

LIST OF EQUIPMENTS

Sl No	Name of the Equipment	Range	Required No's
1.	Digital Trainer kit	--	5 No's
2.	AT89C51/52 Evaluation Board or Trainer kit with ISP	--	10 No's
3.	Digital I/O Boards	--	2 No's
4.	DC Motor control Interface board	--	1 No
5.	Temperature Sensors LM 35	--	2 No's
6.	Proximity Sensors	--	2 No's
7.	8051 simulation software – (μVision Keil software)	--	Any one free software
8.	Desktop Computer	--	5 No's

DIRECTORATE OF TECHNICAL EDUCATION

DIPLOMA IN COMPUTER ENGINEERING AND IoT

II YEAR

N SCHEME

IV SEMESTER

2022-23 onwards

JAVA PROGRAMMING PRACTICAL

CURRICULUM DEVELOPMENT CENTRE

DIPLOMA IN ENGINEERING / TECHNOLOGY SYLLABUS

Course Name   : Diploma in Computer Engineering and IoT

Subject code   : 4052460

Semester   : IV

Subject title   : Java Programming Practical

TEACHING AND SCHEME OF EXAMINATION

No of weeks per semester: 16 weeks

Subject	Instructions		Examination			
	Hours / Week	Hours / Semester	Marks			Duration
			Internal Assessment	Board Examinations	Total	
Java Programming Practical	4	64	25	100*	100	3 Hrs.

* Examinations will be conducted for 100 marks and it will be reduced to 75 marks.

OBJECTIVES:

On Completion of the following exercise, the students must be able to

- Develop programs using different operators and expressions.

- Develop programs using Iterative statements.

- Develop programs using arrays

- Develop applications using Vectors.

- Create classes and objects with constructors

- Solve problems using inheritance

- Handle exception arising in programs.

- Use multithreading in programs

- Develop programs using File/ Create Applet programs

- Develop programs using Graphics & Color classes

- Use GUI components to develop GUI applications

DETAILED SYLLABUS

Contents: Practical

PART – A

1. Write a program to read the temperature in Celsius and convert into Fahrenheit.
2. Write a program to read 2 integers and find the largest number using conditional operator.
3. Write a program to read an integer and find the factorial of a number.
4. Write a program to implement Vector class and its methods.
5. Write a program to read a string and check whether it is palindrome or not.
6. Write a program to create a class with following data members
    1. register number 2. Name
    2. Marks in 3 subjects and member functions
        i. parameterised constructor – to assign values to members
        ii. method to find total mark
        iii. method to display register number, name, total mark Create 3
    3. objects from the above class and use the members
7. Write a program that accepts radius of a circle from command line and display its area.

PART – B

8. Write a program to implement multilevel inheritance.
9. Write a program to create a own exception subclass that throws exception if the given number is not in a range of numbers.
10. Write a program that creates three threads. First thread displays "Good Morning" everyone second, the second thread displays "Hello" every two seconds and the third thread displays "Welcome" every three seconds.
11. Write a program to create a file using Byte stream or Character stream class.
12. Write a program to demonstrate Mouse events.
13. Write a program to display basic shapes using Graphics class and fill them using Color class
14. Write a program to create a simple calculator to perform addition, subtraction, multiplication and division using button, label and text field.

BOARD EXAMINATION

DETAILLED ALLOCATION OF MARKS

SCHEME OF VALUATION	
Writing answer for any one program from PART – A	20 Marks
Execution (Part A)	20 Marks
Result with Print out (Part A)	05 Marks
Writing answer for any one program from PART – B	25 Marks
Execution (Part – B)	20 Marks
Result with Print out (Part – B)	05 Marks
VIVA-VOCE	05 Marks
TOTAL	**100 Marks**

NOTE:
Students should write one program from **PART A** and one program from **PART B.**

LIST OF EQUIPMENTS

Hardware Requirements

1. Desktop Computers – 30 Nos
2. Laser Printer – 1 No

Software Requirement:

1. Any Text Editor
2. JDK 1.7 or above
3. Java enabled Browser

DIRECTORATE OF TECHNICAL EDUCATION

DIPLOMA IN COMPUTER ENGINEERING AND IoT

II YEAR

N SCHEME

IV SEMESTER

2022-23 onwards

MOBILE COMPUTING PRACTICAL

CURRICULUM DEVELOPMENT CENTRE

ANNEXURE- III

DIPLOMA IN ENGINEERING / TECHNOLOGY SYLLABUS

Course Name   : Diploma in Computer Engineering and IoT

Subject code   : 4052563

Semester   : IV

Subject title   : Mobile Computing Practical

TEACHING AND SCHEME OF EXAMINATION

No of weeks per semester: 16 weeks

Subject	Instructions		Examination			
	Hours / Week	Hours / Semester	Marks			Duration
			Internal Assessment	Board Examinations	Total	
Mobile Computing Practical	4	64	25	100*	100	3 Hrs.

* Examinations will be conducted for 100 marks and it will be reduced to 75 marks.

OBJECTIVES:
    On completion of the following exercises, the students must be able to

- Provide a solid foundation and skills for programming to create applications for Mobile Devices
- Install, configure and use Android development environment.
- To Learn about Basic Mobile Application Development tools
- To learn How to create interactive applications in android with multiple activities
- Create Mobile Application using SQLite Database

LIST OF EXPERIMENTS

PART-A

1. Write a program to demonstrate activity (Application Life Cycle)

2. Write a program to demonstrate different types of layouts

3. Write a program to implement simple calculator using text view, edit view, option button and button

4. Write a program to demonstrate list view

5 Write a program to display Text in Text View using different Font Style

6 Write a program to demonstrate AutoComplete Text View

7 Write a program to demonstrate Image Button View

PART-B

1 Write a program to demonstrate Date picker and time picker

2. Develop an simple application with context menu and option menu

3. Develop an application to send SMS

4. Write a program to view ,edit, contact

5. Write a program to send e-mail

6. Write a program to display map of given location/position using map view

7. Write a program to demonstrate the application of intent class

8. Write a program to demonstrate SQLite (Create Database, Table , Insert ,Update, Delete and view records)

HARDWARE REQUIREMENTS:

- Desktop Computers with minimum 4 GB RAM 30 Nos
- Printer 1 No

SOFTWARE REQUIREMENTS:

- Android Studio / Netbeans /Eclipse - Android ATD
- Android SDK - JDK 6.0 or above

DIRECTORATE OF TECHNICAL EDUCATION

DIPLOMA IN COMPUTER ENGINEERING AND IoT

III YEAR

N SCHEME

V SEMESTER

2022-23 onwards

PYTHON PROGRAMMING

CURRICULUM DEVELOPMENT CENTRE

ANNEXURE- III

DIPLOMA IN ENGINEERING / TECHNOLOGY SYLLABUS

Course Name   : Diploma in Computer Engineering and IoT

Subject code   : 4052510

Semester   : V

Subject title   : Python Programming

TEACHING AND SCHEME OF EXAMINATION

No of weeks per semester: 16 weeks

Subject	Instructions		Examination				
	Hours / Week	Hours / Semester	Marks				Duration
			Internal Assessment	Board Examinations	Total		
Python Programming	5	80	25	100*	100		3 Hrs.

 * Examinations will be conducted for 100 marks and it will be reduced to 75 marks.

Topics and Allocation of Hours

UNIT	Topic	Hrs.
I	INTRODUCTION	14
II	CONTROL STRUCTURE AND FUNCTIONS	15
III	STRINGS AND LISTS	14
IV	TUPLE, SET,DICTONARIES	15
V	FILES AND EXCEPTION HANDLING	15
	TEST AND MODEL EXAM	7
	Total	**80**

OBJECTIVES:

On completion of the following units of syllabus contents, the students must be able to

- ➢ To read and write simple Python programs.
- ➢ To develop Python programs with conditionals and loops
- ➢ To define Strings in Python and operations on String.
- ➢ To define Python functions and call them.
- ➢ Decompose a Python program into functions.
- ➢ Represent compound data using Python lists, tuples, dictionaries.
- ➢ To use Python data structures –- lists, tuples, dictionaries.
- ➢ To do input/output with files in Python.
- ➢ To do exception handling in Python

DETAILED SYLLABUS

Contents: Theory

Unit	Name of the Topics	Hours
I	**Introduction to Python** **Features of Python** - Installing and running Python – interpreter and Interactive mode - Identifiers - Reserved Keywords - Variables - Comments in Python **Data Types** – Numeric, String, List, Sets, Tuple, Dictionary, Boolean; Operators – Arithmetic, Relational, Assignment, Logical, Bitwise, Membership operator, identity operator - Statements and Expressions, String Operations; Boolean Expressions, Data Type Conversion, Type coercion; Input from keyboard - input function, raw input function, Mutable and immutable Objects; Illustrative programs.	14

II	**Decision Making, Control structure and Functions**	15
	Decision Making – Simple if, if…else and if … elif statement; Control Statement - for loop, range(), while, break , continue, pass	
	Functions: Built in functions-Mathematical functions , Date and Time, dir(), help() Functions; User defined functions-Return values, parameters and arguments, function calls, local and global scope, function composition, recursion, anonymous functions.	
	Writing Scripts in Python; Illustrative programs.	
II	**Strings and Lists**	14
	Strings: Strings in python, String functions and methods, string slicing, immutable property, string Traversal, Escape Characters, string formatting operators and functions.	
	Lists – Creation of List, values and accessing elements, mutable property, Traversing a List, copying the list, altering values, deleting elements from list - Built-in List operators and built-in methods. Illustrative Programs.	
IV	**Tuples and Dictionaries**:	15
	Tuples-creating, accessing values, immutable property, assignment of tuples, returning tuples, tuples as arguments - variable length arguments - basic tuple operations, Built-in tuple functions.	
	Dictionaries: Creating a Dictionary , accessing values, updating dictionary, deleting elements from dictionary; dictionary keys - Properties, operations in Dictionary, Built-in dictionary methods, Illustrative Programs..	

V	**Files and Exception Handling** **Files:** Text files, opening a file, closing a file, reading from a file and writing into a file, file opening modes, closing a file, File Object Attributes, File positions, renaming, deleting a file and files related methods. **Directory :**Directory methods – mkdir(), chdir(), getcwd(), rmdir(). **Exceptions in Python:** Definition - Built-in exceptions, Handling Exceptions-try…except, except with No Exception, except with Multiple Exceptions, try…finally; User defined exceptions - Illustrative programs	15

Reference Books

1 Introduction to Computing and Problem Solving using Python - E.Balagurusamy McGraw Hill Education(India) Pvt. Ltd. 1st Edition /2016

2. Learning Python Programming Jeffrey Elkner, Allan B. Downey, Chris Meyers Samurai Media Limited. 2016

3. Taming Python By Programming Jeeva Jose Khanna Book Publishing Co(P) Ltd 2017 Reprinted 2019

Python Online Learning Resources:

https://www.learnpython.org

www.python.org ,

https://www.tutorialspoint.com/python

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DIPLOMA IN COMPUTER ENGINEERING AND IoT

III YEAR

N SCHEME

V SEMESTER

2022-23 onwards

INTERNET OF THINGS

CURRICULUM DEVELOPMENT CENTRE

ANNEXURE- III

DIPLOMA IN ENGINEERING / TECHNOLOGY SYLLABUS

Course Name   : Diploma in Computer Engineering and IoT

Subject code   : 4058520

Semester   : V

Subject title   : Internet of Things

TEACHING AND SCHEME OF EXAMINATION

No of weeks per semester: 16 weeks

Subject	Instructions		Examination				Duration
	Hours / Week	Hours / Semester	Marks				
			Internal Assessment	Board Examinations	Total		
Internet of Things	6	96	25	100*	100		3 Hrs.

* Examinations will be conducted for 100 marks and it will be reduced to 75 marks.

Topics and Allocation of Hours

UNIT	Topic	Hrs.
I	INTRODUCTION TO INTERNET OF THINGS	17
II	IOT PLATFORM DESIGN AND DEVELOPMENT	18
III	CHALLENGES IN IOT DESIGN CHALLENGES	18
IV	INTRODUCTION TO CLOUD COMPUTING	18
V	CLOUD PLATFORMS	18
	Test and Model Exam	7
	Total	**96**

Objectives:

At the end of this semester. Students will be able to

- ➢ To understand the fundamentals of IOT

- ➢ To understand the dynamic, self-configuring and inter-operable network of things

- ➢ To understand the design and development methodology for IoT domains.

- ➢ To build simple IoT systems using Raspberry Pi and ESP8266 WiFi Module.

- ➢ To understand an overview of the basic concepts of cloud Computing;

- ➢ To address the security issues in cloud

- ➢ To Know the Advantages and limitations of cloud Computing and List the benefits of cloud computing

- ➢ To Know the Cloud services and benefits

DETAILED SYLLABUS

CONTENTS: THEORY

Unit	Name of the Topic	Hours
I	**UNITI: INTRODUCTION TO INTERNET OF THINGS** **Introduction:** Definition and characteristics of IOT – History of IOT- Physical design of IOT - Things in IOT- IOT Protocols- Logical Design of IOT - IOT functional blocks- IOT communication Models **IOT enabling Technologies:** Wireless sensor networks – Cloud Computing- Big Data Analytics- Communication protocols- embedded systems **IOT Levels and Deployment templates**: IOT Level-1- IOT Level-2- IOT Level-3-IoT Level-4 - IOT Level-5- IOT Level-6 **IOT & M2M :**Introduction of M2M - Evolution of M2M- Working of M2M - Role of M2M in IoT	17

II	**UNIT 2: IOT PLATFORM DESIGN AND DEVELOPMENT** Introduction- IOT Design and Methodology- Purpose and requirements specification- Process specification- Domain model specification- Information model specification- service Specification - IoT level specification- functional view specification -Operational view specification - Device and component integration- application development. Development Board : RaspberriPi Board - , ESP8266 Board : Block diagram of ESP8266 Wifi Module- ESP8266 Interfaces(Temperature Sensor/ Ultrasonic sensor)	18
III	**Challenges in IoT Design challenges**: Development Challenges, Security Challenges, Other challenges IoT Applications: Smart Metering, E-health, City Automation, Automotive Applications, home automation, smart cards, communicating data with H/W units, mobiles, tablxxets, Designing of smart street lights in smart city.	18
IV	**UNIT IV: INTRODUCTION TO CLOUD COMPUTING** **Cloud computing overview** – Origins of Cloud computing – Cloud components -Essential characteristics – on-demand self-service, Broad network access, Location independent resource pooling, Rapid elasticity, measured service **Architectural influences** – High-performance computing, utility and enterprise grid computing, Autonomic computing, Service consolidation, Horizontal scaling, Web services, High scalability architecture **Security in the cloud:** Understanding Cloud Security - Securing the Cloud - Security service boundary: CSA Cloud Reference Model - Securing Data – Brokered cloud storage access - Storage location and tenancy – Encryption- Cloud 16Computing Security Challenges - Security Policy Implementation - Policy Types - Virtualization Security Management - Virtual Threat	18
V	**CLOUD PLATFORMS** Cloud deployment model: Public clouds – private clouds – community clouds – hybrid clouds - Advantages of Cloud computing. **Software as a Service (SaaS):** SaaS service providers – Web Services – Web 2.0 – Web Operating system -Google App Engine, Salesforce.com and	18

google platform – benefits – Operational benefits, Economic benefits – Evaluating SaaS

Platform as a Service (PaaS): Cloud Plat form & Management – Computation& Storage - PaaS service providers – Right Scale – Salesforce.com – Rackspace - Force.com – services and benefits.

Infrastructure as a Service (IaaS): IaaS service providers –Amazon EC2, GoGrid – Microsoft implementation and support – Amazon EC service level agreement – recent developments – benefits.

Text Books

1. Olivier Hersent, David Boswarthick, Omar Elloumi"The Internet of Things key applications and protocols", willey

2. Jeeva Jose, Internet of Things, Khanna Publishing House

3. Michael Miller "The Internet of Things" by Pearson

4. Raj Kamal "INTERNET OF THINGS", McGraw-Hill, 1ST Edition, 2016

5. ArshdeepBahga, Vijay Madisetti "Internet of Things (A hands on approach)" 1ST edition, VPI publications,2014

6. Ronald L. Krutz Russell Dean Vines "CLOUD SECURITY: A Comprehensive Guide to Secure Cloud Computing" Wiley Publishing, Inc

7. Cloud Computing A Practical Approach 2008 Edition Tata McGrawHill

Reference

1. Adrian McEwen,Hakin Cassimally "Designing the Internet of Things" Wiley India
2. Barrie Sosinsky "Cloud Computing Bible" Wiley Publishing, Inc

DIRECTORATE OF TECHNICAL EDUCATION

DIPLOMA IN COMPUTER ENGINEERING AND IoT

III YEAR

N SCHEME

V SEMESTER

2022-23 onwards

DATA SCIENCE AND BIG DATA

CURRICULUM DEVELOPMENT CENTRE

ANNEXURE- III

DIPLOMA IN ENGINEERING / TECHNOLOGY SYLLABUS

Course Name : Diploma in Computer Engineering and IoT

Subject code : 4052633

Semester : V

Subject title : Data Science and Big Data

TEACHING AND SCHEME OF EXAMINATION

No of weeks per semester: 16 weeks

Subject	Instructions		Examination				
	Hours / Week	Hours / Semester	Marks				Duration
			Internal Assessment	Board Examinations	Total		
Data Science and Big Data	5	80	25	100*	100		3 Hrs.

* Examinations will be conducted for 100 marks and it will be reduced to 75 marks.

Topics and Allocation of Hours

UNIT	Topic	Hrs.
I	INTRODUCTION TO DATA SCIENCE	15
II	FUNDAMENTALS OF DATA MODELLING	15
III	FUNDAMENTALS OF BIG DATA	15
IV	BIG DATA STORAGE	14
V	BIG DATA PROCESSING	14
	Test and Model Exam	7
	Total	**80**

OBJECTIVES:

This subject has two major divisions. The objectives of these topics are given below.

Data Science

After studying the first two units of this syllabus, students will be able

➢ To understand the fundamentals of data science, various data types, their sources, problems and issues, various formats of data.

➢ To apply the Python libraries and Microsoft Excel for Data analysis.

➢ To work with Microsoft Excel for data analysis and applying various functions for data analysis.

➢ To familiarise with the basic data representation methods.

➢ To understand the concepts of samples, attributes and their relationships.

➢ To develop and implement simple linear regression models.

➢ To understand the concept of model equation and of fit.

➢ To understand and differentiate the concepts of predictive models and the classification models.

➢ To familiarize with the concepts of Neural Networks, Decision Trees and Nearest neighbors techniques.

Big Data

After studying the lessons from Units III to V, the students will be able to

➢ Get conceptual understanding of Big Data, Web data, classification of data,

➢ Big Data characteristics, types, classification and handling techniques.

➢ Get the conceptual understanding of the impact of ICT developments on Big Data Adoption.

➢ Understand the Big Data Analytics Life Cycle.

➢ Get the conceptual understandings of Big Data Storage systems and technologies.

➢ Understand the concepts of NoSQL databases, their types and characteristics.

➢ Understand the concepts of Hadoop and its Ecosystem.

➢ Understand the steps involved in Big data processing like parallel processing, distributed   processing and Batch processing.

➢ Get understanding of MapReduce, map and reduce tasks, MapReduce algorithm.

➢ Understand the various techniques for Big Data analysis.

➢ Get introduced to the concepts and types of machine learning techniques.

➢ Explore the applications of Big Data in different fields.

DETAILED SYLLABUS

Contents: Theory

Unit	Name of the Topics	Hours
I	**Introduction to Data Science** **1.1.Data Science** - Subfields of Data Science- Data Types-Data Science Road Map- Programming languages for Data Science- Problems with Data- Formatting issues- Python features- Python - Technical libraries-Python Arrays and Data Frames. **1.2.Data sources**- Data Quality- Consistency and accuracy (Integrity), Noise: Outliers, Missing and Duplicate values- Data Preprocessing using Cleaning, Enrichment, Editing, Reduction, Wrangling- Data Formats: TXT, CSV, XML, JSON, TLV- Loading and Saving files. **1.3 Working with Excel:** Loading data- Statistical functions- Text Functions- Lookup Functions- Sorting- Filtering- Data Analysis: Correlation, covariance, Descriptive statistics, Regression.	15
II	**Fundamentals of Data Modelling** **2.1.Linear Algebra:** Data representation - Data as a Matrix - Samples and Attributes- Classification of attributes- Concept of Rank-Identify the relationship among attributes **2.2.Predictive models:** Regression Models - Linear regression - Simple and Multiple Regression-Correlation-Mean squared Error- Testing goodness of fit-Model Equation **2.3.Classification models:** Two class- Multi class classification-Separability- Performance measures- Terminology- Confusion Matrix-Types (Concepts only): Neural Network- Decision Trees- Nearest Neighbors.	15

III	**Fundamentals of Big Data**	15
	3.1 Data - Web Data- Classification of Data- Big Data- Characteristics-Volume, Velocity, Variety, Veracity, Value- Need for Big Data- Big Data Types and classifications- Sources of Big Data- Big Data handling techniques - Challenges.	
	3.2 Impact of ICT developments on Big data Adoption: data analytics and data science, digitization, affordable technology and commodity hardware, social media, hyper connected communities and devices, cloud computing and IoT.	
	3.3. Big Data Analytics Life Cycle: Business Case Evaluation, Data Identification, Data Acquisition & Filtering, Data Extraction, Data Validation & Cleansing, Data Aggregation & Representation, Data Analysis, Data Visualization, Utilization of Analysis Results.	
IV	**Big Data Storage**	14
	4.1. Storage Concepts: Clusters, File Systems, Distributed File System, NoSQL, Sharding, Replication, Master Slave, Peer to Peer, CAP Theorem	
	4.2. Big Data Storage Technologies: On-Disk Storage Devices-Distributed File system-RDBMS- NoSQL Databases- Characteristics of NoSQL- Types of NoSQL Storage devices. In-Memory storage devices-Data Grids-Databases	
	4.3.Hadoop: Introduction- Hadoop and its Ecosystem: Hadoop core components - Features of Hadoop- Hadoop Ecosystem components-Hadoop streaming- Hadoop pipes- Hadoop distributed File system- HDFS data storage -Hadoop Ecosystem tools.	
V	**Big Data Processing**	14
	5.1.Parallel data processing- Distributed data processing- Hadoop Framework- Processing workloads- cluster for processing- Batch processing with MapReduce- Map and Reduce Tasks- MapReduce algorithms- Processing in Realtime mode- Real time processing and MapReduce.	
	5.2.Big Data Analysis Techniques: Quantitative analysis, Qualitative analysis, Data mining, Statistical analysis: Correlation, regression, Machine Learning: Classification, clustering, outlier detection, filtering.	

		Semantic analysis: Natural language processing, Text Analytics, Sentiment analysis, Visual Analysis. **5.3.Big Data Analytics Applications and case studies**: Big data in Marketing and sales- Big data and Healthcare- Big data in Medicine- Big Data in Advertising.	

Reference Books

1. Field Cady, "The Data Science Handbook", Wiley, 2017.
2. Jake VanderPlas, "Python Data Science Handbook- Essential tools for working with data", O'REILLY, 2017
3. Davy Cielen, Arno D. B. Meysman, Mohamed Ali, "Introducing Data Science", manning publications, 2016
4. Thomas Erl, Wajid Khattak - Big Data Fundamentals Concepts, Drivers & Techniques-Prentice Hall (2016).
5. Raj kamal, Preeti Saxena, "Big Data Analytics-Introduction to Hadoop, Spark and Machine Learning", McGraw Hill Education(India) Pvt Ltd., 2019.
6. Michael Minelli, Michelle Chambers, and Ambiga Dhiraj, "Big Data, Big Analytics: Emerging Business Intelligence and Analytic Trends for Today's Businesses", Wiley, 2013.
7. Tom White, "Hadoop: The Definitive Guide", Third Edition, O'Reilley, 2012.
8. NPTEL MOOC courses on "Data Science" and "Big Data".

DIRECTORATE OF TECHNICAL EDUCATION

DIPLOMA IN COMPUTER ENGINEERING AND IoT

III YEAR

N SCHEME

V SEMESTER

2022-23 onwards

Programming in Python Practical

CURRICULUM DEVELOPMENT CENTRE

Course Name　　　 : Diploma in Computer Engineering and IoT

Subject code　　　 : **4058540**

Semester　　　　　 : V

Subject title　　　 : Programming in Python Practical

TEACHING AND SCHEME OF EXAMINATION

No of weeks per semester: 16 weeks

Subject	Instructions		Examination				
	Hours / Week	Hours / Semester	Marks				Duration
			Internal Assessment	Board Examinations	Total		
Programming in Python Practical	4	64	25	100*	100		3 Hrs.

* Examinations will be conducted for 100 marks and it will be reduced to 75 marks.

OBJECTIVES:

➢ To write, test and debug simple Python programs

➢ To Implement Python Programs with conditionals and Loops

➢ To use functions for structuring Python Programs

➢ To implement string manipulation functions using Python Program

➢ To implement List and its built-in functions and methods

➢ To implement Tuples and passing tuple as arguments

➢ To create Python Dictionaries and updating Dictionaries

➢ To develop programs to read and write data from or to files in Python

➢ To Develop programs with Exception Handling

DETAILED SYLLABUS

Contents: Practical

PART – A

1. i) Write a Python Program to print prime numbers in the given range

   ii) Write a Python Program to convert decimal to binary and octal

2. i) Write a Python Program to check the given year is leap year or not.

   ii) Write a Python Program to print Armstrong numbers between given range.

3. Write a Python program function for display calendar

4. i) Write a Python Program using recursion to print 'n' terms in Fibonacci series.

   ii) Write a Python Program using without recursion to print 'n' terms in Fibonacci series.

5. Write a Python program to find minimum and maximum of a list of numbers

6. Write a Python program to display a list in reverse order.

7. Write a Python Program to print the first half values of tuple in one line and last half values in next line.

PART – B

8. Write a Python Program to make a simple calculator

9. Write a Python Program to take a list of words and return the length of the longest one using string.

10. Write a Python Program to find an element in a given set of elements using Linear Search

11. Write a Python Program to sort a set of elements using Selection sort.

12. Write a Python Program to multiply two matrices.

13. Write a Python Program to demonstrate to use Dictionary and related functions.

14. Write a Python Program to copy file contents from one file to another and display number of words copied.

BOARD EXAMINATION

DETAILLED ALLOCATION OF MARKS

NOTE:

SCHEME OF VALUATION	
Writing answer for any one program from PART – A	20 Marks
Execution (Part A)	20 Marks
Result with Print out (Part A)	05 Marks
Writing answer for any one program from PART – B	25 Marks
Execution (Part – B)	20 Marks
Result with Print out (Part – B)	05 Marks
VIVA-VOCE	05 Marks
TOTAL	**100 Marks**

Students should write one program from **PART A** and one program from **PART B.**

LIST OF EQUIPMENTS

Hardware Requirements

1. Desktop Computers – 30 Nos
2. Laser Printer – 1 No

Software Requirement:

1. Windows / Linux Operating System
2. Python (to run as interactive mode and IDLE mode)

DIRECTORATE OF TECHNICAL EDUCATION

DIPLOMA IN COMPUTER ENGINEERING AND IoT

III YEAR

N SCHEME

V SEMESTER

2022-23 onwards

Data Science and Big Data Practical

CURRICULUM DEVELOPMENT CENTRE

ANNEXURE- III

DIPLOMA IN ENGINEERING / TECHNOLOGY SYLLABUS

Course Name   : Diploma in Computer Engineering and IoT

Subject code   : 4052653

Semester   : V

Subject title   : Data Science and Big Data Practical

TEACHING AND SCHEME OF EXAMINATION

No of weeks per semester: 16 weeks

Subject	Instructions		Examination				
	Hours / Week	Hours / Semester	Marks				Duration
			Internal Assessment	Board Examinations	Total		
Data Science and Big Data Practical	4	64	25	100*	100	3 Hrs.	

* Examinations will be conducted for 100 marks and it will be reduced to 75 marks.

OBJECTIVES:

On Completion of the exercises in this practical subject, the students will be able to

- ➢ Install the required packages to set up a data science coding environment
- ➢ Load different types of data into a Python Environment.
- ➢ Use basic operation with NumPy and Pandas libraries to prepare data
- ➢ Preprocess the data by handling missing data, duplicate values
- ➢ Aggregate the data
- ➢ Create data subsets
- ➢ Perform data cleaning operations
- ➢ Develop a single dataset by merging various datasets together
- ➢ Examine statistical summaries
- ➢ Use Matplotlib to create data visualizations
- ➢ Find the relationship between the data attributes
- ➢ Measure the basic statistical properties of the data
- ➢ Fit a regression model and understand the predictive capabilities of the models.
- ➢ Understand the basic text processing concepts.

DETAILED SYLLABUS

1. Load the data about the exam fee paid by the students of all branches of your college. Perform the following operations on it using Excel.

   a. Arrange the data branch wise within the branch and arrange register numbers. Replace all names with CAPITAL.

   b. Count the number of students in each branch and semester

   c. Calculate the total fee paid by students of each branch.

   d. Find the minimum and the maximum fee paid by the student.

   e. Find the sum, average, max, min of fee paid in each branch

2. Load the data collected from all students during online answer paper submission with the following details for each exam.

   Regno, name, course_code, subject_code, semester, number_of_pages(nop), mode_of_dispatch, email_id, mobile_number.

   Perform the following operations using Excel.

   a. Check the file for any missing data in the columns.

   b. Count the number of students appeared for the exam.

   c. Count the number of papers (subjects) submitted by each student (Using register number)

   d. Create a new column by concatenating register number and the subject code. Using this column, perform the vlookup function to find the number of pages (nop) written by the students in that subject, and the mode of dispatch.

   e. Count the number of students appeared (submitted) for each subject.

   f. Count the number of different (unique) subject_codes that have been submitted.

3. Read the dataset from the Auto-MPG repository and perform the descriptive statistics on the data using Excel-Data Analysis. Verify the same using the statistical functions of Excel.

4. Read the dataset from the Auto-MPG repository and

   a) Identify the relationship between the variables using correlation.

   b) Identify the independent and the dependent variables.

   c) Perform the linear regression on the related variables and find the regression equation.

   d) Estimate the performance of the regression model.

5. Load any external csv data file and store it in a Pandas Data Frame.

a. Check the shape and column types of the Data Frame (rows and columns).[Note: Use df.info () and df.shape()]

b. Subset the data column by names, by index, by range.

c. Subset data based on index label, row index, multiple rows.

d. Subset based on rows and columns

6. DESCRIPTIVE STATISTICS using Python-Pandas

a) Write a Python script to find basic descriptive statistics on AUTO-MPG dataset.

b) Find the values of the descriptive statistics.

c) Determine the measures of a central location, such as mean, markers such as quartiles or percentiles, and measures of variability or spread, such as the standard deviation.

7. READING AND WRITING DIFFERENT TYPES OF DATASETS

a. Reading different types of data sets (.txt, .csv) from Web and disk and writing in file in specific disk location.

b) Reading Excel data sheet using Pandas

c) Export the values from the Data Frame to several other formats.

8. DATA VISUALIZATION

a. Load the Auto-MPG dataset from csv file into pandas.

a) Analyze the Behavior of the Number of Cylinders and Horsepower Using a Boxplot

b) Find the relationship between horsepower and weight using the scatter plot using the data from Auto-MPG:

c) Find the outliers using plot.

d) Plot the histogram, bar chart and pie chart on sample data.

9. COVARIANCE and CORRELATION

a. Find the correlation and covariance between two variables.

b. Plot the correlation plot on the dataset and visualize giving an overview of relationships among data.

C. Fit a simple linear regression model using libraries such as Numpy or Scikitlearn. (importLinearRegression from sklearn. linear_model)

- Import the packages and classes you need.
- Provide data for independent and dependent variables.
- Create a regression model and fit it with existing data.
- Check the results of model fitting to know whether the model is satisfactory.

10. OUTLIER Detection

When analysing data collected as part of a science experiment it may be desirable to remove the most extreme values before performing other calculations. Write a function that takes a list of values and an non-negative integer, n, as its parameters.

The function should create a new copy of the list with the n largest elements and the n smallest elements removed. Then it should return the new copy of the list as the function's only result. The order of the elements in the returned list does not have to match the order of the elements in the original list.

11 Text Processing

a) Open a text file and read all the lines of the file.

b) Tokenise (separate the words) the text.

c) Count the total number of lines, total number of words and unique words

d) Sort the words alphabetically.

e) Find the most frequent and least frequent words.

f) List the words having certain suffixes.

Note: You can open a Tamil text file using 'UTF-16' encoding.

12 Text Processing-II

Load a text file containing a list of words into aDataFrame. Apply the following functions and verify the results.

Replace(), repeat(), count(pattern), startswith (pattern), endswith(pattern), find(pattern), findall(pattern).

Mini Project: Develop any data science application using Python/Excel for processing your college data.

DETAILED ALLOCATION OF MARKS

Writing answer for any one program from the list	45 Marks
Execution	35 Marks
Result with printout	10 Marks
Demonstration of Mini Project	5 Marks
Viva -Voce	5 Marks
TOTAL	**100 Marks**

Hardware Requirements

Desktop Computers – 30 Nos
Laser printer - 1 No.
For the optimal student experience, we recommend the following hardware configuration:

- Processor: Intel Core i5 or equivalent
- Memory: 4 GB RAM
- Storage: 35 GB available space

Software Requirements

You'll also need the following software installed

• OS: Windows 7 SP1 64-bit, Windows 8.1 64-bit or Windows 10 64-bit, Linux.

• Browser: Google Chrome/Mozilla Firefox Latest Version

• Notepad++ as IDE (this is optional, as you can practice everything using the Jupyter Notebook on your browser)

• Python 3.4+ (latest is Python 3.9) installed (from https://python.org)

• Python libraries as needed (NumPy, Pandas, Matplotlib and so on)

• Microsoft Excel

Install Anaconda by following the instructions at this link: https://www.anaconda.com/distribution/Data Source:

Students may use the following data sources form their department

Online examination answer paper uploaded details.

Data about the alumni of your college

Your college result details.

Data collected from students like students' profile, resume etc.

Some other online resources for testing

https://archive.ics.uci.edu/ml/machine-learning-databases/auto-mpg/

https://archive.ics.uci.edu/ml/machine-learning-databases/iris/iris.data

https://www.kaggle.com/rohankayan/years-of-experience-and-salary-dataset

DIRECTORATE OF TECHNICAL EDUCATION

DIPLOMA IN COMPUTER ENGINEERING AND IoT

III YEAR

N SCHEME

V SEMESTER

2022-23 onwards

IOT & CLOUD COMPUTING PRACTICAL

CURRICULUM DEVELOPMENT CENTRE

ANNEXURE- III

DIPLOMA IN ENGINEERING / TECHNOLOGY SYLLABUS

Course Name   : Diploma in Computer Engineering and IoT

Subject code   : **4058560**

Semester   : V

Subject title   : IoT & Cloud Computing Practical

TEACHING AND SCHEME OF EXAMINATION

No of weeks per semester: 16 weeks

Subject	Instructions		Examination				
	Hours / Week	Hours / Semester	Marks				Duration
			Internal Assessment	Board Examinations	Total		
IoT & Cloud Computing Practical	4	64	25	100*	100		3 Hrs.

 * Examinations will be conducted for 100 marks and it will be reduced to 75 marks.

OBJECTIVES:

> - At the end of the Semester, Students will be able to
> - Interface various devices with Arduino
> - Interface Arduino/ Raspberry Pi with cloud
> - Simulate programs with Arduino
> - Adapt different types of virtualization and increase resource utilization.
> - Build a private cloud using open source technologies.

PART-A (List of Experiments performed for IOT)

1. Interfacing LED with Arduino
2. Interfacing digital sensor and buzzer with Arduino
3. Interfacing LCD display with Arduino.
4. Interfacing Servo Motor Control with Arduino.
5. Interfacing Ultrasonic sensor with Arduino to monitor the distance.
6. Interfacing LM35/DHT11 sensor with ESP8266 Wifi Module to monitor the temperature and upload the data to the cloud using Thing speak.
7. Using Think Speak Cloud Reading Temperature Sensor Monitoring with NodeMCU /Raspberry Pi

PART-B (List of Experiments performed for Cloud Computing)

1. To implement program on SaaS to Create a word document of your class time table and store locally and on cloud with doc and pdf format
2. To implement program on SaaS to Create a spread sheet to generate a mark sheet for student progress report.
3. To implement web services by create your BlogSpot and Collaborating via Wikis
4. To implement on PaaS to Install Google App Engine, create a program to validate user; create a database login (username, password) in mysql and deploy to cloud
5. Install Virtual box / VMware Workstation with different flavours of linux or windows OS on top of windows7 or 8.
6. Install OpenStack and use it as Infrastructure as a Service and use technology own Cloud.
7. Case Study on any one Open source and commercial Cloud-Microsoft Azure, Eucalyptus, Amazon EC2

DETAILED ALLOCATION OF MARKS

Connection	20 Marks
Program	30 Marks
Execution / Simulation	30 Marks
Result with printout	10 Marks
Viva -Voce	10 Marks
TOTAL	**100 Marks**

List of Equipment

1. Arduino Development Board   - 5 No's
2. Raspberry Pi Board   - 4 No's
3. Servo motor drive module   - 2 No's
4. LCD Display module   - 2 No's
5. Ultrasonic Sensor   - 2 No's
6. LM35 / DTH11   - 2 No's
7. ESP 8266 module   - 5 No's
8. 16x2 LCD Display   - 5 No's
9. Relay module   - 2 No's
10. Proximity Sensor   - 2 No's
11. Buzzer   - 2 No's

SOFTWARE

12. Any one Open source and commercial Cloud
13. Arduino SDK

DIRECTORATE OF TECHNICAL EDUCATION

DIPLOMA IN COMPUTER ENGINEERING AND IoT

III YEAR

N SCHEME

V SEMESTER

2022-23 onwards

ENTREPRENEURSHIP AND STARTUP

CURRICULUM DEVELOPMENT CENTRE

ANNEXURE- III

DIPLOMA IN ENGINEERING / TECHNOLOGY SYLLABUS

Course Name   : Diploma in Computer Engineering and IoT

Subject code   : 4052570

Semester   : V

Subject title   : Entrepreneurship and startup

TEACHING AND SCHEME OF EXAMINATION

No. of Weeks per Semester: 16 Weeks

Subject	Instructions		Examination				Duration
	Hours/ Week	Hours/ Semester	Marks				
			Internal Assessment	Board Examination	Total		
Entrepreneurship & Startup	4	64	25	100*	100		3 Hrs.

*Examinations will be conducted for 100 marks and it will be reduced for 75 marks for result

Topics and Allocation of Hours

UNIT	Topic	Hours
I	ENTREPRENEURSHIP – INTRODUCTION AND PROCESS	10
II	BUSINESS IDEA AND BANKING	10
III	START UPS, E-CELL AND SUCCESS STORIES	10
IV	PRICING AND COST ANALYSIS	10
V	BUSINESS PLAN PREPARATION	10
Revision, Field visit and Preparation of case study report		14
Total		64

OBJECTIVES:

At the end of the study of 5ᵗʰ semester the students will be able to

- To excite the students about entrepreneurship
- Acquiring Entrepreneurial spirit and resourcefulness
- Understanding the concept and process of entrepreneurship
- Acquiring entrepreneurial quality, competency and motivation
- Learning the process and skills of creation and management of entrepreneurial venture
- Familiarization with various uses of human resource for earning dignified means of living
- Know its contribution in and role in the growth and development of individual and the nation
- Understand the formation of E-cell
- Survey and analyze the market to understand customer needs
- Understand the importance of generation of ideas and product selection
- Learn the preparation of project feasibility report
- Understand the importance of sales and turnover
- Familiarization of various financial and non financial schemes
- Aware the concept of incubation and starts ups

DETAILED SYLLABUS

Unit	Name of the Topics	Hours
1	**ENTREPRENEURSHIP – INTRODUCTION AND PROCESS** • Concept, Functions and Importance • Myths about Entrepreneurship • Pros and Cons of Entrepreneurship • Process of Entrepreneurship • Benefits of Entrepreneur • Competencies and Characteristics • Ethical Entrepreneurship • Entrepreneurial Values and Attitudes • Motivation • Creativity • Innovation • Entrepreneurs - as problem solvers • Mindset of an employee and an entrepreneur • Business Failure – causes and remedies • Role of Networking in entrepreneurship	10
2	**BUSINESS IDEA AND BANKING** • Types of Business: Manufacturing, Trading and Services • Stakeholders: Sellers, Vendors and Consumers • E- Commerce Business Models • Types of Resources - Human, Capital and Entrepreneurial tools • Goals of Business and Goal Setting • Patent, copyright and Intellectual Property Rights • Negotiations - Importance and methods • Customer Relations and Vendor Management • Size and Capital based classification of business enterprises • Role of Financial Institutions • Role of Government policy • Entrepreneurial support systems	10

		• Incentive schemes for State Government	
		• Incentive schemes for Central Government	
3	**STARTUPS, E-CELL AND SUCCESS STORIES**		**10**
		• Concept of Incubation centre's	
		• Activities of DIC, financial institutions and other relevance institutions	
		• Success stories of Indian and global business legends	
		• Field Visit to MSME's	
		• Various sources of Information	
		• Learn to earn	
		• Startup and its stages	
		• Role of Technology – E-commerce and Social Media	
		• Role of E-Cell	
		• E-Cell to Entrepreneurship	
4	**PRICING AND COST ANALYSIS**		**10**
		• Calculation of Unit of Sale, Unit Price and Unit Cost	
		• Types of Costs - Variable and Fixed, Operational Costs	
		• Break Even Analysis	
		• Understand the meaning and concept of the term Cash Inflow and Cash Outflow	
		• Prepare a Cash Flow Projection	
		• Pricing and Factors affecting pricing	
		• Understand the importance and preparation of Income Statement	
		• Launch Strategies after pricing and proof of concept	
		• Branding - Business name, logo, tag line	
		• Promotion strategy	
5	**BUSINESS PLAN PREPARATION**		**10**
		• Generation of Ideas,	
		• Business Ideas vs. Business Opportunities	
		• Selecting the Right Opportunity	
		• Product selection	

	• New product development and analysis	
	• Feasibility Study Report – Technical analysis, financial analysis and commercial analysis	
	• Market Research - Concept, Importance and Process	
	• Marketing and Sales strategy	
	• Digital marketing	
	• Social Entrepreneurship	
	• Risk Taking-Concept	
	• Types of business risks	

REFERNCE BOOKS:

1. Dr. G.K. Varshney, Fundamentals of Entrepreneurship, Sahitya Bhawan Publications, Agra - 282002

2. Dr. G.K. Varshney, Business Regulatory Framework , Sahitya Bhawan Publications, Agra - 282002

3. Robert D. Hisrich, Michael P. Peters, Dean A. Shepherd, Entrepreneurship , McGraw Hill (India) Private Limited, Noida - 201301

4. M.Scarborough, R.Cornwell, Essentials of Entrepreneurship and small business management, Pearson Education India, Noida - 201301

5. Charantimath Poornima M. Entrepreneurship Development and Small Business Enterprises, Pearson Education, Noida - 201301

6. Trott, Innovation Management and New Product Development, Pearson Education, Noida - 201301

DIRECTORATE OF TECHNICAL EDUCATION

DIPLOMA IN COMPUTER ENGINEERING AND IoT

III YEAR

N SCHEME

VI SEMESTER

2022-23 onwards

ROBOTICS AND ARTIFICIAL INTELLIGENCE

CURRICULUM DEVELOPMENT CENTRE

ANNEXURE- III

DIPLOMA IN ENGINEERING / TECHNOLOGY SYLLABUS

Course Name   : Diploma in Computer Engineering and IoT

Subject code   : 4058610

Semester   : VI

Subject title   : **Robotics and Artificial Intelligence**

TEACHING AND SCHEME OF EXAMINATION

No. of weeks per Semester 16 Weeks

Subject	Instructions		Examination				
	Hours/ Week	**Hours/ Semester**	**Marks**				**Duration**
Robotics and Artificial Intelligence	5	80	**Internal Assessment**	**Board Examination**	**Total**		
			25	100 *	100		3 Hrs

* Examinations will be conducted for 100 marks and it will be reduced to 75 marks.

Objectives:

- Understand fundamentals of robotics

- Acquire knowledge structure and elements of robot

- Gain knowledge on controller and various drives used in robotics

- Develop knowledge on role of sensors and vision system

- Acquire skill to program and control robot

- Understand to adopt robot to various industrial applications.

DETAILAED SYLLABUS

Contents: Theory

UNIT	Name of the Topic	Hours
I	**FUNDAMENTAL OF ROBOTIC SYSTEMS**	**14**
	1.1 Introduction - History of Robot – Definition-Basic Configuration of Robotics - Robot Components: Manipulator, End Effector, Drive System, Controller and Sensors.	
	1.2 Robot Arm – Degrees of freedom – Links and Joints - Types of joints – Joint notation scheme – Degrees of freedom associated with robot arm and wrist (Pitch, Yaw, Roll)	
	1.3 End Effector- Grippers: Mechanical grippers - Screw and Cam Actuated type- Two Fingered – Three Fingered Gripper - Magnetic grippers- Vacuum grippers- End of Arm Tooling - Gripper design: Selection and design considerations	
II	**SENSORS, DRIVES AND CONTROL SYSTEM FOR ROBOTICS**	**14**
	2.1Sensors in robot – Touch Sensors-Tactile sensor – Proximity sensor-range sensors – Robotic vision Sensor-Force sensor- Pressure sensors.	
	2.2 Robot Controllers- open loop and closed loop control, Robot path control – point to point control – continuous path control – sensor based path control	
	2.3 Drive system -Hydraulic drives, Pneumatic drives, Electrical drives-Servo motor	
	- Applications and Comparison of Drives.	
III	**ROBOT PROGRAMMING**	**14**
	3.1 Robot Operating Aids: Teach Pendant- Manual Data Input Panel	
	3.1 Robot Programming: Lead through programming- Powered Lead Through, Manual Lead Through, Textual Robot Languages.	
	3.2 Robot languages – Different Robot Textual Languages- Generation of Robot Programming Languages – On-Line & Off-Line programming - Basic Commands- Motion Commands, Sensor Commands, End effecter commands,	
IV	**INTRODUCTION TO AI AND SEARCHING STRATEGIES**	**13**

		4.1 Introduction – Overview of AI- Subsystems of Artificial Intelligence- Historical Perspective-Branches of AI- Intelligent Agent- Structure of Agents- Role of AI in Robotics 4.2 Searching Strategies: Generate and test- Heuristic Search: Hill Climbing- Depth first search- Breadth first search- Greedy method- Best first search.	
V	**KNOWLEDGE, REASONING AND APPLICATION:** 5.1 Knowledge Representation: Knowledge management- Types of Knowledge- Approaches to knowledge representation- Issues in Knowledge representation. 5.2 Knowledge base Reasoning: Types- Non-Monotonic Reasoning: Non-monotonic Interference Methods-Truth maintenance Systems. 5.3 Applications- Artificial Intelligence in real world- Health care Management and Business- Education- Autonomous Vehicle – Social media- Tourism	**13**

Textbooks:

1) Artificial Intelligence and Machine Learning, Chandra.S.S & H.S.Anand, PHI Publications, 2014

2) Deepak Kemani. A First Course in Artificial Intelligence, Mc Graw Hill Education (India), 2013

3) Stuart Russell and Peter Norvig, Artificial Intelligence A Modern Approach, 3rd Edition, Pearson, 2014. References

References:

1) R.S. Sutton and A.G. Barto, Reinforcement Learning: An Introduction, 2nd Edition,MIT Press, 2018.

2) Elaine Rich, Kevin Knight, and Shiva Shankar B Nair "Artificial Intelligence", Tata McGraw Hill Publishing Company, New Delhi, 2009.

3) Robin Murphy, Robin R. Murphy, Ronald C. Arkin, "Introduction to   AI Robotics",MIT Press, 2000.

Francis.X.Govers, "Artificial Intelligence for Robotics", Packt Publishing, 2018

DIRECTORATE OF TECHNICAL EDUCATION

DIPLOMA IN COMPUTER ENGINEERING AND IoT

III YEAR

N SCHEME

VI SEMESTER

2022-23 onwards

INDUSTRIAL IoT

CURRICULUM DEVELOPMENT CENTRE

ANNEXURE- III

DIPLOMA IN ENGINEERING / TECHNOLOGY SYLLABUS

Course Name   : Diploma in Computer Engineering and IoT

Subject code   : **4058620**

Semester   : VI

Subject title   : **Industrial IoT**

TEACHING AND SCHEME OF EXAMINATION

No. of weeks per Semester 16 Weeks

Subject	Instructions		Examination				
Industrial IoT	Hours/ Week	Hours/ Semester	Marks				Duration
			Internal Assessment	Board Examination	Total		
	5	80	25	100 *	100		3 Hrs

* Examinations will be conducted for 100 marks and it will be reduced to 75 marks.

Objectives:

At the end of this semester. Students will be able to

- ➢ Learn the new evolution in hardware, software and data
- ➢ Acquire upcoming industrial IoT: Roadmap to the connected world course offers important insights on overcoming the challenges and thrive in this exciting space
- ➢ Discover key IIoT concepts including identification, sensors, localization, wireless protocols, data storage and security.
- ➢ Explore IoT technologies, architectures, standards and regulation
- ➢ Examine technological developments

DETAILED SYLLABUS

CONTENTS: THEORY

Unit	Name of the Topic	Hours
I	**UNIT I: Totally Integrated Automation:** Overview of Industry 4.0 – What is Cyber physical systems? – Need for TIA – Types: Factory Automation and Process Automation – Components of TIA systems: Integrated Engineering, Industrial data Management, Industrial Management, Industrial Communication, Industrial Security, Safety Integrated, Augmented Reality, Virtual Reality, Artificial Intelligence. IIOT – Definition, Difference between IOT and IIOT, Challenges of IIOT, General block diagram of IOT device, Logical design of IOT – IOT functional blocks, IOT communication models, IOT communication APIs – IOT enabling technologies – WSN, Cloud computing, Big data analytics, Communication protocols, Embedded systems.	16
II	**UNIT – II PLC, HMI, SCADA:** **PLC**: Introduction to Programmable Logic controller – Hardwired circuits versus PLC control – Advantages of PLC control - Block diagram of PLC – Processor – Memory – Input and output modules – Digital and Analog I/O's - Principle of operation – Various modes of operation - Different programming languages - Ladder Programming Bit instruction – Logic functions (OR, AND, NAND & EX –OR)- timer- counter. **HMI**: Introduction to HMI – Different types of HMI - – Role of HMI **SCADA** – Introduction –SCADA system architecture – elements of SCADA. Features of SCADA, MTU - functions of MTU, RTU- Functions of RTU - Communication Architecture.	14
III	**UNIT III - IIOT COMPONENTS** IIOT layered architecture, IIOT Levels – IOT Level – 1 to 6 **Communication technologies** – Wi-Fi, IOT Protocols, RFID - Introduction, Types, RFID system working, Selection of RFID system **AR** – Introduction, Key Features, Applications, Types of AR, Working of AR **VR** - Introduction, Key Features, Applications, Types of VR, Working of VR – Comparison of AR and VR	13

	Digital Twin – Introduction, Types of digital twin, Benefits of digital twin, Challenges, Working, Applications		
IV	**UNIT IV - IOT CONNECTIVITY** **Communication Models** – Request Response communication model, Publish subscribe communication model, Push Pull communication model, Exclusive pair communication model **Industrial Communication**: Modbus TCP – Introduction, Features - Profinet – Introduction, Features, Working - Profibus – Introduction, Types, Features - CC Link – Introduction, Types, Features - **Wireless Technologies for IoT**: WPAN Technologies for IoT: IEEE 802.15.4, ZigBee, HART, NFC, Z-Wave, BLE, Modbus, IEEE 802.11ah **IP based pr**otocols –6LOWPAN, AMPQ, MQTT, REST	16	
V	**UNIT V – IIOT ANALYTICS, DATABASE IMPLEMENTATION, SECURITY** Introduction to Data Analytics – Types of data, Structured vs Unstructured data – Data in motion vs Data at rest, Data analytics results – Types, Hadoop Ecosystem, Cloud computing in IIOT, Fog/Edge computing in IIOT - Challenges in OT security, Threats and Vulnerabilities - Types of Hackers, Malicious Codes - Virus, Trojans, Worms, Spywares, and Advanced Persistent Threats (APT), Frameworks and Standards for Cyber Security - Introduction to ISO 27001 and NIST800	14	

Text Books

1. Industry 4.0: The Industrial Internet of Things", by Alasdair Gilchrist (Apress), 2017
   Industry 4.0: The Industrial Internet of Things", by Alasdair Gilchrist (Apress), 2017

2. The Internet of Things in the Industrial Sector, Mahmood, Zaigham(Ed.) (Springer Publication)

3. Industrial Internet of Things: Cybermanufacturing System, Sabina Jeschke, Christian Brecher, Houbing Song, Danda B. Rawat (Springer Publication)

4. Industrial IoT Challenges, Design Principles, Applications, and Security by Ismail Butun (editor)

Reference

1. Hands-On Industrial Internet of Things: Create a powerful Industrial IoT by Giacomo Veneri, Antonio Capasso, Packt, 2018

DIRECTORATE OF TECHNICAL EDUCATION

DIPLOMA IN COMPUTER ENGINEERING AND IoT

III YEAR

N SCHEME

VI SEMESTER

2022-23 onwards

COMPUTER NETWORKS AND SECURITY

CURRICULUM DEVELOPMENT CENTRE

ANNEXURE- III

DIPLOMA IN ENGINEERING / TECHNOLOGY SYLLABUS

Course Name   : Diploma in Computer Engineering and IoT

Subject code   : 4052620

Semester   : VI

Subject title   : Computer Networks and Security

TEACHING AND SCHEME OF EXAMINATION

No. of Weeks per Semester: 16 Weeks

Subject	Instructions		Examination				
	Hours/ Week	Hours/ Semester	Marks			Duration	
			Internal Assessment	Board Examination	Total		
Computer Networks and Security	5	80	25	100*	100	3Hrs.	

*Examinations will be conducted for 100 marks and it will be reduced for 75 marks for result

Topics and Allocation of Hours

UNIT	Topic	Hours
I	DATA COMMUNICATIONS	15
II	OSI MODEL AND LAN PROTOCOLS	16
III	TCP/IP PROTOCOLS	15
IV	NETWORK SECURITY	13
V	APPLICATION OF NETWORK SECURITY	14
	Test and Model Exam	7
	Total	80

OBJECTIVES:

- Understand the concept of data communication.

- Discuss the advantages and disadvantages of different network topologies.

- Know different network classification based on different category.

- Study about different networking devices and their practical usages.

- Understand the different layers of OSI and their functions.

- Compare different LAN protocols.

- Understanding of Synchronization in networks

- Study of different WAN networks and protocols

- Study of Broadband Next Gen (BNG)

- Identify the protocols used in TCP /IP and compare with OSI model.

- Know the IP addressing and TCP/ IP protocols briefly.

- QoS and Traffic Engineering in networks

- Overview of Operations, Administration and Maintenance (OAM) in networks

- Understand the basic concepts of network security.

- Identify the attacks and threats.

- Understand the basic concepts of RAID and digital Signatures.

- Study about Cryptography and different Cryptography Algorithms.

- Discuss about Network Security Applications.

- Know the applications of Network Security.

- Discuss about VPN and Firewalls.

DETAILED SYLLABUS

Contents: Theory

Unit	Name of the Topics	Hours
1	**DATA COMMUNICATIONS** **Data Communication:** Components of a data communication – Data flow: Simplex - Half duplex – Full duplex; Networks – Network criteria – Types of Connections: Point to point – multipoint; Topologies: Star, Bus, Ring, Mesh, Hybrid – Advantages and Disadvantages of each topology. **Types of Networks:** Need for computer Networks **-** LAN – MAN – WAN – CAN – HAN –Internet – Intranet – Extranet , Client- Server, Peer to Peer, Wi-Fi, Bluetooth, Mobile Networks, Data Centre Networks, Service Provider Networks **Transmission Media** : Characteristics of Transmission Media - Classification of transmission media - Guided – Twisted pair – Coaxial – Fiber optics – Unguided – Radio waves – Infrared – Low Orbit satellite (LOS) – VSAT – Cabling and Standards **Network devices:** Features and Concepts of Switches – Routers (Wired and Wireless) –Gateways. **Synchronization in Networks**: Concepts of Frequency and Time synchronization in Computer networks.	15
2	**OSI MODEL and LAN PROTOCOLS** **Network Models:**Protocol definition - Standards - OSI Model – Layered architecture–Functions of all layers. **802.X Protocols: Concepts** and PDU format of CSMA/CD (802.3) – Token bus (802.4) –Token ring (802.5) – Ethernet – Types of Ethernet (Fast Ethernet, gigabit Ethernet, High speed Ethernet 10GE to 800GE) – Comparison between 802.3, 802.4 and – Overview of Carrier Ethernet and use cases **Understanding Wireless Network protocols**- 802.11a, 802.11b, 802.11g, 802.11n, 802.11ac **WAN Networks:** Different layers in Service Provider Networks – Protocols Involved – High level design of Data Centre Networks	16

		Switching: Definition **–** Circuit switching – Packet switching – Message switching – Optical Switching OTN– Multicasting **BNG** – Concepts – Services – Broadband NextGen	
3		**TCP/IP SUIT and PROTOCOLS**	15
		3.1Overview of TCP / IP: OSI & TCP/IP – Transport Layer Protocol 3 Connection Oriented and Connectionless Services– Sockets - TCP & UDP.	
		3.2Network Layers Protocol: IP – Interior Gateway Protocols (IGMP, ICMP, ARP, RARP, IGP, BGP Concept only).	
		3.3IP Addressing : Dotted Decimal Notation –Subnetting & Supernetting – VLSM Technique-IPv6 (concepts only) 3	
		3.4Application Layer Protocols: FTP– Telnet – SMTP– HTTP DNS – POP	
		3.5 QoS and Traffic Engineering – Overview of QoS and Traffic Engineering techniques and protocols	
		3.6. OAM– Concepts of OAM in networks Protocols – Fault detection and isolation	
4		**NETWORK SECURITY**	13
		Introduction to Network security: Definition – Need for security – Principles of Security – Attacks – Types of Attacks – Criminal attacks – Legal Attacks – Passive and Active attacks – Software Supply Chain attacks - Security Services – Security Mechanisms.	
		Cryptography: Definition – Symmetric Encryption principles – Symmetric Block Encryption Algorithms – DES, AES – Stream ciphers – RC4 – Digest function – Public key Cryptography Principles–RSA- Diffe-Hellman algorithm – Digital Signature (Definition only)	
		Network Security Application: Authentication applications – Kerberos (concepts only) - Overview- Motivation –Encryption Techniques.	
		4.4 Internet Security: Email security – PGP - S/MIME - IP security – Overview –IP Security Architecture - Web security - SSL, TLS,SET (Concepts only) – Link Layer MACSEC security overview- Network Address Translation NAT - Distributed Denial of Service attacks– DDoS and its mitigation – Lawful intercept of traffic flow overview	

5	**APPLICATIONS OF NETWORK SECURITY**	14
	Introduction to network security : Definition and Basic concepts- Basic concepts of RAID levels(0,1,2,3,4,5).	
	Hackers Techniques: Historical hacking techniques & open sharing-Bad Passwords- Advanced Techniques- Viruses-worms- Trojan horses-SPAM	
	Security Mechanism : Introduction – Types of Firewalls – Packet filters – Application gate ways – Limitations of firewalls.	
	Intrusion: Intruders– Intruder detection – Classification of Intruder Detection systems –Honey pots.	
	Wireless Security Issues: Definition and Types –Transmission Security, Authentication , WLAN Detection, Eaves Dropping, Active Attacks, WEP Definition and Features.	
	Network Security Appliances: Overview of Network security appliances: IPSec, DDoS, NAT, IPS gateways.	

TextBooks:

1 Data Communication and networking - Behrouz A.Forouzen - Tata Mc GrawHill

2 Network Security Essentials - William Stallings - Pearson Publications.

3 CRYPTOGRAPHY AND - NETWORK SECURITY - William Stallings - Pearson Publications.

4 CRYPTOGRAPHY AND NETWORK SECURITY -Behrouz A.Forouzen TataMcGraw-

Hill,New Delhi

5 Computer Networks Andrew S.Tanenbaum - Pearso Publications.

DIRECTORATE OF TECHNICAL EDUCATION

DIPLOMA IN COMPUTER ENGINEERING AND IoT

III YEAR

N SCHEME

VI SEMESTER

2022-23 onwards

COMPUTER HARDWARE AND NETWORKING PRACTICAL

CURRICULUM DEVELOPMENT CENTRE

ANNEXURE- III

DIPLOMA IN ENGINEERING / TECHNOLOGY SYLLABUS

Course Name   : Diploma in Computer Engineering and IoT

Subject code   : 4052640

Semester   : VI

Subject title   : Computer Hardware and Networking Practical

TEACHING AND SCHEME OF EXAMINATION

No of weeks per semester: 16 weeks

Subject	Instructions		Examination				
	Hours / Week	Hours / Semester	Marks				Duration
			Internal Assessment	Board Examinations	Total		
Computer Hardware and Networking Practical	6 Hrs	96 Hrs	25	100*	100		3 Hrs.

* Examinations will be conducted for 100 marks and it will be reduced to 75 marks.

OBJECTIVES

On completion of the following exercises, the students must be able to

- Know the various indicators, switches and connectors used in Computers.
- Familiarize the layout of SMPS, motherboard and various Disk Drives.
- Configure Bios set up options.
- Install various secondary storage devices with memory partition and formatting.
- Know the various types of printer installation and to handle the troubleshooting ability.
- Assemble PC system and checking the working condition.
- Installation of Dual OS in a system.
- Identify the problems in Computer systems, software installation and rectification
- Assembling and disassembling of Laptop to identify the parts and to install OS and configure it.
- Enable to perform different cabling in a network.
- Configure Internet connection and use utilities to debug the network issues.

- Configure router for any topology
- Installation of sever operating system
- Configuring various services in server operating system
- Install various packet sniffing tools in linux

LIST OF EXPERIMENTS

PART-A

1 HARD DISK

    a) Install Hard Disk.

    b) Configure CMOS-Setup.

    c) Partition and Format Hard Disk.

    d) Identify Master /Slave / IDE Devices.

    e) Practice with scan disk, disk cleanup, disk De-fragmentation, Virus Detecting and Rectifying Software.

    f) Creating System restore points in windows for system recovery.

2 a) Install and Configure a DVD Writer & Blu-ray Disc Writer.

  b) Recording a Blank DVD & Blu-ray Disc.

3 Printer Installation and Servicing

    a) Install and configure Dot matrix printer, Ink jet and Laser printer.

    b) Troubleshoot the above printers

4 Install and configure Scanner, Web cam, and bio-metric device with system and troubleshoot the problems

5 Do the following cabling works in a network

  a) Cable Crimpling b) Standard Cabling c) Cross Cabling d) Testing the Crimped cable using a Cable tester

6 a) Configure Host IP, Subnet Mask and Default Gateway in a system in LAN (TCP/IP Configuration).

  b) Configure Internet connection and use IPCONFIG, PING / Tracert and Netstat utilities to Debug the Network issues.

7 a) Install and configure Network Devices: HUB, Switch and Routers

   b) Install and Configure Wired and Wireless NIC and transfer files between systems

8 Transfer files between systems in LAN using FTP Configuration. Install a printer in LAN
   and share it in the network.

PART B – SYSTEM ADMINISTRATION PRACTICAL

1 Installation of Windows 2008 / 2013 Server

2 Installation and configuration of DHCP Server

3 Installation and configuration of Mail Server

4 Installation and configuration of Active Directory Services. Create a user and permission
   using logon script and group permissions.

5 Installation and configuration of DNS Server

6 a) Installation of Red Hat Linux using Graphical mode.

   b) Installation of Red Hat Linux using VMware.

7 Installation of various open source packet sniffing tools and inspect packets in linux.

DETAILED ALLOCATION OF MARKS

SCHEME OF VALUATION

Procedure Writing – One Question from PART – A	20 Marks
Procedure Writing – One Question from PART - B	25 Marks
Executing Exercise (PART – A)	20 Marks
Executing Exercise (PART – B)	20 Marks
Result(Part – A)	5 Marks
Result(Part – B)	5 Marks
VIVA - VOCE	5 Marks
TOTAL	**100 Marks**

LIST OF EQUIPMENTS

Hardware Requirements:

- Desktop Systems   30 Nos
- Hard disk drive   06 Nos
- DVD, Blu-ray Drive   06 Nos
- Blank DVD , Blu-ray Disc   30 Nos
- Head cleaning CD   01 No
- Dot matrix Printer   01 No
- Laser Printer   01 No
- Ink Jet Printer   01 No
- Web camera   01 No
- Biometric Device   01 No
- Scanner   01 No
- Crimping Tool   06 Nos
- Screwdriver set   06 Nos
- Network Cables   50 mtrs
- Switch   01 No
- Hub   01 No
- Router   01 No
- Wires / Wire cutters

Software Requirements:

- Windows server OS
- Windows /Linux OS
- DVD and Blu-ray Burning S/W.

DIRECTORATE OF TECHNICAL EDUCATION

DIPLOMA IN COMPUTER ENGINEERING AND IoT

III YEAR

N SCHEME

VI SEMESTER

2022-23 onwards

INDUSTRIAL IoT PRACTICAL

CURRICULUM DEVELOPMENT CENTRE

ANNEXURE- III

DIPLOMA IN ENGINEERING / TECHNOLOGY SYLLABUS

Course Name   : Diploma in Computer Engineering and IoT

Subject code   : **4058650**

Semester   : VI

Subject title   : **Industrial IoT Practical**

TEACHING AND SCHEME OF EXAMINATION

No of weeks/ semester: 16 weeks

	Instruction		Examination			
			Marks			
Subject	Hours /Week	Hours /Semester	Internal Assessment	Board Examination	Total	Duration
Industrial IoT Practical	5	80	25	100*	100	3 Hrs.

 ***Examinations will be conducted for 100 marks and it will be reduced to 75 marks.**

OBJECTIVES:

1. Hardware and software design for IoT
2. Design of Industrial Internet of Things.

DETAILED SYLLABUS

List of Experiments

1. Sense the available network using Arduino
2. Write a program to transmit a digital data to a cloud server.
3. Read the analog input and update the cloud server
4. Build a temperature monitoring system using Raspberry Pi.
5. Create Wireless network of sensors using ZigBee.
6. Create a Firebase cloud database and monitor the I/O's
7. Control the direction of motor through IIoT gateway
8. Establish remote connection between PLC and cloud through IIOT gateway.
9. Create and Publish the web dashboard for IIoT application
10. Develop an IIoT based Motor control system
11. Remotely edit PLC program using an IOT protocol
12. Predict machine maintenance and analyse upfront which alarm is ON through IOT protocol.

DETAILED ALLOCATION OF MARKS

Connection	20 Marks
Program	30 Marks
Execution / Simulation	30 Marks
Result with printout	10 Marks
Viva -Voce	10 Marks
TOTAL	**100 Marks**

LIST OF EQUIPMENT

1. IIoT Gateway   - 4 No's (With suitable software)
2. PLC with Ethernet communication   - 2 No's
3. ZigBee Module   - 2 No's
4. Raspberry Pi Development board   - 2 No's

5. Arduino   Development board / Trainer kit - 5 No's
6. Desktop Computer   - 10 No's
7. ESP module   - 5 No's
8. Selector Switch / Joystick   - 2 No's
9. DC Motor 5V   - 2 No's
10. DC motor Drive board   - 2 No's
11. Ultrasonic Sensor   - 2 No's
12. Temperature Sensor (0-5)V   - 2 No's

DIRECTORATE OF TECHNICAL EDUCATION

DIPLOMA IN COMPUTER ENGINEERING AND IoT

III YEAR

N SCHEME

VI SEMESTER

2022-23 onwards

PROJECT WORK AND INTERNSHIP

CURRICULUM DEVELOPMENT CENTRE

ANNEXURE- III

DIPLOMA IN ENGINEERING / TECHNOLOGY SYLLABUS

Course Name   : Diploma in Computer Engineering and IoT

Subject code   : **4058660**

Semester   : VI

Subject title   : Project work and internship

TEACHING AND SCHEME OF EXAMINATION

No of weeks per semester: 16 weeks

Subject	Instructions		Examination			
	Hours / Week	Hours / Semester	Marks			Duration
Project Work and Internship			Internal Assessment	Board Examinations	Total	
	6	96	25	100*	100	3 Hrs.

* Examinations will be conducted for 100 marks and it will be reduced to 75 marks for result.

OBJECTIVES:

- Implement the theoreticaland practical knowledge gained through the curriculuminto an application suitable for a real practicalworking environment preferablyin an industrialenvironment.
- Implement the planned activity as a team.
- Take appropriate decisions on collected information.
- Carryout cooperativelearning through synchronousguided discussionswithin theclassinkey dates,asynchronousdocumentsharinganddiscussions,as well as to prepare collaborative edition ofthefinalproject report.

Project Work and Internship:

The students of all the Diploma Courses have to do a Project Work as part of the Curriculum and in partial fulfillment for the award of Diploma by the State Board of Technical Education and Training, Tamil Nadu. In order to encourage students to do worthwhile and innovative projects, every year prizes are awarded for the best three projects i.e. institution wise, region wise and state wise.

The Project work must be reviewed twice in the same semester. The project work is approved during the V semester by the properly constituted committee with guidelines.

a) Internal assessment mark for Project Work and Internship:

Project Review I	…	**10 marks**
Project Review II	…	**10 marks**
Attendance	…	**05 marks** (Award of marks same as theory subject pattern)
Total	…	**25 marks**

Proper record should be maintained for the two Project Reviews and preserved for one semester after the publication of Board Exams results. It should be produced to the flying squad and the inspection team at the time of inspection/verification.

b) Allocation of Marks for Project Work and Internship in Board Examinations:

Demonstration/Presentation	25 marks
Report	25 marks
Viva Voce	30 marks
Internship Report	20 marks
Total	**100* marks**

*Examination will be conducted for 100 marks and will be converted to 75 marks.

c) Internship Report:

The internship training for a period of two weeks shall be undergone by every candidate at the end of IV / V semester during vacation. The certificate shall be produced along with the internship report for evaluation. The evaluation of internship training shall be done along with final year "Project Work & Internship" for 20 marks. The internship shall be undertaken in any industry / Government or Private certified agencies which are in social sector / Govt. Skill Centres / Institutions / Schemes.

A neatly prepared PROJECT REPORT as per the format has to be submitted by individual student during the Project Work and Internship Board examination.