DIPLOMA IN ENGINEERING AND TECHNOLOGY

6

DEPARTMENT OF INSTRUMENTATION AND CONTROL ENGINEERING

F – SCHEME

DRAFT

SYLLABUS

IMPLEMENTED FROM 2020 – 2021

SESHASAYEE INSTITUTE OF TECHNOLOGY
(Autonomous)
TIRUCHIRAPPALLI – 620 010.

CONTENTS

PREFACE

The wave of liberalization and globalization has created an environment for free flow of information and technology through fast and efficient means the world over. This has lead to shrinking of world, bringing people from different cultures and environment together, giving rise to a global village. A shift has been taking place in India from closed economy to knowledge based and opens economy. In order to cope-up with the challenges of handling new technologies, materials and methods, we have to develop human resources having appropriate knowledge, professional skills and attitude. Technical education system is one of the significant components for human resource development. Polytechnics play an important role in meeting the requirements of trained technical manpower for industries and field organizations. The initiatives being taken by to revise the curriculum as per the needs of the industry are laudable.

In order to meet the requirements of future technical manpower, constant efforts have to be made to identify new employment opportunities, carryout activity analysis and design need based curricula of diploma programmes. This curriculum document has been designed by identifying job potential and competency profile of diploma holders leading to identification of curriculum areas for the course. It is needless to emphasize that the real success of the diploma programme depends upon its effective implementation. Thiswill require harnessing and effective utilization of resources. In addition to acquisition of appropriate physical resources, the availability of competent and qualified faculty is essential. It is time for the managers of technical education system to reorganize the system to accept the challenges of both quantitative and qualitative expansion of technical education.

There are various online training facilities created by the Government of India through MHRD for the benefit of both the Teaching and Student community. Facilities like Spoken-Tutorial, SWAYAM, NPTEL, e-Yantra must be exploited to its fullest extent to reap the benefits of interactive electronic media for teaching-learning process. It is hoped that polytechnics will carry out job market research on a continuous basis to identify the new skill requirements and develop innovative methods of course offering and thereby infuse dynamism in the system.

PRINCIPAL & CHAIRMAN

ACKNOWLEDGEMENTS

We gratefully acknowledge the assistance and guidance received from the followingpersons:

i) Commissioner and Principal Secretary, Directorate of Technical Education, Govt. of Tamil Nadu.

ii) Principal & Chairman, Seshasayee Institute of Technology, Trichy for initiating this project on designing of curriculum.

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Alumni of S.I.T. (ICE)
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iv) All the faculty members of the Instrumentation and Control Engineering department for their sustained effort and support in the design of this curriculum and documentation.

Coordinator

1. DEPARTMENT VISION, MISSION, PO and PEOs

THE VISION AND MISSION OF THE DEPARTMENT

Vision

To produce technically competent skillful engineers to respond the society socially and morally to cater the needs of the industries and society.

Mission

M 1 To provide need based curriculum through teaching- learning process.

M 2 Inculcate logical thinking, creativity and effective communication skills.

M 3 Motivate to learn emerging trends in Instrumentation and Control Engineering field through self-learning.

M 4 Create a sense of socio-environmental concerns, humanitarian services, morals and ethics.

M 5 Motivate lifelong learning, updating and creating good resources to the society.

Program Educational Objectives (PEOs) (06)

After successful completion of the program, the graduates will be

1. Lead a successful career in the field of Instrumentation and Control Engineering and its allied fields as an employee or an entrepreneur.
2. Adopt the latest changes and developments in the field of Instrumentation and Control Engineering by updating knowledge and skills.
3. Able to work effectively as an individual, in multi disciplines, multicultural environments and research activities.

LIST OF PROGRAM OUTCOMES

1. **Basic and Discipline specific knowledge: Apply** knowledge of basic mathematics, science and engineering fundamentals and engineering specialization to solve theengineering problems.
2. **Problem analysis**: Identify and **analyse** well-defined engineering problems using codified standard methods.
3. **Design/ development of solutions: Design** solutions for well-defined technical problems and assist with the design of systems components or processes to meet specified needs.
4. **Engineering Tools, Experimentation and Testing: Apply** modern engineering toolsand appropriate technique to conduct standard tests and measurements.
5. **Engineering practices for society, sustainability and environment:** Apply appropriate technology in context of society, sustainability, environment and ethical practices.
6. **Project Management:** Use engineering management principles individually, as a teammember or a leader to manage projects and effectively communicate about well-definedengineering activities.
7. **Life-long learning:** Ability to analyse individual needs and engage in updating in the context of technological changes.

Program Specific Outcomes (PSOs)

PSO 1:

- ❖ Actively apply technical skills and knowledge in engineering practices to solve complex problems in electrical, electronics, control system and other associated fields.
- ❖ Inculcate comprehensive education to widen their knowledge and expertise by lifelong learning.
- ❖ Create themselves in responsible professional and ethical manner.

PSO 2:

- ❖ Analyze and apply knowledge in instrumentation, automation and process control engineering and other associated fields
- ❖ Prove their competency in the field of modern electronics, hardware and software tools to solve complex problems in instrumentation and control engineering as well as automation

2. R E G U L A T I O N S

DIPLOMA COURSES IN ENGINEERING (TERM PATTERN)
(Implemented from 2020- 2021) F– SCHEME
(Common to all Programmes)

2.1. Description of the Course:

a. Full Time (3 years)
The Programme for the Full Time Diploma in Engineering shall extend over a period of three academic years, consisting of 6 terms* and the First Year is common to all Engineering Branches.

b. Sandwich (3½ years)
The Course for the Sandwich Diploma in Paper Technology shall extend over a period of three and half academic years, consisting of 7 terms* and the First Year is common to all Engineering Branches. The subjects of three years full time diploma course being regrouped for academic convenience. During 4th and/or during 7th term the students undergo industrial training for six months. Industrial training examination will be conducted after completion of every 6 months of industrial training.

** Each term will have 16 weeks duration of study with 35 hrs. / Week for Regular Diploma Courses.*

2.2. 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.

2.3. 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 courses.

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		
		Studied any three of the following subjects	Studied any three of the following subjects	Vocational subjects	
1	All the Regular and Sandwich Diploma Courses	• Maths • Physics • Chemistry • Computer Science • Electronics • Information Technology • Biology • Informatics Practices • Bio Technology • Technical Vocational subject • Agriculture • Engineering Graphics • Business Studies • Entrepreneurship	• Maths • Physics • Chemistry • Computer Science • Electronics • Information Technology • Biology • Informatics Practices • Bio Technology • Technical Vocational subject • Agriculture • Engineering Graphics • Business Studies • Entrepreneurship	Related Vocational Subjects Theory& Practical	2 years course to be passed with appropriate Trade

- For the Diploma Programmes related with Engineering/Technology, the related / equivalent courses prescribed along with Practical's may also be taken for arriving the eligibility.
- Programmes will be allotted according to merit through counseling by the Principal as per communal reservation.
- Candidates who have studied Commerce Courses are not eligible for Engineering Diploma Programmes.

2.4. Age Limit:

No Age limit.

2.5. Medium of Instruction: English

2.6. 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 3/3 ½ academic years (Full Time/Sandwich), affiliated to the State Board of Technical Education and Training, Tamil Nadu, when joined in First Year and 2/2 ½ years (Full Time/Sandwich), if joined under Lateral Entry scheme in the second year and passed the prescribed examination.

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

Diploma Programmes	Minimum Period	Maximum Period
Full Time	3 Years	6 Years
Full Time (Lateral Entry)	2 Years	5 Years
Sandwich	3½ Years	6½ Years
Sandwich (Lateral Entry)	2½ Years	5½ Years

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

2.7. Programmes of Study and Curriculum outline

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

The curriculum outline is given in Annexure – I.

2.8. Examinations:

Autonomous Examinations in all Programmes of all the terms under the scheme of examinations will be conducted at the end of each term.

The internal assessment marks for all the courses will be awarded on the basis of continuous assessment earned during the term concerned. For each course, 25 marks are allotted for internal assessment. Autonomous Examinations are conducted for 100 marks and reduced to 75.

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

2.9. Continuous Internal Assessment:

A. For Theory Courses:

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

i) Course 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**

Two Tests each of 2 hours duration for a total of 50 marks are to be conducted. Average of 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 & Half of Unit II	End of 6th week	50	2 Hrs
Test II	Remaining Half of Unit II & III	End of 12th week	50	2 Hrs
Test III	Model Examination: Covering all the 5 Units. (Autonomous Examinations- Question paper-pattern).	End of 16th week	100	3 Hrs

 # From the Academic Year 2020 – 2021 onwards.

Question Paper Pattern for the Cycle Test :(Test - I & Test- II) **:**

Part A Type questions (Any 4 out of 6 questions) : 4 Questions × 2 mark 08 marks

Part B Type questions (Any 4 out of 6 questions) : 4 Questions × 3 mark 12 marks

Part C Type questions (Either or) : 3 Questions × 10 mark 30 marks

Total **50 marks**

Assignment **10 Marks**

- **Written Assignment** - **4 marks**
- **Multiple Choice Questions** - **3 marks**
- **Seminar Presentation** - **3 marks**
- **Total** - **10 Marks**

iii) Assignment **4 Marks**

For each course Two Assignments are to be given each for 10 marks and the average marks scored should be reduced for 4 marks.

iv) Multiple Choice Questions **3 Marks**

For each course one MCQ test are to be given each for 30 marks and the average marks scored should be reduced for 3 marks.

v) Seminar Presentation **3 Marks**

The students have to select the topics either from their course or general courses 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 courses and carries 3 marks for each theory course. The respective course faculty may suggest topics to the students and will evaluate the submitted materials and seminar presentation. (1 ½ marks for the material submitted in writing and 1 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 3 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 term 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 term, 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.

2.10. 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.

2.11. Project Work and Internship:

The students of all the Diploma Programme have to do a Project Work as part of the Curriculum and in partial fulfilment 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 term. The project work is approved during the V term 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 term 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 term 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.

2.12. Scheme of Examinations:

The Scheme of examinations for courses is given in Curriculum outline

2.13. 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 course 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 Autonomous Examinations marks put together, course to the condition that he/she secures at least a ***minimum of 40 marks out of 100 marks in the Autonomous Theory Examinations and a minimum of 50 marks out of 100 marks in the Autonomous Practical Examinations***.

2.14. 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 courses and passes all the terms in the first appearance itself and passes all courses within the stipulated period of study 2 / 3 / 3½ years [Full time (lateral entry)/Full Time/Sandwich] 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 terms put together and passes all the terms except the I and II term in the first appearance itself and passes all courses within the stipulated period of study 2 / 3 / 3½ years [Full time(lateral entry)/Full Time/Sandwich] 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 terms put together and passes all the courses within the stipulated period of study 2 / 3 / 3½ years [Full time(lateral entry)/Full Time/Sandwich] 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 students who pass out Final Examination from October 2023 /April 2024 onwards (both joined First Year in 2020 -2021).

2.15. 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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3. SALIENT FEATURES OF THE DIPLOMA PROGRAMME IN INSTRUMENTATION AND CONTROL ENGINEERING

Name of the Programme	**:**	Diploma in Instrumentation and Control Engineering
Duration of the Programme	**:**	Three years (Six Terms)
Entry Qualification	**:**	Matriculation or equivalent as prescribed by State Board of Technical Education, Tamil Nadu
Intake	**:**	50 (or as approved by AICTE)
Pattern of the Programme	**:**	Term Pattern
Ratio Between Theory & Practical Classes	**:**	50:50 (Approximately)

4. EMPLOYMENT OPPORTUNITIES AND ACTIVITY PROFILE OF DIPLOMA HOLDERS IN INSTRUMENTATION AND CONTROL ENGINEERING

- It is observed that employment in government/public sector undertakings are dwindling day by day. Keeping present scenario in view, following employment opportunities are visualized in different sectors of employment for diploma holders in Instrumentation and Control Engineering**.**

(A) EMPLOYMENT OPPORTUNITIES

(1) Process Industry

The Instrumentation diploma holder will be involved in following activities in Process industry:

- Supervisor/technician (Maintenance and repair)
- Supervisor/technician (Erection, commissioning and testing)
- Laboratory technician/workshop in charge in process industries
- Console operator in cement, pharmaceutical, paper, hydro and other process industries
- Measuring and controlling of different variables during process line, pressure, temperature etc.
- Supervisor (automation)
- Thermal Power Station
- Automobile Industry
- Refinery
- Nuclear Power Plant
- Wind Power Grid
- Solar Power Grid and other various renewable energy sources

(2) Manufacturing Industry

The Instrumentation diploma holder will be involved in following activities in Instrumentation and Control manufacturing industry:

- Design and development assistant
- Production supervisor/senior assistant
- Foreman

- Erection, calibration, testing and commissioning supervisor in measuring instruments and control system of manufacturing and assembly industries

(3) Marketing and Service Organization

The Instrumentation diploma holder will be involved in following activities in Instrumentation and Control manufacturing industry:

- Marketing Assistant
- Sales and Service Engineer
- Customer Support Service Engineer

(4) Service Organization

- Repair and Maintenance Technician
- Customer Support Service Engineer

(5) Instrumentation User Organization

- Instrument technician/supervisor, in institutions / research laboratories
- Junior Engineer
- Maintenance Mechanic/Supervisor

(6) A small percentage of diploma holders may also become entrepreneurs either in Manufacturing instruments or service and maintenance of instruments

(7) Laboratory Supervisor in Educational Institutions

(8) Medical and Healthcare Institutions for

- Repair and Maintenance &
- sales and service

(B) JOB PROFILE/ ACTIVITY PROFILE

- Reading, interpreting and preparing instrumentation drawings and circuits.
- Preparing estimates of men and material required for simple jobs of installation and maintenance.
- Selecting instruments and devices for simple applications including specifications.

- Developing control circuits and instrumentation for simple application/ modification of existing circuits.
- Assembly, alignment, calibration and Testing of electronic process instruments.
- Installing instruments, control accessories and panels
- Doing wiring/pneumatic connection of system/panel and check the systems as per instruction of suppliers
- Inspecting system, diagnose fault and take corrective action
- Testing instruments and devices on simulated systems and actual system(s)
- Performing routine preventive maintenance of instruments and system(s)
- Activities related to teaching profession in laboratories
- Fault finding through tests, repair and calibration of instruments, devices and systems
- Sale and service of equipment/instruments and systems
- Repairing of analog and digital electronic instruments
- Managing a small repair shop
- Dealing and communicating effectively with the people
- Process blue print generation
- PLCs, DCS, SCADA networking and installation
- Procurement System – documentation, hierarchical involvement in management information system
- Awareness of Standards/Codes/Safety measures
- Safety hazards
- Process Operation and Control eg electroplating
- Disaster mitigation and management-seismic data monitoring and use
- Terrorism acts mitigation – using safety controls, close circuit TV and sensing elements
- Preparation of Management Information System
- Process parameter monitoring and taking corrective action. Process tread/alarm monitoring and report generation by making use of latest control software like Yokogawa, CS=3000/100, TATA Honeywell, DCS software etc.

5. COMPETENCY PROFILE OF DIPLOMA HOLDER IN INSTRUMENTATION AND CONTROL ENGINEERING

Keeping in view the employment scenario and requirement of four domains of learning viz. Professional Development Domain, Continued Learning Domain, Human Relations Domain and Personal Development Domain, a diploma holder in Instrumentation and Control Engineering should have the:

1. Understanding of various stages of process, process variables, methods adopted for measurement and control including recording data in industries
2. Understanding of the principles of operation, constructional details, error adjustment and process of assembly of instruments and devices
3. Ability to identify various types of control devices, systems and instruments
4. Understanding of basic principles of electrical and electronics engineering
5. Understanding of electrical equipment and machines
6. Ability to draw and interpret various types of drawings used in the process and control systems
7. Competency of designing the layout of control circuits and fabricate small control panels
8. Ability to select appropriate instruments for the control and measurement of particular parameter
9. Ability to select and use actuators, different devices and interface circuits, components, tools and instruments for testing, maintenance and repair of instruments including bio-medical instruments
10. Competency to install/erect and commission, equipment including power electronic devices and control panels including preparation of estimates for given job of installation/repair/survey
11. Ability to test and calibrate various components and instruments in industry
12. Knowledge and skills in using information technology tools for information storage, retrieval and dissemination, and making use of computer application software like MATLAB, Allen bradely, SLC 100 on PLCs, DCS software etc.
13. Knowledge of digital devices, microprocessors and micro controllers and their applications in electronic instrumentation system

14. Knowledge of digital bus technologies in Automated Process/Manufacturing industries like Foundation Field Bus, MOD Bus etc.
15. Modern control strategies which one is used by the Industries in the present context
16. Knowledge of hybrid systems being used by developed countries.
17. Knowledge of basic principles of management and entrepreneurship to manage men, material and machines optimally
18. Knowledge of setting up an enterprise in small scale of tiny sector and competency to promote marketing/servicing of the products
19. Proficiency in oral and written communication, preparation of projects and technical report writing, managing relationship with juniors, peers and seniors for effective functioning in the world of work
20. Knowledge of using quality control standards (national and international) for instrumentation and control
21. Understanding of basic principles of sciences and foundation for further studies
22. Awareness about environment, pollution control and technological advancements in areas of instrumentation and control

6. DERIVING CURRICULUM AREAS FROM COMPETENCY PROFILE

Following curriculum areas have been derived from competency profile as identified in Section 3:

S.No.	Competency Profile	Curriculum Area/Subjects
1.	Understanding of various stages of process, process variables, methods adopted for measurement and control including recording data in industries	• Process Control • Control Systems, • Measurement and Instruments • Transducers and Signal Conditioning
2.	Understanding of the principles of operation, constructional details, error adjustment and process of assembly of instruments and devices	• Fundamentals of Digital Electronics Test and Measuring Instruments
3.	Understanding of basic principles of electrical and electronics engineering, electrical equipment and machines	Electrical Circuits and Machines
4.	Ability to draw and interpret various types of drawings used in the process and control systems	Piping and Instrumentation diagram
6.	Ability to select appropriate instruments for the control and measurement of particular parameter	Principles of Instrumentation - Test and Measuring Instruments - Process Instrumentation
7.	Understanding the basic principles of Digital electronics	Digital Electronics
8.	Knowledge and skills in programming	C Programming
9.	Understanding, designing and analyzing the electronic circuits using simulation software.	Electronic Circuit Design and Simulation Lab
10.	Knowledge of microprocessor & microcontroller and their applications in Electronic System.	Microcontroller

S.No.	Competency Profile	Curriculum Area/Subjects
11.	Understanding the principles of power devices, circuits, converters, choppers, inverters, PLC.	• Industrial Electronics • PLC
12.	Knowledge and skills in using information technology tools for information storage, retrieval and dissemination, and making use of computer application software and Networking	Computer hardware Servicing and Networking Lab
13.	Knowledge of Bio-medical equipment and Telemedicine.	Biomedical and Telemedicine
14.	Proficiency in oral and written communication, technical report writing, managing relationship with juniors, pears and seniors for effective functioning.	Life Skills and Employability Lab
15.	Competency in solving simple problems related to various functional areas of Electronics, Electrical and Instrumentation Engineering, making a prototype model	Project work

CURRICULUM OUTLINE: III - VI*:* TERM CURRICULUM

SESHASAYEE INSTITUTE OF TECHNOLOGY(AUTONOMOUS),TRICHY-10												
TEACHING AND EXAMINATION SCHEME												
PROGRAMME : INSTRUMENTATION AND CONTROL ENGINEERING								COURSE CODE: ICE				
DURATION OF COURSE: 6 TERMS								PATTERN: FULL TIME				
TERM: THIRD								DURATION: 15 WEEKS				
SCHEME: F								WITH EFFECT FROM 2020-2021				
SL. NO	COURSE TITLE	ABBREVIATION	COURSE CODE	TEACHING SCHEME				CREDITS	SCHEME OF EXAMINATION			
				THEORY	TUTORIAL	PRACTICAL	TOTAL		INTERNAL	EXAM	TOTAL	MIN MARK FOR PASS	DURATION
1	**THEORY** Electronic Devices & its Applications	EDA	6F3201	5	-	-	5	5	25	100	100	40	3
2	Electrical Circuits and Machines	ECM	6F3202	5	-	-	5	5	25	100	100	40	3
3	Analog & Digital Electronics	ADE	6F3301	5	-	-	5	5	25	100	100	40	3
4	Measurements & Instruments	M&I	6F3203	5	-	-	5	5	25	100	100	40	3
5	**PRACTICAL** Electronic Devices & its Applications Lab	EDA Lab	6F3204	-	-	4	4	2	25	100	100	50	3
6	Electrical Circuits and Machines Lab	ECM Lab	6F3205	-	-	4	4	2	25	100	100	50	3
7	Analog & Digital Electronics Lab	ADE Lab	6F3302	-	-	4	4	2	25	100	100	50	3
8	Physical Education	PE				2	2						
9	Library	LIB				1	1						
TOTAL				20	-	15	35	26	700				

SESHASAYEE INSTITUTE OF TECHNOLOGY(AUTONOMOUS),TRICHY-10													
TEACHING AND EXAMINATION SCHEME													
PROGRAMME : INSTRUMENTATION AND CONTROL ENGINEERING								COURSE CODE: ICE					
DURATION OF COURSE: 6 TERMS								PATTERN: FULL TIME					
TERM: FOURTH								DURATION: 15 WEEKS					
SCHEME: F								WITH EFFECT FROM 2020-2021					
SL. NO	COURSE TITLE	ABBREVIATION	COURSE CODE	TEACHING SCHEME				CREDITS	SCHEME OF EXAMINATION				
				THEORY	TUTORIAL	PRACTICAL	TOTAL		INTERNAL	EXAM	TOTAL	MIN MARK FOR PASS	DURATION
1	**THEORY** Industrial Instrumentation -1	II-1	6F4206	5	-	-	5	5	25	100	100	40	3
2	Control Systems	CS	6F4207	5	-	-	5	5	25	100	100	40	3
3	Microcontroller & its Applications	MC	6F4303	5	-	-	5	5	25	100	100	40	3
4	E-Vehicle Technology & its Policy	EVT	6F4401	5	-	-	5	5	25	100	100	40	3
5	**PRACTICAL** Industrial Instrumentation -1 Lab	II-1 Lab	6F4208	-	-	4	4	2	25	100	100	50	3
6	MATLAB+LABVIEW Simulation Lab	MLSLab	6F4209	-	-	4	4	2	25	100	100	50	3
7	Microcontroller & its Applications Lab	MC Lab	6F4304	-	-	4	4	2	25	100	100	50	3
8	Physical Education	PE				2	2						
9	Library	LIB				1	1						
10	Concurrent Career Development	CCD**	6F0005					5	25	100	100	40	3
TOTAL				20	-	15	35	26	800				

**** The total hours allotted for taking CCD is 75 Hrs and will be handled with flexible timings**

SESHASAYEE INSTITUTE OF TECHNOLOGY(AUTONOMOUS),TRICHY-10														
TEACHING AND EXAMINATION SCHEME														
PROGRAMME : INSTRUMENTATION AND CONTROL ENGINEERING									COURSE CODE: ICE					
DURATION OF COURSE: 6 TERMS									PATTERN: FULL TIME					
TERM: FIFTH									DURATION: 15 WEEKS					
SCHEME: F									WITH EFFECT FROM 2020-2021					
SL. NO	COURSE TITLE	ABBREVIATION	COURSE CODE	TEACHING SCHEME				CREDITS	SCHEME OF EXAMINATION				
				THEORY	TUTORIAL	PRACTICAL	TOTAL		INTERNAL	EXAM	TOTAL	MIN MARK FOR PASS	DURATION
1	**THEORY** Industrial Instrumentation -2	II-2	6F5210	5	-	-	5	5	25	100	100	40	3
2	Process Control	PC	6F5211	5	-	-	5	5	25	100	100	40	3
3	**ELECTIVE -1** (i) Power Plant Instrumentation (ii) VLSI (iii) Embedded Systems	PPI VLSI ES	6F5212.1 6F5212.2 6F5212.3	5	-	-	5	5	25	100	100	40	3
4	**PRACTICAL** Entrepreneurship & Startups	ERS	6F5402	-	1	4	5	3	25	100	100	40	3
5	Industrial Instrumentation-2 Lab	II-2 Lab	6F5213	-	-	4	4	2	25	100	100	50	3
6	Process Control Lab	PC Lab	6F5214	-	-	4	4	2	25	100	100	50	3
7	**ELECTIVE -1** (i) C Programming Lab (ii) VLSI Lab (iii) Embedded Systems Lab	CP Lab VLSI Lab ES Lab	6F5403.1 6F5403.2 6F5403.3	-	-	4	4	2	25	100	100	50	3
8	Physical Education	PE				2	2						
9	Library	LIB				1	1						
10	Universal Human Values	UHV**	6F0006					5	25	100	100	40	3
TOTAL				15	1	19	35	24	800				

** The total hours allotted for taking UHV is 75 Hrs and will be handled with flexible timings

SESHASAYEE INSTITUTE OF TECHNOLOGY(AUTONOMOUS),TRICHY-10													
TEACHING AND EXAMINATION SCHEME													
PROGRAMME : INSTRUMENTATION AND CONTROL ENGINEERING								COURSE CODE: ICE					
DURATION OF COURSE: 6 TERMS								PATTERN: FULL TIME					
TERM: SIXTH								DURATION: 15 WEEKS					
SCHEME: F								WITH EFFECT FROM 2020-2021					
SL. NO	COURSE TITLE	ABBREVIATION	COURSE CODE	TEACHING SCHEME				CREDITS	SCHEME OF EXAMINATION				
				THEORY	TUTORIAL	PRACTICAL	TOTAL		INTERNAL	EXAM	TOTAL	MIN MARK FOR PASS	DURATION
1	**THEORY** Industrial Automation	IA	6F6215	5	-	-	5	5	25	100	100	40	3
2	Industrial Electronics	IE	6F6305	5	-	-	5	5	25	100	100	40	3
3	**ELECTIVE -1** (i) Bio-Medical Instrumentation (ii) Robotics And Auto Electronics (iii) Fiber Optics & Laser Instrumentation	BMI RAE FOLI	6F6216.1 6F6216.2 6F6216.3	5	-	-	5	5	25	100	100	40	3
4	**PRACTICAL** Industrial Automation Lab	IA Lab	6F6217	-	-	6	6	3	25	100	100	40	3
5	Industrial Electronics Lab	IE Lab	6F6306	-	-	6	6	3	25	100	100	50	3
6	Project Work And Internship	PWI	6F6403	-	-	5	5	3	25	100	100	50	3
7	Physical Education	PE				2	2						
8	Library	LIB				1	1						
TOTAL				15	-	20	35	24	600				

SESHASAYEE INSTITUTE OF TECHNOLOGY (Autonomous), TRICHY-10

6: DIPLOMA IN INSTRUMENTATION AND CONTROL ENGINEERING
SYLLABUS F-SCHEME
(To be implemented for the students admitted from the year 2020-21 onwards)

EQUIVALENT PAPERS OF E SCHEME TO F SCHEME
EQUIVALENT PAPERS

III Term

	"E" SCHEME		"F" SCHEME
6E3201	Electronic Devices & its Applications	6F3201	Electronic Devices & its Applications
6E3203	Electrical Circuits and Machines	6F3202	Electrical Circuits and Machines
6E3301	Analog & Digital Electronics	6F3301	Analog & Digital Electronics
6E3202	Electronic Devices & its Applications Lab	6F3204	Electronic Devices & its Applications Lab
6E3204	Electrical Circuits and Machines Lab	6F3205	Electrical Circuits and Machines Lab
6E3302	Analog & Digital Electronics Lab	6F3302	Analog & Digital Electronics Lab
6E3401	Computer Applications Lab		**NO RELAVENT PAPER**

IV Term

	"E" SCHEME		"F" SCHEME
6E4303	Microcontroller and its applications	6F4303	Microcontroller & its Applications
6E4205	Industrial Instrumentation - I	6F4206	Industrial Instrumentation -1
6E4206	Measurements & Instruments	6F3203	Measurements & Instruments **(III Term)**
6E4207	Control System	6F4207	Control Systems
6E4304	Microcontroller and its applications Lab	6F4304	Microcontroller & its Applications Lab
6E4305	Simulation Lab		**NO RELAVENT PAPER**
6E4402	Life and Employability Skills Practical		**NO RELAVENT PAPER**
		6F4401	E-Vehicle Technology & its Policy
		6F4208	Industrial Instrumentation -1 Lab
		6F4209	MATLAB+LABVIEW Simulation Lab
		6F0005	Concurrent Career Development

V Term

	"E" SCHEME		"F" SCHEME
6E5208	Industrial Instrumentation - II	6F5210	Industrial Instrumentation -2
6E5210	Process Control	6F5211	Process Control
6E5403	C Programming		**NO RELAVENT PAPER**
6E5212.1	Power Plant Instrumentation	6F5212.1	Power Plant Instrumentation
6E5212.2	Embedded Systems	6F5212.3	Embedded Systems
6E5212.3	VLSI	6F5212.2	VLSI
6E5209	Industrial Instrumentation Lab	6F5213	Industrial Instrumentation -2 Lab
6E5211	PC& P&ID Lab	6F5214	Process Control Lab
6E5404	C Programming Lab	6F5403.1	C Programming Lab
		6F5403.2	VLSI Lab
		6F5403.3	Embedded Systems Lab
		6F5402	Entrepreneurship & Startups
		6F0006	Universal Human Values

VI Term

	"E" SCHEME		"F" SCHEME
6E6213	Industrial Automation	6F6215	Industrial Automation
6E6306	Industrial Electronics	6F6305	Industrial Electronics
6E6215.1	Bio-Medical Instrumentation	6F6216.1	Bio-Medical Instrumentation
6E6215.2	Fiber Optics & Laser Instrumentation	6F6216.3	Fiber Optics & Laser Instrumentation
6E6215.3	Robotics And Auto Electronics	6F6216.2	Robotics And Auto Electronics
6E6214	Industrial Automation Lab	6F6217	Industrial Automation Lab
6E6307	Industrial Electronics Lab	6F6306	Industrial Electronics Lab
6E6501	Environmental Studies Practical		**NO RELAVENT PAPER**
6E6405	Project work	6F6403	Project Work And Internship

SESHASAYEE INSTITUTE OF TECHNOLOGY (Autonomous), TRICHY-10
6: DIPLOMA IN INSTRUMENTATION AND CONTROL ENGINEERING
SYLLABUS F-SCHEME
(To be implemented for the students admitted from the year 2020-21 onwards)

DETAILS OF ADDITION / DELETION OF SUBJECTS

III Term

Courses in "E" Scheme	Courses in "F" Scheme	Remarks
Electronic Devices & its Applications	Electronic Devices & its Applications	**Deleted :** (i) Atomic structure as per the experts opinion, (ii) Special Semiconductor devices and included in I Unit, **Included :** (i) block diagram of SMPS, (ii) Power amplifier introduction and UJT, (iii) basic concept of power supply, SMPS and UPS
Electrical Circuits and Machines	Electrical Circuits and Machines	**Included :** (i) Impedance and Admittance method is included in RLC parallel AC circuits **Deleted :** (i) Deleted Capacitor start motor in 1Ø induction motor. (ii) Deleted core and copper loss derivation in transformer - only Equation is included
Analog & Digital Electronics	Analog & Digital Electronics	**Included :** i. Logic families-TTL, CMOS ii. Binary weighted Resistor D/A iii. Ramp type ADC iv. Instrumentation amplifier, v. V-to-I converter vi. I-to-V converter **Deleted :** i. The Excess-3 code and Gray code
	Measurements & Instruments	**Shifted** from E – Scheme fourth term to F – Scheme third term (Equivalent to E- Scheme)

Courses in "E" Scheme	Courses in "F" Scheme	Remarks
Electronic Devices & its Applications Lab	Electronic Devices & its Applications Lab	**Reduced** to 12 Experiment as per the experts suggestions in PAC meeting
Electrical Circuits and Machines Lab	Electrical Circuits and Machines Lab	**Reduced** to 12 Experiment as per the experts suggestions in PAC meeting
Analog & Digital Electronics Lab	Analog & Digital Electronics Lab	**Included :** Experiment; Full Subtractor
Computer Applications Lab		Shifted from E – Scheme Third term to F – Scheme Second term

IV Term

Courses in "E" Scheme	Courses in "F" Scheme	Remarks
Microcontroller and its applications	Microcontroller & its Applications	**Included :** Interfacing Digital humidity and temperature sensor. **Deleted :** GSM based Security Application-using GSM Modem.
Industrial Instrumentation - I	Industrial Instrumentation -1	• Vibration measurement deleted • Velocity measurement included • Level, humidity, moisture measurement topics shifted to Industrial Instrumentation – 2 • Temperature measurement shifted from industrial instrumentation – 2 **(Equivalent to E- Scheme)**
Measurements & Instruments		**Shifted** from E – Scheme fourth term to F – Scheme third term **(Equivalent to E- Scheme)**
Control System	Control Systems	**Included :** Properties of LT - Initial and final value theorems - only statements are included, **Deleted :** Derivation is deleted.
	Concurrent Career Development	**Newly introduced in F – scheme**

Courses in "E" Scheme	Courses in "F" Scheme	Remarks
Microcontroller and its applications Lab	Microcontroller & its Applications Lab	**Included :** 1. Interfacing Traffic light controller with ARDUINO . 2. Interfacing digital humidity sensor with ARDUINO **Deleted :** Sum of N numbers
Simulation Lab		**Removed in F Scheme**
Life and Employability Skills Practical		**Removed in F Scheme**
	E-Vehicle Technology & its Policy	**Newly introduced in F – scheme**
	Industrial Instrumentation -1 Lab	**Newly introduced in F – scheme**
	MATLAB+LABVIEW Simulation Lab	**Newly introduced in F – scheme**

V Term

Courses in "E" Scheme	Courses in "F" Scheme	REMARKS
Industrial Instrumentation - II	Industrial Instrumentation -2	• Level, humidity, moisture measurement topics shifted from Industrial Instrumentation – 1 • Temperature measurement shifted to industrial instrumentation – 1 • Fibre optics and laser instrumentation topic introduced in industrial instrumentation – 2 **(Equivalent to E- Scheme)**
Process Control	Process Control	No changes **(Equivalent to E- Scheme)**
C Programming		**Removed in F Scheme**

Courses in "E" Scheme	Courses in "F" Scheme	Remarks
Power Plant Instrumentation	Power Plant Instrumentation	No changes **(Equivalent to E- Scheme)**
Embedded Systems	Embedded Systems	No changes **(Equivalent to E- Scheme)**
VLSI	VLSI	No changes **(Equivalent to E- Scheme)**
Industrial Instrumentation Lab	Industrial Instrumentation -2 Lab	No changes **(Equivalent to E- Scheme)**
PC& P&ID Lab	Process Control Lab	(i) Characteristics of RTD and Flapper Nozzle - Introduced (ii) Feedback, feed forward and ratio, cascade are combined
C Programming Lab	C Programming Lab	No changes **(Equivalent to E- Scheme)**
	Entrepreneurship & Startups	i. Batch Process and continuous process ii. Floating mode, controller mode, single speed, multispeed and its application iii. Frequency Response method of Controller tuning and self- tuning Controllers iv. P&I Drawing feedback, feed forward cascade, ratio
	VLSI Lab	**Newly introduced in F – scheme**
	Embedded Systems Lab	**Newly introduced in F – scheme**
	Universal Human Values	**Newly introduced in F – scheme**

VI Term

Courses in "E" Scheme	Courses in "F" Scheme	REMARKS
Industrial Automation	Industrial Automation	No changes **(Equivalent to E- Scheme)**
Industrial Electronics	Industrial Electronics	No changes **(Equivalent to E- Scheme)**
Bio-Medical Instrumentation	Bio-Medical Instrumentation	No changes **(Equivalent to E- Scheme)**
Fiber Optics & Laser Instrumentation	Fiber Optics & Laser Instrumentation	No changes **(Equivalent to E- Scheme)**
Robotics And Auto Electronics	Robotics And Auto Electronics	No changes **(Equivalent to E- Scheme)**
Industrial Automation Lab	Industrial Automation Lab	Experiment revised **(Equivalent to E- Scheme)**
Industrial Electronics Lab	Industrial Electronics Lab	12 Experiments only as per recommendation of Expert committee **Deleted :** LDR control, IC 555 Multivibrator
Environmental Studies Practical		**Removed in F Scheme**
Project work	Project Work And Internship	

8. HORIZONTAL AND VERTICAL ORGANISATION OF THE COURSES (ICE)

S.No.	Subject	Distribution of time in various semesters					
		I	II	III	IV	V	VI
1	English For Communication-I	5	-	-	-	-	-
2	Engineering Mathematics-I	6	-	-	-	-	-
3	Engineering Physics-I	5	-	-	-	-	-
4	Engineering Chemistry-I	5	-	-	-	-	-
5	Engineering Graphics-I	6	-	-	-	-	-
6	Engineering Physics Practical	1	-	-	-	-	-
7	Engineering Chemistry Practical	1	-	-	-	-	-
8	Communication Skill Practical	1	-	-	-	-	-
9	Communication English-II	-	4	-	-	-	-
10	Engineering Mathematics-II	-	6	-	-	-	-
11	Engineering Physics-II	-	4	-	-	-	-
12	Engineering Chemistry-II	-	4	-	-	-	-
13	Engineering Graphics-II	-	5	-	-	-	-
14	Engineering Physics Practical	-	1	-	-	-	-
15	Engineering Chemistry Practical	-	1	-	-	-	-
16	WorkShop Practice	-	4	-	-	-	-
17	Computer Application Practical	-	1	-	-	-	-
18	Electronic Devices & Its Applications	-	-	5	-	-	-
19	Electrical Circuits And Machines	-	-	5	-	-	-
20	Analog & Digital Electronics	-	-	5	-	-	-
21	Measurements & Instruments	-	-	5	-	-	-
22	Electronic Devices & Its Applications Lab	-	-	2	-	-	-
23	Electrical Circuits And Machines Lab	-	-	2	-	-	-
24	Analog & Digital Electronics Lab	-	-	2	-	-	-
25	Industrial Instrumentation-1	-	-	-	5	-	-
26	Control Systems	-	-	-	5	-	-
27	Microcontroller & Its Applications	-	-	-	5	-	-

S.No.	Subject	Distribution of time in various semesters					
		I	II	III	IV	V	VI
28	E-Vehicle Technology & Its Policy	-	-	-	5	-	-
29	Industrial Instrumentation-1 Lab	-	-	-	2	-	-
30	MATLAB + Lab VIEW Simulation Lab	-	-	-	2	-	-
31	Microcontroller & Its Applications Lab	-	-	-	2	-	-
32	Concurrent Career Development	-	-	-	5	-	-
33	Industrial Instrumentation-2	-	-	-	-	5	-
34	Process Control	-	-	-	-	5	-
35	Power Plant Instrumentation	-	-	-	-	5	-
36	VLSI	-	-	-	-	5	-
37	Embedded Systems	-	-	-	-	5	-
38	Entrepreneurship & Startups	-	-	-	-	3	-
39	Industrial Instrumentation-2 Lab	-	-	-	-	2	-
40	Process Control Lab	-	-	-	-	2	-
41	C Programming Lab	-	-	-	-	2	-
42	VLSI Lab	-	-	-	-	2	-
43	Embedded Systems Lab	-	-	-	-	2	-
44	Universal Human Values	-	-	-	-	5	-
45	Industrial Automation	-	-	-	-	-	5
46	Industrial Electronics	-	-	-	-	-	5
47	Bio-Medical Instrumentation	-	-	-	-	-	5
48	Robotics And Auto Electronics	-	-	-	-	-	5
49	Fiber Optics & Laser Instrumentation	-	-	-	-	-	5
50	Robotics And Auto Electronics	-	-	-	-	-	5
51	Industrial Automation Lab	-	-	-	-	-	3
52	Industrial Electronics Lab	-	-	-	-	-	3
53	Project Work And Internship	-	-	-	-	-	3

III SEMESTER

DIPLOMA IN ENGINEERING AND TECHNOLOGY

6

DEPARTMENT OF INSTRUMENTATION AND CONTROL ENGINEERING

II YEAR

F – SCHEME

III - TERM

IMPLEMENTED FROM 2020 – 2021

6F3201 - ELECTRONIC DEVICES AND ITS APPLICATIONS

SESHASAYEE INSTITUTE OF TECHNOLOGY
(Autonomous)
TIRUCHIRAPPALLI – 620 010.

ANNEXURE- II

SESHASAYEE INSTITUTE OF TECHNOLOGY (Autonomous), TRICHY-10

6: DIPLOMA IN INSTRUMENTATION AND CONTROL ENGINEERING SYLLABUS

F-SCHEME

(To be implemented for the students admitted from the year 2020-21 onwards)

Programme Name : 6 - Diploma In Instrumentation and Control Engineering

Course Code : 6F3201

Term : III

Course Name : Electronic Devices & its Applications

TEACHING AND SCHEME OF EXAMINATION

No of weeks per semester: 16 weeks

Subject	Instructions		Examination			
			Marks			Duration
	Hours / Week	Hours / Semester	Internal Assessment	Board Examinations	Total	
6F3201	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	Semiconductors & Diodes	14
II	Rectifiers And Filters	15
III	Bipolar Junction Transistor Specific Contents	15
IV	Oscillators And Wave Shaping Circuits	14
V	Field Effect Transistor (Unipolar Transistor) , MOSFET And RPS	15
	Test & Model Exam	7
	Total	**80**

RATIONALE:

The aim of introducing this course is to impart knowledge of basic Electronics devices to the students of Instrumentation & Control Engineering. Through the study of this course, the students will get knowledge of working, characteristics and applications of various devices. Study of Electronic devices & its applications is pre-requisite for Industrial Electronics.

OBJECTIVES:

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

- Understand the semiconductors, PN junction diode and zener diode
- Understand the working principle of different types of rectifiers, filters, clippers, clampers and special purpose diodes
- Differentiate various transistor configurations and understand the working principle of amplifiers and oscillators.
- Understand the structure, principle and characteristics of FET, MOSFET and UJT
- Understand the operation of Multivibrators

Course Outcome

On successful completion of the course, the students will be able to attain below Course Outcome (CO):

Course outcome		BTL	Linked PO
6F3201**- CO1**	Ability to understand Characteristics of PN diode, Zener diode, LED and Photo diode.	**L3 (AP)**	
6F3201**- CO2**	Ability to summarize the operations of Rectifiers, Clippers, Clampers and filters.	**L3 (AP)**	
6F3201**- CO3**	Ability to describe the structure, type and Characteristics of Transistors, UJT and operations of Amplifiers.	**L3 (AP)**	
6F3201**- CO4**	Ability to explain the structure, operation Oscillators and Wave shaping circuits.	**L3 (AP)**	
6F3201**- CO5**	Ability to describe the structure, type and Characteristics of JFET and MOSFETs.	**L3 (AP)**	

Legends: R = Remember U= Understand; A= Apply and above levels (BTL-Bloom's revised taxonomy Level)

Mapping Course Outcomes (CO) - Program Outcomes (PO)

CO	Program Outcomes (PO)							Program Specific Outcomes (PSO)	
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2
6F3201- **CO1**	2	2	1	2	-	-	-	-	-
6F3201- **CO2**	2	2	1	2	-	-	-	-	-
6F3201- **CO3**	2	2	1	2	-	-	-	-	-
6F3201- **CO4**	2	2	1	2	-	-	-	-	-
6F3201- **CO5**	2	2	1	2	-	-	-	-	-
TOTAL	10	10	5	10	-	-	-	-	-
No. of COs Mapping with POs	5	5	5	5	-	-	-	-	-
Average	2	2	1	2	-	-	-	-	-
Round off(Average)	2	2	1	2	-	-	-	-	-
Correlation									
Strong – S / 3			**Medium – M /2**				**Weak – W / 1**		

DETAILED SYLLABUS

Contents: Electronic Devices & its Applications Theory

Unit	Name of the Topics	Hours
I	**SEMICONDUCTORS & DIODES** 1.1 Semiconductor **-** Bonds in semiconductor, commonly used semiconductors, Intrinsic semiconductor, extrinsic semiconductor 1.2 PN junction diode – forward & reverse bias characteristics, LEDs - forward & reverse bias characteristics and Photo diode working principle 1.2 Zener diode – Principle - characteristics - zener breakdown- avalanche break down –applications- specifications - Zener diode as a voltage regulator.	14

II	**RECTIFIERS AND FILTERS** 2.1 Rectifiers - Need of rectifier Types of rectifier: Half wave rectifier, Full wave rectifier (Bridge and Centre tapped) Working with waveform (IP/OP waveforms for voltage and current, Average (DC) value of current and voltage (No derivation) Definition: Ripple factor, PIV, Comparison of three types of rectifiers (HWR. FWR (bridge & centre tapped). 2.2 Filters - Need of filters - Types of filters: shunt capacitor, series inductor, LC filter, π filter (circuit diagram, operation) 2.3 Clipper, Clamper	15
III	**BIPOLAR JUNCTION TRANSISTOR SPECIFIC CONTENTS** 3.1 Transistor definition - Types: NPN, PNP junction transistors (Symbols, operating principle (NPN only) Transistor configuration: Common emitter (CE), common collector (CC), common base (CB). Characteristics in CE configuration (Circuit diagram, I/P and O/P characteristics, different points of characteristics (Cut-off, Active and Saturation), input resistance, output resistance, current gain (α & β) 3.2 Transistor as an amplifier (CE configuration only) Need of Cascaded amplifier - RC coupled amplifier - working principle and frequency response curve Transistor as a switch – (Circuit diagram, operation, application) 3.3 Power amplifier - Introduction, classification: class A, class B, class AB, class C (Definition only with i/p and o/p waveforms) UJT Symbol, characteristics and working principle of UJT.	15
IV	**OSCILLATORS AND WAVE SHAPING CIRCUITS** 4.1 Definition and block diagram of oscillator. - Concept of feedback, Types of feedback, Positive feedback, Negative feedback, Barkhausen's criterion - Classification of oscillators - LC oscillators - Hartley oscillators - Colpitt's oscillators - RC oscillator - Crystal Oscillator - Circuit Diagram & Working 4.2 Wave shaping circuits Astable, Monostable and Bistable multivibrators using transistor.	14
V	**FIELD EFFECT TRANSISTOR (UNIPOLAR TRANSISTOR) , MOSFET AND RPS** 5.1 FET - Types, Symbols and working principle - Characteristics of FET,	15

	Circuit diagram for drain characteristics, Operating regions of characteristics. - Drain resistance, trans conductance and amplification factor and their relation, Pinch off Voltage of FET - Comparison of BJT and FET. 5.2 MOSFET - Types, symbol, working principle - Application of FET and MOSFET. 5.3 Regulated Power Supply Definition of regulator, Need of regulator, Voltage regulation factor, Concept of load regulation and line regulation - Basic block diagram of DC power supply - Block diagram of SMPS, UPS and their explanation.	

Reference Books

1. Principles of Electronics, V.K. Mehta & Rohit Mehta, S.Chand& Company New Delhi, 3rd edition 2014
2. Electronics Devices & Circuits, Salivahanan S, N.Suresh Kumar, Mcgraw Hill Education 3rd Edition, 2012
3. Electronics principles, Malvino, Tata McGraw Publication
4. Electronics Devices and Circuits, Allen Mottershed, Tata McGraw Hill Publication

DIPLOMA IN ENGINEERING AND TECHNOLOGY

6

DEPARTMENT OF INSTRUMENTATION AND CONTROL ENGINEERING

II YEAR

F – SCHEME

III - TERM

IMPLEMENTED FROM 2020 – 2021

6F3202 - ELECTRICAL CIRCUITS AND MACHINES

SESHASAYEE INSTITUTE OF TECHNOLOGY
(Autonomous)
TIRUCHIRAPPALLI – 620 010.

ANNEXURE- II

SESHASAYEE INSTITUTE OF TECHNOLOGY (Autonomous), TRICHY-10

6: DIPLOMA IN INSTRUMENTATION AND CONTROL ENGINEERING SYLLABUS

F-SCHEME

(To be implemented for the students admitted from the year 2020-21 onwards)

Programme Name : 6 - Diploma In Instrumentation and Control Engineering

Course Code : 6F3202

Term : III

Course Name : Electrical Circuits and Machines

TEACHING AND SCHEME OF EXAMINATION

No of weeks per semester: 16 weeks

Subject	Instructions		Examination			
			Marks			Duration
	Hours / Week	Hours / Semester	Internal Assessment	Board Examinations	Total	
6F3202	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 Circuits	12
II	AC Circuits	16
III	Resonance and 3 Φ AC Circuits	15
IV	DC Generator & DC Motor	15
V	AC Machines	15
Test & Model Exam		7
Total		**80**

RATIONALE:

Basic Electrical knowledge is essential for Instrumentation & Control Engineering.

- Study of Electric Circuits and Machines provides the foundation of Electrical Engineering.
- It helps the students to familiarize with working principle of DC and AC machines, Transformer, which is a prerequisite for the students in the industries.

OBJECTIVES:

- ❖ At the end of the course, the students will be able to
- ❖ Understand voltage, current, Resistance, resistivity, EMF, power and energy.
- ❖ Apply Ohm's law ‘E’ scheme
- ❖ Solve problems in mesh current and nodal voltage method.
- ❖ Solve problems in super position, thevinin’s and maximum power transfer theorem.
- ❖ Develop knowledge in single phase and three phase circuits.
- ❖ Understand the concept of resonance circuit.
- ❖ Understand the principle, construction, working types and characteristics of DC Generator.
- ❖ Understand the principle, construction, working types and characteristics of DC Motors.
- ❖ Understand the principle, construction, working types and characteristics of transformer.
- ❖ Understand the principle, construction, working types and characteristics of alternator.
- ❖ Understand the principle, construction, working types and characteristics of principle, construction, working and applications of induction motor.

Course Outcome

On successful completion of the course, the students will be able to attain below Course Outcome (CO):

Course outcome		BTL	Linked PO
6F3202-**CO1**	Analyse the Electrical Circuits and apply circuit theorems.	**L4 (AP)**	
6F3202-**CO2**	Understand the concept of 1Ø AC circuits.	**L2 (U)**	
6F3202-**CO3**	Understand the concept of 3Ø AC circuits and series, Parallel resonance.	**L2 (U)**	
6F3202-**CO4**	Able to acquire knowledge about construction and working of DC machines	**L2 (U)**	
6F3202-**CO5**	Able to acquire knowledge about AC machines, transformer	**L2 (U)**	

Legends: R = Remember U= Understand; A= Apply and above levels (BTL-Bloom's revised taxonomy Level)

Mapping Course Outcomes (CO) - Program Outcomes (PO)

CO	Program Outcomes (PO)							Program Specific Outcomes (PSO)	
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2
6F3202- **CO1**	3	1	1	3	-	-	-	-	-
6F3202- **CO2**	3	1	1	3	-	-	-	-	-
6F3202- **CO3**	3	1	1	3	-	-	-	-	-
6F3202- **CO4**	2	2	2	1	-	-	-	-	-
6F3202- **CO5**	2	2	2	1	-	-	-	-	-
TOTAL	13	07	07	11	-	-	-	-	-
No. of COs Mapping with POs	5	5	5	5	-	-	-	-	-
Average	2.6	1.4	1.4	2.2	-	-	-	-	-
Round off(Average)	3	1	1	2	-	-	-	-	-
Correlation									
Strong – S / 3		**Medium – M /2**				**Weak – W / 1**			

DETAILED SYLLABUS

Contents: Electrical Circuits and Machines Theory

Unit	Name of the Topics	Hours
I	**DC CIRCUITS** 1.1 Concept of electrical quantities – Voltage – Current – Resistance – Power – Energy – Ohm's law – Resistances in series – resistances in parallel – Series parallel circuits – Kirchhoff's laws – Simple problems. 1.2 Superposition, Thevinin's and Maximum power transfer theorems – Statement and explanations – simple problems. Voltage to current and current to voltage conversion (Circuits).	12
II	**AC CIRCUITS** 2.1 AC fundamentals: AC fundamentals – AC waveform – Sinusoidal and non-sinusoidal – Period – Frequency – Cycle – Amplitude – Peak value – Average value – RMS value (effective value) – Form factor – Crest factor – Rectangular and Polar forms for complex number – Concept of vector diagram. 2.2 AC through pure resistor, Inductor and Capacitor – Concept of Impedance – vector diagram. Capacitors in series and parallel – energy stored in a capacitor, Derivation – simple problems. 2.3 Power in AC circuits – power factor – RL, RC and RLC series and parallel circuits (impedance and admittance methods) – simple problems.	16
III	**RESONANCE AND 3 Φ AC CIRCUITS** 3.1 Resonance: Condition for resonance – series and parallel resonance – resonance curve – selectivity – Q-factor and bandwidth, Applications of resonance – simple problems in resonance. 3.2 3ф AC Circuits: Concept of 3ф supply – Line and Phase voltage and current in star and delta connected circuits – 3ф power – Measurement of 3ф power by two wattmeter methods – simple problems – Advantages of 3ф over 1ф system.	15
IV	**DC GENERATOR & DC MOTOR** 4.1 DC Generator: DC machines – Constructional details of DC machines – DC generators – Principle – Types – EMF equation –	15

	characteristics of shunt, series and compound generators. 4.2 DC Motor: DC motor – Types – Motor action – Back EMF – Torque speed characteristics –Necessity of starters – Working of 3 point & 4 point starters – Speed control of DC motor – Applications.	
V	**AC MACHINES** 5.1 Alternators: Ac machines - 3ϕ Alternator – Construction and working – Relation between speed and frequency. 5.2 Induction Motor: 3ϕ induction motor – construction – Types – Principle of operation – Methods of starting of 3ϕ Induction motor – Slip. 1ϕ induction motor – Principle of operation –Capacitor start Motors – Applications. 5.3 Transformer: Transformer – Ideal Transformer – Principle of working – Constructional details – EMF equation – Turns ratio – Core loss – Copper loss – Efficiency – Regulation – SC and OC tests – Simple problems – All day efficiency. Auto transformer – Construction and working – Applications.	15

Reference Books

1.A text book of Electrical Technology - Vol. I & II, B.L. Theraja, S.Chand& Co.

2.Circuit Theory, Arumugam & Premkumar, Khanna Publishers

3.Circuit Theory, Nagoorkani, RBA Publications

4.Elements of Electrical Engineering, M.M. Louis, Khanna Publishers

DIPLOMA IN ENGINEERING AND TECHNOLOGY

6

DEPARTMENT OF INSTRUMENTATION AND CONTROL ENGINEERING

II YEAR

F – SCHEME

III - TERM

IMPLEMENTED FROM 2020 – 2021

6F3301 - ANALOG AND DIGITAL ELECTRONICS

SESHASAYEE INSTITUTE OF TECHNOLOGY
(Autonomous)
TIRUCHIRAPPALLI – 620 010.

ANNEXURE- II

SESHASAYEE INSTITUTE OF TECHNOLOGY (Autonomous), TRICHY-10

6: DIPLOMA IN INSTRUMENTATION AND CONTROL ENGINEERING SYLLABUS

F-SCHEME

(To be implemented for the students admitted from the year 2020-21 onwards)

Programme Name : 6 - Diploma In Instrumentation and Control Engineering

Course Code : 6F3301

Term : III

Course Name : Analog and Digital Electronics

TEACHING AND SCHEME OF EXAMINATION

No of weeks per semester: 16 weeks

Subject	Instructions		Examination			
			Marks			Duration
	Hours / Week	Hours / Semester	Internal Assessment	Board Examinations	Total	
6F3301	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	Number Systems And Boolean Algebra	15
II	Combinational Logic Circuit and Logic Families	15
III	Sequential Logic Circuit	15
IV	DAC, ADC And TIMER IC 555	14
V	Operational Amplifier IC 741	14
Test & Model Exam		7
Total		80

RATIONALE:

The course has been designed to introduce the fundamental principles of analog and digital electronics. The knowledge of basic logic gates, combinational circuits and sequential circuits will enable the students to understand the working of digital equipment's. After completion of the course, students will be able to develop digital circuits-based applications. The knowledge of linear integrated circuits, various OPAMP configuration, timer, analog - to digital & digital-to-analog conversion techniques help the students to test, diagnose and rectify analog and digital electronic circuits.

OBJECTIVES:

- To understand various Number Systems and conversion from one system to other.
- To understand basic Boolean algebra and laws and De-Morgan's theorem.
- To understand basic logic gates and realization of other gates from universal gate
- To understand Karnaugh Map.
- To realize logic circuits from Boolean expression.
- To understand binary addition, 1's complement and 2's complement.
- To understand the design of combinational circuits such as adder, subtractor, encoder/decoder & MUX / DEMUX, BCD to seven segment decoder, parity generator, and checkers.
- To understand about logic families – TTL & CMOS
- To understand the design of sequential logic circuits such as flipflops, counters and shift registers.
- To understand the different types of digital to analog converters and analog to digital converters.
- To understand the timer IC 555 and its modes of operation
- To understand OPAMP IC 741, various configurations of OPAMP and applications.

Course Outcome

On successful completion of the course, the students will be able to attain below Course Outcome (CO):

Course outcome		BTL	Linked PO
6F3301**- CO1**	Ability to understand number systems, Boolean algebra, K-map and realization of logic circuits from Boolean expression	**L2 (U)**	
6F3301**- CO2**	Ability to design simple combinational logic circuits and understand TTL & CMOS logic families	**L2 (U)**	
6F3301**- CO3**	Ability to design simple sequential logic circuits	**L2 (U)**	
6F3301**- CO4**	Ability to understand the operation of different types of data converters (ADC, DAC) and timer IC 555	**L2 (U)**	
6F3301**- CO5**	Ability to understand OPAMP IC 741,various configurations of OPAMP and applications	**L2 (U)**	

Legends: R = Remember U= Understand; A= Apply and above levels (BTL-Bloom's revised taxonomy Level)

Mapping Course Outcomes (CO) - Program Outcomes (PO)

CO	Program Outcomes (PO)							Program Specific Outcomes (PSO)	
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2
6F3301**- CO1**	2	2	1	2	-	-	-	-	-
6F3301**- CO2**	2	2	1	2	-	-	-	-	-
6F3301**- CO3**	2	2	1	2	-	-	-	-	-
6F3301**- CO4**	2	2	1	2	-	-	-	-	-
6F3301**- CO5**	2	2	1	2	-	-	-	-	-
TOTAL	10	10	5	10	-	-	-	-	-
No. of COs Mapping with POs	5	5	5	5	-	-	-	-	-
Average	2	2	1	2	-	-	-	-	-
Round off(Average)	2	2	1	2	-	-	-	-	-
Correlation									
Strong – S / 3		**Medium – M /2**				**Weak – W / 1**			

DETAILED SYLLABUS

Contents: Analog and Digital Electronics Theory

Unit	Name of the Topics	Hours
I	**NUMBER SYSTEMS AND BOOLEAN ALGEBRA** 1.1 Basics of Analog and Digital signals, Positive logic, and Negative logic. - Number systems– Decimal – Binary – Octal – Hexadecimal – BCD – Conversions from one number system to other 1.2 Boolean Algebra – Basic laws and Demorgan's Theorems, Truth table. - Logic gates – OR – AND – NOT – NOR – NAND – EX-OR EX-NOR Symbols, Truth table and Boolean expression – Realization of gates using universal gates. 1.3 Karnaugh map – Pairs, Quads and Octets. Simplifications of Boolean expression using K-Map (upto 4 variable).	15
II	**COMBINATIONAL LOGIC CIRCUIT AND LOGIC FAMILIES** 2.1 Binary addition, 1's Complement, 2's Complement. - Half adder, Full adder, Half subtractor, Full subtractor 2.2. Decoder (3:8), Encoder (8:3), Multiplexer (8:1), Demultiplexer (1:8). 2.3 BCD to seven segment decoder, Parity bit generator and checker Logic families – TTL – CMOS.	15
III	**SEQUENTIAL LOGIC CIRCUIT** 3.1 Introduction to flipflops, – types – SR flipflop, Clocked SR flipflop, D flipflop JK flipflop, T flip flop and Master and Slave JK Flip Flop. 3.2 Introduction to Counters –types. Asynchronous counter – 4 bit counter, Mod-N counter and Decade counter. Synchronous counter 4 bit counter – Comparison between Asynchronous counter and Synchronous Counter. 3.3 Introduction to shift registers – types – Serial In Serial Out, Serial In Parallel Out, Parallel In Parallel Out and Parallel In Serial Out. Ring counter and Johnson counter	15
IV	**DAC, ADC AND TIMER IC 555** 4.1 Digital to Analog Conversion – types – Binary weighted Resistor D/A converter – R-2R Ladder D/A converter – Specifications of DAC. 4.2 Analog to digital conversion – types - Ramp type ADC – Successive	14

	approximation type ADC –- specification of ADC. 4.3 Timer IC 555 – Functional Block diagram – Astable Multivibrator – Monostable Multivibrator of operation.	
V	**OPERATIONAL AMPLIFIER IC 741** 5.1 Operational amplifier – Ideal Op-Amp characteristics – Op-amp parameters –CMRR – Slew rate. Inverting amplifier – Summing amplifier – Non inverting amplifier – Voltage follower – 5.2 Integrator – Differentiator -Comparator – Zero crossing detector - Schmitt trigger 5.3 Instrumentation amplifier, V-to-I converter, and I-to-V converter	14

Reference Books

1. Dr.R.S.Sedha, A textbook of Digital Electronics, S.Chand & Company Ramnagar, NewDelhi- 110055
2. Roy Choudhury, D Jain, Sail B, Linear Integrated Circuits, New Age International Publisher, NewDelhi
3. Thomas L Floyd, Digital Fundamentals, 10th Edition 2012 , Pearson Education
4. Albert Paul Malvino & Donald P.Leach, Digital Principles & Applications, 8th Edition 2016,TMH
5. Anil k Maini, Digital Electronics - Principles and Integrated Circuits, Wiley Eastern India First Edition 2010
6. R.P. Jain, Modern Digital Electronics, Fourth Edition, 2012 TMH,
7. Roger L. Tokheim Macmillan, Digital Electronics , 8th Edition 2013. McGrawHill
8. Salivahanan S, Linear Integrated Circuits, McGraw Hill, NewDelhi
9. Ramakant A. Gayakwad, OPAMPS and Linear Integrated Circuits, PHI Learning, NewDelhi

DIPLOMA IN ENGINEERING AND TECHNOLOGY

6

DEPARTMENT OF INSTRUMENTATION AND CONTROL ENGINEERING

II YEAR

F – SCHEME

III - TERM

IMPLEMENTED FROM 2020 – 2021

6F3203 - MEASUREMENT AND INSTRUMENTS

SESHASAYEE INSTITUTE OF TECHNOLOGY
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TIRUCHIRAPPALLI – 620 010.

ANNEXURE- II

SESHASAYEE INSTITUTE OF TECHNOLOGY (Autonomous), TRICHY-10

6: DIPLOMA IN INSTRUMENTATION AND CONTROL ENGINEERING SYLLABUS

F-SCHEME

(To be implemented for the students admitted from the year 2020-21 onwards)

Programme Name : 6 - Diploma In Instrumentation and Control Engineering

Course Code : 6F3203

Term : III

Course Name : Measurement and Instruments

TEACHING AND SCHEME OF EXAMINATION

No of weeks per semester: 16 weeks

Subject	Instructions		Examination			
			Marks			Duration
	Hours / Week	Hours / Semester	Internal Assessment	Board Examinations	Total	
6F3203	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	Terminologies used in measurement	14
II	Construction and working of measuring instruments	14
III	Concept of DC AC bridges, multimeter, megger	15
IV	Principle of operation and constructional details of Wattmeter, energy meter, CT,PT	15
V	Concept of CRO and recorder	15
Test & Model Exam		7
Total		**80**

RATIONALE:

The course "Measurements and Instruments" is a pivotal course for Instrumentation & Control Engineering. This course deals with the methods of measuring basic electrical parameters such as voltage, current, power, energy, frequency, resistance, inductance and capacitance. Principle of operation and constructional details, working of various instruments are dealt with this course.

OBJECTIVES:

At the end of the course, the students would be able to

- Familiarize the terms used in measurements and realize the importance of basic forces required in meters.
- Explain the construction and working principle of indicating instruments for voltage, current, Power, Energy.
- Understand the working and applications of Multimeter for Ω, V, A measurement.
- Understand the concept of extending the range of Ammeters and Voltmeters.
- Understand the construction and working and practical application of AC,DC Bridges for R,L,C measurement.
- Understand the construction and working principle of CRO, Function Generator and Recorders
- Understand the practical applications of CRO, Function Generator and Recorders

Course Outcome

On successful completion of the course, the students will be able to attain below Course Outcome (CO):

Course outcome		BTL	Linked PO
6F3203-**CO1**	Familiarize the terms used in measurements and realize the importance of basic forces required in meters.	**2**	
6F3203-**CO2**	Know the principle of operation and constructional details of various instruments used to measure electrical quantities.	**2**	
6F3203-**CO3**	Understand the concept of DC AC bridges, Multimeter, Megger.	**2**	
6F3203-**CO4**	Know the principle of operation and constructional details of Wattmeter, energy meter, CT,PT	**2**	
6F3203-**CO5**	Understand the concept of CRO, Function Generator and recorders used to measure various electrical parameters.	**2**	

Legends: R = Remember U= Understand; A= Apply and above levels (BTL-Bloom's revised taxonomy Level)

Mapping Course Outcomes (CO) - Program Outcomes (PO)

CO	Program Outcomes (PO)							Program Specific Outcomes (PSO)	
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2
6F3301- **CO1**	2	2	1	2	-	-	-	-	-
6F3301- **CO2**	2	2	1	2	-	-	-	-	-
6F3301- **CO3**	2	2	1	2	-	-	-	-	-
6F3301- **CO4**	2	2	1	2	-	-	-	-	-
6F3301- **CO5**	2	2	1	2	-	-	-	-	-
TOTAL	10	10	5	10	-	-	-	-	-
No. of COs Mapping with POs	5	5	5	5	-	-	-	-	-
Average	2	2	1	2	-	-	-	-	-
Round off(Average)	2	2	1	2	-	-	-	-	-
Correlation									
Strong – S / 3		**Medium – M /2**				**Weak – W / 1**			

DETAILED SYLLABUS

Contents: Measurement and Instruments Theory

Unit	Name of the Topics	Hours
I	**TERMINOLOGIES USED IN MEASUREMENT** 1.1 Classification of Instruments: Absolute, Secondary Instruments, - indicating, recording and integrating instruments. Analog and digital instruments. 1.2 Definitions of Static characteristics of Instruments: Accuracy, Precision, Sensitivity, Resolution, Static error, Reproducibility, Drift, Dead Zone. 1.3 Errors: Types of Errors- Gross, Systemic, Random 1.4 Definition of Standards and their classification: International, Primary, Secondary.	14

	1.5 Calibration: Definition, Need of calibration 1.6 Operating forces (torques) - types-deflecting torque- effects used in instruments- controlling torque - spring and gravity control- Damping system – air friction, fluid friction and eddy current damping- comparison- types of supports.	
II	**CONSTRUCTION AND WORKING OF MEASURING INSTRUMENTS** 2.1 Classification of electrical instruments.- Permanent Moving Coil instrument - construction, working- deflecting torque of PMMC instruments. Advantages and disadvantages. 2.2 Moving iron instruments- Attraction and repulsion type -construction, working- torque-Advantages and Disadvantages. Comparison between Attractive and Repulsive types. Extension of instrument range-Shunt and multipliers.	14
III	**CONCEPT OF DC AC BRIDGES, MULTIMETER, MEGGER** 3.1 Ohmmeter - Series type, shunt type Multimeter - Megger - Earth tester – construction and working. 3.2 Construction, working, balance equation (derivation not required) and application- Measurement of resistance by Wheatstone bridge - Measurement of Capacitance by Schering bridge- Measurement of Inductance by Maxwell's Bridge- Measurement of frequency using Wien bridge.	15
IV	**PRINCIPLE OF OPERATION AND CONSTRUCTIONAL DETAILS OF WATTMETER, ENERGY METER, CT,PT** 4.1 Power in DC circuits and AC circuits –definition- Dynamometer type Watt meter-UPF and LPF wattmeter – Construction, Working, 3 phase two element wattmeter Errors in wattmeter. 4.2 Energy-definition - Induction type single phase and 3 phase energy meters-Construction, theory and operation .Creep and prevention. Error and adjustments in energy meter. 4.3 Instrument transformers-construction and working of CT and PT. Measurement of power and energy using of CT and PT in energy meter (only circuits)	15
V	**CONCEPT OF CRO AND RECORDER** 5.1 CRO: Basic Block diagram and function of each block – CRT - Construction and working Vertical Deflection System - Horizontal	15

	deflection system – Block diagram and operation Function of delay line-CRO probe-Explanation of waveform generation-Applications of CRO-Time & frequency measurement, Voltage measurement Lissajous patterns for Phase and Frequency measurement. 5.2 Function generator-working and application. 5.3 X-Y recorder and Strip chart recorder – Block diagram, Working principle and applications	

Text Book

1. Electrical technology by BL. Thereja and A. K Thereja S chand and Co New Delhi.
2. Measurements and Instrumentation Principles by Alan S Moris Third Edition Butterworth Heinemann Publication

Reference Books

1. Electrical and Electronic Measurements & Instrumentation, A. K. Sawheny, Dhanpat Rai & Sons. 1986
2. Modern Electronics Instrumentation & Measurement Techniques, Albert D. Helfrick
3. Electrical and Electronics Measurements and Instrumentation, Umesh Sinha, Satyaprakashan, Tech India Publication 1992

DIPLOMA IN ENGINEERING AND TECHNOLOGY

6

DEPARTMENT OF INSTRUMENTATION AND CONTROL ENGINEERING

II YEAR

F – SCHEME

III - TERM

IMPLEMENTED FROM 2020 – 2021

6F3204 - ELECTRONIC DEVICES AND ITS APPLICATIONS PRACTICAL

SESHASAYEE INSTITUTE OF TECHNOLOGY
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ANNEXURE- II

SESHASAYEE INSTITUTE OF TECHNOLOGY (Autonomous), TRICHY-10

6: DIPLOMA IN INSTRUMENTATION AND CONTROL ENGINEERING SYLLABUS

F-SCHEME

(To be implemented for the students admitted from the year 2020-21 onwards)

Programme Name : 6 - Diploma In Instrumentation and Control Engineering

Course Code : 6F3204

Term : III

Course Name : Electronic Devices & its Applications Practical

TEACHING AND SCHEME OF EXAMINATION

No of weeks per semester: 16 weeks

Subject	Instructions		Examination			
			Marks			Duration
	Hours / Week	Hours / Semester	Internal Assessment	Board Examinations	Total	
6F3204	4	64	25	100*	100	3 Hrs.

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

RATIONALE:

Any electronic equipment comprises of devices and circuit modules. The characteristics of the devices and operation of the circuits are extremely important, not only for understanding the performance of the electronic equipment / instruments but also for their repair and maintenance. After obtaining the theoretical knowledge of fundamental concepts of basic electronic devices and components, this lab enables the students to identify the components, verify the characteristics of various devices construct amplifier circuits and regulated power supply.

OBJECTIVES:

After completion of this laboratory, the students will be able to

- Identify the components and applications of CRO
- Verify the characteristics of PN junction diode and Zener diode
- Construct and verify half wave and full wave rectifiers
- Analyze the Input/output characteristics of Transistors in different configurations
- Construct and test amplifier circuits
- Verify the characteristics of JFET and UJT

Course Outcome

On successful completion of the course, the students will be able to attain below Course Outcome (CO):

CO	Details	BTL	Linked PO
6F3204 **-CO1**	Ability to explain the operations of PN junction diode, Zener diode and its applications.	**L2 (U)**	
6F3204 **-CO2**	Ability to describe the operations and classification of Rectifiers with and without filters. .	**L2 (U)**	
6F3204 **-CO3**	Ability to explain the operations of Transistors, Amplifiers.	**L2 (U)**	
6F3204 **-CO4**	Ability to explain the operations of UJT ,Oscillators and their classifications	**L2 (U)**	
6F3204 **-CO5**	Ability to describe the operations of FET, MOSFET and multivibrators.	**L2 (U)**	

Mapping Course Outcomes (CO) - Program Outcomes (PO)

CO	Program Outcomes (PO)							Program Specific Outcomes (PSO)	
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2
6F3204**- CO1**	2	2	1	2	-	-	-	2	1
6F3204**- CO2**	2	2	1	2	-	-	-	2	1
6F3204**- CO3**	2	2	1	2	-	-	-	2	1
6F3204**- CO4**	2	2	1	2	-	-	-	2	1
6F3204**- CO5**	2	2	1	2	-	-	-	2	1
TOTAL	10	10	5	10	-	-	-	10	5
No. of COs Mapping with POs	5	5	5	5	-	-	-	5	5
Average	2	2	1	2	-	-	-	2	1
Round off(Average)	2	2	1	2	-	-	-	2	1

Correlation		
Strong – S / 3	**Medium – M /2**	**Weak – W / 1**

ELECTRONIC DEVICES AND ITS APPLICATIONS PRACTICAL

LIST OF EXPERIMENTS

1. Identification of components, Color coding, Observe the waveforms using CRO
2. Plot the VI characteristics of PN junction diode and find its cut-in voltage.
3. Plot the VI characteristics of Zener diode and find its break down voltage.
4. Plot the IV characteristics of UJT and find its Ip and Vv.
5. Plot the Input and output characteristics of CE Transistor configuration and find its input & output resistance.
6. Plot the drain and transfer characteristics of JFET and find its pinch off voltage.
7. Construct a Hartley Oscillator Circuit and find its frequency using CRO
8. Construct an astable multivibrator circuit and verify its output waveform.
9. Construct an RC coupled amplifier circuit and draws its frequency response characteristics and determines the 3-db bandwidth.
10. Construct and test the performance of emitter follower circuit
11. Construct and test the performance of half wave rectifier and full wave rectifier without and with filter.
12. Construct and test the performance of Bridge rectifier without and with filter.

DETAILLED ALLOCATION OF MARKS

SCHEME OF VALUATION		
SL.NO	**DESCRIPTION**	**MARKS**
1.	Circuit Diagram	40
2.	Connections	20
3.	Reading & Graph	20
4.	Result	10
5.	Viva	10
6.	TOTAL	100

LIST OF EQUIPMENTS

Sl. No	Name of the Equipments	Range	Required Nos.
1.	DC Regulated power supply	0-30V,1A	6
2.	Signal Generator	2 MHz	1
3.	Dual trace CRO	20MHz/30MHz	1
4.	DC Voltmeter(Analog)	Different Range	6
5.	DC Ammeter(Analog)	Different Range	6

DIPLOMA IN ENGINEERING AND TECHNOLOGY

6

DEPARTMENT OF INSTRUMENTATION AND CONTROL ENGINEERING

II YEAR

F – SCHEME

III - TERM

IMPLEMENTED FROM 2020 – 2021

6F3205 - ELECTRICAL CIRCUITS AND MACHINES PRACTICAL

SESHASAYEE INSTITUTE OF TECHNOLOGY
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ANNEXURE- II

SESHASAYEE INSTITUTE OF TECHNOLOGY (Autonomous), TRICHY-10

6: DIPLOMA IN INSTRUMENTATION AND CONTROL ENGINEERING SYLLABUS

F-SCHEME

(To be implemented for the students admitted from the year 2020-21 onwards)

Programme Name : 6 - Diploma In Instrumentation and Control Engineering

Course Code : 6F3205

Term : III

Course Name : Electrical Circuits and Machines Practical

TEACHING AND SCHEME OF EXAMINATION

No of weeks per semester: 16 weeks

Subject	Instructions		Examination			
			Marks			Duration
	Hours / Week	Hours / Semester	Internal Assessment	Board Examinations	Total	
6F3205	4	64	25	100*	100	3 Hrs.

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

RATIONALE:

Electrical Circuits and Machines is a subject where student will deal with various types of circuits and machines, which are used in industries, power stations, domestic and commercial applications etc., of imparting practical knowledge in this subject will make the instrumentation and control engineering students capable of working with the machines used in industries.

OBJECTIVES:

- To expose the students electrical circuits AC and DC machines.
- To improve their circuit constructing skills using different circuit elements.
- To understand the working of DC and AC machines.
- To provide hands-on experience to the students, so that they are able to put theoretical concepts to practice.

Course Outcome

On successful completion of the course, the students will be able to attain below Course Outcome (CO):

CO	Details	BTL	Linked PO
6F3205-**CO1**	To impart hands on experience in verification of circuits laws.	**L2 (U)**	
6F3205-**CO2**	To impart knowledge on solving circuits using network theorems.	**L2 (U)**	
6F3205-**CO3**	Ability to Understand the concept of 3Ø AC circuits and series, Parallel resonance.	**L2 (U)**	
6F3205-**CO4**	Able to acquire knowledge about the calibration, power and power factor calculation	**L2 (U)**	
6F3205-**CO5**	To expose the students to the basic operation of electrical DC machines and to develop their experimental skills	**L2 (U)**	

Mapping Course Outcomes (CO) - Program Outcomes (PO)

CO	Program Outcomes (PO)							Program Specific Outcomes (PSO)	
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2
6F3204- **CO1**	2	2	1	2	-	-	-	-	-
6F3204- **CO2**	2	2	1	2	-	-	-	-	-
6F3204- **CO3**	2	2	1	2	-	-	-	-	-
6F3204- **CO4**	2	2	1	2	-	-	-	-	-
6F3204- **CO5**	2	2	1	2	-	-	-	-	-
TOTAL	10	10	5	10	-	-	-	-	-
No. of COs Mapping with POs	5	5	5	5	-	-	-	-	-
Average	2	2	1	2	-	-	-	-	-
Round off(Average)	2	2	1	2	-	-	-	-	-
Correlation									
Strong – S / 3	**Medium – M /2**				**Weak – W / 1**				

ELECTRICAL CIRCUITS AND MACHINES PRACTICAL

LIST OF EXPERIMENTS

1. Verification of Ohm's Law by constructing a circuit
2. Verification of Kirchhoff's Laws
3. Verification of Thevenin's Theorem
4. Verification of super position theorems
5. Verification of maximum power transfer theorem
6. Measurement of power in RLC Series Circuit. Calculation of power factor and to draw the phasor diagram.
7. Measurement of power and power factor of single phase load (Fluorescent lamp)
8. Measurement of three phase power by 2 wattmeter method
9. Calibration of given wattmeter
10. Calibration of energy meter
11. Open Circuit characteristics of DC shunt generator
12. speed control DC shunt motor

DETAILLED ALLOCATION OF MARKS

SCHEME OF VALUATION		
SL.NO	**DESCRIPTION**	**MARKS**
1	Circuit Diagram	30
2	Connections	30
3	Reading & Graph	20
4	Result	10
5	Viva	10
6	TOTAL	100

LIST OF EQUIPMENTS

Sl. No	Name of the Equipments	Range	Required Nos.
1	DC Regulated power supply	0-30V,1A	6
2	Signal Generator	2 MHz	1
3	Dual trace CRO	20MHz/30MHz	1
4	DC Voltmeter(Analog)	Different Range	6
5	DC Ammeter(Analog)	Different Range	6
6	Multimeter		6
7	Wattmeter	UPF	3
8	Fluorescent lamp	40W	1
9	Energy meter		2
10	DC shunt generator setup		1
11	DC shunt motor setup		1
12	Resistor		As Required
13	Inductor		As Required
14	Capacitor		As Required

DIPLOMA IN ENGINEERING AND TECHNOLOGY

6

DEPARTMENT OF INSTRUMENTATION AND CONTROL ENGINEERING

II YEAR

F – SCHEME

III - TERM

IMPLEMENTED FROM 2020 – 2021

6F3302 - ANALOG AND DIGITAL ELECTRONICS PRACTICAL

SESHASAYEE INSTITUTE OF TECHNOLOGY
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TIRUCHIRAPPALLI – 620 010.

ANNEXURE- II

SESHASAYEE INSTITUTE OF TECHNOLOGY (Autonomous), TRICHY-10

6: DIPLOMA IN INSTRUMENTATION AND CONTROL ENGINEERING SYLLABUS

F-SCHEME

(To be implemented for the students admitted from the year 2020-21 onwards)

Programme Name : 6 - Diploma In Instrumentation and Control Engineering

Course Code : 6F3302

Term : III

Course Name : Analog and Digital Electronics Practical

TEACHING AND SCHEME OF EXAMINATION

No of weeks per semester: 16 weeks

Subject	Instructions		Examination			
			Marks			Duration
	Hours / Week	Hours / Semester	Internal Assessment	Board Examinations	Total	
6F3302	4	64	25	100*	100	3 Hrs.

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

RATIONALE:

In the present scenario, most of the electronic equipment's like mobile, computer, ATM, automation and control circuits are based on digital circuits. The purpose of introducing this practical is to familiarise the students with the basic principles involved in the analysis and design of analog and digital circuits. The course enables the students to verify the functions of various digital integrated circuits, linear integrated circuits, Timer IC 555 and applications of operation amplifier circuits. After completion of the course, the students will be able to test, design and troubleshoot digital IC based system and analog IC based electronic circuits

OBJECTIVES:

This course enables the students to get practical experience in

- Verification of logic gates and DeMorgan's theorems.
- Realization of basic gates using universal gate NAND.
- Design and Verification of arithmetic logic circuits such as adder & subtractor.

- Design and Verification of Decoder & Multiplexer logic circuits
- Verification of Flip-flops
- Design and verification of counters
- Design and testing of OPAMP circuits such as inverting amplifier and Non inverting amplifier.
- Design and testing of Astable multivibrator and Monostable multivibrator using Timer IC 555

Course Outcome

On successful completion of the course, the students will be able to attain below Course Outcome (CO):

CO	Details	BTL	Linked PO
6F3302 **-CO1**	Ability to verify digital logic ICs, Demorgan's theorems and realize basic gates using universal gates.	**L4 (AP)**	
6F3302 **-CO2**	Ability to design and test combinational logic circuits such as adder, subtractor, Decoder and multiplexer	**L4 (AP)**	
6F3302 **-CO3**	Ability to design and test sequential logic circuits such as flipflops and counters	**L4 (AP)**	
6F3302 **-CO4**	Ability to construct and test operational amplifier circuits such as inverting amplifier and non inverting amplifier	**L4 (AP)**	
6F3302 **-CO5**	Ability to construct and test astable & monostable multivibrator using timer IC 555.	**L4 (AP)**	

Mapping Course Outcomes (CO) - Program Outcomes (PO)

CO	Program Outcomes (PO)							Program Specific Outcomes (PSO)	
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2
6F3302- **CO1**	3	3	2	3	-	-	-	-	-
6F3302- **CO2**	3	3	2	3	-	-	-	-	-
6F3302- **CO3**	3	3	2	3	-	-	-	-	-
6F3302- **CO4**	3	3	2	3	-	-	-	-	-
6F3302- **CO5**	3	3	2	3	-	-	-	-	-
TOTAL	15	15	10	15	-	-	-	-	-
No. of COs Mapping with POs	5	5	5	5	-	-	-	-	-
Average	3	3	2	3	-	-	-	-	-
Round off(Average)	3	3	2	3	-	-	-	-	-

Correlation		
Strong – S / 3	**Medium – M /2**	**Weak – W / 1**

ANALOG AND DIGITAL ELECTRONICS PRACTICAL

LIST OF EXPERIMENTS

1. Verification of logic gates NOT, AND, OR, NAND, NOR, & EX-OR
2. Verification of DeMorgan's Theorem
3. Realization of NOT, AND , OR using only NAND gates
4. Construct Half Adder & Full Adder and verify the truth table
5. Construct Half Subtractor & Full Subtractor and verify the truth table
6. Construct and verify decoder circuit using IC 74138
7. Construct and verify Multiplexer circuit using IC 74151
8. Construct JK flip flop using IC 7473 and verify the truth table
9. Construct a 4 bit ripple counter using IC 7473 and verify
10. Construct and test (i) Inverting amplifier (ii) Non Inverting Amplifier
11. Construct and test an Astable Multivibrator using IC 555
12. Construct and test a Monostable Multivibrator using IC 555

DETAILLED ALLOCATION OF MARKS

SCHEME OF VALUATION		
SL.NO	**DESCRIPTION**	**MARKS**
1	Circuit Diagram	30
2	Connections	30
3	Reading & Graph	20
4	Result	10
5	Viva	10
6	TOTAL	100

LIST OF EQUIPMENTS

Sl. No	Name of the Equipments	Range	Required Nos.
1	Digital Trainer with power supply		6
2	Analog Trainer with power supply		4
3	DC Regulated power supply	0-30V,1A	4
4	Signal Generator	2 MHz	1
5	Dual trace CRO	20MHz/30MHz	1
6	Multimeter		6
7	Bread board		3

IV SEMESTER

DIPLOMA IN ENGINEERING AND TECHNOLOGY

6

DEPARTMENT OF INSTRUMENTATION AND CONTROL ENGINEERING

II YEAR

F – SCHEME

IV - TERM

IMPLEMENTED FROM 2020 – 2021

6F4206 - INDUSTRIAL INSTRUMENTATION – I

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ANNEXURE- II

SESHASAYEE INSTITUTE OF TECHNOLOGY (Autonomous), TRICHY-10

6: DIPLOMA IN INSTRUMENTATION AND CONTROL ENGINEERING SYLLABUS

F-SCHEME

(To be implemented for the students admitted from the year 2020-21 onwards)

Programme Name : 6 - Diploma In Instrumentation and Control Engineering

Course Code : 6F4206

Term : IV

Course Name : Industrial Instrumentation – I

TEACHING AND SCHEME OF EXAMINATION

No of weeks per semester: 16 weeks

Subject	Instructions		Examination			
			Marks			Duration
	Hours / Week	Hours / Semester	Internal Assessment	Board Examinations	Total	
6F4206	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	Classification of Transducer	14
II	Measurement of Force, Torque And Velocity	15
III	Measurement of Pressure	15
IV	Measurement of Temperature	15
V	Measurement of Density, Viscosity, Specific Gravity, Ph.	14
Test & Model Exam		7
Total		**80**

RATIONALE:

Industrial Instrumentation is a core subject for Instrumentation & Control Engineering. The subject gives idea about the various process parameters and its measurement techniques. It gives the foundation for handling Instruments used in industries. In addition, this subject prepares the students to select and calibrate various instruments used in industry.

OBJECTIVES:

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

- Units and scales for various process parameters.
- Principles and laws associated with Instrumentation system.
- Characteristics, advantages and disadvantages of measurement techniques used for various process parameters.
- Latest techniques used for measurement system.

Course Outcome

On successful completion of the course, the students will be able to attain below Course Outcome (CO):

Course outcome		BTL	Linked PO
6F4206 **-CO1**	Ability to classify the transducers.	**L2 (U)**	
6F4206 **-CO2**	Ability to explain the working of force torque and velocity sensors.	**L2 (U)**	
6F4206 **-CO3**	Ability to explain the working of various pressure sensors.	**L2 (U)**	
6F4206 **-CO4**	Ability to explain the working of various temperature sensors	**L2 (U)**	
6F4206 **-CO5**	Ability to explain the working of density, viscosity & pH sensors.	**L2 (U)**	

Legends: R = Remember U= Understand; A= Apply and above levels (BTL-Bloom's revised taxonomy Level)

Mapping Course Outcomes (CO) - Program Outcomes (PO)

CO	Program Outcomes (PO)							Program Specific Outcomes (PSO)	
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2
6F4206- **CO1**	2	2	1	2	-	-	-	-	-
6F4206- **CO2**	2	2	1	2	-	-	-	-	-
6F4206- **CO3**	2	2	1	2	-	-	-	-	-
6F4206- **CO4**	2	2	1	2	-	-	-	-	-
6F4206- **CO5**	2	2	1	2	-	-	-	-	-
TOTAL	10	10	5	10	-	-	-	-	-
No. of COs Mapping with POs	5	5	5	5	-	-	-	-	-
Average	2	2	1	2	-	-	-	-	-
Round off (Average)	2	2	1	2	-	-	-	-	-
Correlation									
Strong – S / 3		**Medium – M /2**				**Weak – W / 1**			

DETAILED SYLLABUS

Contents: Industrial Instrumentation – I Theory

Unit	Name of the Topics	Hours
I	**CLASSIFICATION OF TRANSDUCER** 1.1 Definition and Classifications of Transducer: - Primary and secondary transducers, Active and passive transducers. 1.2 PASSIVE TRANSDUCERS 1.2.1 Resistive Transducer: RVDT Linear and angular Variable resistive potentiometer-construction and working, loading effect, Applications. 1.2.2. Inductive Transducer: LVDT – Characteristics. 1.2.3 Capacitive Transducer: capacitance transducer-construction and working, Applications.	14

	1.3 ACTIVE TRANSDUCERS 1.3.1 Hall Effect Transducer, Thermo Electric Transducer, Photo Electric transducer, Piezo electric Transducer, Proximity Sensors and types – (optical, Inductive Capacitive) Constructional details, working principle, Application for all the above.	
II	**MEASUREMENT OF FORCE, TORQUE AND VELOCITY** 2.1 Force (Weight) measurement Load cell: Hydraulic load cell, pneumatic load cell, strain gauge load cell, Inductive load cell. 2.2 Torque measurement: Gravity balance method – optical torsion method – strain gauge torsion method – Rotating torque sensor – stationary sensors – proximity sensors – DC Cradle Dynamometer Torque measurement - Torsion – Bar Torque meter. 2.3 Velocity measurement: hand held tachometer - optical tachometer - Eddy current drag cup velocity pickup – Translational velocity load cell.	15
III	**MEASUREMENT OF PRESSURE** 3.1 Types of pressure and units – Mechanical methods –Piezometer-Manometers (U tube, well type, inclined type,) – Elastic type: Bellows – Diaphragms – Bourdon Tube-types, working, applications, Advantages, Disadvantages. 3.2 Electrical methods – Pressure measurements using strain gauge, capacitive transducer, LVDT and Piezo Electric transducers – Resonant wire pressure sensor – Optical pressure transducer 3.3Low pressure measurement: McLeod gauge – Pirani gauge. 3.4Pressure Gauge Calibration: Dead weight tester	15
IV	**MEASUREMENT OF TEMPERATURE** 4.1 Temperature units and conversion-construction and working of : Bi-metallic thermometer, range, applications. - Filled system thermometer (Gas, Liquid, vapour) – Thermocouple – Types – Principle, materials,– Thermoelectric laws– Resistance temperature detector – 2 wire – 3 wire and 4 wire RTD – Thermistor – Types. 4.2 Pyrometers: Total radiation pyrometers – optical pyrometers.	15
V	**MEASUREMENT OF DENSITY, VISCOSITY, SPECIFIC GRAVITY, PH.** 5.1 Definition and units – Weighing tube type densitometer – Buoyancy principle – Hydrometer: simple type – Photoelectric type – Ultrasonic	14

	densitometers – Radiation Densitometers. 5.2 Measurement of density of gases: Bridge type gas densitometers. 5.3 Measurement of viscosity: Definition – Say bolt viscometer, vibrating reed viscometer, Rotational industrial viscometer. 5.4 Measurement of pH Definitions– electrodes: Hydrogen electrode – Ag-Agcl electrode – glass electrode	

Reference Books

1. Mechanical Measurement And Instrumentation, A.K.Shawney, Puneet Shawney, Dhanpat Rai & Co, 12th edition, 2001 – 2002
2. Mechanical Measurements & Control, D. S. Kumar, Metropolitan Book Co Pvt. Ltd, 3rd Edition 1989
3. Industrial Instrumentation & Control, S.K. Singh, Tata Mc Graw Hill Publishing Company Ltd. 13th edition 1997

DIPLOMA IN ENGINEERING AND TECHNOLOGY

6

DEPARTMENT OF INSTRUMENTATION AND CONTROL ENGINEERING

II YEAR

F – SCHEME

IV - TERM

IMPLEMENTED FROM 2020 – 2021

6F4207 - CONTROL SYSTEM

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ANNEXURE- II

SESHASAYEE INSTITUTE OF TECHNOLOGY (Autonomous), TRICHY-10

6: DIPLOMA IN INSTRUMENTATION AND CONTROL ENGINEERING SYLLABUS

F-SCHEME

(To be implemented for the students admitted from the year 2020-21 onwards)

Programme Name : 6 - Diploma In Instrumentation and Control Engineering

Course Code : 6F4207

Term : IV

Course Name : Control System

TEACHING AND SCHEME OF EXAMINATION

No of weeks per semester: 16 weeks

Subject	Instructions		Examination			
			Marks			Duration
	Hours / Week	Hours / Semester	Internal Assessment	Board Examinations	Total	
6F4207	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	Basics Of Control System, LT, TF	16
II	System Representation And CS Components	14
III	Time Response	15
IV	Frequency Domain Analysis	15
V	Stability	13
Test & Model Exam		7
Total		80

RATIONALE:

The aim of this subject is to introduce the basic concepts of Control theory to the students. It provides the basic idea about how the physical systems can be represented by a mathematical model to perform a detailed analysis. There are lot of advancements in the field of Control Engineering in which the students can do research during their higher studies.

OBJECTIVES:

- To understand the system, control system and its types
- To acquire practice in the Laplace transform and Inverse Laplace transform
- Provide knowledge about transfer functions.
- To provide knowledge in the time response of I order and II order systems and steady state error.
- To accord knowledge in obtaining frequency response of systems.

Course Outcome

On successful completion of the course, the students will be able to attain below Course Outcome (CO):

Course outcome		BTL	Linked PO
6F4207 **-CO1**	Ability to understand the closed and open loop system, laplace of inverse laplace transfer.	**L2 (U)**	
6F4207 **-CO2**	Ability to obtain and the transfer function of different systems.	**L2 (U)**	
6F4207 **-CO3**	Ability to do time domain analysis	**L4 (AN)**	
6F4207 **-CO4**	Ability to do frequency domain analysis	**L4 (AN)**	
6F4207 **-CO5**	Ability to understand about the stability	**L3 (AP)**	

Legends: R = Remember U= Understand; A= Apply and above levels (BTL-Bloom's revised taxonomy Level)

Mapping Course Outcomes (CO) - Program Outcomes (PO)

CO	Program Outcomes (PO)							Program Specific Outcomes (PSO)	
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2
6F4207- **CO1**	2	2	1	2	-	-	-	-	-
6F4207- **CO2**	2	2	1	2	-	-	-	-	-
6F4207- **CO3**	3	3	2	3	-	-	-	-	-
6F4207- **CO4**	3	3	2	3	-	-	-	-	-
6F4207- **CO5**	2	2	1	2	-	-	-	-	-
TOTAL	12	12	7	12	-	-	-	-	-
No. of COs Mapping with POs	5	5	5	5	-	-	-	-	-
Average	2.4	2.4	1.4	2.4	-	-	-	-	-
Round off(Average)	2	2	1	2	-	-	-	-	-
Correlation									
Strong – S / 3			**Medium – M /2**				**Weak – W / 1**		

DETAILED SYLLABUS

Contents: Control System Theory

Unit	Name of the Topics	Hours
I	**BASICS OF CONTROL SYSTEM, LT, TF** 1.1 Basics of control systems: System - definition and examples, basic block diagram, classification-linear, non-linear, continuous, discrete, SISO and MIMO systems, open and closed loop control systems with examples. 1.2 Laplace Transform and Inverse Laplace Transform: Laplace transform - basic equation - example problems, Inverse Laplace transform - different methods - Properties of Laplace transform - Initial and final value theorems, Shifting Theorem (Only Statements) - problems using initial and final value theorems, 1.3 Transfer function: Definition-Order and type of Transfer function-	16

	pole/zero plot-Solution to differential equations using Laplace transform.	
II	**SYSTEM REPRESENTATION AND CS COMPONENTS** 2.1 Electrical circuits: Overall Transfer function of simple RC, RL, RLC circuits. 2.2 Block diagram - Introduction - Functional elements of block diagram - block diagram reduction techniques - Overall transfer function of a system by Block diagram reduction Techniques - advantages. 2.3 Signal Flow graph: Introduction - Terms used in signal flow graph - rules for reduction - Mason's gain formula - Transfer function of a system from the signal flow graph using Mason's gain formula. Converting block diagram into signal flow graph and determination of Transfer function Comparison of block diagram reduction and signal flow graph methods. 2.4 Control system components: Servo Motors, stepper motor-types-construction, working & applications	14
III	**TIME RESPONSE** 3.1 Definition - standard test signals - General Transfer Function of I order and II order systems. Time response of I order system to unit step, ramp, parabolic, impulse signals. 3.2 Damping – definition - types of damping-unit step response of II order system (un damping, critical damping derivation) - Time domain specifications (definitions and formulae only) - simple problems - types of error - steady state error - static error constants - problems.	15
IV	**FREQUENCY DOMAIN ANALYSIS** 4.1 Frequency response of linear system – Advantages - Frequency domain specifications (definitions only) 4.2 Bode plot - Gain margin - phase margin – problems 4.3 Polar plot - problems.	15
V	**STABILITY** 5.1 Definition - Location of roots on the S-plane for stability - absolute stability - relative stability - characteristic equation 5.2 Routh's stability criterion technique-problems. 5.3 Root Locus -definition -constructing root locus-problems (only for real values)	13

Text Books

1. Control Systems, Nagoor Kani, RBA Publications 1st edition 1998

Reference Books

1. Control system Engineering, I.J.Nagarath & M.Gopal, New age International Ltd., 1stedi 2010,6th edi 2017.
2. Control Systems, S. Palani, McGraw Hill education 2nd edi. 2009
3. Modern Control Engineering, K.Ogata, Prentice Hall of India 5th edi. 2010

DIPLOMA IN ENGINEERING AND TECHNOLOGY

6

DEPARTMENT OF INSTRUMENTATION AND CONTROL ENGINEERING

II YEAR

F – SCHEME

IV - TERM

IMPLEMENTED FROM 2020 – 2021

6F4303 - MICROCONTROLLER AND ITS APPLICATIONS

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ANNEXURE- II

SESHASAYEE INSTITUTE OF TECHNOLOGY (Autonomous), TRICHY-10

6: DIPLOMA IN INSTRUMENTATION AND CONTROL ENGINEERING SYLLABUS

F-SCHEME

(To be implemented for the students admitted from the year 2020-21 onwards)

Programme Name : 6 - Diploma In Instrumentation and Control Engineering

Course Code : 6F4303

Term : IV

Course Name : Microcontroller and its Applications

TEACHING AND SCHEME OF EXAMINATION

No of weeks per semester: 16 weeks

Subject	Instructions		Examination			
			Marks			Duration
	Hours / Week	Hours / Semester	Internal Assessment	Board Examinations	Total	
6F4303	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, Architecture and Pin Details of 8051 microcontroller	15
II	Instruction Set, Addressing Modes and Programs	15
III	Delay Loops, Timer and Counter	15
IV	Serial Communication and Interrupts	14
V	Interfacing and its Applications	14
Test & Model Exam		7
Total		**80**

RATIONALE:

Microcontrollers are used in almost all automobiles, industrial controls, domestic appliances, medical equipment, consumer goods and other high end products. Microcontroller is the main inbuilt element to monitor and control the automation systems. The purpose of introducing this course is to impart the knowledge about microcontroller, to develop the skills to maintain microcontroller-based systems and to solve microcontroller-based application problems.

OBJECTIVES:

The course enables the students to:

- Understand the difference between Microprocessor & Microcontroller and analyze the Architecture, memory organization and Pin configuration of 8051 microcontroller.
- Understand the instructions sets, their classifications and addressing modes
- Write Assembly language programs for given operations
- Write delay subroutines, understand various modes of timer/counter and its operations.
- Understand the concept of interrupts, serial data communication and programming techniques
- Interface the peripherals such keyboard, display, data converters ADC, DAC, STEPPER MOTOR, DC MOTOR.
- Develop microcontroller based applications.

Course Outcome

On successful completion of the course, the students will be able to attain below Course Outcome (CO):

Course outcome		BTL	Linked PO
6F4303 **-CO1**	Ability to understand the architecture, memory organization and pin details of 8051 microcontroller	**L2 (U)**	
6F4303 **-CO2**	Ability to understand the instruction sets and write simple assembly language programs for the given operations	**L3 (A)**	
6F4303 **-CO3**	Ability to write delay subroutines, understand the modes of operation of inbuilt timer/counter and write simple programs to generate time delay	**L2 (U)**	
6F4303 **-CO4**	Ability to understand the concept of interrupts, serial data communication and programming techniques	**L2 (U)**	
6F4303 **-CO5**	Ability to interface keyboard, displays, data converters ADC, DAC, stepper motor, DC motor and to develop microcontroller-based systems	**L3 (A)**	

Legends: R = Remember U= Understand; A= Apply and above levels (BTL-Bloom's revised taxonomy Level)

Mapping Course Outcomes (CO) - Program Outcomes (PO)

CO	Program Outcomes (PO)							Program Specific Outcomes (PSO)	
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2
6F4303- **CO1**	2	2	1	2	-	-	-	-	-
6F4303- **CO2**	3	2	1	3	-	-	-	-	-
6F4303- **CO3**	2	2	1	2	-	-	-	-	-
6F4303- **CO4**	2	2	1	2	-	-	-	-	-
6F4303- **CO5**	3	2	1	3	-	-	-	-	-
TOTAL	12	10	5	12	-	-	-	-	-
No. of COs Mapping with POs	5	5	5	5	-	-	-	-	-
Average	2.4	2.0	1.0	2.4	-	-	-	-	-
Round off(Average)	2	2	1	2	-	-	-	-	-
Correlation									
Strong – S / 3		**Medium – M /2**				**Weak – W / 1**			

DETAILED SYLLABUS

Contents: Microcontroller and its Applications Theory

Unit	Name of the Topics	Hours
I	**ARCHITECTURE & PIN DETAILS OF 8051 MICROCONTROLLER** 1.1 Introduction–comparison of microprocessor and microcontroller- Overview of 8051 family- Applications of microcontroller. 1.2 Architecture of 8051 Microcontroller – Special function registers - program counter and data pointer - ALU – I/O ports- counters and timers- serial input /output- interrupts- –-Program status word register- stack and stack pointers- oscillator and clock- reset- ROM &.RAM- Internal RAM structure 1.3 Pin details of 8051 microcontroller – Functions of each pin	15

II	**INSTRUCTION SET, ADDRESSING MODES & PROGRAMS** 2.1 Classification of 8051 Instructions – Data transfer instructions – Arithmetic Instructions – Logical instructions - Branching instructions – Bit Manipulation Instructions. 2.2 Addressing methods – Immediate addressing, Register addressing, direct addressing, and Indirect addressing and Indexed addressing 2.3 Program: 8 bit Addition – 8 bit subtraction – sum of N numbers – 8 Bit Multiplication, 8 bit Division, Finding Largest/smallest number in an array of data, ascending order and descending order. Assembler directives: ORG, DB, EQU, END	15
III	**SUBROUTINE & TIMER/COUNTER** 3.1 Subroutines - Delay Loops, delay calculation, simple program using Time delay Subroutines 3.2 Timer /Counter- Introduction – Timer special function registers-Timer -Modes of operation- Programming 8051 Timers –Mode 1 Programming - Mode 2 Programming (simple programs) 3.3 Counter programming – Modes of operation -Mode 1 Programming - Mode 2 Programming (simple programs)	15
IV	**SERIAL COMMUNICATION & INTERRUPTS** 4.1 SERIAL COMMUNICATION: Basics of Serial programming – RS 232 Standards - 8051 connection to RS 232 – serial communication special function registers-8051 Serial Communication Programming – Programming 8051 to transmit data serially - Programming 8051 to Receive data serially. 4.2 INTERRUPTS 8051 Interrupts – special function registers-Programming Timer Interrupts – Programming external hardware interrupts – Programming the serial communication interrupt – Interrupt priority in 8051.	14
V	**INTERFACING AND ITS APPLICATIONS** 5.1 Interfacing- keyboard, seven segment Display, Analog to Digital converter (ADC), Digital to analog converter (DAC). 5.2 Interfacing Stepper Motor, DC motor using PWM with 8051 microcontroller. 5.3 Applications: Interfacing temperature sensor LM35, Interfacing Digital humidity and temperature sensor.	14

Text Book

1. Muhammed Ali Mazidi, Janice GillispieMazidi, "The 8051 microcontroller and embedded systems", Pearson Education 2006

Reference Books

1. Kenneth J.Ayala, The 8051 Microcontroller Architecture, Programming & Applications, Penram International
2. Myke predko, Programming and Customizing the 8051 Microcontroller, Tata McGraw Hill
3. B.P.Singh, Microprocessors and Microcontrollers, Galgotia
4. Ajit pal, Micro controllers, Principles and applications, PH Ltd., 2011
5. John B. Peatman, Design with Micro controllers, McGraw Hill

DIPLOMA IN ENGINEERING AND TECHNOLOGY

6

DEPARTMENT OF INSTRUMENTATION AND CONTROL ENGINEERING

II YEAR

F – SCHEME

IV - TERM

IMPLEMENTED FROM 2020 – 2021

6F4401 – E - VEHICLE TECHNOLOGY & ITS POLICY

SESHASAYEE INSTITUTE OF TECHNOLOGY
(Autonomous)
TIRUCHIRAPPALLI – 620 010.

ANNEXURE- II

SESHASAYEE INSTITUTE OF TECHNOLOGY (Autonomous), TRICHY-10

6: DIPLOMA IN INSTRUMENTATION AND CONTROL ENGINEERING SYLLABUS

F-SCHEME

(To be implemented for the students admitted from the year 2020-21 onwards)

Programme Name : 6 - Diploma In Instrumentation and Control Engineering

Course Code : 6F4401

Term : IV

Course Name : E-Vehicle Technology & its Policy

TEACHING AND SCHEME OF EXAMINATION

No of weeks per semester: 16 weeks

Subject	Instructions		Examination			
			Marks			Duration
	Hours / Week	Hours / Semester	Internal Assessment	Board Examinations	Total	
6F4401	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	Environmental impact and history& Electric vehicle Types	15
II	Electric vehicle & Drive System	15
III	Energy Storages, Charging System, Effects and Impacts	15
IV	Electric Mobility Policy Frame work India	14
V	Tamilnadu E-Vehicle Policy 2019	14
Test & Model Exam		7
Total		**80**

RATIONALE:

The world is transitioning to cleaner mobility options with the aim at improving air quality and reducing dependency on fossil fuels. Electric Vehicles (EVs) have emerged a popular clean mobility choice to reduce emissions. EVs are powered fully or partially by batteries, they can help to reduce dependence on fossil fuels also air quality. Tamil Nadu is one of the most advanced states in India. Tamil Nadu has a highly developed industrial eco-system and is very strong in sectors like automobiles and auto-components. Many globally renowned companies have setup their manufacturing facilities in Tamil Nadu. Due the rapid depletion of fossil fuel and increase in fuel cost, environmental pollution, the shift to clean transport is necessary. This subject introduced by keeping all the above factors.

OBJECTIVES:

- To learn the environmental impact and history of Electric Vehicles.
- To understand the concept of Electric Vehicle and its types.
- To study the configurations of Electric Vehicles
- To acquire knowledge about Energy Storages, Charging System, Effects and Impacts
- To appreciate the Electric Mobility Policy Frame work India and EV Policy Tamil Nadu 2019.

Course Outcome

On successful completion of the course, the students will be able to attain below Course Outcome (CO):

Course outcome		BTL	Linked PO
6F4401-**CO1**	Ability to understand Environmental impact and Electric vehicle Types	**L2 (U)**	
6F4401-**CO2**	Ability to analysis the Hybrid electric drive, Electric vehicle, Drive System and Power Consumption	**L4 (AN)**	
6F4401-**CO3**	Ability to understand the Energy Storages, Charging System, Effects and Impacts	**L2 (U)**	
6F4401-**CO4**	Ability to understand the Electric Mobility Policy Frame work India	**L2 (U)**	
6F4401-**CO5**	Ability to understand the tamilnadu E-Vehicle Policy 2019	**L2 (U)**	

Legends: R = Remember U= Understand; A= Apply and above levels (BTL-Bloom's revised taxonomy Level)

Mapping Course Outcomes (CO) - Program Outcomes (PO)

CO	Program Outcomes (PO)							Program Specific Outcomes (PSO)	
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2
6F4401- **CO1**	3	2	3	3	3	-	-	-	-
6F4401- **CO2**	3	3	3	3	3	-	-	-	-
6F4401- **CO3**	3	2	2	3	3	-	-	-	-
6F4401- **CO4**	3	2	3	3	3	-	-	-	-
6F4401- **CO5**	3	2	3	3	3	-	-	-	-
TOTAL	15	11	14	15	15	-	-	-	-
No. of COs Mapping with POs	5	5	5	5	5	-	-	-	-
Average	3	2.2	2.8	3	3	-	-	-	-
Round off(Average)	3	2	3	3	3	-	-	-	-
Correlation									
Strong – S / 3		**Medium – M /2**				**Weak – W / 1**			

DETAILED SYLLABUS

Contents: E-Vehicle Technology & its Policy Theory

Unit	Name of the Topics	Hours
I	**ENVIRONMENTAL IMPACT AND HISTORY& ELECTRIC VEHICLE TYPES** Air pollution – Petroleum resources – History of Electric vehicles - History of Hybrid Electric Vehicles – History of Fuel Cell Vehicles – Hybrid electric Vehicle (HEV) - Plug-in Hybrid Electric Vehicle (PHEV) - Battery Electric Vehicle (BEV) – Fuel Cell Electric Vehicle (FCEV) – Description.	15
II	**ELECTRIC VEHICLE & DRIVE SYSTEM** Configurations of Electric Vehicle – Performance of Electric Vehicles – Tractive Effort in Normal Driving – energy consumption. Hybrid Electric Vehicles: Concept of Hybrid electric drive trains – Architecture of Hybrid	15

	Electric Drive trains. Electric Propulsion Systems: Drive Systems: DC motor drives - Principle of operation – Induction Motor drives - Basic operation principles – Permanent Magnetic Brush Less DC Motor Drives – Principles – Construction and classification.	
III	**ENERGY STORAGES, CHARGING SYSTEM, EFFECTS AND IMPACTS** Electrochemical Batteries – Battery Technologies – Lead Acid Batteries – Nickel Based Batteries – Lithium Based Batteries – Charging system – DC charging – Wireless charging – Power conversion techniques. Effects of EV – Impacts on Power grid – Impacts on Environment – Impacts on Economy.	15
IV	**ELECTRIC MOBILITY POLICY FRAME WORK INDIA** Government of India Electric Mobility Policy Frame Work – Global Scenario of EV adoption – Electric mobility in India – National Electric Mobility Mission Plan 2020 – Action led by Original Equipment Manufacturers – Key Performance Indicator – Global impact – Trends and Future Developments.	14
V	**TAMILNADU E-VEHICLE POLICY 2019** Vehicle Population in Tamil nadu – Need of EV Policy – Advantage of EV Eco system – Scope and Applicability of EV Policy – Objectives of EV Policy – Policy Measures – Demand side incentives – Supply side incentives to promote EV manufacturing – Revision of Transport Regulation of EV – City building codes – Capacity Building and Skilling – Charging structure – implementing agencies – R&D and Business Incubation – Recycling Ecosystem – Battery and EVs.	14

Reference Books

1. Modern Electric, Hybrid Electric and Fuel Cell Vehicles, Mehrdad Ehsani,
2. Yimin Gao, Sebastien E.Gay, Ali Emadi, CR Press, London, New York. Comparison of Electric and Conventional Vehicles in Indian Market: Total Cost of Ownership,Consumer Preference and Best Segment for ElectricVehicle (IJSR),Akshat Bansal, Akriti Agarwal
3. A Comprehensive Study of Key Electric Vehicle (EV)Components, Technologies, Challenges, Impacts, and Future Direction of Development

(MDPI),Fuad Un-Noor, Sanjeevi kumar Padmanaban, Lucian Mihet-Popa, Mohammad Nurunnabi Mollah and Eklas Hossain.

4. Electric Vehicles: A future Projection CII October 2020 report.
5. Design and analysis of aluminum/air battery system for electric vehicles, Shaohua Yang, Harold Knickle, Elsevier.
6. Propelling Electric Vehicles in India, Technical study of Electric Vehicles and Charging Infrastructure
7. ZERO EMISSION VEHICLES (ZEVs): TOWARDS A POLICY FRAMEWORK - NITI Aayog.
8. FASTER ADOPTION OF ELECTRIC VEHICLES IN INDIA: PERSPECTIVE OF CONSUMERS AND INDUSTRY, The Energy and Resources Institute, New Delhi.
9. India EV Story: Emerging Opportunities by Innovation Norway.

DIPLOMA IN ENGINEERING AND TECHNOLOGY

6

DEPARTMENT OF INSTRUMENTATION AND CONTROL ENGINEERING

II YEAR

F – SCHEME

IV - TERM

IMPLEMENTED FROM 2020 – 2021

6F4208 - INDUSTRIAL INSTRUMENTATION – I PRACTICAL

SESHASAYEE INSTITUTE OF TECHNOLOGY
(Autonomous)
TIRUCHIRAPPALLI – 620 010.

ANNEXURE- II

SESHASAYEE INSTITUTE OF TECHNOLOGY (Autonomous), TRICHY-10

6: DIPLOMA IN INSTRUMENTATION AND CONTROL ENGINEERING SYLLABUS

F-SCHEME

(To be implemented for the students admitted from the year 2020-21 onwards)

Programme Name : 6 - Diploma In Instrumentation and Control Engineering

Course Code : 6F4208

Term : IV

Course Name : Industrial Instrumentation – I Practical

TEACHING AND SCHEME OF EXAMINATION

No of weeks per semester: 16 weeks

Subject	Instructions		Examination			
			Marks			Duration
	Hours / Week	Hours / Semester	Internal Assessment	Board Examinations	Total	
6F4208	4	64	25	100*	100	3 Hrs.

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

RATIONALE:

Practical in Industrial Instrumentation is essential course for Instrumentation & Control Engineering. This subject gives exposure the students to familiarize and use various sensors and transducers used in industries. The coverage of syllabus is made in such a way that the students will get through knowledge of handling Instruments used for different process parameters.

OBJECTIVES:

After the completion of this laboratory, the student should be able to

- Obtain characteristics of Thermocouple, RTD and Thermistor.
- Calibrate pressure gauges using Bourdon tube and dead weight tester.
- Understand the concept and working of level transmitter.
- Handle rota meter, venturi meter and Orifice meter for flow measurement.
- Handle instruments to measure strain.

Course Outcome

On successful completion of the course, the students will be able to attain below Course Outcome (CO):

CO	Details	BTL	Linked PO
6F4208 **-CO1**	Ability to choose the temperature sensor based on the characteristics of the system.	L5 (E)	
6F4208 **-CO2**	Ability to calibrate Ammeter, Voltmeter.	L5 (E)	
6F4208 **-CO3**	Ability to Verify thermocouple laws.	L4 (AN)	
6F4208 **-CO4**	Ability to compare the error in the pressure gauges by using dead weight tester.	L2 (U)	
6F4208 **-CO5**	Ability to measure displacement, weight using load cell and pH.	L5 (E)	

Legends: R = Remember U= Understand; A= Apply and above levels (BTL-Bloom's revised taxonomy Level)

Mapping Course Outcomes (CO) - Program Outcomes (PO)

CO	Program Outcomes (PO)							Program Specific Outcomes (PSO)	
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2
6F4208**- CO1**	3	3	2	3	-	-	-	-	-
6F4208**- CO2**	3	3	2	3	-	-	-	-	-
6F4208**- CO3**	3	3	2	3	-	-	-	-	-
6F4208**- CO4**	2	2	1	2	-	-	-	-	-
6F4208**- CO5**	3	3	2	3	-	-	-	-	-
TOTAL	14	14	9	14	-	-	-	-	-
No. of COs Mapping with POs	5	5	5	5	-	-	-	-	-
Average	2.8	2.8	1.8	2.8	-	-	-	-	-
Round off(Average)	3	3	2	3	-	-	-	-	-
Correlation									
Strong – S / 3		**Medium – M /2**				**Weak – W / 1**			

INDUSTRIAL INSTRUMENTATION – I PRACTICAL

LIST OF EXPERIMENTS

1. calibration of ammeter
2. calibration of voltmeter
3. Characteristics of RTD.
4. Characteristics of Thermistor.
5. Characteristics of Thermocouple.
6. Pressure measurement using U Tube manometer.
7. Calibration of pressure gauge using Dead Weight tester.
8. Measurement of pH using pH meter.
9. Measurement of weight using Load cell.
10. Measurement of displacement of using LVDT.
11. Verification of any three thermocouple laws.
12. Measurement of temperature using IC temperature sensor.

DETAILLED ALLOCATION OF MARKS

SCHEME OF VALUATION		
SL.NO	**DESCRIPTION**	**MARKS**
1.	Circuit Diagram	30
2.	Connections	30
3.	Reading & Graph	25
4.	Result	10
5.	Viva	05
6.	TOTAL	100

LIST OF EQUIPMENTS

Sl. No	Name of the Equipments	Required Nos.
1.	Ammeter, voltmeter	6
2.	RTD, Thermistor, Thermocouple, IC temperature sensor	6
3.	U Tube manometer.	3
4.	Dead Weight tester	1
5.	pH meter	1
6.	LVDT.	3

DIPLOMA IN ENGINEERING AND TECHNOLOGY

6

DEPARTMENT OF INSTRUMENTATION AND CONTROL ENGINEERING

II YEAR

F – SCHEME

IV - TERM

IMPLEMENTED FROM 2020 – 2021

6F4209 - MATLAB & LABVIEW-SIMULATION PRACTICAL

SESHASAYEE INSTITUTE OF TECHNOLOGY
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TIRUCHIRAPPALLI – 620 010.

ANNEXURE- II

SESHASAYEE INSTITUTE OF TECHNOLOGY (Autonomous), TRICHY-10

6: DIPLOMA IN INSTRUMENTATION AND CONTROL ENGINEERING SYLLABUS

F-SCHEME

(To be implemented for the students admitted from the year 2020-21 onwards)

Programme Name : 6 - Diploma In Instrumentation and Control Engineering

Course Code : 6F4209

Term : IV

Course Name : MATLAB & Lab VIEW – Simulation Practical

TEACHING AND SCHEME OF EXAMINATION

No of weeks per semester: 16 weeks

Subject	Instructions		Examination			
			Marks			Duration
	Hours / Week	Hours / Semester	Internal Assessment	Board Examinations	Total	
6F4209	4	64	25	100*	100	3 Hrs.

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

RATIONALE:

Control system engineer's use MATLAB at all stages of development from plant modelling to designing and tuning algorithms and supervisory logic, all the way to deployment with automatic code generation and system verification, validation and test. This software is popular because it is powerful and easy to use. A test engineer needs the help of Lab VIEW software that is involved in testing the products they design and manufacture. Lab VIEW is a best option for data acquisition, instrumental control and test automation.

OBJECTIVES:

- To make the students to understand, learn and use the MATLAB and Lab VIEW software.
- To obtain the solution for laplace transfer and inverse laplace transfer by using MATLAB.
- To simulate and analyse the response of I and II order process by using MATLAB.
- To simulate and learn the simulation of control of various process in Lab VIEW.

Course Outcome

On successful completion of the course, the students will be able to attain below Course Outcome (CO):

CO	Details	BTL	Linked PO
6F4209-**CO1**	Know the various aspects of simulation software's MATLAB and Lab VIEW.	**L2 (U)**	
6F4209-**CO2**	Ability to obtain the solution for laplace transform and laplace inverse transform by MATLAB	**L3 (AP)**	
6F4209-**CO3**	Ability to obtain the response I and II order process for unit step input by MATLAB	**L3 (AP)**	
6F4209-**CO4**	Ability to obtain the Root locus, Bode plot of a system by using MATLAB	**L3 (AP)**	
6F4209-**CO5**	To familiarize with simulation of process control in Lab VIEW software	**L3 (AP)**	

Legends: R = Remember U= Understand; A= Apply and above levels (BTL-Bloom's revised taxonomy Level)

Mapping Course Outcomes (CO) - Program Outcomes (PO)

CO	Program Outcomes (PO)							Program Specific Outcomes (PSO)	
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2
6F4209- **CO1**	2	2	1	2	-	-	-	-	-
6F4209- **CO2**	3	3	1	3	-	-	-	-	-
6F4209- **CO3**	3	3	1	3	-	-	-	-	-
6F4209- **CO4**	3	3	1	3	-	-	-	-	-
6F4209- **CO5**	3	3	1	3	-	-	-	-	-
TOTAL	14	13	5	14	-	-	-	-	-
No. of COs Mapping with POs	5	5	5	5	-	-	-	-	-
Average	2.8	2.6	1	2.8	-	-	-	-	-
Round off(Average)	3	3	1	3	-	-	-	-	-

Correlation		
Strong – S / 3	**Medium – M /2**	**Weak – W / 1**

MATLAB & LABVIEW – SIMULATION PRACTICAL

LIST OF EXPERIMENTS

1. Combinational Logic Gates using Simulink Model.
2. Finding Laplace and Inverse Laplace transform of the given transfer function.
3. Obtaining the solution of differential equation with and without initial conditions.
4. Generating sine wave, Pulse and step signal using a Simulink Model.
5. Obtaining time domain specification using MATLAB.
6. Time response of I order system of a transfer function for unit step input using MATLAB.
7. Response of II order (under damped, critical damped, over damped) system for unit step input.
8. Obtaining the Root locus of a transfer function.
9. Obtaining the Bode plot of a transfer function.
10. Familiarization of logic gate functions in LABVIEW
11. Generation and measurement of signals in LABVIEW
12. Simulation of process (Temp/Flow/Level) control in LABVIEW

DETAILLED ALLOCATION OF MARKS

SCHEME OF VALUATION		
SL.NO	**DESCRIPTION**	**MARKS**
1	Diagram	30
2	Performance	30
3	Execution	20
4	Result	10
5	Viva	10
6	TOTAL	100

LIST OF EQUIPMENTS

Sl. No	Name of the Equipments	Range	Required Nos.
1	DC Regulated power supply	0-30V,1A	6
2	Signal Generator	2 MHz	1
3	Dual trace CRO	20MHz/30MHz	1
4	DC Voltmeter(Analog)	Different Range	6
5	DC Ammeter(Analog)	Different Range	6

DIPLOMA IN ENGINEERING AND TECHNOLOGY

6

DEPARTMENT OF INSTRUMENTATION AND CONTROL ENGINEERING

II YEAR

F – SCHEME

IV - TERM

IMPLEMENTED FROM 2020 – 2021

6F4304 - MICROCONTROLLER AND ITS APPLICATIONS PRACTICAL

SESHASAYEE INSTITUTE OF TECHNOLOGY
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TIRUCHIRAPPALLI – 620 010.

ANNEXURE- II

SESHASAYEE INSTITUTE OF TECHNOLOGY (Autonomous), TRICHY-10

6: DIPLOMA IN INSTRUMENTATION AND CONTROL ENGINEERING SYLLABUS

F-SCHEME

(To be implemented for the students admitted from the year 2020-21 onwards)

Programme Name : 6 - Diploma In Instrumentation and Control Engineering

Course Code : 6F4304

Term : IV

Course Name : Microcontroller and its Applications Practical

TEACHING AND SCHEME OF EXAMINATION

No of weeks per semester: 16 weeks

Subject	Instructions		Examination			
			Marks			Duration
	Hours / Week	Hours / Semester	Internal Assessment	Board Examinations	Total	
6F4304	4	64	25	100*	100	3 Hrs.

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

RATIONALE:

Microcontroller is the primary element to monitor and control almost all domestic and industrial appliances. The diploma engineers must deal with various microcontroller-based systems. The knowledge of 8051 microcontroller & ARDUINO and the programming skills will empower the students to maintain microcontroller-based systems and design real time microcontroller-based application systems.

OBJECTIVES:

The introduction of this course enables the students to

- Write and execute assembly language programs for the given operations,
- Write assembly language programs using delay subroutines and calculate delay.
- Generate square waveform using inbuilt timer and calculate the frequency.
- Interface data converters ADC and DAC with 8051 microcontroller.
- Interface serial LEDs, Traffic light controller, DC motor with ARDUINO.
- Interface digital temperature sensor and humidity sensor with ARDUINO.

Course Outcome

On successful completion of the course, the students will be able to attain below Course Outcome (CO):

CO	Details	BTL	Linked PO
6F4304 **-CO1**	Ability to write assembly language programs for the given operations	**L4 (AN)**	
6F4304 **-CO2**	Ability to generate square waveform using delay loop & inbuilt timer and evaluate the time delay.	**L4 (AN)**	
6F4304 **-CO3**	Ability to analyze the output by interfacing data converters ADC, DAC with 8051 microcontroller.	**L4 (AN)**	
6F4304 **-CO4**	Ability to analyze the output by interfacing serial LEDs, traffic light controller with ARDUINO.	**L4 (AN)**	
6F4304 **-CO5**	Ability to analyze the output by interfacing DC motor, digital humidity and temperature sensor with ARDUINO.	**L4 (AN)**	

Legends: R = Remember U= Understand; A= Apply and above levels (BTL-Bloom's revised taxonomy Level)

Mapping Course Outcomes (CO) - Program Outcomes (PO)

CO	Program Outcomes (PO)							Program Specific Outcomes (PSO)	
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2
6F4304**- CO1**	3	3	2	3	-	-	-	-	-
6F4304**- CO2**	3	3	2	3	-	-	-	-	-
6F4304**- CO3**	3	3	2	3	-	-	-	-	-
6F4304**- CO4**	3	3	2	3	-	-	-	-	-
6F4304**- CO5**	3	3	2	3	-	-	-	-	-
TOTAL	15	15	10	15	-	-	-	-	-
No. of COs Mapping with POs	5	5	5	5	-	-	-	-	-
Average	3	3	2	3	-	-	-	-	-
Round off(Average)	3	3	2	3	-	-	-	-	-

Correlation		
Strong – S / 3	**Medium – M /2**	**Weak – W / 1**

MICROCONTROLLER AND ITS APPLICATIONS PRACTICAL

LIST OF EXPERIMENTS

1. Write assembly language programs for 8 bit Addition & 8 bit Subtraction and execute the same in 8051 microcontroller kit
2. Write assembly language programs for 8 bit Multiplication & 8 bit Division and execute the same in 8051 microcontroller kit.
3. Write assembly language programs to find the Largest & smallest number in an array of data and execute the same in 8051 microcontroller kit.
4. Write assembly language programs to arrange an array of data in Ascending order and Descending order and execute the same in 8051 microcontroller kit.
5. Write an assembly language program to generate square waveform using delay subroutine and execute the same in 8051 microcontroller kit.
6. Write an assembly language program to generate Square waveform using inbuilt Timer of 8051 microcontroller
7. Write an assembly language program to interface Analog to Digital Converter (ADC) with 8051 Microcontroller and execute the same.
8. Write an assembly language program to interface Digital to Analog converter (DAC) with 8051 Microcontroller and execute the same.
9. Write an assembly language program to interface series of LEDs with ARDUINO and make them blinking.
10. Write an assembly language program to interface Traffic light controller with ARDUINO and execute the same.
11. Write an assembly language program to interface DC motor with ARDUINO and execute the same.
12. Write an assembly language program to interface digital humidity and temperature sensor with ARDUINO and display the humidity and temperature.

DETAILLED ALLOCATION OF MARKS

SCHEME OF VALUATION		
SL.NO	**DESCRIPTION**	**MARKS**
1	Program	30
2	Execution	30
3	Debugging	20
4	Result	10
5	Viva	10
6	TOTAL	100

LIST OF EQUIPMENTS

Sl. No	Name of the Equipment's	Required Nos.
1	8051 Microcontroller Kit	6
2	ARDUINO	4
3	Dual trace CRO	1
4	8 bit ADC Interface Board	1
5	8 bit DAC Interface Board	1
6	DC motor	1
7	Traffic light controller board	1
8	Digital humidity and temperature sensor	1
9	40 pin bus connectors	2

DIPLOMA IN ENGINEERING AND TECHNOLOGY

6

DEPARTMENT OF INSTRUMENTATION AND CONTROL ENGINEERING

II YEAR

F – SCHEME

IV - TERM

IMPLEMENTED FROM 2020 – 2021

6F0005 - CONCURRENT CAREER DEVELOPMENT

SESHASAYEE INSTITUTE OF TECHNOLOGY
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TIRUCHIRAPPALLI – 620 010.

ANNEXURE- II

SESHASAYEE INSTITUTE OF TECHNOLOGY (Autonomous), TRICHY-10

6: DIPLOMA IN INSTRUMENTATION AND CONTROL ENGINEERING SYLLABUS

F-SCHEME

(To be implemented for the students admitted from the year 2020-21 onwards)

Programme Name : 6 - Diploma In Instrumentation and Control Engineering

Course Code : 6F0005

Term : IV

Course Name : Concurrent Career Development

TEACHING AND SCHEME OF EXAMINATION

No of weeks per semester: 16 weeks

Subject	Instructions		Examination			
			Marks			Duration
	Hours / Week	Hours / Semester	Internal Assessment	Board Examinations	Total	
6F0005	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	National Integration And Awareness	15
II	Social Awareness And Community Development	15
III	Health And Hygiene	15
IV	Environmental Awareness And Conservation	14
V	Traffic Control Organization	14
Test & Model Exam		7
Total		**80**

OBJECTIVES:

1. To promote harmony and the spirit of common brotherhood amongst all the people of the country. To safe guard public property and abjure violence.
2. To develop the idea of ability and better thinking to work for the betterment of community.
3. To prevent illness and have positive health attitude, correct and complete knowledge of health is necessary.
4. To develop a world population that is aware of, and concerned about, the environmental and its associated problems
5. To provide for the safe, rapid, comfortable efficient, convenient, and environmentally compatible movement of people, goods, and services.

Course Outcome

On successful completion of the course, the students will be able to attain below Course Outcome (CO):

Course outcome		BTL	Linked PO
6F0005 **-CO1**	Students to know the responsibility to see that injustice, inequality, oppression; exploitation, corruption, misuse of public money etc. are done away with. Students play a vital role in the society. They are the guardians of freedom, Justice, equality, ethics and social equilibrium.	**L2 (U)**	
6F0005 **-CO2**	To understand social and ethical norms for behaviour, and to recognize family, school, and community resources and supports.	**L2 (U)**	
6F0005 **-CO3**	Students have the knowledge or skills to develop good personal hygiene habits on their own.	**L2 (U)**	
6F0005 **-CO4**	To understand the fragility of our environment and the importance of its protection.	**L2 (U)**	
6F0005 **-CO5**	The students will get a vast understanding on various traffic enforcements rules and regulations.	**L2 (U)**	

Legends: R = Remember U= Understand; A= Apply and above levels (BTL-Bloom's revised taxonomy Level)

Mapping Course Outcomes (CO) - Program Outcomes (PO)

CO	Program Outcomes (PO)							Program Specific Outcomes (PSO)	
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2
6F0005- **CO1**	2	2	1	2	-	-	-	-	-
6F0005- **CO2**	2	2	1	2	-	-	-	-	-
6F0005- **CO3**	2	2	1	2	-	-	-	-	-
6F0005- **CO4**	2	2	1	2	-	-	-	-	-
6F0005- **CO5**	2	2	1	2	-	-	-	-	-
TOTAL	10	10	5	10	-	-	-	-	-
No. of COs Mapping with POs	5	5	5	5	-	-	-	-	-
Average	2	2	1	2	-	-	-	-	-
Round off(Average)	2	2	1	2	-	-	-	-	-
Correlation									
Strong – S / 3			**Medium – M /2**				**Weak – W / 1**		

DETAILED SYLLABUS

Contents: Concurrent Career Development

Unit	Name of the Topics	Hours
I	**NATIONAL INTEGRATION AND AWARENESS** Introduction – Importance of National Integration – Essence of national integration : Cultural Integration, Economic Integration, Political Integration, Religious Integration, Social Integration- Necessity of National Integration : Maintenance of peace and harmony, Growth and development of the nation, Law and Order, Culture and religious development, dignity and self-respect, welfare and wellbeing of the people-Role of NCC in nation Building.	15

II	**SOCIAL AWARENESS AND COMMUNITY DEVELOPMENT** Need of social awareness – Types of Social Awareness : Empathy, Organizational awareness- Service – How to build Social Awareness – Aims of Social Awareness – Different Social Awareness Programmes – Aims of Community development – Different community awareness programmes	15
III	**HEALTH AND HYGIENE** Introduction to the structure of the body – Personal hygiene - Food hygiene –water supply and its purification – Sanitisation – Waste Product / Refuse – Types of waste product – Sources of refuse – Collection and removal of refuse – Preventable diseases – Classification of disease – Preventive measures Yoga –Definition and meaning of Yoga-Principles of Yoga- Asana – Definition, Types, Benefits - Effect of various yogic practices on Respiratory and Circulatory system - Method of performing various asanas – Padmasana, Siddhasana, Gyan Muthra, Suryanamaskar. Physical and Mental health – Elements of good health – Objectives and scopes of health education – Characteristics of healthy mind, Measures to secure mental health	15
IV	**ENVIRONMENTAL AWARENESS AND CONSERVATION** Introduction- Human activities and the environment – Depletion and deterioration – Deforestation – Forest and wild life – Water Resources – Global Warming – Depletion of Ozone layer – Role of the NCC cadets towards the environment – Ecology – Definition and components Conservation of environment and ecology – Resource depletion – Resource pollution – Environmental damage – Environment, life and ecology – Conservation measures – Methods of managements and conservation of natural resources.	14
V	**TRAFFIC CONTROL ORGANIZATION** Understanding Road Safety – Importance or road safety: Major causes of road accident – Role of Education sector in road safety – Role of general Community in road safety – Road Safety tips – Safety Devices – Safe and Responsible driving : Getting ready to drive before driving, Physical and mental alertness, Know your vehicle, Know your blind spots, Fasten Your seat belt, Turn on head lights at night and in poor light conditions – Driving License.	14

ASSESSMENT:

This is a compulsory credit course. The assessment is to provide a fair State of development of the student, so participation in classroom discussions, etc. will be used in evaluation.

- Final marks = 25% of Assignment mark + 50% of Online exam mark (Proctored) + 25 % of External exam (proctored).
- Unproctored means candidate will be taking the exam from college.
- The overall pass percentage is 40%.

Reference Books

1. Cadet's Hand Book.
2. Public Health And Hygiene, Dr.Sudhar R.Wagh.
3. Question Answers Of Environment And Road Safety Awareness Kindle Edition By Brijesh Pathak (Author) .
4. Environment And Road By Naresh Kumar (Author).
5. Traffic Safety And Environment: Conflict Or Integration Author Links Open Overlay Panelburkhard E.Horn (Professor) A. Hh.Jansson.

V SEMESTER

DIPLOMA IN ENGINEERING AND TECHNOLOGY

6

DEPARTMENT OF INSTRUMENTATION AND CONTROL ENGINEERING

III YEAR

F – SCHEME

V - TERM

IMPLEMENTED FROM 2020 – 2021

6F5210 - INDUSTRIAL INSTRUMENTATION – II

SESHASAYEE INSTITUTE OF TECHNOLOGY
(Autonomous)
TIRUCHIRAPPALLI – 620 010.

ANNEXURE- II

SESHASAYEE INSTITUTE OF TECHNOLOGY (Autonomous), TRICHY-10

6: DIPLOMA IN INSTRUMENTATION AND CONTROL ENGINEERING

SYLLABUS

F-SCHEME

(To be implemented for the students admitted from the year 2020-21 onwards)

Programme Name : 6 - Diploma In Instrumentation and Control Engineering

Course Code : 6F5210

Term : V

Course Name : Industrial Instrumentation – II

TEACHING AND SCHEME OF EXAMINATION

No of weeks per semester: 16 weeks

Subject	Instructions		Examination			
			Marks			Duration
	Hours / Week	Hours / Semester	Internal Assessment	Board Examinations	Total	
6F5210	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	Measurement of Flow (Mechanical)	15
II	Measurement of Flow (Electrical)	15
III	Measurement of Level, Moisture and Humidity	15
IV	Fiber Optics and Laser Instrumentation	15
V	Safety In Instrumentation and Control Systems	13
Test & Model Exam		7
Total		**80**

RATIONALE:

Industrial Instrumentation is a core subject for Instrumentation & Control Engineering. The subject gives idea about the various process parameters and its measurement techniques. It forms the foundation of Instrumentation techniques used in industries. In addition this subject prepares the students to handle Instrumentation system safely.

OBJECTIVES:

At the end of the course, the students will be able to**:**

- ❖ Units and scales for various process parameters.
- ❖ Principles and laws associated with Instrumentation system.
- ❖ Characteristics, advantages and disadvantages of measurement techniques used for various process parameters.
- ❖ Latest techniques used for measurement system.
- ❖ Safety aspects of Instrumentation system.

Course Outcome

On successful completion of the course, the students will be able to attain below Course Outcome (CO):

Course outcome		BTL	Linked PO
6F5210 **-CO1**	Ability to explain the working of Mechanical Flow sensors	**L2 (U)**	
6F5210 **-CO2**	Ability to explain the working of Electrical flow sensors	**L2 (U)**	
6F5210 **-CO3**	Ability to explain the working of Level, humidity & Moisture sensors	**L2 (U)**	
6F5210 **-CO4**	Ability to explain the working of Fibre optic and laser sensors	**L2 (U)**	
6F5210 **-CO5**	Ability to explain the concept of safety.	**L2 (U)**	

Legends: R = Remember U= Understand; A= Apply and above levels (BTL-Bloom's revised taxonomy Level)

Mapping Course Outcomes (CO) - Program Outcomes (PO)

CO	Program Outcomes (PO)							Program Specific Outcomes (PSO)	
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2
6F5210- **CO1**	2	2	1	2	-	-	-	2	1
6F5210- **CO2**	2	2	1	2	-	-	-	2	1
6F5210- **CO3**	2	2	1	2	-	-	-	2	1
6F5210- **CO4**	2	2	1	2	-	-	-	2	1
6F5210- **CO5**	2	2	1	2	-	-	-	2	1
TOTAL	10	10	5	10	-	-	-	10	5
No. of COs Mapping with POs	5	5	5	5	-	-	-	5	5
Average	2	2	1	2	-	-	-	2	1
Round off(Average)	2	2	1	2	-	-	-	2	1
Correlation									
Strong – S / 3			**Medium – M /2**				**Weak – W / 1**		

DETAILED SYLLABUS

Contents: Industrial Instrumentation – II Theory

Unit	Name of the Topics	Hours
I	**MEASUREMENT OF FLOW (MECHANICAL)** 1.1 Units of flow – types of flow: Laminar flow – Turbulent flow – Bernoulli's theorem (No derivation) – Reynolds's number – Inferential flow meters: Rotameter – Differential pressure type meters: Orifice plates, Venturi tubes , Flow Nozzle, Dall tube , Pitot tube (No derivation) 1.2 Quantity meters: Positive displacement type meters, Nutating disc type meter – reciprocating piston type – Principle, working, advantages and disadvantages of above.	15

II	**MEASUREMENT OF FLOW (ELECTRICAL)** 2.1 Electromagnetic flow meter – Ultrasonic flow meter: Doppler and Transit time method – Vortex shedding meter – Coriolis mass flow meter – Thermal mass flow meter – solid flow measurement using conveyor belt method – Turbine flow – Target flow meter – Hot wire anemometer - solid flow measurement using conveyor belt method - Principle, construction, working, advantage and disadvantages of the above.	15
III	**MEASUREMENT OF LEVEL, MOISTURE AND HUMIDITY** 3.1 Level measurement: using differential pressure, using movement of float – sight glass – Electrical methods: change in resistance – Change in capacitance – Radiation method. Solid level measurement: bin and diaphragm type. 3.2 Definition of Moisture, Humidity, Absolute humidity, Relative humidity, Specific Humidity, Dew point – Humidity units. 3.3 Measurement of humidity: Hair hygrometer, sling psychrometer – Resistive Hygrometer or Humistor. 3.4 Measurement of moisture in - Granular material, Wood and wood products, textiles and paper sheets.	15
IV	**FIBER OPTICS AND LASER INSTRUMENTATION** 4.1 optical fibres and their properties & industrial application of optical fibres. Principles of light propagation through a fibre - Different types of fibres and their properties, fibre characteristics – Absorption losses – Scattering losses – Dispersion. Fibre optic sensors – Fibre optic instrumentation system - Interferometry method of measurement of length – Moire fringes – Measurement of pressure, temperature, current, voltage, liquid level and strain. 4.2 Laser Instrumentation: Fundamental characteristics of lasers - Properties of laser - Types of lasers – Gas lasers, solid lasers, liquid lasers, semiconductor lasers. - Laser for measurement of distance, length, velocity, acceleration, current, voltage - Laser heating, welding, melting and trimming of material - Removal and vaporization.	15

V	**SAFETY IN INSTRUMENTATION AND CONTROL SYSTEMS** 5.1 Area and Material Classification – International Electro technical Commission (IEC) – Classifying a Hazardous Location – Techniques used to reduce Explosion Hazards – Explosion proof Housings – Sealing – Pressurization Systems. 5.2 Intrinsic Safety – Definition – Design of Intrinsically Safe Systems – Basic techniques in the design of intrinsically safe apparatus. 5.3 Mechanical and Electrical Isolation – Current and Voltage Limiting – Shunt Elements – System design using commercially available intrinsically safe and associated apparatus	13

Reference Books

1. Mechanical Measurements & Control, D. S. Kumar, Metropolitan Book Co Pvt. Ltd, 3rd Edition 1989
2. Industrial Instrumentation & Control, S.K. Singh, Tata Mc Graw Hill Publishing Company Ltd. 13thedition 1997
3. Instrumentation Measurement & Analysis, C. Nakra, K. K. Chaudry, 2ndedition, Tata Mcgraw Hill Publishing Company

DIPLOMA IN ENGINEERING AND TECHNOLOGY

6

DEPARTMENT OF INSTRUMENTATION AND CONTROL ENGINEERING

III YEAR

F – SCHEME

V - TERM

IMPLEMENTED FROM 2020 – 2021

6F5211 - PROCESS CONTROL

SESHASAYEE INSTITUTE OF TECHNOLOGY
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TIRUCHIRAPPALLI – 620 010.

ANNEXURE- II

SESHASAYEE INSTITUTE OF TECHNOLOGY (Autonomous), TRICHY-10

6: DIPLOMA IN INSTRUMENTATION AND CONTROL ENGINEERING

SYLLABUS

F-SCHEME

(To be implemented for the students admitted from the year 2020-21 onwards)

Programme Name : 6 - Diploma In Instrumentation and Control Engineering

Course Code : 6F5211

Term : V

Course Name : Process Control

TEACHING AND SCHEME OF EXAMINATION

No of weeks per semester: 16 weeks

Subject	Instructions		Examination			
			Marks			Duration
	Hours / Week	Hours / Semester	Internal Assessment	Board Examinations	Total	
6F5211	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	Simple Process Control Systems and Terminology	15
II	Controller Principles	15
III	Tuning of Controllers	14
IV	Final Control Elements	15
V	Advanced Process Control Systems and P&ID	14
Test & Model Exam		7
Total		**80**

RATIONALE:

Measurements and control are one of the most important parts in a processing unit. Process control ensures production level of consistency, automated, efficiency and quality which could not be achieved purely by human manual control. Study of Process Control is an essential for Instrumentation & Control Engineering. It is a core subject that gives knowledge about the control algorithms, strategies and techniques used in Process industries. It prepares the students to familiarize with basic concepts as well as the analysis on different control actions.

OBJECTIVES:

- To familiarize with functional block diagram of a process control loop and their elements.
- To introduce various technical terms and definitions used in process control.
- To make the students understand the basic control action proportional integral and derivative
- To familiarize with the effect of set point and loop changes.
- To illustrate the necessity of controller tuning and different criteria used for controller tuning and controller settings.
- To explain the frequency response of systems with controller.
- To make the students understand the design and construction of electronic and pneumatic controllers.
- To familiarize the students with characteristics, selection, sizing of control valves.
- To elaborate the different types of control schemes such as cascade control, feed forward control and ratio control.

Course Outcome

On successful completion of the course, the students will be able to attain below Course Outcome (CO):

Course outcome		BTL	Linked PO
6F5211-**CO1**	Ability to understand the technical terms and nomenclature associated with process control domain.	**L2 (U)**	
6F5211-**CO2**	Ability to design ON/OFF controller with differential gap and to design P, PI, PID electronic controllers to achieve desired performance for various processes.	**L3 (AP)**	
6F5211-**CO3**	Ability to understand the criteria for controller tuning and controller settings	**L2 (U)**	
6F5211-**CO4**	Ability to understand the characteristics, selection and sizing of control valve.	**L2 (U)**	
6F5211-**CO5**	Ability to understand different types of control schemes such as cascade, feed forward, and ratio control and P&ID drawing.	**L2 (U)**	

Legends: R = Remember U= Understand; A= Apply and above levels (BTL-Bloom's revised taxonomy Level)

Mapping Course Outcomes (CO) - Program Outcomes (PO)

CO	Program Outcomes (PO)							Program Specific Outcomes (PSO)	
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2
6F5211- **CO1**	2	2	1	2	-	-	-	-	-
6F5211- **CO2**	2	2	1	2	-	-	-	-	-
6F5211- **CO3**	2	2	1	2	-	-	-	-	-
6F5211- **CO4**	2	2	1	2	-	-	-	-	-
6F5211- **CO5**	2	2	1	2	-	-	-	-	-
TOTAL	10	10	5	10	-	-	-	-	-
No. of COs Mapping with POs	5	5	5	5	-	-	-	-	-
Average	2	2	1	2	-	-	-	-	-
Round off(Average)	2	2	1	2	-	-	-	-	-
Correlation									
Strong – S / 3		**Medium– M /2**				**Weak – W / 1**			

DETAILED SYLLABUS

Contents: Process Control Theory

Unit	Name of the Topics	Hours
I	**SIMPLE PROCESS CONTROL SYSTEMS AND TERMINOLOGY** 1.1 Definition – process – batch process and continuous process - functional block diagram of an automatic process control system – set point – measured value – comparator – error - controller –final control element – controlled variable – manipulated variable – disturbances – advantages of automatic control system 1.2 Simple liquid level control system – flow control system – temperature control system with examples 1.3 Transportation lag – self regulation	15
II	**CONTROLLER PRINCIPLES** 2.1 Controller – block diagram, general properties, Control Modes - reverse and direct action, 2.2 Discontinuous controller modes – two position mode (ON-OFF) Control with differential gap, without differential gap – neutral zone – application, multi position mode, floating control mode – single speed, multi speed and applications. 2.3 Continuous Controller modes – proportional controller (P) – direct and reverse action – proportional band (PB) – effect of PB on a controller output – offset – application, Integral control mode (I) – Derivative control mode (D) – application – selection of control action. 2.4 Composite Controller Modes – Proportional Integral control (PI) - Proportional Derivative control (PD) - Proportional Integral Derivative control (PID). 2.5 Electronic controllers – error detector – two position controllers – P, I, D, PI, PD, PID controllers – reverse action – applications. 2.6 Pneumatic controllers – general features – mode implementation – P, PI, PD, PID Mode.	15

III	**TUNING OF CONTROLLERS** 3.1 Necessity & concept of controller tuning – 3 General Criteria for controller tuning – simple criteria, Time integral criteria (IAE, ISE, TAE), semi empirical rule. 3.2 Tuning Methods – Empirical tuning methods - process reaction curve method (cohen and coon method), Advantages and disadvantages in CC method, Ziegler – Nichols method (ultimate cycle method), Advantages and disadvantages in Z-N method, Damped – oscillation method, Frequency response method – gain margin – phase margin – tuning, self tuning controllers. 3.3 Approximation of higher order systems into first order plus dead time [FOPDT] Model.	14
IV	**FINAL CONTROL ELEMENTS** 4.1 Signal converters – P to I converter, I to P converter – Actuators Valves, Motors, Piston and Cylinders – (Basics Only) – electrical, pneumatic, hydraulic actuators. 4.2 Valve – types – characteristics – quick opening, linear, equal percentage – pneumatic valve – solenoid valve – split range control valve – single seat plug – electric motor actuated control valve 4.3 Control valve sizing – CV rating – selection of a control valve – effect of cavitations and flashing on control valve performance	15
V	**ADVANCED PROCESS CONTROL SYSTEMS AND P&ID** 5.1 Cascade control systems, ratio control systems, feed forward control system, comparison of feedback control system and feed forward control system – (one specific application for each of the above systems) 5.2 Piping & instrumentation diagram – Symbols and Drawings - P&I diagram of Feedback, Feed forward control system - P&I diagram of cascade control system (level) and ratio control system.	14

Text Book

1. Process control instrumentation technology, C.D. Johnson, Pearson Education 7th edt. 2003
2. Process system analysis & Control, Donal R Coughanowr, Tata Mc Graw Hill International, 2nd edt. 1991

Reference Books

1. Process control, Donald P Eckman, Wiely eastern limited,1991
2. Process control, Peter Hariot, Tata Mc Graw Hill,1st edt. 2001

DIPLOMA IN ENGINEERING AND TECHNOLOGY

6

DEPARTMENT OF INSTRUMENTATION AND CONTROL ENGINEERING

III YEAR

F – SCHEME

V - TERM

IMPLEMENTED FROM 2020 – 2021

6F5212.1 - POWER PLANT INSTRUMENTATION

SESHASAYEE INSTITUTE OF TECHNOLOGY
(Autonomous)
TIRUCHIRAPPALLI – 620 010.

ANNEXURE- II

SESHASAYEE INSTITUTE OF TECHNOLOGY (Autonomous), TRICHY-10

6: DIPLOMA IN INSTRUMENTATION AND CONTROL ENGINEERING

SYLLABUS

F-SCHEME

(To be implemented for the students admitted from the year 2020-21 onwards)

Programme Name : 6 - Diploma In Instrumentation and Control Engineering

Course Code : 6F5212.1

Term : V

Course Name : Power Plant Instrumentation

TEACHING AND SCHEME OF EXAMINATION

No of weeks per semester: 16 weeks

Subject	Instructions		Examination			
			Marks			Duration
	Hours / Week	Hours / Semester	Internal Assessment	Board Examinations	Total	
6F5212.1	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	Overview of Power Generation	16
II	Measurements in Power Plants	14
III	Boiler Control	13
IV	Control of Turbine	14
V	Instrumentation For Solar and Wind Energy	16
Test & Model Exam		7
Total		**80**

RATIONALE:

Power Plant Instrumentation can feed the knowledge on Different types of Power Generation with eco-friendly manner.

To understand the concept of Control and Instrumentation Systems in conventional and renewable Power generation systems.

OBJECTIVES:

Students will be able to know

- Various types of power generation
- the importance of instrumentation in power generation
- various types of turbines and boiler control systems
- the importance of instrumentation in renewable power generation

Course Outcome

On successful completion of the course, the students will be able to attain below Course Outcome (CO):

Course outcome		BTL	Linked PO
6F5212.1 **-CO1**	Ability to understand various power generation methods	**L2 (U)**	
6F5212.1**-CO2**	Ability to understand various measurements involved in power generation	**L2 (U)**	
6F5212.1 **-CO3**	Ability to understand boiler control system	**L2 (U)**	
6F5212.1 **-CO4**	Ability to understand turbine control system	**L2 (U)**	
6F5212.1 **-CO5**	Ability to understand various types renewable energy and it's instrumentation system	**L2 (U)**	

Legends: R = Remember U= Understand; A= Apply and above levels (BTL-Bloom's revised taxonomy Level)

Mapping Course Outcomes (CO) - Program Outcomes (PO)

CO	Program Outcomes (PO)							Program Specific Outcomes (PSO)	
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2
6F5212.1-**CO1**	2	2	1	2	-	-	-	-	-
6F5212.1-**CO2**	2	2	1	2	-	-	-	-	-
6F5212.1-**CO3**	2	2	1	2	-	-	-	-	-
6F5212.1-**CO4**	2	2	1	2	-	-	-	-	-
6F5212.1-**CO5**	2	2	1	2	-	-	-	-	-
TOTAL	10	10	5	10	-	-	-	-	-
No. of COs Mapping with POs	5	5	5	5	-	-	-	-	-
Average	2	2	1	2	-	-	-	-	-
Round off(Average)	2	2	1	2	-	-	-	-	-
Correlation									
Strong – S / 3		**Medium– M /2**				**Weak – W / 1**			

DETAILED SYLLABUS

Contents: Power Plant Instrumentation Theory

Unit	Name of the Topics	Hours
I	**OVERVIEW OF POWER GENERATION** 1.1 Survey of methods of power generation : hydro, thermal, nuclear, solar and wind power –Importance of instrumentation in power generation – Thermal power plant – Building blocks – Combined Cycle System – Combined Heat and Power System (CO GENERAION) – sub critical and supercritical boilers. Energy conservation.	16
II	**MEASUREMENTS IN POWER PLANTS** 2.1 Measurement of feed water flow, air flow, steam flow and coal flow – Drum level measurement – Steam pressure and temperature measurement – Turbine speed and vibration measurement.	14

III	**BOILER CONTROL** 3.1 Combustion of fuel and requirement of excess air – firing rate demand – Steam temperature control – Drum level control – Single, two and three element control – Soot blower control Combustion control for liquid and solid fuel fired boilers – air/fuel ratio control.	13
IV	**CONTROL OF TURBINE** 4.1 Types of steam turbines – impulse and reaction turbines – compounding – Turbine governing system – Speed and Load control – Transient speed rise – Free governor mode operation – Automatic Load Frequency Control – Turbine oil system – Turbine Run-up System.	14
V	**INSTRUMENTATION FOR SOLAR AND WIND ENERGY** 5.1 Wind Energy: Air Velocity, Direction, Quality Check, Pitch and Yaw Control, Speed of Rotor and Generator, Torque Measurement, Power, Current, Voltage, Frequency, Automation and Telemetry. 5.2 Solar Energy: Sun Tracking, Radiation, Power, Current, Voltage, Frequency, Automation and Telemetry.	16

Reference Books

1. Power Plant Engineering, R.K. Bansal, Kanna Publisher
2. Power Plant Engineering, R.S. Khurmi, Kanna Publisher

DIPLOMA IN ENGINEERING AND TECHNOLOGY

6

DEPARTMENT OF INSTRUMENTATION AND CONTROL ENGINEERING

III YEAR

F – SCHEME

V - TERM

IMPLEMENTED FROM 2020 – 2021

6F5212.2 - VLSI

SESHASAYEE INSTITUTE OF TECHNOLOGY
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ANNEXURE- II

SESHASAYEE INSTITUTE OF TECHNOLOGY (Autonomous), TRICHY-10

6: DIPLOMA IN INSTRUMENTATION AND CONTROL ENGINEERING

SYLLABUS

F-SCHEME

(To be implemented for the students admitted from the year 2020-21 onwards)

Programme Name : 6 - Diploma In Instrumentation and Control Engineering

Course Code : 6F5212.2

Term : V

Course Name : VLSI

TEACHING AND SCHEME OF EXAMINATION

No of weeks per semester: 16 weeks

Subject	Instructions		Examination			
			Marks			Duration
	Hours / Week	Hours / Semester	Internal Assessment	Board Examinations	Total	
6F5212.2	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 VLSI	15
II	Introduction To VHDL	15
III	Combinational Circuit Design	15
IV	Sequential Circuit Design	14
V	Programmable Logic Devices	14
Test & Model Exam		7
Total		**80**

RATIONALE:

Very Large Scale Integration technology, when especially used for designing digital systems, it is mandatory that the behaviour of the required system to be described (modelled) and verified (simulated) before synthesis, translate the design into real hardware fabrication in the foundry (gates and wires).Hardware Description Language (HDL) allows designs to be described using any methodology- top down, bottom up approach. VHDL can be used to describe hardware at the gate level or in a more abstract way. This course is to introduce the digital system design concepts through hardware description Language, VHDL programming, design flow of VLSI and architectures of CPLD, FPGA. It is mainly aimed at design of combinational and sequential functions and simulates or verifies their functionality using the Hardware description Language (HDL).

OBJECTIVES:

On successful completion of the course, the students must be able to

- Understand the concepts of VLSI design process.
- Develop a VHDL code for combinational circuit
- Develop a VHDL code for sequential circuit.
- Explain the importance of PROM, PLA, and PAL.
- Differentiate PROM, PLA and PAL.
- Develop the circuit using PROM, PAL and PLA.
- Understand CPLD and FPGA hardware.
- Differentiate ASIC, CPLD, FPGA.

Course Outcome

On successful completion of the course, the students will be able to attain below Course Outcome (CO):

Course outcome		BTL	Linked PO
6F5212.2 **-CO1**	Ability to implement logic functions is CMOS and understands VLSI design process.	**L2 (U)**	
6F5212.2 **-CO2**	Ability to understand VHDL coding format and write VHDL program for logic gates.	**L6 (D)**	
6F5212.2 **-CO3**	Ability to write VHDL program for combinational logic circuits.	**L6 (D)**	
6F5212.2 **-CO4**	Ability to write VDHL program for sequential logic circuits.	**L6 (D)**	
6F5212.2 **-CO5**	Ability to understand the logic circuits of PROM, PAL, PLA and architecture of CPLD, FPGA, ASIC	**L2 (U)**	

Legends: R = Remember U= Understand; A= Apply and above levels (BTL-Bloom's revised taxonomy Level)

Mapping Course Outcomes (CO) - Program Outcomes (PO)

CO	Program Outcomes (PO)							Program Specific Outcomes (PSO)	
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2
6F5212.2**- CO1**	2	2	1	2	-	-	-	-	-
6F5212.2**- CO2**	3	3	3	3	-	-	-	-	-
6F5212.2**- CO3**	3	3	3	3	-	-	-	-	-
6F5212.2**- CO4**	3	3	3	3	-	-	-	-	-
6F5212.2**- CO5**	2	2	1	2	-	-	-	-	-
TOTAL	13	13	11	13	-	-	-	-	-
No. of COs Mapping with POs	5	5	5	5	-	-	-	-	-
Average	2.6	2.6	2.2	2.6	-	-	-	-	-
Round off(Average)	3	3	2	3	-	-	-	-	-

Correlation		
Strong – S / 3	**Medium – M /2**	**Weak – W / 1**

DETAILED SYLLABUS

Contents: VLSI Theory

Unit	Name of the Topics	Hours
I	**INTRODUCTION TO VLSI:** 1.1 NMOS, CMOS logic: NOT, AND, OR, NAND, and NOR Gates using NMOS – NOT, AND, OR, NAND, and NOR Gates using CMOS – Implementation of logic function (SOP, POS) in CMOS. 1.2 VLSI design process: Different level of abstractions in VLSI design – steps involved in VLSI design process: Design Entry, Simulation, Synthesis, Placement and Routing – Layout rules, Stick diagram.	15
II	**INTRODUCTION TO VHDL:** 2.1 Introduction: HDL – Different types of modelling – General format for VHDL program. 2.2 VHDL statements: Syntax for process statement, if statement, if else statement, case statement – Syntax for signal declaration and signal assignment statement – Syntax for variable declaration and variable assignment statement, component declaration. 2.3 VHDL code example: VHDL code for Logic gates AND, OR, NOT, NAND, NOR gate and XOR gates.	15
III	**COMBINATIONAL CIRCUIT DESIGN:** 3.1 Combinational circuit: Half adder, Full adder , Half subtractor and Full subtractor – 4 to 1 Mux, 1 to 4 Demux, 4 to 2 Encoder, 2 to 4 decoder and comparator – Four bit Arithmetic adder – Four bit Arithmetic subtractor. 3.2 VHDL program for Combinational circuit: VHDL program for Half adder, Full adder – VHDL program for Hall subtractor and Full subtractor – 4 to 1 Mux, 1 to 4 Demux, 4 to 2 Encoder, 2 to 4 decoder and comparator in VHDL – VHDL program for Four bit Arithmetic adder (structural) – VHDL program for Four bit Arithmetic subtractor (structural).	15
IV	**SEQUENTIAL CIRCUIT DESIGN:** 4.1 Sequential circuit: Flip-flops: D, J K and T Flip - flops – counters:3 bit	14

	up Counter, 3 bit down counter and 3 bit up/down counter, Decade counter, ring counter and Johnson Counter. 4.2 VHDL program for Sequential circuit: VHDL program for D, JK and T Flip-flops with reset input, without reset input – VHDL program for 3 bit up Counter,3 bit down counter and 3 bit up/down counter, Decade counter, ring counter and Johnson Counter.	
V	**PROGRAMMABLE LOGIC DEVICES:** 5.1 PROM, PLA and PAL: Introduction to PROM, PLA and PAL – Implementation of combinational circuits with PROM, PAL and PLA (upto 4 variables) – Comparison between PROM, PAL and PLA. 5.2 CPLD,FPGA and ASIC : Architecture of Complex Programmable Logic device (CPLD) – Architecture of Field Programmable Gate Arrays (FPGA) – Introduction to Application Specific Integrated Circuit (ASIC) – Types of ASIC – ASIC design flow.	14

Reference Books

1. "M.Morris Mano, Michael DCiletti ""Digital Design"Pearson Education 2008.
2. "Bhasker J ""VHDL Primer" Prentice Hall India-2009.
3. "NEIL H.E.WESTE, KAMRAN ESRHAGHIAN" "Principles of CMOS VLSI design", Addison – Wesley professional, second edition 1994.
4. "NigelP.Cook" "Digital Electronics with PLD Integration", Pearson 2000.
5. "Ashok K.Sharma", "Programmable Logic Hand book : PLDs, CPLDs, and FPGAs", Mcgraw-Hill,1998.
6. "Michael John Sebastian Smith" Application Specific Integrated Circuits", Addison – Wesley professional, first edition 1997.

DIPLOMA IN ENGINEERING AND TECHNOLOGY

6

DEPARTMENT OF INSTRUMENTATION AND CONTROL ENGINEERING

III YEAR

F – SCHEME

V - TERM

IMPLEMENTED FROM 2020 – 2021

6F5212.3 - EMBEDDED SYSTEMS

SESHASAYEE INSTITUTE OF TECHNOLOGY
(Autonomous)
TIRUCHIRAPPALLI – 620 010.

ANNEXURE- II

SESHASAYEE INSTITUTE OF TECHNOLOGY (Autonomous), TRICHY-10

6: DIPLOMA IN INSTRUMENTATION AND CONTROL ENGINEERING

SYLLABUS

F-SCHEME

(To be implemented for the students admitted from the year 2020-21 onwards)

Programme Name : 6 - Diploma In Instrumentation and Control Engineering

Course Code : 6F5212.3

Term : V

Course Name : Embedded Systems

TEACHING AND SCHEME OF EXAMINATION

No of weeks per semester: 16 weeks

Subject	Instructions		Examination			
			Marks			Duration
	Hours / Week	Hours / Semester	Internal Assessment	Board Examinations	Total	
6F5212.3	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 Embedded Systems And ARM Processor	16
II	ARM Instruction Set	16
III	LPC 2148 Controller	16
IV	LPC 2148 Peripherals	15
V	Operating System	10
Test & Model Exam		7
Total		**80**

RATIONALE:

This subject makes the students to understand the definition for Embedded Systems. It also enables the students to have the knowledge about the different architectures, RISC and CISC processors. This subject makes the students to understand about RTOS. To specific, the subject deals with ARM7 RISC processor and the on chip peripherals of LPC 2148.

OBJECTIVES:

On completion of the syllabus, the students must be able to

- Understand ARM7 processor.
- Understand the architecture of LPC 2148.
- Understand ARM7 instruction set.
- Understand the types of buses.
- Explain On chip peripherals.
- Have clear knowledge about RTOS concepts.

Course Outcome

On successful completion of the course, the students will be able to attain below Course Outcome (CO):

Course outcome		BTL	Linked PO
6F5212.3-**CO1**	Ability to understand the concept of embedded system & ARM controller	**L2 (U)**	
6F5212.3-**CO2**	Ability to understand the instruction in ARM microcontroller	**L2 (U)**	
6F5212.3-**CO3**	Ability to understand the concept of LPC 2148 Controller	**L2 (U)**	
6F5212.3-**CO4**	Ability to understand the interfacing concept of LPC 2148 Peripherals	**L2 (U)**	
6F5212.3-**CO5**	Ability to understand the concept of Embedded Operating System	**L2 (U)**	

Legends: R = Remember U= Understand; A= Apply and above levels (BTL-Bloom's revised taxonomy Level)

Mapping Course Outcomes (CO) - Program Outcomes (PO)

CO	Program Outcomes (PO)							Program Specific Outcomes (PSO)	
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2
6F5212.3- **CO1**	2	2	1	2	-	-	-	-	-
6F5212.3- **CO2**	2	2	1	2	-	-	-	-	-
6F5212.3- **CO3**	2	2	1	2	-	-	-	-	-
6F5212.3- **CO4**	2	2	1	2	-	-	-	-	-
6F5212.3- **CO5**	2	2	1	2	-	-	-	-	-
TOTAL	10	10	5	10	-	-	-	-	-
No. of COs Mapping with POs	5	5	5	5	-	-	-	-	-
Average	2	2	1	2	-	-	-	-	-
Round off(Average)	2	2	1	2	-	-	-	-	-
Correlation									
Strong – S / 3		**Medium – M /2**				**Weak – W / 1**			

DETAILED SYLLABUS

Contents: Embedded Systems Theory

Unit	Name of the Topics	Hours
I	**INTRODUCTION TO EMBEDDED SYSTEMSAND ARM PROCESSOR** 1.1 : Embedded Systems Definition of Embedded System – Features of Embedded System – Types of Embedded System – List of Embedded System Devices Harvard and Von-Neumann architectures-RISC and CISC Processors. 1.2 : ARM Processor Architecture Fundamentals Block diagram of ARM based embedded system with hardware components - Pipeline-Data Flow Model-CPU registers – Modes of Operation – PSW -Processor State and Instruction Set-Exceptions Interrupts - Vector table - Little Endian and Big Endian.	16

II	**ARM INSTRUCTION SET** 2.1 : Instruction Set ARM state instruction set - Thumb State Instruction sets (Brief introduction only) - Data processing instructions-Branch instructions Load - store instructions - Software interrupt instruction-Program status register instructions - stack instructions-Conditional execution. 2.2 : Simple programs Addition, Subtraction and Multiplication using ARM processor assembly language.	16
III	**LPC 2148 CONTROLLER** 3.1 : Introduction to LPC 2148 ARM controller LPC 2148 ARM Controller – Features - Block diagram – Memory and on chip peripheral devices – ARM 7 TDMI-S Nomenclature – Memory Map – Memory re-map and boot block - Types of buses. 3.2 : System control functions Crystal oscillator – PLL - Power control – RESET - VPB Divider - Wakeup timer Vector Interrupt controller - (VIC) - Register description - External Interrupts.	16
IV	**LPC 2148 PERIPHERALS** 4.1 : Peripherals Pin connect block-Features-pin connect block register description - GPIO (Slow) – Features - register description - Timer/Counter – Block diagram – Register description – PWM – features -register description - ADC –features register description-DAC-features - register description. 4.2: Serial communication in LPC 2148 UART features – UART0 Block diagram — UART0 register description.	15
V	**OPERATING SYSTEM** 5.1 : Embedded OS and RTOS Introduction to OS- -Functions of OS-Embedded OS Fore ground / background systems - Real time system concepts Resources - shared resources-Critical section - multitasking - Tasks - kernel Scheduler-Round Robin-Non Pre-emptive and Pre-emptive scheduling Context switch - re-entrancy - task priorities - Event flag-mutual exclusion semaphores and types-Message mail box-Message Queues.	10

Reference Books

1. ”Andrew N Sloss””ARM System Developer’s Guide Designing and Optimizing” Elsevier publication,2004.
2. ”B.Kanta Rao” “Embedded systems”, PHI publishers.
3. ”Tammy Noergaard” “Embedded Systems Architecture”, Newness edition.
4. ”Steve Furbe “ “ARM System on chip Architecture”, 2nd edition, Pearson Education,2000.
5. ”Dr.K.V.K.K Prasad” ”Embedded Real Time Systems”, Dream tech press, 2009.
6. ”David Seal” “ARM Architecture Reference Manual”.
7. LPC 2148 User Manual.

DIPLOMA IN ENGINEERING AND TECHNOLOGY

6

DEPARTMENT OF INSTRUMENTATION AND CONTROL ENGINEERING

III YEAR

F – SCHEME

V - TERM

IMPLEMENTED FROM 2020 – 2021

6F5402 - ENTREPRENEURSHIP & STARTUPS

SESHASAYEE INSTITUTE OF TECHNOLOGY
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ANNEXURE- II

SESHASAYEE INSTITUTE OF TECHNOLOGY (Autonomous), TRICHY-10

6: DIPLOMA IN INSTRUMENTATION AND CONTROL ENGINEERING

SYLLABUS

F-SCHEME

(To be implemented for the students admitted from the year 2020-21 onwards)

Programme Name : 6 - Diploma In Instrumentation and Control Engineering

Course Code : 6F5402

Term : V

Course Name : Entrepreneurship & Startups

TEACHING AND SCHEME OF EXAMINATION

No of weeks per semester: 16 weeks

Subject	Instructions		Examination			
			Marks			Duration
	Hours / Week	Hours / Semester	Internal Assessment	Board Examinations	Total	
6F5402	4	64	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	Entrepreneurship – Introduction and Process	12
II	Business Idea and Banking	12
III	Startups, E-cell and Success Stories	11
IV	Pricing and Cost Analysis	11
V	Business Plan Preparation	11
Test & Model Exam		7
Total		**71**

RATIONALE:

Development of a diploma curriculum is a dynamic process responsive to the society and reflecting the needs and aspiration of its learners. Fast changing society deserves changes in educational curriculum particularly to establish relevance to emerging socio-economic environments; to ensure equity of opportunity and participation and finally promoting concern for excellence. In this context the course on entrepreneurship and startups aims at instilling and stimulating human urge for excellence by realizing individual potential for generating and putting to use the inputs, relevant to social prosperity and thereby ensure good means of living for every individual, provides jobs and develop Indian economy.

OBJECTIVES:

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

- Acquire Entrepreneurial spirit and resourcefulness
- Understand the concept and process of entrepreneurship
- Acquire entrepreneurial quality, competency and motivation
- Learn 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
- Familiarize of various financial and non-financial schemes
- Aware the concept of incubation and starts ups

Course Outcome

On successful completion of the course, the students will be able to attain below Course Outcome (CO):

Course outcome		BTL	Linked PO
6F5402-**CO1**	Ability to understand the concept, Functions and importance of entrepreneurship	**L2(U)**	
6F5402-**CO2**	Ability to understand the concept, of Business and banking	**L2(U)**	
6F5402-**CO3**	Ability to understand the concept, of incubation centre, E-cell and social media.	**L2(U)**	
6F5402-**CO4**	Ability to understand the concept, of pricing and cost analysis	**L2(U)**	
6F5402-**CO5**	Ability to understand the concept, of business plan preparation	**L2(U)**	

Legends: R = Remember U= Understand; A= Apply and above levels (BTL-Bloom's revised taxonomy Level)

Mapping Course Outcomes (CO) - Program Outcomes (PO)

CO	Program Outcomes (PO)							Program Specific Outcomes (PSO)	
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2
6F5402 - **CO1**	2	2	1	2	-	-	-	-	-
6F5402 - **CO2**	2	2	1	2	-	-	-	-	-
6F5402 - **CO3**	2	2	1	2	-	-	-	-	-
6F5402 - **CO4**	2	2	1	2	-	-	-	-	-
6F5402 - **CO5**	2	2	1	2	-	-	-	-	-
TOTAL	10	10	5	10	-	-	-	-	-
No. of COs Mapping with POs	5	5	5	5	-	-	-	-	-
Average	2	2	1	2	-	-	-	-	-
Round off (Average)	2	2	1	2	-	-	-	-	-

Correlation		
Strong – S / 3	**Medium – M /2**	**Weak – W / 1**

DETAILED SYLLABUS

Contents: Entrepreneurship & Startups

Unit	Name of the Topics	Hours
I	**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 ➢ Mind set of an employee and an entrepreneur ➢ Business Failure – causes and remedies ➢ Role of Networking in entrepreneurship	12
II	**BUSINESS IDEA AND BANKING** ➢ Types of Business: Manufacturing, Trading and Services. ➢ Stake holders: sellers, vendors and consumers and Competitors ➢ E- commerce Business Models ➢ Types of Resources - Human, Capital and Entrepreneurial tools and resources ➢ Selection and utilization of human resources and professionals, etc. ➢ Goals of Business; 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 ➢ Various sources of Information	12

	➢ Role of financial institutions ➢ Role of Government policy ➢ Entrepreneurial support systems ➢ Incentive schemes for state government ➢ Incentive schemes for Central governments	
III	**STARTUPS, E-CELL AND SUCCESS STORIES** ➢ Concept of Incubation centre's ➢ Visit and report of DIC , financial institutions and other relevance institutions ➢ Success stories of Indian and global business legends ➢ Field Visit to MSME's ➢ Study visit to Incubation centers and start ups ➢ Learn to earn ➢ Startup and its stages ➢ Role of Technology – E-commerce and Social Media ➢ Role of E-Cell ➢ E-Cell to Entrepreneurship	11
IV	**PRICING AND COST ANALYSIS** ➢ Unit of Sale, Unit Price and Unit Cost - for single product or service ➢ Types of Costs - Start up, Variable and Fixed ➢ Income Statement ➢ Cash flow Projections ➢ Break Even Analysis - for single product or service ➢ Taxes ➢ Financial Business Case Study ➢ Understand the meaning and concept of the term Cash Inflow and Cash Outflow ➢ Price ➢ Calculate Per Unit Cost of a single product ➢ Operational Costs ➢ Understand the importance and preparation of Income Statement ➢ Prepare a Cash Flow Projection	11

	➢ Projections ➢ Pricing and Factors affecting pricing. ➢ Launch Strategies after pricing and proof of concept	
V	**BUSINESS PLAN PREPARATION** ➢ Generation of Ideas. ➢ Business Ideas vs. Business Opportunities ➢ Opportunity Assessment – Factors, Micro and Macro Market Environment ➢ 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 ➢ Market Sensing and Testing ➢ Marketing and Sales strategy ➢ Digital marketing ➢ Branding - Business name, logo, tag line ➢ Promotion strategy ➢ Business Plan Preparation ➢ Social Entrepreneurship as Problem ➢ Solving - Concept and Importance ➢ Risk Taking-Concept ➢ Types of business risks ➢ Execution of Business Plan	11

Reference 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
7. M N Arora, A Textbook of Cost and Management Accounting, Vikas Publishing House Pvt. Ltd., New Delhi-110044
8. Prasanna Chandra, Financial Management, Tata McGraw Hill Education Private Limited,New Delhi
9. I. V. Trivedi, Renu Jatana, Indian Banking System, RBSA Publishers, Rajasthan Simon Daniel, HOW TO START A BUSINESS IN INDIA, BUUKS, Chennai – 600018.
10. Ramani Sarada, The Business Plan Write-Up Simplified - A practitioners guide to writing the Business Plan, Notion Press Media Pvt. Ltd., Chennai 600095.

AUTONOMOUS EXAMINATION – EVALUATION PATTERN

INTERNAL MARK ALLOCATION	
Assignment (Theory portion)*	10
Seminar Presentation	10
Attendance	5
Total	25

Note: *Two assignments should be submitted. The same must be evaluated and converted to 10 marks.

Guidelines for Assignment

First assignment ... Unit I

Second assignment ... Unit II

Guidelines for Seminar Presentation ... Unit III

Each assignment should have five three marks questions and two five marks questions.

BOARD EXAMINATION

Note:

1. The students should be taught all units and proper exposure and field visit also arranged. All the portions should be completed before examinations.
2. The students should maintain theory assignment and seminar presentation. The assignment and seminar presentation should be submitted during the Board Practical Examinations.
3. The question paper consists of theory and practical portions. All students should write the answers for theory questions (40 Marks) and practical portions (60 Marks) should be completed for board examinations.
4. All exercises should be given in the question paper and students are allowed to select by lot. If required the dimensions of the exercises may be varied for every batch. No fixed time allotted for each portion and students have liberty to do the examination for 3Hrs.
5. For Written Examination: Theory Question and Answer: 45 Marks
   Ten questions will be asked for 3 marks each.
   Five questions from each unit 1 & 2. (10 X 3 = 30).
   Three questions will be asked for 5 marks each.
   One question from each unit 1, 2 & 3. (3 X 5 = 15)
6. For Practical Examination: The business plan/Feasibility report or Report on Unit 4 & 5 should be submitted during the board practical examinations. The same have to be evaluated for the report submission (40 marks).

DETAILED ALLOCATION OF MARKS

Sl. No	Description	Marks
Part A	Written Examination - Theory Question and answer (10 questions x 3 marks: 30 marks & (3 questions x 5 marks: 15 marks)	45
Part B	Practical Examination – Submission on Business Plan/Feasibility Report or Report on Unit 4 & 5	40
Part C	Viva voce	15
	Total	100

DIPLOMA IN ENGINEERING AND TECHNOLOGY

6

DEPARTMENT OF INSTRUMENTATION AND CONTROL ENGINEERING

III YEAR

F – SCHEME

V - TERM

IMPLEMENTED FROM 2020 – 2021

6F5213 - INDUSTRIAL INSTRUMENTATION – II PRACTICAL

SESHASAYEE INSTITUTE OF TECHNOLOGY
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TIRUCHIRAPPALLI – 620 010.

ANNEXURE- II

SESHASAYEE INSTITUTE OF TECHNOLOGY (Autonomous), TRICHY-10

6: DIPLOMA IN INSTRUMENTATION AND CONTROL ENGINEERING

SYLLABUS

F-SCHEME

(To be implemented for the students admitted from the year 2020-21 onwards)

Programme Name : 6 - Diploma In Instrumentation and Control Engineering

Course Code : 6F5213

Term : V

Course Name : Industrial Instrumentation – II Practical

TEACHING AND SCHEME OF EXAMINATION

No of weeks per semester: 16 weeks

Subject	Instructions		Examination			
			Marks			Duration
	Hours / Week	Hours / Semester	Internal Assessment	Board Examinations	Total	
6F5213	4	64	25	100*	100	3 Hrs.

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

RATIONALE:

Practical in Industrial Instrumentation is essential course for Instrumentation & Control Engineering. This subject gives exposure to students to familiarize and use various sensors and transducers used in industries. The coverage of syllabus is made in such a way that the students will get deep knowledge of handling Instruments used for different process parameters.

OBJECTIVES:

After the completion of this laboratory, the student should be able to

- Understand the concept and working of level transmitter.
- Handle rotameter, venturi meter and Orifice meter for flow measurement.
- Handle instruments to measure speed, humidity.
- Handle level measuring instruments.

Course Outcome

On successful completion of the course, the students will be able to attain below Course Outcome (CO):

CO	Details	BTL	Linked PO
6F5213 **-CO1**	Ability to choose the Flow sensor based on Flow Characteristics	**L5 (E)**	
6F5213 **-CO2**	Ability to choose the Level sensor based on Measuring situation	**L5 (E)**	
6F5213 **-CO3**	Ability to measure the Speed and velocity	**L5 (E)**	
6F5213 **-CO4**	Ability to measure the Humidity	**L5 (E)**	
6F5213 **-CO5**	Ability to understand the concept of Fiber Optics sensor	**L2 (U)**	

Legends: R = Remember U= Understand; A= Apply and above levels (BTL-Bloom's revised taxonomy Level)

Mapping Course Outcomes (CO) - Program Outcomes (PO)

CO	Program Outcomes (PO)							Program Specific Outcomes (PSO)	
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2
6F5213 **- CO1**	3	3	2	3	-	-	-	-	-
6F5213 **- CO2**	3	3	2	3	-	-	-	-	-
6F5213 **- CO3**	3	3	2	3	-	-	-	-	-
6F5213 **- CO4**	3	3	2	3	-	-	-	-	-
6F5213 **- CO5**	2	2	1	2	-	-	-	-	-
TOTAL	14	14	9	14	-	-	-	-	-
No. of COs Mapping with POs	5	5	5	5	-	-	-	-	-
Average	2.8	2.8	1.8	2.8	-	-	-	-	-
Round off(Average)	3	3	2	3	-	-	-	-	-

Correlation

Strong – S / 3	Medium – M /2	Weak – W / 1

INDUSTRIAL INSTRUMENTATION – II PRACTICAL

LIST OF EXPERIMENTS

1. Measurement of flow using Venturi meter.
2. Measurement of flow using orifice meter.
3. Measurement of flow using Rotameter.
4. Measurement of level using level transmitter.
5. Measurement of speed using proximity pickup.
6. Measurement of flow using electromagnetic flow meter
7. Measurement of humidity
8. Measurement of level using capacitive level transducer.
9. Measurement of level using Resistive level transducer.
10. Measurement of level using Ultrasonic sensor.
11. Safety light barrier using Fiber Optics sensor
12. Measurement of vibration using vibration sensor

DETAILLED ALLOCATION OF MARKS

SCHEME OF VALUATION		
SL.NO	**DESCRIPTION**	**MARKS**
1.	Circuit Diagram	30
2.	Connections	30
3.	Reading & Graph	20
4.	Result	10
5.	Viva	10
6.	TOTAL	100

LIST OF EQUIPMENTS

Sl. No	Name of the Equipments	Range	Required Nos.
1.	DC Regulated power supply	0-30V,1A	6
2.	Dual trace CRO	20MHz/30MHz	1
3.	DC Voltmeter(Analog)	Different Range	6
4.	DC Ammeter(Analog)	Different Range	6
5.	Venturi meter		1
6.	orifice meter		1
7.	Rotameter		1
8.	level transmitter		1
9.	Proximity Sensor		1
10.	electromagnetic flow meter		1
11.	Humidity Sensor		1
12.	capacitive level transducer		1
13.	Resistive level transducer		1
14.	Ultrasonic sensor		1
15.	Fiber Optics sensor		1
16.	vibration sensor		1
17.	Digital panel meter		7

DIPLOMA IN ENGINEERING AND TECHNOLOGY

6

DEPARTMENT OF INSTRUMENTATION AND CONTROL ENGINEERING

III YEAR

F – SCHEME

V - TERM

IMPLEMENTED FROM 2020 – 2021

6F5214 - PROCESS CONTROL PRACTICAL

SESHASAYEE INSTITUTE OF TECHNOLOGY
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ANNEXURE- II

SESHASAYEE INSTITUTE OF TECHNOLOGY (Autonomous), TRICHY-10

6: DIPLOMA IN INSTRUMENTATION AND CONTROL ENGINEERING

SYLLABUS

F-SCHEME

(To be implemented for the students admitted from the year 2020-21 onwards)

Programme Name : 6 - Diploma In Instrumentation and Control Engineering

Course Code : 6F5214

Term : V

Course Name : Process Control Practical

TEACHING AND SCHEME OF EXAMINATION

No of weeks per semester: 16 weeks

Subject	Instructions		Examination			
			Marks			Duration
	Hours / Week	Hours / Semester	Internal Assessmen	Board Examination	Total	
6F5214	4	64	25	100*	100	3 Hrs.

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

RATIONALE:

Study of Process Control Lab is an essential for Instrumentation & Control Engineering. It is a core subject that gives knowledge about the control algorithms, strategies and techniques used in Process industries. It prepares the students to familiarize with characteristics of different control actions. It also gives hands-on training on MATLAB.

OBJECTIVES:

- Experimentally verify the process control concepts on the selected process control loops.
- Impart theoretical and practical skills in process identification and controller tuning.
- To make the students to design and construct electronic ON/OFF IP and PI controller
- Make the students understanding the working of pressure to current converter and current to pressure converter.

- ❖ Familiarize with the characteristics of control valve.

Course Outcome

On successful completion of the course, the students will be able to attain below Course Outcome (CO):

CO	Details	BTL	Linked PO
6F5214 **-CO1**	Ability to design and construct the electronic, P and PI controllers.	**L6 (D)**	
6F5214 **-CO2**	Ability to practice with the controller tuning using MATLAB.	**L3 (AP)**	
6F5214 **-CO3**	Ability to understand the working of P-I and I-P converter.	**L2 (U)**	
6F5214 **-CO4**	Get exposed to the characteristics of control valve.	**L2 (U)**	
6F5214 **-CO5**	Ability to practice with the P&ID drawing using E-Draw software.	**L3 (AP)**	

Legends: R = Remember U= Understand; A= Apply and above levels (BTL-Bloom's revised taxonomy Level)

Mapping Course Outcomes (CO) - Program Outcomes (PO)

CO	Program Outcomes (PO)							Program Specific Outcomes (PSO)	
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2
6F5214 **- CO1**	3	3	3	3	-	-	-	-	-
6F5214 **- CO2**	3	2	1	3	-	-	-	-	-
6F5214 **- CO3**	2	2	1	2	-	-	-	-	-
6F5214 **- CO4**	2	2	1	2	-	-	-	-	-
6F5214 **- CO5**	3	2	1	3	-	-	-	-	-
TOTAL	13	11	7	13	-	-	-	-	-
No. of COs Mapping with POs	5	5	5	5	-	-	-	-	-
Average	2.6	2.2	1.4	2.6	-	-	-	-	-
Round off(Average)	3	2	1	3	-	-	-	-	-
Correlation									
Strong – S / 3		**Medium – M /2**				**Weak – W / 1**			

PROCESS CONTROL PRACTICAL

LIST OF EXPERIMENTS

1. Step response of Resistance Temperature Detector.
2. Study and verify the characteristics of ON-OFF, P, PI, PID controllers using temperature process trainer.
3. Design and Construction of electronic Proportional controllers.
4. Design and Construction of electronic PI controllers.
5. Design and Construction of Annunciator Circuit.
6. Characteristics of Flapper nozzle system
7. Characteristics of Current to Pressure Converter
8. Characteristics of Pressure to Current Converter
9. Characteristics of control valve
10. Z-N, Cohen coon method of controller (P, PI, PID) tuning using MATLAB.
11. Draw the P&I diagram of Feedback, Feed forward control system
12. Draw the P&I diagram of cascade control system (level) and ratio control system.

DETAILLED ALLOCATION OF MARKS

SCHEME OF VALUATION		
SL.NO	**DESCRIPTION**	**MARKS**
1	Circuit Diagram	30
2	Connections	30
3	Reading & Graph	20
4	Result	10
5	Viva	10
6	TOTAL	100

LIST OF EQUIPMENTS

Sl. No	Name of the Equipments	Range	Required Nos.
1	DC Regulated power supply	0-30V,1A	6
2	Signal Generator	2 MHz	1
3	Dual trace CRO	20MHz/30MHz	1
4	DC Voltmeter(Analog)	Different Range	6
5	DC Ammeter(Analog)	Different Range	6
6	Annunciator Circuit		
7	Flapper nozzle system		
8	Current to Pressure Converter Kit		
9	Pressure to Current Converter Kit		
10	control valve setup		
11	Temperature process trainer kit.		

DIPLOMA IN ENGINEERING AND TECHNOLOGY

6

DEPARTMENT OF INSTRUMENTATION AND CONTROL ENGINEERING

III YEAR

F – SCHEME

V - TERM

IMPLEMENTED FROM 2020 – 2021

6F5403.1 - C PROGRAMMING PRACTICAL

SESHASAYEE INSTITUTE OF TECHNOLOGY
(Autonomous)
TIRUCHIRAPPALLI – 620 010.

ANNEXURE- II

SESHASAYEE INSTITUTE OF TECHNOLOGY (Autonomous), TRICHY-10

6: DIPLOMA IN INSTRUMENTATION AND CONTROL ENGINEERING

SYLLABUS

F-SCHEME

(To be implemented for the students admitted from the year 2020-21 onwards)

Programme Name : 6 - Diploma In Instrumentation and Control Engineering

Course Code : 6F5403.1

Term : V

Course Name : C Programming Practical

TEACHING AND SCHEME OF EXAMINATION

No of weeks per semester: 16 weeks

Subject	Instructions		Examination			
			Marks			Duration
	Hours / Week	Hours / Semester	Internal Assessment	Board Examinations	Total	
6F5403.1	4	64	25	100*	100	3 Hrs.

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

RATIONALE:

This subject is a fundamental for the student to learn how to write a program in high level language. So it will be useful for Instrumentation and control engineers to write coding and to develop the software. Further practice for writing simple program for instrumentation application is insisted.

OBJECTIVES:

At the end of the Course, the students will be 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 different looping and branching statements.
- Write programs based on arrays.
- Write programs using the concept of Pointers.
- Write programs for solving simple equations used in circuit theory.

Course Outcome

On successful completion of the course, the students will be able to attain below Course Outcome (CO):

CO	Details	BTL	Linked PO
6F5403.1 **-CO1**	Calculate the sum and average ,Quotient and remainder of given numbers	L3 (AP)	
6F5403.1 **-CO2**	Write the program to read student name , Reg no, to read 5 marks using loops and to read percentage of a student and award the class	L6 (C)	
6F5403.1 **-CO3**	Write the program to create a student record, to read two values and add using functions	L6 (C)	
6F5403.1 **-CO4**	Write the program using Unions and Strings	L6 (C)	
6F5403.1 **-CO5**	Write the program using File	L6 (C)	

Legends: R = Remember U= Understand; A= Apply and above levels (BTL-Bloom's revised taxonomy Level)

Mapping Course Outcomes (CO) - Program Outcomes (PO)

CO	Program Outcomes (PO)							Program Specific Outcomes (PSO)	
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2
6F5403.1 **- CO1**	3	2	1	3	-	-	-	-	-
6F5403.1 **- CO2**	3	3	3	3	-	-	-	-	-
6F5403.1 **- CO3**	3	3	3	3	-	-	-	-	-
6F5403.1 **- CO4**	3	3	3	3	-	-	-	-	-
6F5403.1 **- CO5**	3	3	3	3	-	-	-	-	-
TOTAL	15	14	13	15	-	-	-	-	-
No. of COs Mapping with POs	5	5	5	5	-	-	-	-	-
Average	3	2.8	2.6	3	-	-	-	-	-
Round off(Average)	3	3	3	3	-	-	-	-	-

Correlation		
Strong – S / 3	**Medium – M /2**	**Weak – W / 1**

C PROGRAMMING PRACTICAL

LIST OF EXPERIMENTS

1. Write a Program to calculate and display the volume of a CUBE having its height (h=10cm), width (w=12cm) and depth (8cm).
2. Write a C program to perform addition, subtraction, division and multiplication of two numbers.
3. Write a program to take input of name, roll no and marks obtained by a student in 4 subjects of 100 marks each and display the name, roll no with percentage score secured.
4. Write a program to print whether a given number is even or odd.
5. Write a program to display the following pattern.

```
    *
   * *
  * * *
 * * * *
* * * * *
```

6. Write a program to compute grade of students using if else adder. The grades are assigned as followed:
   a. Marks Grade
   b. marks<50 F
   c. 50≤marks< 60 C
   d. 60≤marks<70 B
   e. 70≤marks<80 B+
   f. 80≤marks<90 A
   g. 90≤mars≤ 100 A+
7. Write a program to calculate factorial of a number using recursion.
8. Write a C program to create, declare and initialize structure.
9. Write a program to store information of 5 students in structure and display it.
10. Write a program to insert 5 elements into an array and print the elements of the array.
11. Write a Program to find the largest and smallest element in Array.
12. Write a program to find biggest among three numbers using pointer.

13. Write a program to create a file called emp.rec and store information about a person, in terms of his name, age and salary.
14. Write a Program to draw a circle and rectangle.
15. Write a Program to draw a OP-AMP using graphics function.

DETAILLED ALLOCATION OF MARKS

SCHEME OF VALUATION		
SL.NO	**DESCRIPTION**	**MARKS**
1	Writing Steps	40
2	Execution of Exercise	30
3	Result with Printout	20
4	Viva	10
5	Total	100

LIST OF EQUIPMENTS

SOFTWARE REQUIRMENTS:

1	Operating System	Windows XP or Windows Vista
2	Software Package	Turbo7

HARDWARE REQUIRMENTS:

1	Desktop Computer System	30 Nos.
2	Power Backup	10KVA
3	Laser Printer	2 Nos

DIPLOMA IN ENGINEERING AND TECHNOLOGY

6

DEPARTMENT OF INSTRUMENTATION AND CONTROL ENGINEERING

III YEAR

F – SCHEME

V - TERM

IMPLEMENTED FROM 2020 – 2021

6F5403.2 - VLSI PRACTICAL

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ANNEXURE- II

SESHASAYEE INSTITUTE OF TECHNOLOGY (Autonomous), TRICHY-10

6: DIPLOMA IN INSTRUMENTATION AND CONTROL ENGINEERING

SYLLABUS

F-SCHEME

(To be implemented for the students admitted from the year 2020-21 onwards)

Programme Name : 6 - Diploma In Instrumentation and Control Engineering

Course Code : 6F5403.2

Term : V

Course Name : VLSI Practical

TEACHING AND SCHEME OF EXAMINATION

No of weeks per semester: 16 weeks

Subject	Instructions		Examination			
			Marks			Duration
	Hours / Week	Hours / Semester	Internal Assessment	Board Examinations	Total	
6F5403.2	4	64	25	100*	100	3 Hrs.

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

RATIONALE:

VHDL is a versatile and powerful hardware description language which is useful for modelling digital systems at various levels of design abstraction. This language is mainly for describing the hardware. Execution of a VHDL program results in a simulation of the digital system allows us to validate the design prior to fabrication of Digital Integrated circuit. This practical will enable the students to have hands on experience in using FPGA kit. The students are exposed to do programming in VHDL.

OBJECTIVES:

The students will be able to

- Understand the use of VHDL statements by writing program in VHDL.
- Develop a VHDL code for any digital circuits.
- Understand the concepts of digital circuits / logic function by simulating VHDL programs through XILINX software.
- Understand the concepts of digital circuits by using FPGA kit.

- To know the usage of input switches, output LEDs and seven segment display in FPGA kit.

Course Outcome

On successful completion of the course, the students will be able to attain below Course Outcome (CO):

CO	Details	BTL	Linked PO
6F5403.2-**CO1**	Able to simulate combinational and sequential logic gates	**L2 (U)**	
6F5403.2-**CO2**	Able to simulate data processing circuits	**L2 (U)**	
6F5403.2-**CO3**	Able to write code for encoder and decoder	**L3(AP)**	
6F5403.2-**CO4**	Able to write code for counter	**L3(AP)**	
6F5403.2-**CO5**	Able to write code for shift register	**L3(AP)**	

Legends: R = Remember U= Understand; A= Apply and above levels (BTL-Bloom's revised taxonomy Level)

Mapping Course Outcomes (CO) - Program Outcomes (PO)

CO	Program Outcomes (PO)							Program Specific Outcomes (PSO)	
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2
6F5403.2 **- CO1**	2	2	1	2	-	-	-	-	-
6F5403.2 **- CO2**	2	2	1	2	-	-	-	-	-
6F5403.2 **- CO3**	3	2	1	3	-	-	-	-	-
6F5403.2 **- CO4**	3	2	1	3	-	-	-	-	-
6F5403.2 **- CO5**	3	2	1	3	-	-	-	-	-
TOTAL	13	10	5	13	-	-	-	-	-
No. of COs Mapping with POs	5	5	5	5	-	-	-	-	-
Average	2.6	2	1	2.6	-	-	-	-	-
Round off(Average)	3	2	1	3	-	-	-	-	-

Correlation

Strong – S / 3	Medium – M /2	Weak – W / 1

VLSI PRACTICAL

LIST OF EXPERIMENTS

NOTE: Behavioral or structural model can be used for all experiments

1. SIMULATION OF VHDL CODE FOR LOGIC GATES (AND GATE,OR GATE)
   Develop code for logic gates. Simulate the code in the software.
2. SIMULATION OF VHDL CODE FOR COMBINATIONAL FUNCTION
   Optimize a 4 variable combinational function (SOP), describe it in VHDL code and simulate it. Example: F=(0,1,4,5,8,9,12) in sop
3. SIMULATION OF VHDL CODE FOR HALF ADDER AND FULL ADDER
   Develop code for half adder and full adder. Simulate the code in the software.
4. SIMULATION OF VHDL CODE FOR HALF SUBTRACTOR AND FULL SUBTRACTOR
   Develop code for half subtractor and full subtractor. Simulate the code in the software.
5. SIMULATION OF VHDL CODE FOR SINGLE BIT DIGITAL COMPARATOR
   Develop Boolean expression for A>B, A=B, A
6. VHDL IMPLEMENTATION OF 8 TO 1 MULTIPLEXER
   Develop the code for a 8 to 1 multiplexer and implement it in FPGA kit in which switches are connected for select inputs and for data inputs, a LED is connected to the output.
7. VHDL CODE FOR JK FLIP FLOP (SIMULATION / IMPLEMENTATION)
   Develop the code for JK flip flop and simulate using software or implement it in FPGA kit.
8. VHDL IMPLEMENTATION OF 1 TO 8 DEMULTIPLEXER
   Develop the code for a 1 t0 8 De multiplexer and implement it in FPGA kit in which Switches are connected for select inputs and a data input, Eight LEDs are connected to the output of the circuit.
9. VHDL IMPLEMENTATION OF 7 SEGMENT DECODER – BOOLEAN EXPRESSION
   Develop Boolean expression for 4 input variables and 7 output variables. Develop a seven segment decoder in VHDL for 7 equations. A seven segment display is connected to the output of the circuit. Four switches are connected to the input. The 4 bit input is decoded to 7 segment equivalent.
10. VHDL IMPLEMENTATION OF 7 SEGMENT DISPLAY - WITH COUNTER
    Design and develop a seven segment decoder in VHDL. Design and develop a 4 bit BCD counter, the output of the counter is given to seven segment

decoder. A seven segment display is connected to the output of the decoder. The displayshows0,1, 2..9 for every one second

11. VHDL IMPLEMENTATION OF 8 TO 3 ENCODER

    Develop code for 8 to 3 encoder. There will be 8 switches and 3 LEDs in the FPGA kit.

    The input given from switches and it is noted that any one of the switch is active.

    The binary equivalent for the corresponding inputs witch will be glowing in the LED as output.

12. VHDL IMPLEMENTATION OF 2 TO 4 DECODER

    Develop code for 2 to 4 decoder and implement it in FPGA kit in which 2 Switches are connected for inputs, four LEDs for output.

13. VHDL IMPLEMENTATION FOR BLINKING A LED

    Develop a VHDL Code for delay .Delay is adjusted in such a way that LED blinks for every 1 or 2seconds.

14. VHDL IMPLEMENTATION FOR BLINKING AN ARRAY OF LEDS

    Design and develop a VHDL Code for 4 bit binary up counter. Four LEDs are connected at the output of the counter. The counter should up for every one seconds.

15. VHDL IMPLEMENTATION OF A SPELLER WITH AN ARRAY OF LEDS

    Design and develop VHDL Code for a 5 bit Johnson ring counter 4 bit. The LEDs are connected at the output of the counter. The speller should work for every one seconds.

DETAILLED ALLOCATION OF MARKS

SCHEME OF VALUATION		
SL.NO	**DESCRIPTION**	**MARKS**
1	Algorithm or flowchart	30
2	Program	30
3	Execution	25
4	Result	10
5	Viva	5
6	TOTAL	100

LIST OF EQUIPMENTS

1. FPGA KIT with atleast 10 switches for input, 8 LEDs for output, a 7 segmentdisplay, debounced push switch (2 Nos) for manual clock input and external clocksource–10Nos with software.

DIPLOMA IN ENGINEERING AND TECHNOLOGY

6

DEPARTMENT OF INSTRUMENTATION AND CONTROL ENGINEERING

III YEAR

F – SCHEME

V - TERM

IMPLEMENTED FROM 2020 – 2021

6F5403.3 - EMBEDDED SYSTEMS PRACTICAL

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ANNEXURE- II

SESHASAYEE INSTITUTE OF TECHNOLOGY (Autonomous), TRICHY-10

6: DIPLOMA IN INSTRUMENTATION AND CONTROL ENGINEERING

SYLLABUS

F-SCHEME

(To be implemented for the students admitted from the year 2020-21 onwards)

Programme Name : 6 - Diploma In Instrumentation and Control Engineering

Course Code : 6F5403.3

Term : V

Course Name : Embedded Systems Practical

TEACHING AND SCHEME OF EXAMINATION

No of weeks per semester: 16 weeks

Subject	Instructions		Examination			
			Marks			Duration
	Hours / Week	Hours / Semester	Internal Assessment	Board Examinations	Total	
6F5403.3	4	64	25	100*	100	3 Hrs.

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

RATIONALE:

The introduction of this subject will enable the students to have hands on experience in using ARM Based trainer kit. The students are exposed to use the on chip peripherals using embedded C language. They can also get familiar with the use of ARM instruction set. They are learning the different methods for providing time delay and u se of serial communication. 32 bit ARM is a RISC processor which makes the students to expose to the new dimension in the field of embedded systems.

OBJECTIVES:

The students are able to

- Understand the use of instruction set by writing simple ARM ALP and simulate to see output.

- ❖ Know the application details of on chip peripherals.
- ❖ Familiarize with the register map of on chip Timer / counter.
- ❖ Know the use of serial communication concepts using on chip UART0.
- ❖ Understand the use of GPIO and the connection of peripheral devices using these on chip GPIO programmable port Pins.
- ❖ Use the interrupts with the help of VIC.
- ❖ Get used with pin connect block registers for programming the GPIO port pins.
- ❖ Interface stepper motor and its operation.
- ❖ Understand the multiplexing of seven segment LED display device.

Course Outcome

On successful completion of the course, the students will be able to attain below Course Outcome (CO):

CO	Details	BTL	Linked PO
6F5403.3-**CO1**	Able to write code for basic arithmetic operations	L2	
6F5403.3-**CO2**	Able to write code for LED interfacing	L3	
6F5403.3-**CO3**	Able to write code for counters and timers	L3	
6F5403.3-**CO4**	Able to write code for polling methods	L3	
6F5403.3-**CO5**	Able to write code for interrupts	L3	

Legends: R = Remember U= Understand; A= Apply and above levels (BTL-Bloom's revised taxonomy Level)

Mapping Course Outcomes (CO) - Program Outcomes (PO)

CO	Program Outcomes (PO)							Program Specific Outcomes (PSO)	
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2
6F5403.3 **- CO1**	2	2	1	2	-	-	-	-	-
6F5403.3 **- CO2**	3	2	1	3	-	-	-	-	-
6F5403.3 **- CO3**	3	2	1	3	-	-	-	-	-
6F5403.3 **- CO4**	3	2	1	3	-	-	-	-	-
6F5403.3 **- CO5**	3	2	1	3	-	-	-	-	-
TOTAL	14	10	5	14	-	-	-	-	-
No. of COs Mapping with POs	5	5	5	5	-	-	-	-	-
Average	2.8	2	1	2.8	-	-	-	-	-
Round off(Average)	3	2	1	3	-	-	-	-	-

Correlation		
Strong – S / 3	**Medium – M /2**	**Weak – W / 1**

EMBEDDED SYSTEMS PRACTICAL

LIST OF EXPERIMENTS

1. Study of ARM Processor kit.(Example LPC 2148 kit)
2. Write assembly language program for addition, subtraction and multiplication and simulate.
3. Write and execute C program to blink the LEDs using software delay routine.
4. Write and execute C program to blink the LEDs using on chip TIMER// COUNTER for the delay(Using Polling method).
5. Write and execute C program to blink the LEDs using on chip TIMER// COUNTER for the delay(Using interrupt method).
6. Write and execute C program to read the switch and display in the LEDs.

7. Write and execute C program to count external interrupt pulses EINTx (using VIC) and Show the binary count value in LEDs.
8. Write and execute C program to display a number in seven segment LED.
9. Write and execute C program for serial transmission and reception using on chip UART. Send the received character back to the PC by Polling method.
10. Write and execute C program for serial transmission and reception using on chip UART. Send the received character back to the PC by Interrupt method.
11. Write and execute C program for accessing an internal ADC and display the binary output in LEDs.
12. Write and execute C program to generate square wave using on chip DAC.

DETAILLED ALLOCATION OF MARKS

SCHEME OF VALUATION		
SL.NO	**DESCRIPTION**	**MARKS**
1	Algorithm or flowchart	20
2	Program	30
3	Execution	30
4	Result	10
5	Viva	10
6	TOTAL	100

LIST OF EQUIPMENTS

1. ARM7 TDMI KIT – 15 numbers with interface boards for the above experiments. The chip set may be TMS4701, LPC2138, LPC2148 or STR7 etc.
2. Desktop computer / Laptop -15 Nos
3. Interfaces : Seven segment display. LEDS , switches and stepper motor .
4. Manual for the trainer kit and Interfaces.
5. Manual for the built in function for the board.
6. Bit details of registers of on chip peripherals.

DIPLOMA IN ENGINEERING AND TECHNOLOGY

6

DEPARTMENT OF INSTRUMENTATION AND CONTROL ENGINEERING

III YEAR

F – SCHEME

V - TERM

IMPLEMENTED FROM 2020 – 2021

6F0006 - UNIVERSAL HUMAN VALUES

SESHASAYEE INSTITUTE OF TECHNOLOGY
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ANNEXURE- II

SESHASAYEE INSTITUTE OF TECHNOLOGY (Autonomous), TRICHY-10

6: DIPLOMA IN INSTRUMENTATION AND CONTROL ENGINEERING

SYLLABUS

F-SCHEME

(To be implemented for the students admitted from the year 2020-21 onwards)

Programme Name : 6 - Diploma In Instrumentation and Control Engineering

Course Code : 6F5403.3

Term : V

Course Name : Universal Human Values

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	
6F0006	5	80	25	100*	100	3 Hrs.

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

OBJECTIVES:

1. To help students distinguish between values and skills, and understand the need, basic guidelines, content and process of value education.
2. To help students initiate a process of dialog within themselves to know what they 'really want to be' in their life and profession
3. To help students understand the meaning of happiness and prosperity for a Human being.
4. To understanding the moral values that ought to guide engineering profession or practice, resolving moral issues in engineering, and justifying the moral judgments in engineering.
5. To understand the concept of values, meaning of stress, various causes of stress and to manage stress.

Course Outcome

On successful completion of the course, the students will be able to attain below Course Outcome (CO):

CO	Details	BTL	Linked PO
6F5403.3-**CO1**	Understand the significance of value inputs in a classroom and start applying them in their life and profession.	**L2(U)**	
6F5403.3-**CO2**	Distinguish between values and skills, happiness and accumulation of physical facilities, the Self and the Body, Intention and Competence of an individual, etc.	**L2(U)**	
6F5403.3-**CO3**	Understand the value of harmonious relationship based on trust and respect in their life and Profession.	**L2(U)**	
6F5403.3-**CO4**	To facilitate the students in applying the understanding of harmony in existence in their profession and lead an ethical life.	**L3(AP)**	
6F5403.3-**CO5**	To understand the individual and organizational strategies to manage stress.	**L2(U)**	

Legends: R = Remember U= Understand; A= Apply and above levels (BTL-Bloom's revised taxonomy Level)

Mapping Course Outcomes (CO) - Program Outcomes (PO)

CO	Program Outcomes (PO)							Program Specific Outcomes (PSO)	
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2
6F5403.3 **- CO1**	2	2	1	2	-	-	-	-	-
6F5403.3 **- CO2**	2	2	1	2	-	-	-	-	-
6F5403.3 **- CO3**	2	2	1	2	-	-	-	-	-
6F5403.3 **- CO4**	3	2	1	3	-	-	-	-	-
6F5403.3 **- CO5**	2	2	1	2	-	-	-	-	-
TOTAL	11	10	5	11	-	-	-	-	-
No. of COs Mapping with POs	5	5	5	5	-	-	-	-	-
Average	2.2	2	1	2.2	-	-	-	-	-
Round off(Average)	2	2	1	2	-	-	-	-	-

Correlation		
Strong – S / 3	**Medium – M /2**	**Weak – W / 1**

DETAILED SYLLABUS

Contents: Universal Human Values

Unit	Name of the Topics	Hours
I	**COURSE INTRODUCTION - NEED, BASIC GUIDELINES, CONTENT AND PROCESS FOR VALUE EDUCATION** Purpose and motivation for the course, recapitulation from Universal Human Values-I - Self-Exploration – what is it? - Its content and process; 'Natural Acceptance' and Experiential Validation- as the process for self- exploration - Continuous Happiness and Prosperity- A look at basic Human Aspirations - Right understanding, Relationship and Physical Facility- the basic requirements for fulfilment of aspirations of every human being with their correct priority - Understanding Happiness and Prosperity correctly- A critical appraisal of the current scenario - Method to fulfil the above human aspirations: understanding and living in harmony at various levels.	12
II	**UNDERSTANDING HARMONY IN THE HUMAN BEING - HARMONY IN MYSELF** Understanding human being as a co-existence of the sentient 'I' and the material 'Body'- Understanding the needs of Self ('I') and 'Body' - happiness and physical facility-Understanding the Body as an instrument of 'I' (I being the doer, seer and enjoyer)- Understanding the characteristics and activities of 'I' and harmony in 'I'- Understanding the harmony of I with the Body: Sanyam and Health; correct appraisal of Physical needs, meaning of Prosperity in detail- Programs to ensure Sanyam and Health.	12
III	**UNDERSTANDING HARMONY IN THE FAMILY AND SOCIETY- HARMONY IN HUMAN - HUMAN RELATIONSHIP** Understanding values in human-human relationship; meaning of Justice (nine universal values in relationships) and program for its fulfilment to ensure mutual happiness; Trust and Respect as the foundational values of relationship- Understanding the meaning of Trust; Difference between intention and competence- Understanding the meaning of	11

	Respect, Difference between respect and differentiation; the other salient values in relationship-Understanding the harmony in the society (society being an extension of family): Resolution, Prosperity, fearlessness (trust) and co-existence as comprehensive Human Goals- Visualizing a universal harmonious order in society- Undivided Society, Universal Order- from family to world family.	
IV	**PERSONALITY DEVELOPMENT AND LEADERSHIP** Introduction- Personality- Character- Determinants of Personality and Character Development - Measures to Develop the Personality – Measures to Improve Character – leadership - leadership traits Senses of engineering -Variety of moral issues-Types of inquiries - Moral dilemma -Moral autonomy -Moral development (theories)- Consensus and controversy -Profession -Models of professional roles-Responsibility - Theories about right action (Ethical theories)- control -Self-interest – Customs -Religion -Self-respect -Case study: Choice of the theory	11
V	**STRESS MANAGEMENT** Characteristics of Values- Meaning- Sources of Value Formation: Social institutions, Organisation, Colleagues, Work Need of studying values, Need for Studying Values- Stress -Meaning and Definition- Nature of Stress- Stress Level and Its Impacts- Causes of Stress- Stress Management- Individual Approaches- Organizational Approaches.	11

ASSESSMENT:

- This is a compulsory credit course. The assessment is to provide a fair state of development of the student, so participation in classroom discussions, etc. will be used in evaluation.

Example:

- Assessment by faculty mentor: 10 marks
- Socially relevant project/Group Activities/Assignments: 15 marks
- Semester End Examination: 100 marks
- Question Pattern for End semester is 50 MCQ.

- ❖ Each question carries 2 points (10 MCQ's from Each Unit)
- ❖ The overall pass percentage is 40%.

Reference Books

1. Human Values, A.N. Tripathi, New Age Intl. Publishers, New Delhi, 2004.
2. The Story of Stuff (Book).
3. Small is Beautiful - E. F Schumacher.
4. Slow is Beautiful - Cecile Andrews
5. Economy of Permanence - J C Kumarappa
6. Bharat Mein Angreji Raj - PanditSunderlal
7. Rediscovering India - by Dharampal
8. Hind Swaraj or Indian Home Rule - by Mohandas K. Gandhi
9. India Wins Freedom - Maulana Abdul Kalam Azad
10. Vivekananda - Romain Rolland (English)
11. IES Master Institute of Engineering.

VI SEMESTER

DIPLOMA IN ENGINEERING AND TECHNOLOGY

6

DEPARTMENT OF INSTRUMENTATION AND CONTROL ENGINEERING

III YEAR

F – SCHEME

VI - TERM

IMPLEMENTED FROM 2020 – 2021

6F6215 - INDUSTRIAL AUTOMATION

SESHASAYEE INSTITUTE OF TECHNOLOGY
(Autonomous)
TIRUCHIRAPPALLI – 620 010.

ANNEXURE- II

SESHASAYEE INSTITUTE OF TECHNOLOGY (Autonomous), TRICHY-10

6: DIPLOMA IN INSTRUMENTATION AND CONTROL ENGINEERING SYLLABUS

F-SCHEME

(To be implemented for the students admitted from the year 2020-21 onwards)

Programme Name : 6 - Diploma In Instrumentation and Control Engineering

Course Code : 6F6215

Term : VI

Course Name : Industrial Automation

TEACHING AND SCHEME OF EXAMINATION

No of weeks per semester: 16 weeks

Subject	Instructions		Examination			
			Marks			Duration
	Hours / Week	Hours / Semester	Internal Assessmen	Board Examination	Total	
6F6215	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	Electrical Drives	13
II	Pneumatic and Hydraulic Drives	15
III	PLC & Communication Protocols	15
IV	DCS & SCADA	15
V	Industrial IOT Introduction	15
Test & Model Exam		7
Total		**80**

RATIONALE:

As Automation plays the vital role in process industries, manufacturing sectors, it is Essential for an Instrumentation and control engineer to understand the practical aspects Of Automation. In most of the automation process double acting and single acting cylinders plays the role of actuating element. Hence in this subject it is dealt practically.

OBJECTIVES:

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

- Know the operation of single and double acting cylinder
- Know the operation of Hydraulic motor
- Control DC motor using SCR
- Know about distributed control system
- Understand the detailed hardware of PLC and its parts
- Understand the working of PLC and scan cycle
- Understand the ladder logic programming of PLC
- Develop simple ladder programs

Course Outcome

On successful completion of the course, the students will be able to attain below Course Outcome (CO):

Course outcome		BTL	Linked PO
6F6215-**CO1**	Ability to summarize various industrial drives	**L2(U)**	
6F6215-**CO2**	Ability to understand Pneumatic and Hydraulic drives and systems	**L2(U)**	
6F6215-**CO3**	Ability to understand the basics PLC systems and its applications	**L2(U)**	
6F6215-**CO4**	Ability to understand the basics of DCS its applications	**L2(U)**	
6F6215-**CO5**	Ability to understand basics of SCADA its applications	**L2(U)**	

Legends: R = Remember U= Understand; A= Apply and above levels (BTL-Bloom's revised taxonomy Level)

Mapping Course Outcomes (CO) - Program Outcomes (PO)

CO	Program Outcomes (PO)							Program Specific Outcomes (PSO)	
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2
6F6215-**CO1**	2	2	1	2	-	-	-	-	-
6F6215-**CO2**	2	2	1	2	-	-	-	-	-
6F6215-**CO3**	2	2	1	2	-	-	-	-	-
6F6215-**CO4**	2	2	1	2	-	-	-	-	-
6F6215-**CO5**	2	2	1	2	-	-	-	-	-
TOTAL	10	10	5	10	-	-	-	-	-
No. of COs Mapping with POs	5	5	5	5	-	-	-	-	-
Average	2	2	1	2	-	-	-	-	-
Round off(Average)	2	2	1	2	-	-	-	-	-
Correlation									
Strong – S / 3			**Medium – M /2**				**Weak – W / 1**		

DETAILED SYLLABUS

Contents: Industrial Automation Theory

Unit	Name of the Topics	Hours
I	**ELECTRICAL DRIVES** 1.1 Industrial Electrical Drives: Definition, Parts and Types of Electric Motor, Stepper Motor, Hybrid Motor, Servo Motor, Brushless Motor with selection and Application for various industries	13
II	**PNEUMATIC AND HYDRAULIC DRIVES** 2.1 Pneumatic Systems and Drives: Definition, Types and Elements of Pneumatic System, Power Supply and Accumulator, Filter Regulator and Lubricator(FRL), Pressure Control Valve, Pressure Relief Valve, Direction Control Valve, Memory Valve, SA Cylinder, DA Cylinder,	15

	Poppet and Spool Valve with selection and Application in various industries 2.2 Hydraulic Systems and Drives : Definition, Types and Elements of Hydraulic System, Power Supply and Accumulator, FRL, Pressure Control Valve, Pressure Relief Valve, Direction Control Valve, Memory Valve, SA Cylinder, DA Cylinder, Poppet and Spool with selection and Application in various industries	
III	**PLC & COMMUNICATION PROTOCOLS** 3.1 PLC and Interfacing: Definition, Types and Architecture and Types and Comparison. Hard Wired Logic Relays, 3.2 RLL and Symbols, Logic Function, Timers, Counters and Special functions. List of PLC Manufacturers with selection and Application in various industries, 4 applications 3.3 Communication Protocols	15
IV	**DCS & SCADA** 4.1 Distributed Control Systems : Evaluation of DCS, (Basics and block diagram only) Functional elements of DCS, Operator Interfaces, Engineering Interfaces, Architecture of Commercial DCS, Advantages of DCS, Selection of DCS, List of DCS Manufacturers with selection and Application in various industries 4.2 SCADA: Evaluation of SCADA, (Basics and block diagram only) Functional elements of SCADA, Operator Interfaces, Engineering Interfaces, Architecture of Commercial SCADA, Advantages of SCADA, Selection of SCADA, List of SCADA Manufacturers with selection and Application in various industries	15
V	**INDUSTRIAL IOT INTRODUCTION** 5.1 Introduction to IOT, What is IIOT? IOT Vs. IIOT, History of IIOT, Components of IIOT - Sensors, Interface, Networks, People &Process, Hype cycle, IOT Market, Trends& future Real life examples, Key terms – IOT Platform, Interfaces, API, clouds, Data Management Analytics, Mining &Manipulation; Role of IIOT in Manufacturing Processes Use of IIOT in plant maintenance practices, Sustainability through Business excellence tools Challenges & Benefits in implementing IIOT	15

Text Books :

1. Fundamentals of Electrical Drives, G.K.Dubey Narosa Publication 2002

Reference Books :

1. Hydraulic and pneumatic controls, R. srinivasan 2nd edition 2010 MC graw-hill education(india) pvt.ltd
2. Electric Motor Drives, M.S. Berde Khanna, publishers 2008
3. Programmable logic controllers with Applications, Pradheep kumar srivastava BPB publications 2004

DIPLOMA IN ENGINEERING AND TECHNOLOGY

6

DEPARTMENT OF INSTRUMENTATION AND CONTROL ENGINEERING

III YEAR

F – SCHEME

VI - TERM

IMPLEMENTED FROM 2020 – 2021

6F6305 - INDUSTRIAL ELECTRONICS

SESHASAYEE INSTITUTE OF TECHNOLOGY
(Autonomous)
TIRUCHIRAPPALLI – 620 010.

ANNEXURE- II

SESHASAYEE INSTITUTE OF TECHNOLOGY (Autonomous), TRICHY-10

6: DIPLOMA IN INSTRUMENTATION AND CONTROL ENGINEERING SYLLABUS

F-SCHEME

(To be implemented for the students admitted from the year 2020-21 onwards)

Programme Name : 6 - Diploma In Instrumentation and Control Engineering

Course Code : 6F6305

Term : VI

Course Name : Industrial Electronics

TEACHING AND SCHEME OF EXAMINATION

No of weeks per semester: 16 weeks

Subject	Instructions		Examination			
			Marks			Duration
	Hours / Week	Hours / Semester	Internal Assessmen	Board Examination	Total	
6F6305	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	Characteristics of Power Devices	15
II	Trigger Circuits and Commutations	14
III	Converters	15
IV	Inverters	15
V	Cyclo Converter and Chopper	14
Test & Model Exam		7
Total		**80**

RATIONALE:

This subject enables the students to know power devices and phase control circuits, converters, choppers, UPS, SMPS, CNC and Robotics. This will provide the student basic understanding of the principles of working of the power electronic equipment used in Industries.

OBJECTIVES:

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

- Understand the working principle of SCR ,MOSFET, IGBT,GTO,LASER
- Study the methods of triggering
- Learn about the operation of converters and its types.
- Understand the various types of commutation.
- Learn about the operation of choppers.
- Learn about the operation of inverters and types.
- Understand the concept of HVDC.
- Know about working principle of SMPS, UPS and its types.
- Understand the concept of HVDC.

Course Outcome

On successful completion of the course, the students will be able to attain below Course Outcome (CO):

Course outcome		BTL	Linked PO
6F6305-**CO1**	Ability to Explain the theory of Thyristor family devices	**L2 (U)**	
6F6305-**CO2**	Ability to Explain the concepts of triggering and Commutation methods	**L2 (U)**	
6F6305-**CO3**	Apply acquired knowledge , facts, techniques to controlled rectifiers	**L3 (AP)**	
6F6305-**CO4**	Apply acquired knowledge , facts, techniques to Inverters	**L3 (AP)**	
6F6305-**CO5**	Apply acquired knowledge , facts, techniques to Chopper and Cyclo converters	**L3 (AP)**	

Legends: R = Remember U= Understand; A= Apply and above levels (BTL-Bloom's revised taxonomy Level)

Mapping Course Outcomes (CO) - Program Outcomes (PO)

CO	Program Outcomes (PO)							Program Specific Outcomes (PSO)	
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2
6F6305-**CO1**	2	2	1	2	-	-	-	-	-
6F6305-**CO2**	2	2	1	2	-	-	-	-	-
6F6305-**CO3**	3	2	1	3	-	-	-	-	-
6F6305-**CO4**	3	2	1	3	-	-	-	-	-
6F6305-**CO5**	3	2	1	3	-	-	-	-	-
TOTAL	13	10	5	13	-	-	-	-	-
No. of COs Mapping with POs	5	5	5	5	-	-	-	-	-
Average	2.6	2	1	2.6	-	-	-	-	-
Round off(Average)	3	2	1	3	-	-	-	-	-
Correlation									
Strong – S / 3			**Medium – M /2**				**Weak – W / 1**		

DETAILED SYLLABUS

Contents: Industrial Electronics Theory

Unit	Name of the Topics	Hours
I	**CHARACTERISTICS OF POWER DEVICES** 1.1 Introduction to power electronics- Introduction to Thyristor family – Principle of Operation of SCR – VI-Characteristics of SCR – The two-transistor Model of SCR [Two Transistor Analogy] - Thyristor Ratings - Holding current - latching current- comparison between transistor and thyristor. 1.2 Bidirectional Diode Thyristor (DIAC) -Bidirectional Triode Thyristor (TRIAC)– Silicon Unilateral Switch (SUS) – Silicon Bilateral Switch (SBS)	15

	– Silicon Controlled Switch(SCS) – Light-activated Silicon-Controlled Rectifiers (LASCR) –Gate Turn OFF Thyristors (GTOs Latching Transistors), Insulated Gate Bipolar Thyristor (IGBT)- Principle of Operation–VI- Characteristics.	
II	**TRIGGER CIRCUITS AND COMMUTATIONS** 2.1 Turn ON Methods of a Thyristor - Forward voltage triggering - Thermal triggering (Temperature triggering) - Radiation triggering (Light triggering) - triggering - Gate triggering- AC- DC and pulse triggering. 2.2 Turn OFF Methods-Commutation -definition-Classification -natural & forced- types – self commutation by resonating the load(Class A)- self commutation by an LC circuit (Class B)- complementary commutation(Class C)-auxiliary commutation(Class D)-External pulse commutation(Class E) and A.C line commutation(Class F). 2.3 Firing of Thyristors, pulse transformer in triggering circuits, Optical isolators- Gate triggering circuits - Resistance Firing circuit-Resistance-Capacitance Firing circuit–UJT relaxation oscillator-UJT triggering circuit – Synchronized UJT Triggering (Ramp triggering), Phase control using Pedestal and Ramp triggering	14
III	**CONVERTERS** 3.1 Phase angle control- Single phase half wave controlled rectifier with R load, with RL load, effect of freewheeling diode. Single phase full wave controlled rectifier- Mid- point converters with R load, with RL load- Single phase fully controlled bridge rectifier with R load, Single phase fully controlled bridge rectifier with R-L load. Single phase half controlled bridge rectifier with R load, Single phase half controlled bridge rectifier with R-L load, Asymmetric and Symmetric Configurations. 3.2 Three-phase controlled converters-Three phase half wave controlled rectifier with R load, with RL load. Three phase fully controlled bridge rectifier with R load, Three phase fully controlled bridge rectifier with R-L load. Three phase half controlled bridge controlled bridge rectifier with R-L load	15
IV	**INVERTERS** 4.1 Inverters – Thyristor inverter classification – Basic series inverters – modified series inverter-self-commutated inverters – Basic parallel	15

	inverter. 4.2 The single-phase bridge voltage source inverter: – Single phase half bridge Inverter, Single phase full bridge inverter. The McMurray Inverter (Auxiliary commutated Inverter) McMurray – Bedford half bridge Inverter (complementary Commutated Inverters) 4.3 Three- phase bridge inverter -three- phase 180° conduction mode-three- phase 120° conduction mode. 4.4 Current source inverters: Single phase capacitor commutated current source inverters with Resistive Load.	
V	**CYCLO CONVERTER AND CHOPPER** 5.1 Choppers: Principle of chopper operation – control strategies(Time Ratio Control and current limit control) – step-up choppers – step-up/down choppers -chopper commutation –voltage commutated chopper- current commutated chopper-load commutated chopper - jones chopper – morgan chopper – A.C. Choppers. 5.2 Cyclo converters: basic principle of operation – 1ф to 1ф cyclo converter with resistive load – 1ф bridge type cyclo converter - 3ф to 3ф cyclo converters applications UPS	14

Reference Books

1. Power Electronics, M.H.Rashid, PHI Publication
2. Power Electronics, Dr.P.S.Bimbhra,, Khanna publishers
3. Industrial & Power Electronics, HarishC.Rai, Umesh Publication
4. Power Electronics, M D Singh, K B Khanchandani, Tata McGraw-Hill

DIPLOMA IN ENGINEERING AND TECHNOLOGY

6

DEPARTMENT OF INSTRUMENTATION AND CONTROL ENGINEERING

III YEAR

F – SCHEME

VI - TERM

IMPLEMENTED FROM 2020 – 2021

6F6216.1 - BIO MEDICAL INSTRUMENTATION

SESHASAYEE INSTITUTE OF TECHNOLOGY
(Autonomous)
TIRUCHIRAPPALLI – 620 010.

ANNEXURE- II

SESHASAYEE INSTITUTE OF TECHNOLOGY (Autonomous), TRICHY-10

6: DIPLOMA IN INSTRUMENTATION AND CONTROL ENGINEERING SYLLABUS

F-SCHEME

(To be implemented for the students admitted from the year 2020-21 onwards)

Programme Name : 6 - Diploma In Instrumentation and Control Engineering

Course Code : 6F6216.1

Term : VI

Course Name : Bio Medical Instrumentation

TEACHING AND SCHEME OF EXAMINATION

No of weeks per semester: 16 weeks

Subject	Instructions		Examination			
			Marks			Duration
	Hours / Week	Hours / Semester	Internal Assessmen	Board Examination	Total	
6F6216.1	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	Physiological & Clinical Measurements	14
II	Bio – Medical Recorder	15
III	Therapeutic Instruments	15
IV	Modern Imaging Techniques	15
V	Bio-Telemetry And Patient Safety	14
Test & Model Exam		7
Total		**80**

RATIONALE:

Bio medical engineering education is in the growing stage. But every year, there is a tremendous increase in the use of modern medical equipment in the hospital and health care industry therefore it is necessary for every student to understand the functioning of various medical equipments. This course is to enable the students to learn the basic principles of different bio medical instruments viz clinical measurement, Bio-medical recorders, Therapeutic instruments, Biotelemetry and Modern imaging techniques instruments.

OBJECTIVES:

The students will be able to

- Understand the generation of Bio-potential and its measurement using various electrodes.
- Understand the methods of measurement of blood pressure, lung volume, respiration rate, body temperature and skin temperature.
- Understand the principles of operations of ECG recorder, EEG recorder and ENG recorder
- Understand the working principles of audio meter, pacemaker and ventilators.
- The basic principle of short wave diathermy.
- The working principles of telemetry and telemedicine
- To learn about the importance of patient safety and various methods of accident prevention
- The basic principle of CT, MRI scanner and operation of various imaging techniques

Course Outcome

On successful completion of the course, the students will be able to attain below Course Outcome (CO):

Course outcome		BTL	Linked PO
6F6216.1-**CO1**	Ability to understand about Bio - electric signals, electrodes and clinical measurement	**L2 (U)**	
6F6216.1-**CO2**	Ability to understand the construction and working of Bio - medical recorders	**L2 (U)**	
6F6216.1-**CO3**	Ability to understand the construction and working of Therapeutic instruments	**L2 (U)**	
6F6216.1-**CO4**	Ability to understand the construction and working of Modern imaging techniques instruments	**L2 (U)**	
6F6216.1-**CO5**	Ability to understand the construction and working of Biotelemetry and patient safety systems	**L2 (U)**	

Legends: R = Remember U= Understand; A= Apply and above levels (BTL-Bloom's revised taxonomy Level)

Mapping Course Outcomes (CO) - Program Outcomes (PO)

CO	Program Outcomes (PO)							Program Specific Outcomes (PSO)	
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2
6F6216.1-**CO1**	2	2	1	2	-	-	-	-	-
6F6216.1-**CO2**	2	2	1	2	-	-	-	-	-
6F6216.1-**CO3**	2	2	1	2	-	-	-	-	-
6F6216.1-**CO4**	2	2	1	2	-	-	-	-	-
6F6216.1-**CO5**	2	2	1	2	-	-	-	-	-
TOTAL	10	10	5	10	-	-	-	-	-
No. of COs Mapping with POs	5	5	5	5	-	-	-	-	-
Average	2	2	1	2	-	-	-	-	-
Round off(Average)	2	2	1	2	-	-	-	-	-

Correlation		
Strong – S / 3	**Medium – M /2**	**Weak – W / 1**

DETAILED SYLLABUS

Contents: Bio Medical Instrumentation Theory

Unit	Name of the Topics	Hours
I	**PHYSIOLOGICAL & CLINICAL MEASUREMENTS** 1.1 Components of man instrument system – Bio-potential and their generation – resting & action potential – propagation of action potential. Electrodes-Micro- Skin, Surface – Needle electrodes. Measurement of blood pressure (direct & indirect) – Instantaneous flow (Electromagnetic blood flow meter, Ultrasonic blood flow meter) – blood PH. Measurement of Respiration rate – Lung Volume – Heart rate – Temperature(Body temperature & Skin Temperature).	14
II	**BIO – MEDICAL RECORDER** 2.1 Electro cardiography (ECG) - Lead system – ECG Electrodes – ECG Amplifiers – ECG recording – analysis of ECG curves. Nervous system - EEG recorder – 10-20 lead System-EEG wave types – Clinical use of EEG – brain Tumor. Electro – myograph (EMG)- EMG Waves – Measurement of conduction velocity – Electro Retinography (ERG). Phonocardiography Audiometer - Types – Basic Audiometer. Bekesy Audiometer.	15
III	**THERAPEUTIC INSTRUMENTS** 3.1 Cardiac pacemaker – Classification – External pacemaker – Implantable pacemaker – Programmable pacemaker (only concepts) – Power source of implantable pacemaker (Hg batteries, Nuclear Batteries, Lithium cells). Cardiac Defibrillators – Types – AC-DC defibrillators. Heart lung Machine – Oxygenators – Blood pumps – Peristolic pump-Heart valves-problems of artificial heart valves. Dialysis – Hemo dialysis – peritoneal dialysis.	15
IV	**MODERN IMAGING TECHNIQUES** 4.1 Laser beam properties – principles - application of laser in medicine. Endoscopy – principle of working and application. X-Ray apparatus – Block Diagram – operation – Special Techniques in X -ray imaging: Computerized Axial Tomography – Ultrasonic imaging Instrumentation – Echo cardiography – Angiography –CT Scanner – Magnetic resonance imaging (MRI) Technique.	15

V	**BIO-TELEMETRY AND PATIENT SAFETY** 5.1 Introduction – Physiological parameter adaptable to bio telemetry components of a bio telemetry system – Application of telemetry in patient care – Problems associated with implantable telemetry. Physiological efforts of electric current – Microshock Hazards: Leakage Currents, static electricity, interruption of power – Macroshock – Devices to protect against electrical hazards	14

Reference Books

1. Medicine and clinical Engineering, Jacobson and Webstar, Prentice-Hall
2. Medical Electronics, Kumara doss, Cambridge University-2nd edition Press -2003
3. Introduction to Medical Electronics, B.R. Klin,Mc graw hill international edition, 3rd edition, 1989
4. Introduction to Biomedical Instrumentation, Mandeep Singh, PHI Learning Pvt. Ltd, 2nd edition 2010

DIPLOMA IN ENGINEERING AND TECHNOLOGY

6

DEPARTMENT OF INSTRUMENTATION AND CONTROL ENGINEERING

III YEAR

F – SCHEME

VI - TERM

IMPLEMENTED FROM 2020 – 2021

6F6216.2 - ROBOTICS AND AUTO ELECTRONICS

SESHASAYEE INSTITUTE OF TECHNOLOGY
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TIRUCHIRAPPALLI – 620 010.

ANNEXURE- II

SESHASAYEE INSTITUTE OF TECHNOLOGY (Autonomous), TRICHY-10

6: DIPLOMA IN INSTRUMENTATION AND CONTROL ENGINEERING SYLLABUS

F-SCHEME

(To be implemented for the students admitted from the year 2020-21 onwards)

Programme Name : 6 - Diploma In Instrumentation and Control Engineering

Course Code : 6F6216.2

Term : VI

Course Name : Robotics and Auto Electronics

TEACHING AND SCHEME OF EXAMINATION

No of weeks per semester: 16 weeks

Subject	Instructions		Examination			
			Marks			Duration
	Hours / Week	Hours / Semester	Internal Assessmen	Board Examination	Total	
6F6216.2	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	Basic Configuration of Robotics and its Working	15
II	Robot Controller, Servo Systems	15
III	Robot Motion Analysis and Vision System	14
IV	Robot Programming	15
V	Robot Application in Manufacturing and Auto Electronics	14
Test & Model Exam		7
Total		**80**

RATIONALE:

Rapid industrialization and globalization needs industries to be more competitive and deliver cost effective quality products. This needs industries to implement flexible manufacturing systems where Robotic technology plays major role. Hence study of robotic technology is very essential.

OBJECTIVES:

At the end of the Course, the students will be able to know

- Explain different components of robot
- compare various types of Robot
- Study the working of various robot controllers.
- Differentiate various robot controllers.
- Explain the kinematics of robot.
- Explain the working of vision system
- Appreciate the application of robot s in various industries.
- Compare the uses of various sensors & warning system

Course Outcome

On successful completion of the course, the students will be able to attain below Course Outcome (CO):

Course outcome		BTL	Linked PO
6F6216.2-**CO1**	Ability to understand basic configuration of robotics and its working	**L2 (U)**	
6F6216.2-**CO2**	Ability to understand robot controller, servo systems	**L2 (U)**	
6F6216.2-**CO3**	Ability to describe the robot motion analysis and vision system	**L2 (U)**	
6F6216.2-**CO4**	Ability to explain the robot programming	**L2 (U)**	
6F6216.2-**CO5**	Ability to describe the robot application in manufacturing & auto electronics	**L2 (U)**	

Legends: R = Remember U= Understand; A= Apply and above levels (BTL-Bloom's revised taxonomy Level)

Mapping Course Outcomes (CO) - Program Outcomes (PO)

CO	Program Outcomes (PO)							Program Specific Outcomes (PSO)	
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2
6F6216.2-**CO1**	2	2	1	2	-	-	-	-	-
6F6216.2-**CO2**	2	2	1	2	-	-	-	-	-
6F6216.2-**CO3**	2	2	1	2	-	-	-	-	-
6F6216.2-**CO4**	2	2	1	2	-	-	-	-	-
6F6216.2-**CO5**	2	2	1	2	-	-	-	-	-
TOTAL	10	10	5	10	-	-	-	-	-
No. of COs Mapping with POs	5	5	5	5	-	-	-	-	-
Average	2	2	1	2	-	-	-	-	-
Round off(Average)	2	2	1	2	-	-	-	-	-

Correlation		
Strong – S / 3	**Medium – M /2**	**Weak – W / 1**

DETAILED SYLLABUS

Contents: Robotics and Auto Electronics Theory

Unit	Name of the Topics	Hours
I	**BASIC CONFIGURATION OF ROBOTICS AND ITS WORKING** Introduction – definition – basic configuration of robotics and its working – robot components – manipulator, end effectors, drive system, controller, sensors – mechanical arm – degrees of freedom – links and joints – construction of links, types of joint – classification of robots – Cartesian, cylindrical, spherical, horizontal articulated (SCARA), vertical articulated – structural characteristics of robots – work envelope and work volume - robot work volumes and comparison – wrist rotations – mechanical transmission, pulleys, belts, gears, harmonic drive – conversion between linear and rotary motion and its devices.	15

II	**ROBOT CONTROLLER, SERVO SYSTEMS** Robot controller – level of controller – open loop and closed loop controller – servo systems –– robot path control – point to point continuous path control – sensor based path control – controller programming – actuators – dc servo motors – stepper motors – hydraulic and pneumatic drives – feedback devices – potentiometers – optical encoders – dc tachometers.	15
III	**ROBOT MOTION ANALYSIS AND VISION SYSTEM** Robot motion analysis – robot kinematics – robot dynamics – end effectors – grippers and tools - gripper design – mechanical gripper – vacuum gripper – magnetic grippers – sensors – transducers – tactile sensors – proximity sensors and range sensors – force and moment sensors and its applications and problems – photoelectric sensors – vision system – image processing and analysis – robotic applications – robot operation aids – teach pendent – MDI and computer control.	14
IV	**ROBOT PROGRAMMING** Robot programming – lead through methods and textual robot languages – motion specification - motion interpolation - basic robot languages – generating of robot programming languages – On-Line & Off-Line programming - robot language structure – basic commands – artificial intelligence and robotics.	15
V	**ROBOT APPLICATION IN MANUFACTURING AND AUTO ELECTRONICS** Robot application in manufacturing – material handling – assembly finishing – adopting robots to work station - requisite and non – requisite robot characteristics – stages in selecting robot for individual application – precaution for robot –future of robotics. Sensors for fuel level in tank- Engine cooling water temperature sensor – engine oil pressure sensor – Speed sensor – Air pressure sensor – Engine oil temperature sensor – Oil pressure warning system – Engine over heat warning system – Air pressure warning system – Speed warning system – Door Lock Indicators.	14

Reference Books

1. Industrial Robotics, Mikell P. Groover, Mite chell weiss, Roger Negal and Nicholes G. Odress
2. Robotics, R. Halconnjr
3. Walter E Billet & Leslie, F GOINGS

DIPLOMA IN ENGINEERING AND TECHNOLOGY

6

DEPARTMENT OF INSTRUMENTATION AND CONTROL ENGINEERING

III YEAR

F – SCHEME

VI - TERM

IMPLEMENTED FROM 2020 – 2021

6F6216.3 - FIBRE OPTICS & LASER INSTRUMENTATION

SESHASAYEE INSTITUTE OF TECHNOLOGY
(Autonomous)
TIRUCHIRAPPALLI – 620 010.

ANNEXURE- II

SESHASAYEE INSTITUTE OF TECHNOLOGY (Autonomous), TRICHY-10

6: DIPLOMA IN INSTRUMENTATION AND CONTROL ENGINEERING SYLLABUS

F-SCHEME

(To be implemented for the students admitted from the year 2020-21 onwards)

Programme Name : 6 - Diploma In Instrumentation and Control Engineering

Course Code : 6F6216.3

Term : VI

Course Name : Fibre Optics & Laser Instrumentation

TEACHING AND SCHEME OF EXAMINATION

No of weeks per semester: 16 weeks

Subject	Instructions		Examination			
			Marks			Duration
	Hours / Week	Hours / Semester	Internal Assessmen	Board Examination	Total	
6F6216.3	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	Optical Fibre Wave Guides	15
II	Optical Joints And Couplers	15
III	Optical Sources	14
IV	Optical Detectors	15
V	Measurement And Application	14
Test & Model Exam		7
Total		**80**

RATIONALE:

Study of Linear Fibre optics and Laser Instrumentation is a diversified subject for Instrumentation & Control Engineering. Through the study of this course, the students will get exposure to optical fibres and knowledge about Laser. It gives an overview about optical sources and applications of Laser.

OBJECTIVES:

At the end of the Course, the students will be able to know

- Optical Fibre Wave Guides
- Optical Joints And Couplers
- Optical Sources
- Optical Detectors
- attenuation, optical sensor systems, public network applications

Course Outcome

On successful completion of the course, the students will be able to attain below Course Outcome (CO):

Course outcome		BTL	Linked PO
6F6216.3-**CO1**	Ability to understand the basic optical communication system.	**L2 (U)**	
6F6216.3-**CO2**	Ability to know the optical joint losses and attenuation.	**L2 (U)**	
6F6216.3-**CO3**	Able to learn about optical sources and fiber coupling to sources	**L2 (U)**	
6F6216.3-**CO4**	Ability to understand the optical detectors	**L2 (U)**	
6F6216.3-**CO5**	Ability to measure the fiber attenuation and understand the concept of various network applications.	**L2 (U)**	

Legends: R = Remember U= Understand; A= Apply and above levels (BTL-Bloom's revised taxonomy Level)

Mapping Course Outcomes (CO) - Program Outcomes (PO)

CO	Program Outcomes (PO)							Program Specific Outcomes (PSO)	
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2
6F6216.3-**CO1**	2	2	1	2	-	-	-	-	-
6F6216.3-**CO2**	2	2	1	2	-	-	-	-	-
6F6216.3-**CO3**	2	2	1	2	-	-	-	-	-
6F6216.3-**CO4**	2	2	1	2	-	-	-	-	-
6F6216.3-**CO5**	2	2	1	2	-	-	-	-	-
TOTAL	10	10	5	10	-	-	-	-	-
No. of COs Mapping with POs	5	5	5	5	-	-	-	-	-
Average	2	2	1	2	-	-	-	-	-
Round off(Average)	2	2	1	2	-	-	-	-	-

Correlation

Strong – S / 3	Medium – M /2	Weak – W / 1

DETAILED SYLLABUS

Contents: Fibre Optics and Laser Instrumentation Theory

Unit	Name of the Topics	Hours
I	**OPTICAL FIBRE WAVE GUIDES** 1.1 Basic optical communication system – advantages, Definitions of attenuation, Band width and pulse definitions duration – Ray theory transmission – Total internal reflection – Acceptance angle – numerical aperture – skew rays simple problems. Types of fibres – step index and graded index fibre structures.	15
II	**OPTICAL JOINTS AND COUPLERS** 2.1 Characteristics of fibres – Attenuation – Material absorption Linear scattering – Rayleigh and mie scattering – Nonlinear scattering – stimulated and stimulated Raman scattering – fibre bend loss. 2.2 fibre alignment and joint loss – single and multi-mode fibres – fibre	15

	splices – Fusion, mechanical, and multiple splices – fibre connectors – cylindrical and biconical ferrule connectors length division multiplexing couplers.	
III	**OPTICAL SOURCES** 3.1 LED'S : Recombination process – Definitions of direct and indirect band gap semiconductors – internal quantum efficiency – the double hetero – structure – useful properties – external quantum efficiency – Types of LED'S – The burrus type and edge – emitting LED, LED to fibre coupling – Lens coupling to fibre 3.2 The Laser: Basic concepts – absorption and emission of radiation, population inversion, Threshold condition for laser oscillation – semiconductor injection laser to fibre coupling.	14
IV	**OPTICAL DETECTORS** 4.1 Optical detection principle – Device types – absorption co-efficient, quantum efficiency – Responsibility – long wave length cut off – PN diode – speed of response – Noise – Avalanche, photo diode – Silicon, Germanium photo diodes – merits and demerits of avalanche photo diode – photo transmitters – photo conductive detectors.	15
V	**MEASUREMENT AND APPLICATION** 5.1 fibre attenuation measurements – total fibre attenuation – fibre absorption loss measurement – Diameter measurements – outer and core diameter. 5.2 Public network applications – Trunk, junction and local area networks – military applications – mobile and communication links civil, consumer and industrial applications. 5.3 Optical sensor system – Intrinsic and extrinsic sensor systems – chemical and Bio sensors.	14

Reference Books

1. fibre Optics Communications, SENIOR, Mc Craw Hill
2. fibre Optics Communication Systems, GOWER, Prentice Hall of India
3. Electronic Communication Systems, KENNEDY, Mc Craw Hill
4. Optical Electronics foundation book, A.K.GHATAK THIAGRAJAN

DIPLOMA IN ENGINEERING AND TECHNOLOGY

6

DEPARTMENT OF INSTRUMENTATION AND CONTROL ENGINEERING

III YEAR

F – SCHEME

VI - TERM

IMPLEMENTED FROM 2020 – 2021

6F6217 - INDUSTRIAL AUTOMATION PRACTICAL

SESHASAYEE INSTITUTE OF TECHNOLOGY
(Autonomous)
TIRUCHIRAPPALLI – 620 010.

ANNEXURE- II

SESHASAYEE INSTITUTE OF TECHNOLOGY (Autonomous), TRICHY-10

6: DIPLOMA IN INSTRUMENTATION AND CONTROL ENGINEERING SYLLABUS

F-SCHEME

(To be implemented for the students admitted from the year 2020-21 onwards)

Programme Name : 6 - Diploma In Instrumentation and Control Engineering

Course Code : 6F6217

Term : VI

Course Name : Industrial Automation Practical

TEACHING AND SCHEME OF EXAMINATION

No of weeks per semester: 16 weeks

Subject	Instructions		Examination			
			Marks			Duration
	Hours / Week	Hours / Semester	Internal Assessmen	Board Examination	Total	
6F6217	6	96	25	100*	100	3 Hrs.

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

RATIONALE:

As Automation plays the vital role in process industries, manufacturing sectors, it is Essential for an Instrumentation and control engineer to understand the practical aspects of Automation. In most of the automation process double acting and single acting cylinders plays the role of actuating element. Hence in this subject it is dealt practically.

OBJECTIVES:

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

- Know the operation of single and double acting cylinder
- Know the operation of Hydraulic motor
- Control DC motor using SCR
- Know about distributed control system
- Understand the detailed hardware of PLC and its parts
- Understand the working of PLC and scan cycle
- Understand the ladder logic programming of PLC
- Develop simple ladder programs

Course Outcome

On successful completion of the course, the students will be able to attain below Course Outcome (CO):

CO	Details	BTL	Linked PO
6F6217-**CO1**	Ability to practice operate and control Electrical Drives	**L3(AP)**	
6F6217-**CO2**	Ability to practice operate and control Pneumatic and Hydraulic Drives	**L3(AP)**	
6F6217-**CO3**	Ability to practice operate PLC programming Ability to understand Communication Protocols	**L4(AN)**	
6F6217-**CO4**	Ability to understand DCS & SCADA	**L2(U)**	
6F6217-**CO5**	Ability to understand Industrial IOT Introduction	**L2(U)**	

Mapping Course Outcomes (CO) - Program Outcomes (PO)

CO	Program Outcomes (PO)							Program Specific Outcomes (PSO)	
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2
6F6217-**CO1**	3	3	1	2	-	-	-	-	-
6F6217-**CO2**	3	3	1	2	-	-	-	-	-
6F6217-**CO3**	3	3	1	1	-	-	-	-	-
6F6217-**CO4**	2	2	1	2	-	-	-	-	-
6F6217-**CO5**	2	2	1	2	-	-	-	-	-
TOTAL	13	13	5	9	-	-	-	-	-
No. of COs Mapping with POs	5	5	5	5	-	-	-	-	-
Average	2.6	2.6	1	1.8	-	-	-	-	-
Round off(Average)	3	3	1	2	-	-	-	-	-

Correlation		
Strong – S / 3	**Medium – M /2**	**Weak – W / 1**

INDUSTRIAL AUTOMATION PRACTICAL

LIST OF EXPERIMENTS

1. Single/double acting Cylinder
2. Direction control valves
3. Memory valves
4. Air Motor
5. DC Motor control with PLC
6. AC Motor control with PLC
7. PLC Lift Controller, Conveyer
8. Motor control using variable frequency drive
9. Interfacing of LM35 temperature sensor with fire alarm using Arduino
10. Interfacing of Servo motor control using Arduino
11. Interfacing of Humidity sensor using Arduino
12. Electric motor control and protection with relays, contactors and thermal overload protector

DETAILLED ALLOCATION OF MARKS

SCHEME OF VALUATION		
SL.NO	**DESCRIPTION**	**MARKS**
1.	Circuit Diagram	30
2.	Connections	30
3.	Reading & Graph	20
4.	Result	10
5.	Viva	10
6.	TOTAL	100

LIST OF EQUIPMENTS

Sl. No	Name of the Equipments	Range	Required Nos.
1.	Arduino Kit	0-30V,1A	6
2.	Variable Frequency Drive	1Ø to 3Ø	1
3.	Air Compressor	300psi	1
4.	Air Supply system with hose	100 psi	6
5.	Single acting Cylinder	0 to 100 psi	2
6.	Double acting Cylinder	0 to 100 psi	2
7.	Hose Cutter	½ inch	2
8.	Memory Valves	0 to 100 psi	3
9.	Air Motor	0 to 100 psi	2
10.	5/2 Direction Control Valve	0 to 100 psi	6
11.	3/2 Direction Control Valve	0 to 100 psi	6
12.	PLC KIT	24v DC	4
13.	AC Motor	230v AC	2
14.	DC Motor	24v DC	2
15.	LM35 SENSOR	5V	6
16.	Humidity sensor	5v	5
17.	Stepper Motor	24v DC	2
18.	Servo Motor 2	24v DC	2
19.	Thermal overload Relay	230v AC 40A	2
20.	4pole contactor 40A	440v AC	2
21.	4 pole Relay 40 A	440v AC	2
22.	FRL	200psi	2
23.	Shuttle Valve	200psi	2
24.	Air Manifold 6 way	200psi	2
25.	Air Hoses	1/8inch	20 mts
26.	Air Hoses	1/4inch	20 mts
27.	3Ø motor rotation tester	600v	1

DIPLOMA IN ENGINEERING AND TECHNOLOGY

6

DEPARTMENT OF INSTRUMENTATION AND CONTROL ENGINEERING

III YEAR

F – SCHEME

VI - TERM

IMPLEMENTED FROM 2020 – 2021

6F6306 - INDUSTRIAL ELECTRONICS PRACTICAL

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ANNEXURE- II

SESHASAYEE INSTITUTE OF TECHNOLOGY (Autonomous), TRICHY-10

6: DIPLOMA IN INSTRUMENTATION AND CONTROL ENGINEERING SYLLABUS

F-SCHEME

(To be implemented for the students admitted from the year 2020-21 onwards)

Programme Name : 6 - Diploma In Instrumentation and Control Engineering

Course Code : 6F6316

Term : VI

Course Name : Industrial Electronics Practical

TEACHING AND SCHEME OF EXAMINATION

No of weeks per semester: 16 weeks

Subject	Instructions		Examination			
			Marks			Duration
	Hours / Week	Hours / Semester	Internal Assessmen	Board Examination	Total	
6F6316	6	96	25	100*	100	3 Hrs.

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

RATIONALE:

Industrial electronics lab provides the students the complete knowledge of the power electronic devices and circuits used in industry. This lab helps the students to analyze the characteristics of power devices and understand the applications of Power Electronic devices.

OBJECTIVES:

After completion of this lab, the students will be able to

- Analyze the characteristics of power devices.
- Construct and test the applications of power devices.

Course Outcome

On successful completion of the course, the students will be able to attain below Course Outcome (CO):

CO	Details	BTL	Linked PO
6F6316-**CO1**	Demonstrate the VI characteristics of power devices.	**L2 (U)**	
6F6316-**CO2**	Design the triggering circuits, and class C commutation circuits	**L6 (C)**	
6F6316-**CO3**	Design the half and full controlled rectifiers	**L6 (C)**	
6F6316-**CO4**	Design the Inverters.	**L6 (C)**	
6F6316-**CO5**	Design the Choppers and Cyclo converters.	**L6 (C)**	

Mapping Course Outcomes (CO) - Program Outcomes (PO)

CO	Program Outcomes (PO)							Program Specific Outcomes (PSO)	
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2
6F6316-**CO1**	2	3	3	3	-	-	-	-	-
6F6316-**CO2**	3	3	3	3	-	-	-	-	-
6F6316-**CO3**	3	3	3	3	-	-	-	-	-
6F6316-**CO4**	3	3	3	3	-	-	-	-	-
6F6316-**CO5**	3	3	3	3	-	-	-	-	-
TOTAL	14	15	15	15	-	-	-	-	-
No. of COs Mapping with POs	5	5	5	5	-	-	-	-	-
Average	2.8	3	3	3	-	-	-	-	-
Round off(Average)	3	3	3	3	-	-	-	-	-
Correlation									
Strong – S / 3		**Medium – M /2**				**Weak – W / 1**			

INDUSTRIAL ELECTRONICS PRACTICAL

LIST OF EXPERIMENTS

1. Plot the VI Characteristics of SCR and determine the Holding current
2. Plot the VI Characteristics of DIAC and determine its break down voltage.
3. Plot the VI Characteristics of TRIAC.
4. Construct and test the performance of complementary commutation circuit.
5. Construct and test the performance of Auxiliary commutation circuit.
6. Construct an UJT triggering circuit and observe its output waveform
7. Construct and test the performance of half controlled bridge rectifier using SCR with resistive load. Plot the output waveform for different firing angles.
8. Construct and test the performance of fully controlled bridge rectifier using SCR for resistive load. Plot the output waveform for different firing angles.
9. Construct a DC motor Speed control circuit using semi converter and test its performance.
10. Construct and test the performance of Series Inverter
11. Construct and test the performance of DC Chopper
12. Construct and test the performance of Single phase cyclo converter

DETAILLED ALLOCATION OF MARKS

SCHEME OF VALUATION		
SL.NO	**DESCRIPTION**	**MARKS**
1	Circuit Diagram	40
2	Connections	20
3	Reading & Graph	20
4	Result	10
5	Viva	10
6	TOTAL	100

LIST OF EQUIPMENTS

Sl. No	Name of the Equipments	Range	Required Nos.
1	DC Regulated power supply	0-30V,1A	6
2	Signal Generator	2 MHz	1
3	Dual trace CRO	20MHz/30MHz	1
4	DC Voltmeter (Analog)	Different Range	6
5	DC Ammeter (Analog)	Different Range	6
6	SCR		4
7	Triac		4
8	Diac		4
9	DC Motor		1
10	DC Chopper Kit		1
11	Series Inverter Kit		1
12	Single phase cyclo converter Kit		1
13	UJT triggering		1

DIPLOMA IN ENGINEERING AND TECHNOLOGY

6

DEPARTMENT OF INSTRUMENTATION AND CONTROL ENGINEERING

III YEAR

F – SCHEME

VI - TERM

IMPLEMENTED FROM 2020 – 2021

6F6403 - PROJECT WORK AND INTERNSHIP

SESHASAYEE INSTITUTE OF TECHNOLOGY
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ANNEXURE- II

SESHASAYEE INSTITUTE OF TECHNOLOGY (Autonomous), TRICHY-10

6: DIPLOMA IN INSTRUMENTATION AND CONTROL ENGINEERING SYLLABUS

F-SCHEME

(To be implemented for the students admitted from the year 2020-21 onwards)

Programme Name : 6 - Diploma In Instrumentation and Control Engineering

Course Code : 6F6403

Term : VI

Course Name : Project Work and Internship Practical

TEACHING AND SCHEME OF EXAMINATION

No of weeks per semester: 16 weeks

Subject	Instructions		Examination			
			Marks			Duration
	Hours / Week	Hours / Semester	Internal Assessment	Board Examinations	Total	
6F6403	5	80	25	100*	100	3 Hrs.

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

RATIONALE:

Project work aims at developing skills in the students whereby they apply in totality the knowledge and skills gained through the course in the solution of a practical problem undertaken as a project work. The students have different aptitudes and strengths. Project work, therefore, should match the strengths of students. For this purpose, students should be asked to identify the type of project work, they would like to execute. It is also essential that the faculty of the respective departments may have a brainstorming session to identify suitable project assignments. The project assignment can be individual assignment or a group assignment. There should not be more than 3 students if the project work is given to a group. The students should identify themselves or be given project assignment at least two to three months in advance. The project work identified in collaboration with industry/field organization should be preferred.

OBJECTIVES:

- Implement the theoretical and practical knowledge gained through the curriculum into an application suitable for a real practical working environment preferably in an industrial environment
- Get exposure on industrial environment and its work ethics.
- Learn and understand the gap between the technological knowledge acquired through curriculum and the actual industrial need and to compensate it by acquiring additional knowledge as required.
- Carry out cooperative learning through synchronous guided discussions within the class in key dates, asynchronous document sharing and discussions, as well as to prepare collaborative edition of the final project report.

INTERNAL ASSESSMENT

The internal assessment should be calculated based on the review of the progress of the work done by the student periodically as follows.

Detail of assessment	Period of	Max. Marks
First Review	5th week	10
Second Review	10th week	10
Attendance	Entire semester	5
Total		25

EVALUATION FOR BOARD EXAMINATION

Details of Mark allocation	**Max Marks**
Demonstration / Presentation	25
Report	25
Viva-Voce	30
Internship report	20
Total	100

MODEL QUESTION PAPER

MODEL QUESTION PAPER

6F3201 - ELECTRONIC DEVICES & ITS APPLICATIONS

Time: 3 Hrs **Max. Marks: 100**

PART-A

(10 x 03 = 30)

[Note : (1) Answer any 10 questions out of 15. (2) Each question carries 3 marks.]		**Unit**	**Bloom's Level**
1.	What is Avalanche breakdown?	I	R
2.	What is Forward bias?	I	R
3.	How many terminals in PN junction diode?	I	U
4.	What is Clipper?	II	R
5.	What is the use of filter in rectifiers?	II	U
6.	What is rectifier?	II	R
7.	What are the three configurations of Transistor?	III	U
8.	How is Transistor act as an Amplifier?	III	U
9.	What is Transistor?	III	R
10.	What is the condition of Oscillator?	IV	U
11.	Draw the Astble multivibrator using transistor.	IV	R
12.	What is an Oscillator?	IV	R
13.	What is pinch off voltage?	V	R
14.	Compare JFET with BJT.	V	U
15.	What is JFET?	V	R

PART – B

(05 x 14 = 70)

[Note:(1) Answer all questions from 16 to 20 either A or B. (2) Each question carries 14 marks.]				**Unit**	**BT**	**Mark**
16.	A.	(i)	Explain the working principle of PN junction diode in forward biased condition?	I	U	7
		(ii)	Explain the working principle of LED in forward biased condition?	I	U	7
			(or)			
	B.	(i)	Explain the working principle of PN junction diode in Reverse biased condition?	I	U	7

		(ii)	Explain the working principle of Zener diode in Reverse biased condition?	I	U	7
17.	A.	(i)	Explain the working principle of Half Wave Rectifier.	II	U	7
		(ii)	Explain the working principle of Positive Biased Clipper.	II	U	7
			(or)			
	B.	(i)	Explain the working principle of Full Wave Rectifier.	II	U	7
		(ii)	Explain the working principle of Clamper.	II	U	7
18.	A.	(i)	Explain the working principles of PNP transistor.	III	U	7
		(ii)	Explain the working principles of RC coupled amplifier.	III	U	7
			(or)			
	B.	(i)	Explain the working principles of UJT.	III	U	7
		(ii)	Differentiate active, Cutoff and Saturation regions in transistor configurations.	III	U	7
19.	A.	(i)	Explain the working principles of Hartley Oscillator	IV	U	7
		(ii)	Explain the working principles of Monostable multivibrator	IV	U	7
			(or)			
	B.	(i)	Explain the working principles of Crystal Oscillator.	IV	U	7
		(ii)	Explain the working principles of Bistable multivibrator.	IV	U	7
20.	A.	(i)	Explain the working principles of JFET.	V	U	7
		(ii)	Draw the basic block diagram of Regulated Power Supply.	V	U	7
			(or)			
	B.	(i)	Explain the working principles of MOSFET.	V	U	7
		(ii)	Give the applications of JFET and MOSFET.	V	U	7

MODEL QUESTION PAPER

6F3202- ELECTRICAL CIRCUITS AND MACHINES

Time: 3 Hrs **Max. Marks: 100**

PART-A

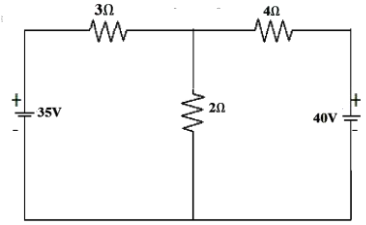
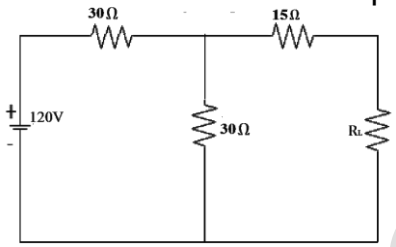
(10 x 03 = 30)

[Note : (1) Answer any 10 questions out of 15. (2) Each question carries 3 marks.]		**Unit**	**Bloom's Level**
1.	State ohm's law.	I	R
2.	Find the equivalent resistance if 2 resistors are connected in parallel.	I	AP
3.	Draw the thevenin's equivalent circuit.	I	AP
4.	Define form factor.	II	U
5.	Convert $10\angle 38.86$ into rectangular form.	II	AP
6.	Draw the phasor diagram of RL series circuit.	II	AP
7.	Write the conditions for resonance.	III	U
8.	Define phase sequence.	III	U
9.	Write two advantages of 3Ø over 1Ø supply.	III	R
10.	What is the principle of DC motor?	IV	U
11.	Write the application of DC generator.	IV	U
12.	Draw the torque – speed characteristics of DC series motor.	IV	AP
13.	What is the necessity of starter in induction motor?	V	U
14.	Write the expression for EMF equation of transformer.	V	R
15.	What is all day efficiency?	V	U

PART – B

(05 x 14 = 70)

[Note: (1) Answer all questions from 16 to 20 either A or B. (2) Each question carries 14 marks.]				**Unit**	**BT**	**Mark**
16.	A.	(i)	State and explain kirchhoff's laws.	I	AP	7
		(ii)	A 40Ω resistor is connected in series with a parallel combination of two resistors an 8Ω and 20Ω respectively. Find the equivalent resistance	I	AP	7

			(or)			
	B.	(i)	Calculate the current in different branches of the circuit shown below. 	I	AP	7
		(ii)	Calculate the value of load resistance for maximum power transferred From the circuit shown below. Also find the maximum power. 	I	AP	7
17.	A.	(i)	Derive the expression for RMS value of AC voltage.	II	U	7
		(ii)	The alternating current passing thro' a circuit is 141.4 sin 314.2t what are the values of a) Maximum value of current b) R.M.S value of current c) The frequency d) The instantaneous value of the current when t=0.02sec	II	AP	7
			(or)			
	B.	(i)	Drive the expression for the energy stored in a capacitor.	II	U	7
		(ii)	Prove that the power in RL series circuit is VI cos ø.	II	U	7
18.	A.	(i)	A series circuit contains a resistance of 5Ω and inductance of 0.4H and variable capacitor across 100V, 50Hz supply. Find a) The capacitance for getting resonance	III	AP	7

			b) The p.d across inductance and capacitance c) The Q-factor of the series circuit.			
		(ii)	Derive the expression to find resonance frequency in RLC series.	III	U	7
			(or)			
	B.	(i)	Explain with necessary diagram the measurement of 3ø power by two wattmeter method for balanced load.	III	U	7
		(ii)	Obtain the relationship between voltages and currents in balanced 3ø delta connection.	III	U	7
19.	A.	(i)	Explain the working principle of DC generator with necessary diagrams.		U	7
		(ii)	Explain the working types of DC generator with necessary diagrams.	IV	U	7
			(or)			
	B.	(i)	Explain the working of 3 point starter with a neat diagram.	IV	U	7
		(ii)	Explain different types of speed control of DC shunt motor.	IV	U	7
20.	A.	(i)	Explain the working of 3ø alternator.	IV	U	7
		(ii)	With a neat circuit the construction of 3Ø induction motor	V	U	7
			(or)			
	B.	(i)	Derive the EMF equation of a transformer.	V	U	7
		(ii)	Explain the working of auto transformer with necessary diagrams.	V	U	7

MODEL QUESTION PAPER
6F3301 - ANALOG & DIGITAL ELECTRONICS

Time: 3 Hrs **Max. Marks: 100**

PART-A

(10 x 03 = 30)

[Note : (1) Answer any 10 questions out of 15. (2) Each question carries 3 marks.]		**Unit**	**Bloom's Level**
1.	Convert the decimal number 253_{10} into Binary and Octal numbers.	I	U
2.	State the three laws of Boolean algebra	I	U
3.	What are universal gates? Why are they called so?	I	U
4.	Find the 1's complement of (i) 11011102 (ii) 10010102 (iii) 11000112	II	U
5.	Define encoder and demultiplexer	II	U
6.	Draw the circuit diagram two input TTL NAND gate.	II	U
7.	Draw the logic diagram and truth table of T flipflop	III	U
8.	Mention any three differences between Asynchronous and Synchronous counter	III	U
9.	Draw the logic diagram of a four-bit ring counter?	III	U
10.	Draw the circuit diagram of 4 bit binary weighted DAC	IV	U
11.	Define resolution and conversion time of ADC	IV	U
12.	Draw the functional block diagram of Timer IC 555	IV	R
13.	Mention the characteristics of an ideal OPAMP	V	U
14.	Define CMRR and slew rate	V	U
15.	What is the function of a zero crossing detector?	V	U

PART – B

(05 x 14 = 70)

[Note: (1) Answer all questions from 16 to 20 either A or B. (2) Each question carries 14 marks.]				**Unit**	**BT**	**Mark**
16.	A.	(i)	Convert the following binary numbers into decimal, octal and hexadecimal number (i) 1010111_2 (ii) 1011110_2	I	U	7
		(ii)	State and prove Demorgan's theorem	I	U	7
			(or)			
	B.	(i)	Realize OR, AND, NOT gates using only NAND gate	I	A	7
		(ii)	Simplify the following function using K-map $F = \sum (0,2,4,6,8,10,12,13,14,15)$	I	A	7
17.	A.	(i)	Explain the function of full adder with its logic diagram and truth table.	II	U	7
		(ii)	Draw the logic diagram of 3:8 decoder and explain	II	U	7

			its operation.			
			(or)			
	B.	(i)	Draw the logic diagram of 8:1 multiplexer and explain its operation.	II	U	7
		(ii)	Explain the operation of parity generator and checker with logic diagram	II	U	7
18.	A.	(i)	Explain the operation of Master Slave JK flipflop with its logic diagram and truth table.	III	U	7
		(ii)	Draw the logic diagram of 4 bit Asynchronous counter and explain its operation.	III	U	7
			(or)			
	B.	(i)	Explain the operation of 4-bit Synchronous counter with its logic diagram and truth table.	III	U	7
		(ii)	Explain the operation of serial in serial out (SISO) and parallel in serial out (PISO) shift register with neat diagram.	III	U	7
19.	A.	(i)	Explain the operation of R-2R ladder type digital to analog converter with neat diagrams.	IV	U	7
		(ii)	Explain the operation of Ramp type analog to digital converter with neat diagram	IV	U	7
			(or)			
	B.	(i)	Explain the operation of successive approximation type analog to digital converter with neat diagram.	IV	U	7
		(ii)	Draw the circuit diagram of astable multivibrator and explain its operation.	IV	U	7
20.	A.	(i)	Explain the operation of summing amplifier with neat diagram	V	U	7
		(ii)	Explain the operation of integrator with neat diagram.	V	U	7
			(or)			
	B.	(i)	Draw the circuit diagram of Schmitt trigger and explain its operation	V	U	7
		(ii)	Explain the operation of Instrumentation amplifier with neat diagram	V	U	7

MODEL QUESTION PAPER

6F3203 - MEASUREMENTS & INSTRUMENTS

Time: 3 Hrs **Max. Marks: 100**

PART-A

(10 x 03 = 30)

[Note : (1) Answer any 10 questions out of 15. (2) Each question carries 3 marks.]		**Unit**	**Bloom's Level**
1.	What is a secondary instrument?	I	R
2.	Define sensitivity.	I	U
3.	State the difference between accuracy and precision	I	U
4.	State the difference between spring control and gravity control.	II	U
5.	Mention the application of moving iron instruments.	II	U
6.	Why PMMC instruments are not suitable for AC measurement?	II	R
7.	What is Megger?	III	R
8.	What is earth tester?	III	R
9.	State the purpose of multiplier in the ammeter.	III	U
10.	List the errors present in energy meter	IV	U
11.	What is creeping in energy meter? How it is prevented?	IV	U
12.	What is instrument transformer?	IV	R
13.	What is the need for time base generator?	V	U
14.	Explain the purpose of horizontal amplifier?	V	U
15.	Mention the application of CRO	V	U

PART – B

(05 x 14 = 70)

[Note: (1) Answer all questions from 16 to 20 either A or B. (2) Each question carries 14 marks.]				**Unit**	**BT**	**Mark**
16.	A.	(i)	Compare analog and digital instrument.	I	U	7
		(ii)	Define the following terms. i) Resolution ii) Instrument efficiency	I	U	7
			(or)			
	B.	(i)	Explain the functional elements of measurement system with neat blockdiagram.	I	U	7

		(ii)	Compare different types of damping.	I	U	7
17.	A.	(i)	Compare attraction and repulsion type MI instrument.	II	U	7
		(ii)	Explain about PMMC instruments.	II	U	7
			(or)			
	B.	(i)	List the advantages and dis advantages of PMMC instrument.	II	U	7
		(ii)	Explain the moving iron instrument in detail with neat sketch	II	U	7
18.	A.	(i)	Explain about earth tester	III	U	7
		(ii)	Explain in detail the instrument transformer with neat sketch.	III	U	7
			(or)			
	B.	(i)	Write shot notes on multimeter.	III	U	7
		(ii)	How do you extend the range of ammeter?	III	U	7
19.	A.	(i)	Explain error present in energy meter?	IV	U	7
		(ii)	Explain about dynamometer type wattmeter?	IV	U	7
			(or)			
	B.	(i)	Draw the CT, PT connection diagram energy meter.	IV	U	7
		(ii)	Explain about single phase energy meter?	IV	U	7
20.	A.	(i)	How do you measure resistance using Wheatstone bridge?	V	U	7
		(ii)	Explain the working of function generator?	V	U	7
			(or)			
	B.	(i)	How do you measure capacitance using Schering bridge?	V	U	7
		(ii)	Explain the working of X-Y recorder?	V	U	7

MODEL QUESTION PAPER
6F4206 - INDUSTRIAL INSTRUMENTATION -1

Time: 3 Hrs **Max. Marks: 100**

PART-A

(10 x 03 = 30)

[Note : (1) Answer any 10 questions out of 15. (2) Each question carries 3 marks.]		**Unit**	**Bloom's Level**
1.	What is active transducer? Give examples.	I	R
2.	What is piezo electric effect?	I	R
3.	What is proximity sensor?	I	R
4.	What is load cell? List the types.	II	U
5.	What is proving ring?	II	R
6.	Define torque with its unit.	II	U
7.	Mention the types of pressure and write the unit of pressure.	III	U
8.	What is LVDT? Write the applications of LVDT.	III	U
9.	What is pirani gauge?	III	R
10.	What is see beck effect	IV	U
11.	What is pyrometer?	IV	R
12.	What is thermistor? List the types.	IV	R
13.	Define pH.	V	U
14.	Define viscosity.	V	U
15.	Define density	V	U

PART – B

(05 x 14 = 70)

[Note: (1) Answer all questions from 16 to 20 either A or B. (2) Each question carries 14 marks.]				**Unit**	**BT**	**Mark**
16.	A.	(i)	Explain the construction and working of inductive Transducer?	I	U	7
		(ii)	Explain the construction and working of resistive Transducer?	I	U	7
			(or)			
	B.	(i)	Explain the construction and working of any one active transducer?	I	U	7
		(ii)	Write a note on piezo electric transducer.	I	U	7

17.	A.	(i)	Explain with a neat diagram the construction and working of optical torsion meter?	II	U	7
		(ii)	Explain with a neat diagram the construction and working of strain gauge load cell?	II	U	7
			(or)			
	B.	(i)	Explain with a neat diagram the construction and working of proximity sensor for toque measurement.	II	U	7
		(ii)	Explain with a neat diagram the construction and working of eddy current tachometer.	II	U	7
18.	A.	(i)	Explain how the pressure is measured by using bourden tube?	III	U	7
		(ii)	Explain with a neat diagram the construction and working of well type manometer?	III	U	7
			(or)			
	B.	(i)	What is Dead weight tester? Explain its operation Explain with a neat diagram the construction and working of saybolt viscometer.	III	U	7
		(ii)	Explain how the pressure is measured by using pirani gauge?	III	U	7
19.	A.	(i)	Explain with a neat diagram the construction and working of Bi-metallic thermometer.	IV	U	7
		(ii)	Explain about Resistance Temperature Detector.	IV	U	7
			(or)			
	B.	(i)	Explain with necessary diagram how the temperature is measured in optical pyrometer.	IV	U	7
		(ii)	Explain with a neat diagram the construction and working of gas filled thermometer.	IV	U	7
20.	A.	(i)	Explain with a neat diagram the construction and working of photoelectric Hydrometer?	V	U	7
		(ii)	Explain with a neat diagram the construction and working of say bolt viscometer.	V	U	7
			(or)			
	B.	(i)	Explain with a neat diagram the construction and working of gas densitometer.	V	U	7
		(ii)	Explain with a neat diagram the construction and working of glass electrode for pH measurement?	V	U	7

MODEL QUESTION PAPER

6F4207- CONTROL SYSTEMS

Time: 3 Hrs **Max.Marks: 100**

PART-A

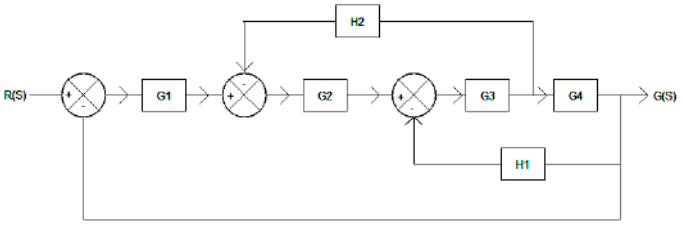
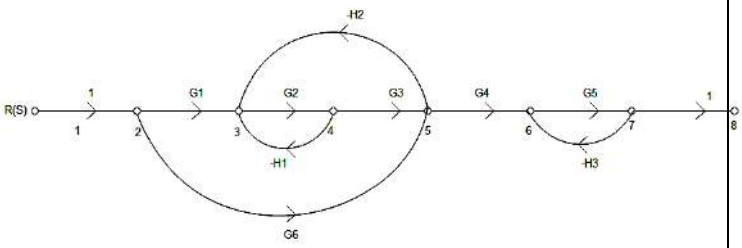
(10 x 03 = 30)

[Note : (1) Answer any 10 questions out of 15. (2) Each question carries 3 marks.]		**Unit**	**Bloom's Level**
1.	What is laplace transform of sinhwt?	I	R
2.	State initial value theorem.	I	U
3.	$L^{-1}\left[\frac{5}{s^2+25}\right]=?$	I	AP
4.	Write masoris gain formula.	II	U
5.	What is stepper motor?	II	R
6.	Define transfer function.	II	U
7.	Sketch the response of I order system for unit step input.	III	R
8.	List the standard test signals.	III	R
9.	Define time constant.	III	R
10.	Define corner frequency?	IV	U
11.	What is meant by polar plot?	IV	U
12.	What is meant by frequency response?	IV	U
13.	Define centroid.	V	U
14.	What is Routh's stability criterion?	V	U
15.	What is break away point in Root locus?	V	R

PART – B

(05 x 14 = 70)

[Note: (1) Answer all questions from 16 to 20 either A or B. (2) Each question carries 14 marks.]				**Unit**	**BT**	**Mark**
16.	A.	(i)	Find the inverse laplace transform of given function $F(S)=\frac{1}{S(S+5)(S+10)}$	I	AP	7
		(ii)	Draw the pole-zero plot for the given function $G(S)=\frac{2S(S+4)(S+2)}{S(S+3)(S+5)^2}$	I	AP	7
			(or)			

	B.	(i)	Find the laplace transform of the following function. $$F(t) = 10 + e^{-2t}\sin 5t$$	I	AP	7
		(ii)	Explain a closed loop control system with necessary diagram.	I	U	7
17.	A.	(i)	Obtain the transfer function RLC series circuit.	II	U	7
		(ii)	Reduce the given block diagram and find C(S)/R(S) 	II	AP	7
			(or)			
	B.	(i)	Explain the rules to be followed in block diagram reduction techniques.	II	AP	7
		(ii)	Find the overall transfer function (signal flow graph). 	II	AP	7
18.	A.	(i)	Obtain the response of I order system for unit step input.	III	U	7
		(ii)	Explain the time domain specification with necessary diagram.	III	U	7
			(or)			

	B.	(i)	For a unit feedback control system with a open loop transfer function $G(S) = \frac{10(S+2)}{S^2(S+1)}$ find the position, velocity and acceleration error constant	III	AP	7
		(ii)	Derive the response of critically damped second order system for unit setp input.	III	U	7
19.	A.	(i)	Explain the frequency domain specification.	IV	U	7
		(ii)	Sketch the bode plot for given function and obtain gain cross over frequency and phase cross over frequency $G(S) = \frac{10}{s(1+0.4s)(1+0.1s)}$	IV	AP	7
			(or)			
	B.	(i)	Explain phase margin and gain margin with necessary diagrams.	IV	U	7
		(ii)	Sketch the polar plot for the given open loop transfer function of a unity feedback system. $G(S) = \frac{1}{s(s+2)(1+2s)}$	IV	AP	7
20.	A.	(i)	Discuss the stability of the system with respect to the location of the roots in 'S' plane.	V	U	6
		(ii)	Determine the stability of the system whose characteristics equation is given by $9S^5 - 20S^4 + 10S^3 - S^2 - 9S - 10 = 0$.	V	AP	8
			(or)			
	B.	(i)	Sketch the root locus for the following open loop transfer function $G(S) = \frac{K}{S(S+1)(S+4)}$	V	AP	7
		(ii)	Explain the rules to be followed to construct the Root locus.	V	U	7

MODEL QUESTION PAPER

6F4303 - MICROCONTROLLER & ITS APPLICATIONS

Time: 3 Hrs **Max.Marks: 100**

PART-A

(10 x 03 = 30)

[Note : (1) Answer any 10 questions out of 15. (2) Each question carries 3 marks.]		**Unit**	**Bloom's Level**
1.	What is a program counter? Mention the size of internal RAM and ROM of 8051 microcontroller	I	U
2.	Explain PSW register with its bit format.	I	R
3.	How many I/O ports are available in microcontroller 8051 and mention the alternate functions of port 3	I	R
4.	Write the instructions used for external data transfer.	II	U
5.	Write an assembly to multiply two 8 bit numbers and store the result in external memory	II	AP
6.	Explain ORG, EQU and END assembler directives.	II	U
7.	Write a simple time delay subroutine.	III	AP
8.	Mention the different modes of operation of timer.	III	U
9.	Write an instruction to set timer 0 in mode 1 operation	III	AP
10.	What is the use of SBUF register? Name the pins used for serial communication in 8051 microcontroller.	IV	U
11.	How will you double the baud rate?	IV	U
12.	List the different types of interrupts available in 8051 microcontroller with its vector address	IV	R
13.	Define ADC and DAC.	V	R
14.	Draw the interfacing diagram of 4 x 4 matrix keyboard with 8051 microcontroller	V	AP
15.	Draw the interfacing diagram of DC motor with 8051 microcontroller	V	AP

PART – B

(05 x 14 = 70)

[Note: (1) Answer all questions from 16 to 20 either A or B. (2) Each question carries 14 marks.]				**Unit**	**BT**	**Mark**
16.	A.	(i)	Compare microprocessor and microcontroller	I	U	7
		(ii)	Explain the architecture of 8051 microcontroller with neat diagram.	I	U	7
			(or)			

	B.	(i)	Draw the structure of internal RAM and explain	I	U	7
		(ii)	Draw the pin details of 8051 microcontroller and explain the functions of each pin	I	U	7
17.	A.	(i)	Explain the rotate and swap instructions of 8051 microcontroller.	II	U	7
		(ii)	Explain the different addressing modes of 8051 microcontroller with one example	II	U	7
			(or)			
	B.	(i)	Explain MOV, MOVX and MOVC instructions with example.	II	U	7
		(ii)	Write an assembly language program to find the largest number in an array of data.	II	AP	7
18.	A.	(i)	Explain TMOD and TCON special function registers with their bit format.	III	U	7
		(ii)	Explain the different modes of operation of timer in 8051 microcontroller.	III	U	7
			(or)			
	B.	(i)	Write a simple assembly language program to operate timer 0 in mode 2.	III	AP	7
		(ii)	Write the steps involved in programming counter 0 in mode 1 operation.	III	U	7
19.	A.	(i)	Explain the function of 9 pin RS 232 standard with neat diagram.	IV	U	7
		(ii)	Write the steps involved in programming 8051 microcontroller to transfer data serially.	IV	U	7
			(or)			
	B.	(i)	Write the steps involved in programming 8051 microcontroller to receive data serially.	IV	U	7

		(ii)	Explain the Interrupt enable(IE) and interrupt priority(IP) special function registers with their bit formats	IV	U	7
20.	A.	(i)	Explain how to interface seven segment display with 8051 microcontroller with neat diagram.	V	AP	7
		(ii)	Draw the interfacing diagram of DAC with 8051 microcontroller and explain.	V	AP	7
			(or)			
	B.	(i)	Explain how to interface stepper motor with 8051 microcontroller with neat diagram.	V	AP	7
		(ii)	Explain how to interface temperature sensor LM35 with 8051 microcontroller with neat diagram.	V	AP	7

MODEL QUESTION PAPER

6F4401- E-VEHICLE TECHNOLOGY & ITS POLICY

Time: 3 Hrs **Max.Marks: 100**

PART - A Fifteen questions will be asked covering all the units. Three questions from each unit. Answer any ten questions. Each question carries 3 marks.

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. (7 + 7)

The questions are to be numbered from 1 to 25. All the units are to be covered with equal weightage.

PART – A	Short answer type questions Question Number 1 to 15	10 x 3 = 30 Marks
PART – B	Descriptive answer type questions (Either A or B) Question number 16 to 20	5 x 14 = 70 Marks
TOTAL		100 Marks

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

MODEL QUESTION PAPER

6F5210 - INDUSTRIAL INSTRUMENTATION - 2

Time: 3 Hrs **Max. Marks: 100**

PART-A

(10 x 03 = 30)

[Note : (1) Answer any 10 questions out of 15. (2) Each question carries 3 marks.]		**Unit**	**Bloom's Level**
1.	Define Reynolds's number	I	U
2.	What is meant by variable area flow meter?	I	U
3.	Define Bernoulli's theorem.	I	U
4.	How will you measure the flow rate of solids?	II	U
5.	What is the principle of operation of Electromagnetic flow meter?	II	U
6.	Define Doppler Effect.	II	U
7.	Give brief notes on laser level devices.	III	U
8.	Define specific Humidity.	III	U
9.	Define humidity and moisture.	III	U
10.	Give the applications of LASER in Industries.	IV	U
11.	Briefly explain the basic principle of length measurement.	IV	U
12.	What is meant by population inversion?	IV	R
13.	What are the considerations taken cares while grounding?	V	R
14.	What is the need for shielding?	V	R
15.	Define intrinsic safety.	V	R

PART – B

(05 x 14 = 70)

[Note: (1) Answer all questions from 16 to 20 either A or B. (2) Each question carries 14 marks.]				**Unit**	**BT**	**Mark**
16.	A.	(i)	Explain with a neat diagram the construction and working of Orifice flow meter.	I	U	7
		(ii)	Explain with a neat diagram the construction and working of Reciprocating piston flow meter.	I	U	7
			(or)			
	B.	(i)	Explain with a neat diagram the construction and working of nutating disc type flow meter.	I	U	7

		(ii)	Explain with a neat diagram the construction and working of venturi flow meter.	I	U	7
17.	A.	(i)	Explain with a neat diagram the construction and working of Electromagnetic Flow meter.	II	U	7
		(ii)	Explain with a neat diagram the construction and working of Hot wire anemometer.	II	U	7
			(or)			
	B.	(i)	Explain with a neat diagram the construction and working of Target flow meter.	II	U	7
		(ii)	Explain with a neat diagram the construction and working of turbine flow meter.	II	U	7
18.	A.	(i)	Explain how the level is measured by using Radiation method.	III	U	7
		(ii)	Explain in detail about hair hygrometer.	III	U	7
			(or)			
	B.	(i)	Explain in detail about the working of resistive hygrometer.	III	U	7
		(ii)	Explain how moisture is measured in granular material, wood and wood product and in textile.	III	U	7
19.	A.	(i)	Discuss on the different types of fibers and their properties.	IV	U	7
		(ii)	Describe the absorption losses in the fiber.	IV	U	7
			(or)			
	B.	(i)	Describe the fiber optic instrumentation system for the measurement of strain.	IV	U	7
		(ii)	Describe the method for the measurement of voltage using LASER technique.	IV	U	7
20.	A.	(i)	Explain about the concept of shielding.	V	U	7

		(ii)	Explain in detail about intrinsic safety.	V	U	7
			(or)			
	B.	(i)	Explain what are the factors to be considering while designing a intrinsically safe system.	V	U	7
		(ii)	Explain the techniques used to reduce explosion hazards.	V	U	7

MODEL QUESTION PAPER

6F5211- PROCESS CONTROL

Time: 3 Hrs **Max. Marks: 100**

PART-A

(10 x 03 = 30)

[Note : (1) Answer any 10 questions out of 15. (2) Each question carries 3 marks.]		**Unit**	**Bloom's Level**
1.	Define set point.	I	U
2.	What is meant by disturbance in a process?	I	R
3.	What is the function of comparator in a process control loop?	I	R
4.	What is meant by controller in a process?	II	R
5.	Define offset.	II	U
6.	Define Proportional Band.	II	U
7.	What is controller tuning?	III	R
8.	Define QADR.	III	U
9.	What is meant by IAE in controller tuning?	III	R
10.	What is meant by actuator?	IV	R
11.	What is Cv rating?	IV	R
12.	Draw the characteristics of Quick opening valve.	IV	U
13.	Define feedback.	V	U
14.	What is P&ID and draw some symbols.	V	R
15.	Draw the block diagram of ratio control.	V	U

PART – B

(05 x 14 = 70)

[Note: (1) Answer all questions from 16 to 20 either A or B. (2) Each question carries 14 marks.]				**Unit**	**BT**	**Mark**
16.	A.	(i)	Draw the block diagram of automatic process control system and explain the function of each element.	I	U	7
		(ii)	With a neat diagram explain the temperature control system.	I	U	7
			(or)			

	B.	(i)	Explain a liquid level control system with necessary diagrams.	I	U	7
		(ii)	Explain flow control system with lag and necessary diagrams.	I	U	7
17.	A.	(i)	What is differential gap? Explain the differential gap with an example.	II	U	7
		(ii)	Explain the working of proportional controller with diagram.	II	U	7
			(or)			
	B.	(i)	With a neat diagram. Explain the working of electronic PID controller.	II	U	7
		(ii)	Explain pneumatic PID controller with necessary diagrams.	II	U	7
18.	A.	(i)	Explain the criteria for controller tuning.	III	U	7
		(ii)	Explain open loop response method for controller tuning.	III	U	7
			(or)			
	B.	(i)	Explain Cohen-coon method of controller tuning.	III	U	7
		(ii)	Explain FOPDT model with an example.	III	U	7
19.	A.	(i)	Explain the working of current to pressure converter with neat diagram.	IV	U	7
		(ii)	With necessary diagrams, explain the operation of solenoid valve.	IV	U	7
			(or)			
	B.	(i)	Explain the cavitation and flashing in control valves.	IV	U	7

		(ii)	With necessary diagram explain the equal percentage control valve.	IV	U	7
20.	A.	(i)	With neat diagram explain the cascade control system.	V	U	7
		(ii)	Compare feed forward and feedback systems.	V	U	7
			(or)			
	B.	(i)	With necessary diagram explain the ratio control.	V	U	7
		(ii)	Draw a P&I Diagram for a simple level control system.	V	U	7

MODEL QUESTION PAPER

6F5212.1 - POWER PLANT INSTRUMENTATION

Time: 3 Hrs **Max. Marks: 100**

PART-A

(10 x 03 = 30)

[Note : (1) Answer any 10 questions out of 15. (2) Each question carries 3 marks.]		**Unit**	**Bloom's Level**
1.	What is a surge tank?	I	R
2.	What are the basic factors to be considered for the thermal power plant?	I	U
3.	What is Enriched uranium?	I	R
4.	What are the basic factors to be considered for feed water flow?	II	U
5.	Why flue gas analysis is used in power plant?	II	U
6.	What are the factors to be considered for choosing vibration sensors?	II	U
7.	What is excess air? What is the relationship between excess air and stoichiometric air?	III	U
8.	What is forced draft?	III	R
9.	Distinguish single point position control and parallel position control.	III	U
10.	Give the difference between impulse and reaction turbine.	IV	U
11.	What is the need for oil cooling system in turbines?	IV	U
12.	Compare liquid and solid fuel fired boilers.	IV	U
13.	State the working principle of solar PV cell.	V	R
14.	Classify the types of wind power plant.	V	U
15.	Compare impulse turbine and reaction turbine.	V	U

PART – B

(05 x 14 = 70)

[Note: (1) Answer all questions from 16 to 20 either A or B. (2) Each question carries 14 marks.]				**Unit**	**BT**	**Mark**
16.	A.	(i)	Distinguish between sub critical and super critical boiler	I	U	7
		(ii)	With a neat sketch explain the process of electric power generation ion in nuclear power plant	I	U	7
			(or)			
	B.	(i)	Explain on hydropower generation with neat	I	U	7

			sketch			
		(ii)	Describe the working of a typical thermal power plant with a suitable building block	I	U	7
17.	A.	(i)	Explain with a neat sketches capsule and bellow gauges.	II	U	7
		(ii)	Explain how flow rate is measure in power plant by using venturi flow meter	II	U	7
			(or)			
	B.	(i)	What is a boiler drum? Explain in detail measurement of drum level.	II	U	7
		(ii)	Summarize how do you measure the speed of a turbine and what are the control mechanisms required to maintain the optimum speed of the turbine?	II	U	7
18.	A.	(i)	Discuss about air / fuel ratio control	III	U	7
		(ii)	Explain the method of measurement of combustion air flow.	III	U	7
			(or)			
	B.	(i)	Discuss about steam temperature control in detail.	III	U	7
		(ii)	Discuss about the three element scheme of boiler drum level control	III	U	7
19.	A.	(i)	Explain in detail about the turbine governing system.	IV	U	7
		(ii)	Explain the control system employed for oil cooling system.	IV	U	7
			(or)			
	B.	(i)	Explain in detail about free governor mode of operation.	IV	U	7

		(ii)	With a neat block diagram explain turbine run up system.	IV	U	7
20.	A.	(i)	With neat sketches explain the process of converting solar energy into electrical energy	V	U	7
	B.	(i)	Discuss the characteristics of different wind mill types and their relative advantages	V	U	7
		(ii)	Explain the importance of instrumentation in power generation.	V	U	7

MODEL QUESTION PAPER

6F5212.2 - VLSI

Time: 3 Hrs **Max. Marks: 100**

PART-A

(10 x 03 = 30)

[Note : (1) Answer any 10 questions out of 15. (2) Each question carries 3 marks.]		**Unit**	**Bloom's Level**
1.	Define simulation.	I	R
2.	Expand VHDL.	I	R
3.	Give an example for combinational circuit.	I	R
4.	What is FPGA?	II	R
5.	Draw the circuit for NOT gate using CMOS.	II	R
6.	Draw the circuit for NAND gate using NMOS.	II	R
7.	Write the syntax for process statement.	III	R
8.	What are the different types of modeling?	III	R
9.	Write the VHDL code for AND gate.	III	U
10.	Write the VHDL code for Half subtractor.	IV	U
11.	Differentiate behavioral and structural model.	IV	U
12.	Write the VHDL code for D flipflop.	IV	U
13.	What is the difference between Ring counter and Johnson counter?	V	U
14.	Compare PROM, PAL and PLA.	V	U
15.	What are the types of ASIC?	V	R

PART – B

(05 x 14 = 70)

[Note: (1) Answer all questions from 16 to 20 either A or B. (2) Each question carries 14 marks.]				**Unit**	**BT**	**Mark**
16.	A.	(i)	Implement the following functions. a) Y= AB+CD b) y= (A+B).(C+D) using CMOS.	I	AP	7
		(ii)	Draw the circuit for AND, OR, NOT gate using NMOS and explain.	I	U	7
			(or)			
	B.	(i)	Draw the circuit for NAND, NOR, AND, OR gate	I	U	7

			using CMOS and explain.			
		(ii)	Explain the steps involved in VLSI design process.	I	U	7
17.	A.	(i)	Write a VHDL program for logic gates OR gate, NOT gate.	II	AP	7
		(ii)	Explain if statement, if else statement with example.	II	U	7
			(or)			
	B.	(i)	Write a VHDL program for logic gates NAND gate, NOR gate.	II	AP	7
		(ii)	Explain if, else if, else statement, case statement with example.	II	U	7
18.	A.	(i)	Write a VHDL program for 4 X 1 Multiplexer.	III	AP	7
		(ii)	Write a VHDL program for 2 X 4 decoder.	III	AP	7
			(or)			
	B.	(i)	Write a VHDL program for 1X 4 DeMultiplexer.	III	AP	7
		(ii)	Write a VHDL program for 4 X 2 encoder.	III	AP	7
19.	A.	(i)	Write a VHDL program for JK flipflop.	IV	AP	7
		(ii)	Write a VHDL program for D flipflop.	IV	AP	7
			(or)			
	B.	(i)	Write a VHDL program for Johnson counter.	IV	AP	7
		(ii)	Write a VHDL program for Decade counter.	IV	AP	7
20.	A.	(i)	Explain PLA with example.	V	U	7
		(ii)	Explain PAL with example.	V	U	7
			(or)			
	B.	(i)	Explain the architecture of FPGA.	V	U	7
		(ii)	Explain design flow of ASIC.	V	AP	7

MODEL QUESTION PAPER

6F5212.3 - EMBEDDED SYSTEMS

Time: 3 Hrs **Max. Marks: 100**

PART-A

(10 x 03 = 30)

[Note : (1) Answer any 10 questions out of 15. (2) Each question carries 3 marks.]		**Unit**	**Bloom's Level**
1.	Define embedded system.	I	R
2.	What is meant by ARM state?	I	R
3.	Expand VIC.	I	R
4.	What is meant by reentrancy?	II	U
5.	Compare RISC and CISC.	II	U
6.	Explain Pipe line.	II	R
7.	Compare ARM state and Thumb state instruction.	III	R
8.	Write the classification of instruction sets.	III	R
9.	What is meant by conditional execution?	III	U
10.	List the types of buses.	IV	R
11.	Give ARM 7 nomenclature.	IV	R
12.	List the registers of Pin connect block.	IV	U
13.	Give the registers of DAC.	V	R
14.	What is meant by Embedded OS?	V	R
15.	What is the use of event flag?	V	R

PART – B

(05 x 14 = 70)

[Note: (1) Answer all questions from 16 to 20 either A or B. (2) Each question carries 14 marks.]				**Unit**	**BT**	**Mark**
16.	A.	(i)	Draw and Explain the data flow model of ARM.	I	U	7
		(ii)	Explain the modes of operation of ARM.	I	U	7
			(or)			
	B.	(i)	Draw the block diagram of ARM based embedded system and explain.	I	U	7
		(ii)	Explain about exceptions.	I	U	7

17.	A.	(i)	Explain data processing instructions with examples.	II	U	7
		(ii)	Explain about software interrupt instruction set.	II	U	7
			(or)			
	B.	(i)	Explain Load store instructions with examples.	II	U	7
		(ii)	Explain about stack instructions.	II	U	7
18.	A.	(i)	Draw the block diagram of LPC2148 ARM controller.	III	U	7
		(ii)	Explain about VIC in detail.	III	U	7
			(or)			
	B.	(i)	Explain about memory map with detailed diagram.	III	U	7
		(ii)	What is meant by external interrupt? Explain in detail.	III	U	7
19.	A.	(i)	Draw the block diagram of Timer/ counter and explain its features.	IV	U	7
		(ii)	Describe the registers of GPIO.	IV	U	7
			(or)			
	B.	(i)	Draw the block diagram of PWM and explain its features.	IV	U	7
		(ii)	Explain the registers of UART0.	IV	U	7
20.	A.	(i)	What is scheduler? Explain pre-emptive scheduling.	V	U	7
		(ii)	Explain about foreground/background system.	V	U	7
			(or)			
	B.	(i)	What is mutual exclusion? Explain the semaphores in detail.	V	U	7
		(ii)	Explain about message queues.	V	U	7

MODEL QUESTION PAPER

6F5402 - ENTREPRENEURSHIP AND START UPS

Time: 1 Hour Max. Marks: 45

PART - A Fifteen questions will be asked covering all the units. Three questions from each unit. Answer any ten questions. Each question carries 3 marks.

PART- B Five questions will be asked Either or type. One question from every unit. Answer either A or B. Each question carries 15 marks. A and B have subdivisions. (7 + 7)

PART – A (45 marks)

ANSWER TEN QUESTIONS IN BRIEF (10 X 3=30)

1. Define entrepreneurship.
2. State the process of entrepreneurship
3. What are the benefits of being an entrepreneur?
4. How do entrepreneurs act as problem solvers?
5. Outline the role of networking in entrepreneurship.
6. List the various types of business
7. Outline the business model.
8. Suggest the various goals of business.
9. How selection of human resources is carried out?
10. Specify the role of government policy on entrepreneurship.

ANSWER THREE QUESTIONS IN DETAILS (3 X 5 = 15)

11. Describe the importance of innovation on entrepreneurship.
12. Enumerate the various incentive schemes for the central government.
13. How technology will play a major role in E- commerce?

PART – B (40 marks)

Practical Examination

Submission on Business Plan / Feasibility Report or Report on Unit 4 & 5

PART - C (15 marks)

Viva Voce

MODEL QUESTION PAPER

6F6215 - INDUSTRIAL AUTOMATION

Time: 3 Hrs **Max. Marks: 100**

PART-A

(10 x 03 = 30)

[Note : (1) Answer any 10 questions out of 15. (2) Each question carries 3 marks.]		**Unit**	**Bloom's Level**
1.	What are Industrial drives?	I	R
2.	What is Stator of a Motor?	I	R
3.	What is Rotor of a Motor?	I	R
4.	What is Pneumatic system?	II	R
5.	What is FRL in Pneumatic system?	II	R
6.	What is Hydraulic system?	II	R
7.	What is PLC?	III	R
8.	What is the role of Relays in PLC?	III	R
9.	What is Relay Ladder Logic in PLC?	III	R
10.	What is Distributed control system?	IV	R
11.	What is operator interface in DCS?	IV	R
12.	What is engineering interface in SCADA?	IV	R
13.	What is Internet of Things?	V	R
14.	What is IIOT?	V	R
15.	What is Application Programming Interface in IOT?	V	R

PART – B

(05 x 14 = 70)

[Note: (1) Answer all questions from 16 to 20 either A or B. (2) Each question carries 14 marks.]				**Unit**	**BT**	**Mark**
16.	A.	(i)	Explain the working principle of Electric Motor with neat diagram	I	U	7
		(ii)	Explain the working principle of Stepper Motor with neat diagram	I	U	7
			(or)			
	B.	(i)	Explain the working principle of Hybrid Motor with neat diagram	I	U	7

		(ii)	Explain the working principle of Servo Motor with neat diagram	I	U	7
17.	A.	(i)	Explain the operation of power source preparation system in pneumatic system	II	U	7
		(ii)	Explain the application of pneumatic system in various industries.	II	U	7
			(or)			
	B.	(i)	Explain the working principle of Double acting Cylinder with neat diagram	II	U	7
		(ii)	Explain the working principle of Pressure relief valve with neat diagram	II	U	7
18.	A.	(i)	Explain the architecture of PLC with neat diagram	III	U	7
		(ii)	Explain the operation of various Logic functions used in PLC programming	III	U	7
			(or)			
	B.	(i)	List out the various PLC Manufacturers	III	U	7
		(ii)	Explain the applications of PLC in various Industries	III	U	7
19.	A.	(i)	Explain the architecture of DCS with neat diagram	IV	U	7
		(ii)	List out the various DCS Manufacturers	IV	U	7
			(or)			
	B.	(i)	Explain the applications of DCS in various Industries	IV	U	7
		(ii)	Explain the advantages of DCS over PLC	IV	U	7
20.	A.	(i)	Explain the architecture of SCADA with neat	V	U	7

			diagram			
		(ii)	List out the various SCADA Manufacturers	V	U	7
			(or)			
	B.	(i)	Explain the applications of SCADA in various Industries	V	U	7
		(ii)	Explain the advantages of SCADA over DCS	V	U	7

MODEL QUESTION PAPER

6F6305 - INDUSTRIAL ELECTRONICS

Time: 3 Hrs **Max. Marks: 100**

PART-A

(10 x 03 = 30)

[Note : (1) Answer any 10 questions out of 15. (2) Each question carries 3 marks.]		**Unit**	**Bloom's Level**
1.	Draw the symbols of DIAC & TRIAC	I	R
2.	Give the abbreviation of SUS, SCS, and SBS	I	R
3.	What is latching current?	I	R
4.	What is meant by natural commutation?	II	R
5.	Classify the commutations	II	U
6.	What is meant by commutation?	II	R
7.	Draw the single phase fully controlled bridge rectifier with RL load.	III	R
8.	What is meant by phase control?	III	R
9.	What is a converter?	III	R
10.	What are the two basic inverters?	IV	R
11.	Give concept of basic parallel inverter.	IV	U
12.	What is Inverter?	IV	R
13.	What is cyclo converter?	V	R
14.	What is meant by step down chopper?	V	U
15.	What is chopper?	V	R

PART – B

(05 x 14 = 70)

[Note: (1) Answer all questions from 16 to 20 either A or B. (2) Each question carries 14 marks.]				**Unit**	**BT**	**Mark**
16.	A.	(i)	Explain the working operation of SCR with its VI characteristics	I	U	7
		(ii)	Explain the following operation with its VI characteristics of IGBT	I	U	7
			(or)			
	B.	(i)	Explain the working operation of DIAC with its VI characteristics.	I	U	7

		(ii)	Explain the working operation of TRIAC with its VI characteristics.	I	U	7
17.	A.	(i)	Explain the thermal triggering and radiation triggering of Thyristor	II	U	7
		(ii)	List the different methods of forced commutation and explain Class C and Class D commutation	II	U	7
			(or)			
	B.	(i)	Draw the circuit diagram of Pedestal and Ramp triggering and explain its operation.	II	U	7
		(ii)	Draw the circuit diagram of Ramp and pedestal UJT triggering and explain its Operation	II	U	7
18.	A.	(i)	Explain single phase Fully controlled Rectifier with RL Load with suitable diagrams.	III	U	7
		(ii)	Explain 3 phase fully controlled bridge rectifier with R load with suitable diagrams	III	U	7
			(or)			
	B.	(i)	Explain 1ϕ half controlled rectifier with RL load with suitable diagrams	III	U	7
		(ii)	Explain 3ϕ half wave controlled rectifier with R load with suitable diagrams	III	U	7
19.	A.	(i)	Draw the circuit diagram of Bedford Half bridge inverter and explain	IV	U	7
		(ii)	Explain 3 phase bridge inverter with 180^0 conduction mode.	IV	U	7
			(or)			
	B.	(i)	Draw the circuit diagram of McMurray inverter and explain	IV	U	7
		(ii)	Explain 3 phase bridge inverter with 120^0	IV	U	7

			conduction mode.			
20.	A.	(i)	Explain the Jones with neat diagrams.	V	U	7
		(ii)	Explain 3 phase to 3 phase cyclo converter with circuit diagram.	V	U	7
			(or)			
	B.	(i)	Explain the Morgans with neat diagrams.	V	U	7
		(ii)	Explain single phase to single phase cyclo converter with circuit diagram.	V	U	7

MODEL QUESTION PAPER

6F6216.1 - BIO-MEDICAL INSTRUMENTATION

Time: 3 Hrs **Max. Marks: 100**

PART-A

(10 x 03 = 30)

[Note : (1) Answer any 10 questions out of 15. (2) Each question carries 3 marks.]		**Unit**	**Bloom's Level**
1.	What is depolarization?	I	U
2.	What is Bio-potential electrode?	I	R
3.	Define Half-cell potential	I	R
4.	What are the lead configurations available in ECG	II	U
5.	What is heart sound?	II	R
6.	What is Evoked potential?	II	U
7.	List the types of pacemaker batteries.	III	U
8.	What is meant by prosthetic valve?	III	R
9.	What is the purpose of a heart lung machine?	III	R
10.	List the medical application of laser.	IV	U
11.	What is CT? What are its applications?	IV	R
12.	What are the different artifacts produced during CT imaging	IV	U
13.	What are the uses of biotelemetry?	V	U
14.	What is meant by let-go current?	V	U
15.	What are the important aspects of hospital architecture	V	U

PART – B

(05 x 14 = 70)

[Note: (1) Answer all questions from 16 to 20 either A or B. (2) Each question carries 14 marks.]				**Unit**	**BT**	**Mark**
16.	A.	(i)	Explain about Bio-Potential Electrodes.	I	U	7
		(ii)	Explain about the indirect method of blood pressure measurement	I	U	7
			(or)			
	B.	(i)	Explain in detail about body and skin temperature measurement.	I	U	7

		(ii)	Explain Doppler Effect method of blood flow measurement.	I	U	7
17.	A.	(i)	Draw the block diagram of EEG recording setup and explain the working of each block	II	U	7
		(ii)	Explain how the conduction velocity is measured in motor nerves.	II	U	7
			(or)			
	B.	(i)	Draw the block diagram of ECG recording setup and explain the working of each block	II	U	7
		(ii)	Explain about the working and measuring procedure of Bekesy audiometer	II	U	7
18.	A.	(i)	Explain about pacemaker batteries.	III	U	7
		(ii)	Differentiate internal and external pacemaker.	III	U	7
			(or)			
	B.	(i)	Explain with a neat diagram the working of peritoneal dialysis.	III	U	7
		(ii)	Draw and explain the block diagram of heart lung machine.	III	U	7
19.	A.	(i)	Explain about photo thermal and photo chemical applications of LASER	IV	U	7
		(ii)	Draw and explain about X-Ray Tube.	IV	U	7
			(or)			
	B.	(i)	Explain about MRI Instrumentation	IV	U	7
		(ii)	Explain in detail about Computer axial tomography.	IV	U	7

20.	A.	(i)	Define Bio-telemetry. Explain the importance of biotelemetry in the modern world.	V	U	7
		(ii)	Explain what are the problems arises during the designing and implanting the biotelemetry system	V	U	7
			(or)			
	B.	(i)	What are the physiological effects due to 50 Hz current passage?	V	U	7
		(ii)	Explain what are the designing considerations taken cares while designing a bio telemetry system?	V	U	7

MODEL QUESTION PAPER

6F6216.2 - ROBOTICS AND AUTO ELECTRONICS

Time: 3 Hrs **Max. Marks: 100**

PART-A

(10 x 03 = 30)

[Note : (1) Answer any 10 questions out of 15. (2) Each question carries 3 marks.]		**Unit**	**Bloom's Level**
1.	Mention the advantages of pulse transformer used in trigger circuit.	I	U
2.	Define flywheel diode and mention its types.	I	U
3.	Define Inverter and mention its uses.	I	U
4.	What is Robotics?	II	R
5.	State the applications of MOSFET,GTO and IGBT.	II	U
6.	Explain AC gate signal triggering.	II	U
7.	State the importance of flywheel diode.	III	U
8.	Define chopper and mention its uses.	III	R
9.	Explain natural commutation.	III	U
10.	Mention the various types of SMPS.	IV	U
11.	Compare ON line UPS and OFF line UPS.	IV	U
12.	State the features of PLC.	IV	U
13.	Draw the various types of symbols used in ladder logic diagram.	V	R
14.	Write about Basic building blocks of Robot.	V	U
15.	Write short note on Robot sensor.	V	R

PART – B

(05 x 14 = 70)

[Note: (1) Answer all questions from 16 to 20 either A or B. (2) Each question carries 14 marks.]				**Unit**	**BT**	**Mark**
16.	A.	(i)	Explain opto isolator.	I	U	7
		(ii)	Explain RC full wave firing circuit.	I	U	7
			(or)			
	B.	(i)	Explain the operation of IGBT with neat diagram.	I	U	7
		(ii)	With the diagram explain synchronized UJT	I	U	7

			triggering circuit.			
17.	A.	(i)	With the diagram explain the operation of single phase fully Controlled bridge converter with resistive load.	II	U	7
		(ii)	Explain commutation circuits.	II	U	7
			(or)			
	B.	(i)	With the diagram explain the operation of Jones chopper.	II	U	7
		(ii)	Explain the principles of operation of DC chopper with diagram.	II	U	7
18.	A.	(i)	Explain the various types of output voltage control used in inverters.	III	U	7
		(ii)	Explain the various types of battery banks.	III	U	7
			(or)			
	B.	(i)	Draw the block diagram of ON line UPS and explain it.	III	U	7
		(ii)	Draw the block diagram of SMPS and explain each block.	III	U	7
19.	A.	(i)	Explain the various types of arithmetic functions used in PLC.	IV	U	7
		(ii)	Draw and Explain the ladder diagram for conveyor control.	IV	U	7
			(or)			
	B.	(i)	Explain the ladder diagram of star-delta starter.	IV	U	7
		(ii)	Draw and Explain the block diagram of PLC.	IV	U	7
20.	A.	(i)	Explain the working of Robot with necessary block diagram.	V	U	7
		(ii)	Explain the working of Electric motors and its types with neat sketch.	V	U	7
			(or)			
	B.	(i)	Explain the working of Robot sensor with neat sketch.	V	U	7
		(ii)	How sensors and actuators are being used to create self-driven vehicles.	V	U	7

MODEL QUESTION PAPER

6F6216.3 - FIBER OPTICS & LASER INSTRUMENTATION

Time: 3 Hrs **Max. Marks: 100**

PART-A

(10 x 03 = 30)

[Note : (1) Answer any 10 questions out of 15. (2) Each question carries 3 marks.]		**Unit**	**Bloom's Level**
1.	Define attenuation.	I	U
2.	What is acceptance angle?	I	R
3.	Define numerical aperture.	I	U
4.	What is fibre bend loss?	II	R
5.	State the advantages of optic fibre.	II	U
6.	Mention the applications of fibre optic sensor.	II	U
7.	Define Moire fringes.	III	U
8.	List the types of LEDs.	III	R
9.	What are the properties of LASER?	III	R
10.	What is cavity damping?	IV	U
11.	What is LASER heating?	IV	U
12.	Define Vaporization.	IV	U
13.	What are holographic components?	V	R
14.	List the medical applications of LASER.	V	R
15.	What is mean by bio sensors?	V	R

PART – B

(05 x 14 = 70)

[Note: (1) Answer all questions from 16 to 20 either A or B. (2) Each question carries 14 marks.]				**Unit**	**BT**	**Mark**
16.	A.	(i)	Explain step and Graded index fibre.	I	U	7
		(ii)	Write a note on intrinsic and extrinsic absorption.	I	U	7
			(or)			
	B.	(i)	Discuss linear and non-linear scattering.	I	U	7

		(ii)	Explain the characteristics of optical sources and detectors.	I	U	7
17.	A.	(i)	Describe the fibre optic instrumentation system for the measurement of strain.	II	U	7
		(ii)	Explain different types of modulators used in fiber optic instrumentation system.	II	U	7
			(or)			
	B.	(i)	Explain the principle of interferometric method of measurement of length.	II	U	7
		(ii)	Explain the method of measurement of temperature using fibre optic sensors.	II	U	7
18.	A.	(i)	Describe LASER modes.	III	U	7
		(ii)	Explain Q-switching and Mode locking.	III	U	7
			(or)			
	B.	(i)	With neat diagram explain the working of liquid and semiconductor laser.	III	U	7
19.	A.	(i)	Describe the method for the measurement of Acceleration	IV	U	7
		(ii)	Describe the method for the measurement of Current	IV	U	7
			(or)			
	B.	(i)	Explain the industrial application of LASER in material processing.	IV	U	7
20.	A.	(i)	Discuss holography for non-destructive testing.	V	U	7
		(ii)	Describe the LASER instruments for surgery and removal of tumors of vocal cards.	V	U	7
			(or)			
	B.	(i)	Explain holography in detail.	V	U	7
		(ii)	Explain the medical applications of LASER in gynecology and oncology.	V	U	7