SYLLABUS

DIPLOMA IN INSTRUMENTATION AND CONTROL ENGINEERING

Course Code: 1042

2011-2012

L - SCHEME

DIRECTORATE OF TECHNICAL EDUCATION
GOVERNMENT OF TAMILNADU

DIPLOMA COURSES IN ENGINEERING/TECHNOLOGY
(SEMESTER SYSTEM)
(Implemented from 2011- 2012)
L – SCHEME

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

* *Applicable to the Diploma Courses other than Diploma in Hotel Management & Catering Technology and the Diploma Courses offered through MGR Film Institute, Chennai.*

1. Description of the Course:

a. Full Time (3 years)

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

b. Sandwich (3½ years)

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

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

c. Part Time (4 years)

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

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

The Curriculum for all the 6 Semesters of Diploma courses (Engineering & Special Diploma Courses viz. Textile Technology, Leather Technology, Printing Technology, Chemical Technology etc.) have been revised and revised curriculum is applicable for the candidates admitted from 2011 – 2012 academic year onwards.

2. Condition for Admission:

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

(Or)

The Anglo Indian High School Examination with eligibility for Higher Secondary Course in Tamilnadu

(Or)

The Matriculation Examination of Tamil Nadu.

(Or)

Any other Examinations recognized as equivalent to the above by the Board of Secondary Education, Tamilnadu.

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

3. Admission to Second year (Lateral Entry):

A pass in HSC (Academic)# or (Vocational) courses mentioned in the Higher Secondary Schools in TamilNadu affiliated to the TamilNadu Higher Secondary Board with eligibility for university Courses of study or equivalent examination, & Should have studied the following subjects

Sl. No	Courses	H.Sc Academic	H.Sc Vocational	
		Subjects Studied	Subjects Studied	
			Related subjects	Vocational subjects
1.	All the Regular and Sandwich Diploma Courses	Maths, Physics & Chemistry	Maths / Physics / Chemistry	Related Vocational Subjects Theory & Practical
2.	Diploma Course in Modern Office Practice	English & Accountancy English & Elements of Economics English & Elements of Commerce	English & Accountancy, English & Elements of Economics, English & Management Principles & Techniques, English & Typewriting	Accountancy & Auditing, Banking, Business Management, Co-operative Management, International Trade, Marketing & Salesmanship, Insurance & Material Management, Office Secretary ship.

Subject to the approval of the AICTE

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

- Branch will be allotted according to merit through counseling by the respective Principal as per communal reservation.

- For admission to the Textile Technology, Leather Technology, Printing Technology, Chemical Technology and Modern Office Practice Diploma courses the candidates studied the related subjects will be given first preference.

- *Candidates who have studied Commerce Subjects are not eligible for Engineering Diploma Courses.*

4. Age Limit:No Age limit.

5. Eligibility for the Award of Diploma:

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

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

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

6.   Subjects of Study and Curriculum outline:

The subjects of study shall be in accordance with the syllabus prescribed from time to time, both in theory and practical subjects. The curriculum outline is given in Annexure **- I**

7.   Examinations:

Board Examinations in all subjects of all the semesters under the scheme of examinations will be conducted at the end of each semester.
The internal assessment marks for all the subjects will be awarded on the basis of continuous internal assessment earned during the semester concerned.   For each subject 25 marks are allotted for internal assessment and 75 marks are allotted for Board Examination.

8.   Continuous Internal Assessment:

A. For Theory Subjects:
The Internal Assessment marks for a total of 25 marks, which are to be distributed as follows:

i) Subject Attendance   5 Marks

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

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

ii) Test #   10 Marks

2 Tests each of 2 hours duration for a total of 50 marks are to be conducted. Out of which the best one will be taken and the marks to be reduced to: 05 marks

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

Total   10 marks

TEST	UNITS	WHEN TO CONDUCT	MARKS	DURATION
Test I	Unit – I & II	End of 6th week	50	2 Hrs
Test II	Unit – III & IV	End of 12th week	50	2 Hrs
Test III	**Model Examination** - **Compulsory** Covering all the 5 Units. (Board Examinations-question paper-pattern).	End of 16th week	75	3 Hrs

 # - From the Academic year 2011-2012 onwards.

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

        14 Questions X 1 mark   … …   14 marks

        6 Questions X 6 marks ⎤   … …   36 marks

(OR)   3 Questions X 12 marks ⎦   ----------

                Total   50 marks
                                        ----

iii) Assignment   10 Marks

For each subject Three Assignments are to be given each for 20 marks and the average marks scored should be reduced for 10 marks

All Test Papers and Assignment notebooks after getting the signature with date from the students must be kept in the safe custody in the Department for verification and audit. It should be preserved for 2 Semesters 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 Record for every completed exercise should be submitted in the subsequent Practical classes and marks should be awarded for 20 for each exercise as per the above allocation.
- At the end of the Semester, the average marks of all the exercises should be calculated for 20 marks and the marks awarded for attendance is to be added to arrive at the internal assessment mark for Practical. (20+5=25 marks)
- The students have to submit the duly signed bonafide record note book/file during the Practical Board Examinations.
- *All the marks awarded for assignments, Tests and attendance should be entered in the Personal Log Book of the staff, who is handling the subject. This is applicable to both Theory and Practical subjects.*

9.   Communication and Life Skills Practical:

The Communication and Life Skills Practical with more emphasis is being introduced in IV Semester for Circuit Branches and in V Semester for other branches of Engineering. Much Stress is given on:
- ❖   Monodic Communication
- ❖   Dyadic Communication
- ❖   Professional Communication
- ❖   Pronunciation
- ❖   Writing Resumes
- ❖   Interview Techniques

Internal Assessment Mark   **…..   25 Marks**

10.   Project Work:

The students of all the Diploma Courses **(except Diploma in Modern Office Practice)** have to do a Project Work as part of the Curriculum and in partial fulfillment for the award of Diploma by the State Board of Technical Education and Training, Tamilnadu. In order to encourage students to do worthwhile and innovative projects, every year prizes are awarded for the best three projects i.e. institution wise, region wise and state wise. **The Project work must be reviewed twice in the same semester.**

a) Internal assessment mark for Project Work & Viva Voce:

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 to be maintained for the two Project Reviews, and It should be preserved for 2 Semesters and produced to the flying squad and the inspection team at the time of inspection/verification.

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

Viva Voce	…	**25 marks**
Demonstration/Presentation	…	**20 marks**

Total	…	**45 marks**
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c) Written Test Mark (from 3 topics for 1 hour duration): $

i) Entrepreneurship	5 questions X 2 marks	=	**10 marks**
ii)Environment Management	5 questions X 2 marks	=	**10 marks**
iii)Disaster Management	5 questions X 2 marks	=	**10 marks**
			-----
			30 marks

$ **-** Selection of Questions should be from Question Bank, by the External Examiner. No choice need be given to the candidates.

Project Work & Viva Voce in Board Examination	--	**45 Marks**
Written Test Mark (from 3 topics for 1 hour duration)	--	**30 Marks**
TOTAL	--	**75 Marks**

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

11. Scheme of Examinations:

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

12. Criteria for Pass:

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

2. A candidate shall be declared to have passed the examination in a subject if he/she secures not less than *40% in theory subjects* and *50% in practical subjects* out of the total prescribed maximum marks including both the Internal Assessment and the Board Examinations marks put together, subject to the condition that he/she secures at least a minimum of *30 marks out of 75 marks in the Board Theory Examinations and a minimum of 35 marks out of 75 marks in the Board Practical Examinations.*

13. Classification of successful candidates:

Classification of candidates who passed out the final examinations from April 2014 onwards (Joined in first year in 2011-2012) will be done as specified below.

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 semesters put together except I and II semesters and passes all the above semesters in the first appearance itself and completes all subjects including that of I & II semesters within the stipulated period of study 3/ 3½/ 4 years (Full Time/Sandwich/Part Time) without any break in study.

First Class:

A candidate will be declared to have passed in **First Class** if he/she secures not less than 60% of the aggregate marks in all semesters put together except I & II semesters and completes all subjects including that of the I & II semesters within the stipulated period of study 3/ 3½ / 4 years (Full Time/Sandwich/Part Time) without any break in study.

Second Class:

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

The above mentioned classifications are also applicable for the Sandwich / Part-Time students who passed out Final Examination from October 2014 /April 2015 onwards (both joined in First Year in 2011-2012)

14. Duration of a period in the Class Time Table:

The duration of each period of instruction is1 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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Chairperson

Thiru. Ramesh Chand Meena, I.A.S

Commissioner of Technical Education
Directorate of Technical Education
Chennai 600 025

Co-ordinator
Dr. K. Sundaramoorthy Ph.D,
Principal,
Central Polytechnic College
Chenai – 113

Convener
Tmt. J.Rama,
Lecturer (Selection Grade)
Government Polytechnic College
Purasawalkam, Chennai – 12

Members

1) Tmt. Manjula S
   Head of Department,
   Instrumentation & Control Engg
   GRG Polytechnic College,
   Coimbatore

2) Thiru Sankaran E,
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   VLB Janaki Ammal Polytechnic College,
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5) Tmt. Parvathy, P
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6) Dr. K.Padmanaban,
   Former HOD.,
   Central Instrumentation & Servicing Lab.,
   University of Madras., Chennai.

7) Dr. S. Dhanasekaran,.,
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   NITTTR, Chennai.

8) Thiru Vijayarajeswaran M.E.,
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   Intech Systems Chennai (pvt).,
   S/2, Thiru. Vi. Ka Industrial Estate.,
   Guindy, Chennai – 2

THIRD SEMESTER

SUBJECT CODE	SUBJECT	HOURS PER WEEK			
		Theory Hours	Tutorial/ Drawing	Practical Hours	Total Hours
24031	Electronic devices and circuits #	5			5
24232	Electrical circuits and machines	5			5
24233	Basics of Instrumentation	5			5
24234	Electrical and Electronics Practical			5	5
24235	Basics of Instrumentation Practical			5	5
25236	C Programming Practical @			6	6
20001	Computer Application Practical*			4	4
	TOTAL	15		20	35

FOURTH SEMESTER

SUBJECT CODE	SUBJECT	HOURS PER WEEK			
		Theory Hours	Tutorial/ Drawing	Practical Hours	Total Hours
24241	Analog and Digital Electronics	5			5
24242	Measurements and Instruments	4			4
24243	Measurement of Process variables	5			5
24244	Industrial Instrumentation	5			5
24245	Analog and Digital Electronics Practical			6	6
24246	Measurement of Process variables Practical			6	6
20002	Communication & Life Skill Practical *			4	4
	TOTAL	19		16	35

Common with ECE
@ Common with Computer Engineering

Common with all the Branches

FIFTH SEMESTER

SUBJECT CODE	SUBJECT	HOURS PER WEEK			
		Theory	Tutorial/ Drawing	Practical Hours	Total
24251	Process Control Instrumentation	5			5
24052	Microcontroller #	5			5
24253	Control Engineering	5			5
	Elective I				
24271	1.Instrumentation System Design	5			5
24272	2. .Embedded Systems	5			5
24273	3.Industrial Power Electronics	5			5
24255	Process Control Instrumentation Practical			5	5
24256	Microcontroller Practical			5	5
24057	LabVIEW & Matlab			5	5
	Total	20		15	35

SIXTH SEMESTER

SUBJECT CODE	SUBJECT	HOURS PER WEEK			
		Theory	**Tutorial/ Drawing**	**Practical Hours**	**Total**
24261	Industrial Process Control Instrumentation	5			5
24262	Industrial Automation and Drives	5			5
	Elective II				
24281	1.Bio Medical Instrumentation	5			5
24763	2 Robotics and Auto Electronics $	5			5
24283	3.Mechatronics	5			5
24264	Industrial Automation Practical			5	5
24265	P & I Drawing using CAD Practical			5	5
24266	Programmable Logic Controller Practical			5	5
24267	Project Work			5	5
	Total	15		20	35

Common with ECE

$ Common with Electronics(ROBOTICS)

* Common with all the Branches

ANNEXURE- II
SCHEME OF THE EXAMINATION

THIRD SEMESTER

| SUBJECT CODE | SUBJECT | Examination Marks | | | Minimum for pass | Duration of Exam Hours |
		Internal assess-ment marks	Board Exam Marks	Total Mark		
24031	Electronic devices and circuits	25	75	100	40	3
24232	Electrical circuits and machines	25	75	100	40	3
24233	Basic of Instrumentation	25	75	100	40	3
24234	Electrical and Electronics Practical	25	75	100	50	3
24235	Basics of Instrumentation Practical	25	75	100	50	3
25236	C Programming Practical	25	75	100	50	3
20001	Computer Application Practical	25	75	100	50	3
	TOTAL	**175**	**525**	**700**		

FOURTH SEMESTER

| SUBJECT CODE | SUBJECT | Examination Marks | | | Minimum for pass | Duration of Exam Hours |
		Internal assess-ment marks	Board Exam Marks	Total Mark		
24241	Analog and Digital Electronics	25	75	100	40	3
24242	Measurements and Instruments	25	75	100	40	3
24243	Measurement of Process variables	25	75	100	40	3
24244	Industrial Instrumentation	25	75	100	40	3
24245	Analog and Digital Electronics Practical	25	75	100	50	3
24246	Measurement of Process variables Practical	25	75	100	50	3
20002	Communication and Life Skill Practical	25	75	100	50	3
	TOTAL	**175**	**525**	**700**		

FIFTH SEMESTER

SUBJECT CODE	SUBJECT	Examination Marks			Minimum for pass	Duration of Exam Hours
		Internal assess-ment marks	Board Exam Marks	Total Mark		
24251	Process Control Instrumentation	25	75	100	40	3
24052	Microcontroller	25	75	100	40	3
24253	Control Engineering	25	75	100	40	3
	Elective I					
24271	1. Instrumentation System Design	25	75	100	40	3
24272	2. Embedded Systems	25	75	100	40	3
24273	3. Industrial Power Electronics	25	75	100	40	3
24255	Process Control Instrumentation Practical	25	75	100	50	3
24256	Microcontroller Practical	25	75	100	50	3
24057	labVIEW&Matlab	25	75	100	50	3
	Total	**175**	**525**	**700**		

SIXTH SEMESTER

SUBJECT CODE	SUBJECT	Examination Marks			Minimum for pass	Duration of Exam Hours
		Internal assess-ment marks	Board Exam Marks	Total Mark		
24261	Industrial Process Control Instrumentation	25	75	100	40	3
24262	Industrial Automation and Drives	25	75	100	40	3
	Elective II					
24281	1. Bio Medical Instrumentation	25	75	100	40	3
24763	2.Robotics and Auto electronics	25	75	100	40	3
24283	2. Mechatronics	25	75	100	40	3
24264	Industrial Automation Practical	25	75	100	50	3
24265	P & I Drawing using CAD Practical	25	75	100	50	3
24266	Programmable Logic Controller Practical	25	75	100	50	3
24267	Project Work	25	75	100	50	3
	Total	175	525	700		

III SEMESTER

DIPLOMA IN INSTRUMENTATION AND CONTROL ENGINEERING

L - SCHEME

2011 - 2012

DIRECTORATE OF TECHNICAL EDUCATION
GOVERNMENT OF TAMILNADU

L-SCHEME

(Implemented from the Academic year 2011-2012 onwards)

Course Name : DIPLOMA IN INSTRUMENTATION AND CONTROL ENGINEERING
Course Code : 1042
Subject code : **24031**
Semester   : III Semester
Subject title   : **ELECTRONIC DEVICES & CIRCUITS**

TEACHING AND SCHEME OFEXAMINATION:

Number of Weeks/ Semester   :   16 weeks

Subject Title	Instruction		Examination			
	Hrs. Week	Hrs Semester	Marks			Duration
			Internal Assessment	Board Examination	Total	
Electronic Devices and Circuits	5	80	25	75	100	3Hrs

Topics and allocation of hours

UNIT	TOPIC	TIME(HRS)
I	Semiconductor and Diodes	14
II	Bipolar Junction Transistor	14
III	Transistor oscillators and FET and UJT	15
IV	SCR,DIAC,TRIAC,MOSFET and IGBT	13
V	Opto Electronic Devices and Wave shaping Circuits	14
	Revision and test	10
	Total	80

RATIONALE:

Every Electronics Engineer should have sound knowledge about the components used in Electronics Industry. This is vital in R&D Department for chip level troubleshooting. To meet the industrial needs, diploma holders must be taught about the most fundamental subject, Electronic devices and Circuits. By studying this subject, they will be skilled in handling all types of electronic devices and able to apply the skill in electronics system

OBJECTIVES:

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

Study the working principle of PN junction diode and transistor

Understand the working principle of different types of rectifiers

Understand the different transistor configurations

Differentiate various types of amplifiers

Study the performance of special devices like UJT, FET

Study the performance of different transistor oscillators

Study the performance of SCR, DIAC, and TRIAC

Study the performance of MOSFET and IGBT

Know the construction and working principle of optoelectronic devices

Study the performance of solar cell

Explain the concept of wave shaping circuits

Study the working principle of clippers and clampers

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24031 ELECTRONIC DEVICES AND CIRCUITS
DETAILED SYLLABUS

UNIT	NAME OF THE TOPIC	HOURS
I	**Semiconductor and Diodes:** **Semiconductor** – Definition, Classification, Intrinsic and Extrinsic N type & P type -Drift current & Diffusion current Diodes-PN junction diode-Forward and Reverse bias characteristics-Specification-Zener diode-Construction & working principle-Characteristics-Zener break down-Avalanche break down-Zener diode as a voltage regulator - Applications-Specifications **Rectifier**-Introduction-Classification of Rectifiers-Half wave rectifier- Fullwave rectifier (Center tapped, Bridge) – Efficiency – Ripple factor – comparison - Applications – Filters – C, LC, and PI Filters.	14 Hrs
II	**Bipolar Junction Transistor:** Transistor – NPN and PNP transistor – operation- Transistor as an amplifier – Transistor biasing – Fixed bias, Collector base bias, Self bias – CB, CE, CC Configurations – Characteristics – Comparison between three configurations in terms of input impedence, Output impedence, Current gain, Voltage gain – (simple problems using α & β) RC coupled amplifier – Load characteristic analysis – Emitter follower and its application – Negative feedback – Basic concept, effect of negative feedback, Types of Negative feedback connections – Transistor as a switch.	14 Hrs
III	**Transistor Oscillators and FET and UJT:** **Transistor oscillator** – Classifications – Condition for oscillations (Barkhausen criterion) – General form of LC oscillator – Hartley Oscillator – Colpitts Oscillator – RC Phase shift oscillator, Crystal oscillator. **Field Effect Transistor** – Construction – Working principle of FET – Difference between FET and BJT – Characteristics of FET – Applications – FET amplifier(Common source amplifier). **Uni Junction Transistor** – Construction – Equivalent circuit – Operation – Characteristics – UJT as a relaxation oscillator.	15 Hrs

UNIT	NAME OF THE TOPIC	HOURS
IV	**SCR, TRIAC, DIAC, MOSFET:** **SCR** – Introduction – Working – Two transistor analogy of SCR – VI Characteristics – SCR as a switch, Controlled rectifier – Specifications. TRIAC – Basic working principle – Characteristics – Speed control of fan using DIAC and TRIAC. DIAC – Construction – working – characteristics – DIAC as bi-directional switch. MOSFET – Construction – characteristics – MOSFET as a switch.	13 Hrs
V	**Opto Electronics Devices and wave shaping circuits:** LDR, LED, 7 Segment LED, LCD, Opto coupler, Opto interrupter – Infrared transmitter and receiver - Laser diode(Simple treatment) – Solar cell – Avalanche Photo diode - Photo transistor. Clipper, Clamper – Voltage doubler, Astable multivibrator, Monostable and Bistable Multivibrators using Transistor – Schmitt Trigger.	14 Hrs
	Revision and test:	10 Hrs

Text Books:
1. Electronic Devices and Circuits by Boylstead, Tata McGraw Publication
2. Principle of Electronics by V.K.Mehta, S.Chand & Company ltd.
3. Electronics Devices & Circuits by Sallaivahanan, N.Suresh Kumar, A.Vallavaraj
   Tata McGraw Publication

Reference Books:
1. Electronics principles by Malvino, Tata McGraw Publication
2. Electronics Devices & Circuits by Allen Mottershed Tata McGraw – Hill Publication
3. Electronics Devices & Circuits by Jacob Millman and Halkias Tata McGraw – Hill publication
4. Optical Fiber Communication by Gerd Keise

24031 ELECTRONIC DEVICES AND CIRCUITS
MODEL QUESTION PAPER – I

Time : 3 Hrs.   **Max Marks : 75**
PART A   **(15 x 1 = 15)**
Answer any FIFTEEN questions

1. Give an example for donor impurity.
2. What is the cut in voltage for silicon diode?
3. What is the peak inverse voltage of full wave rectifier?
4. Name a component used for filtering.
5. Draw the symbol of NPN transistor.
6. What is the formula for current gain in common emitter configuration?
7. Which bias is normally used in applications?
8. What is the need for negative feedback?
9. What is the condition for oscillation?
10. What is the output frequency of Heartley oscillator?
11. Mention the relationship between the parameters of JFET.
12. State any two applications of UJT
13. Give an example for unidirectional switch.
14. Draw the symbol of TRIAC.
15. Name the terminals of DIAC.
16. Expand MOSFET.
17. In which bias, LED emits light?
18. Expand LASER.
19. What is the other name for Astable Multivibrator?
20. Draw the output waveform of negative clipper.

PART B   **(5 x 12 = 60 Marks)**
Answer all questions choosing either A or B from each question.
Each question carries 12 marks.

21 A) Explain the operation of Zener diode and draw its characteristics. (OR)
   B) Explain the operation of full wave rectifier and draw its output waveforms. List out
       its applications.

22 A) i) Explain the operation of NPN transistor.
       ii) Compare three different configurations of transistors. (OR)
   B) Explain the operation of RC coupled amplifier and draw its frequency response.

23 A) i)Explain the operation of Hartley oscillator.
       ii) Differentiate FET with BJT (OR)
    B) Explain the construction and operation of UJT.

24 A) i)Explain SCR as a controlled rectifier.
       ii) Discuss about the specifications of SCR. (OR)
   B) Explain the operation of DE-MOSFET with neat diagram.

25 A) Explain the operation of Solar cell and Photo Transistor. (OR)
   B) Explain the operation of Schmitt Trigger and draw its output waveform.

24031 ELECTRONIC DEVICES AND CIRCUITS

MODEL QUESTION PAPER – II

Time : 3 Hrs.   **Max Marks : 75**

PART A   **(15 x 1 = 15)**

Answer any FIFTEEN questions

1. Give an example for intrinsic semiconductor.
2. Draw the symbol of Zener diode
3. What is the efficiency of half-wave rectifier?
4. How many filtering components are used in pi filter?
5. In which region transistor has to be operated for faithful amplification?
6. What is the output impedance of common base configuration?
7. What is Q-point?
8. Name the types of feedback
9. What are the components used in tank circuit?
10. State the advantages of crystal oscillator.
11. Give an example for voltage controlled device.
12. What is the formula for intrinsic standoff ratio?
13. What is the family name of SCR?
14. How many terminals are present in TRIAC?
15. Expand DIAC.
16. What are the types of MOSFET?
17. Draw the symbol of LDR.
18. What is solar cell?
19. Draw the output waveform of negative clamper.
20. How many stable states are present in Astable Multivibrator?

PART B (5 x 12 = 60 Marks)

Answer all questions choosing either A or B from each question.
Each question carries 12 marks.

21 A) Explain the operation and characteristics of PN junction diode with suitable diagram.

(or)

B) Explain the operation of C and pi filter and draw its waveform.

22 A) i)Explain the operation of transistor as an amplifier.
ii) Write short notes on fixed bias.

(or)

B) i)Explain the operation of emitter follower.
ii) Explain how transistor is used as a switch

23 A) i) Discuss about the conditions for oscillation..
ii) Explain the operation of RC phase shift oscillator.

(or)

B) Explain the working principle of JFET and draw its characteristics.

24 A) With neat diagram explain the working principle of SCR and draw the transistor analogy of SCR.

(or)

B) i)Explain the operation of DIAC with its characteristics.
   ii) Explain the construction details of MOSFET.

25 A) Explain the operation of i)Opto interrupter ii)avalanche photo diode.

(or)

B) Explain the operation of positive and negative clamper.

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L-SCHEME
(Implemented from the Academic year 2011-2012 onwards)

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Course Name : DIPLOMA IN INSTRUMENTATION AND CONTROL ENGINEERING
Course Code : 1042
Subject code : **24232**
Semester   : III Semester
Subject title   : ELECTRICAL CIRCUITS AND MACHINES

TEACHING AND SCHEME OF EXAMINATION

No. of weeks per semester : 16 Weeks

Subject Title	Instruction		Examination				
	Hrs. Week	Hrs Semester	Marks				Duration
			Internal Assessment	Board Examination	Total		
Electrical circuits and Machines	5	80	25	75	100		3Hrs

Topics and Allocation of Hours :

UNIT	TOPICS	TIME (hrs)
I	DC circuits and DC Networks Theorems	14
II	AC circuits	14
III	Resonance and 3 phase AC circuits	12
IV	DC Machines and AC Machines	14
V	Transformers	14
	Revision / Test	12
	Total	80

Rationale:

The fundamental knowledge about Electrical circuits both AC and DC is essential for all diploma holders.The working principle of DC AND AC machines,transformer is a prerequisite for technicians in their workplace.This subject helps in this way.

Objectives

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

- Define voltage, current, resistance, resistivity, power, energy and their units.
- State and explain ohm's law and Kirchhoff's law and solve simple problems.
- Derive equivalent resistance of series and parallel circuits.
- Solve problems in mesh current and nodal voltage method.
- State and explain super position therem, Thevenin's theorem. maximum power theorem transfer theorem and solve problems using theorems.
- Define period, frequency, amplitude, average value, RMS value, form factor and peak factor.
- Derive voltage and current in R, L and C.
- Derive power in AC circuit.
- Solve problems and draw vector diagram of RL, RC and RLC series and parallel circuits.
- Define Q factor and bandwidth.
- Understand 3ф supply and advantages of 3ф over 1ф system.
- Derive relation between line and phase quantity in star and Delta connections.
- Explain 3ф power measurement by two wattmeter method.
- Explain the constructional details of DC machines.
- Explain the principle and working of DC generator and DC motor.
- Derive EMF equation of DC generator.
- Explain the characteristics and applications of DC generators.
- Draw and explain 3 and 4 point starters.
- Explain the characteristics, applications and speed control of DC motor.
- Explain the principle and working of 3ф alternator.
- Explain the construction, working and starting methods of 3ф induction motor.
- Explain the principle and working of different types of 1ф induction motor.
- Explain the principle and working of transformer.
- Derive EMF equation and solve simple problems.
- Explain OC and SC test on transformer.
- Explain the construction, working and applications of auto transformer.

24231 ELECTRICAL CIRCUITS AND MACHINES

DETAILED SYLLABUS

UNIT	NAME OF THE TOPIC	HOURS
I	**DC CIRCUITS AND DC NETWORK THEOREMS** 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 Mesh current– Two loops only. Simple problems Super position, Thevenin's and Maximum power transfer theorems – Statement and explanations – Two loops only Simple problems.	**14 hrs.**
II	**AC CIRCUITS** Ac fundamentals – Ac waveform – Sinusoidal and non-sinusoidal – Period – Frequency – Cycle – Amplitude – Phase – Peak value – Average value – RMS value (effective value) – Form factor – Crest factor – Rectangular and Polar forms for complex number. Ac through pure resistor, Inductor and Capacitor, Concept of Capacitor – Concept of Impedance – vector diagram. Capacitors in series and parallel – energy stored in a capacitor, inductor – Derivation - simple problems. Power in AC circuits – power factor – RL, RC and RLC series and parallel circuits – simple problems.	**14 hrs**
III	**RESONANCE AND 3 ф AC CIRCUITS** Resonance – condition for resonance – series and parallel resonance – resonance curve – Applications of resonance – simple problems in resonance. Concept of 3ф supply – Line and phase voltage and current in star and Delta connected circuits - 3ф power – Measurement of 3ф power by two watt meter method – simple problems – Advantages of 3ф over 1ф system.	**12hrs**

UNIT	NAME OF THE TOPIC	HOURS
IV	**DC MACHINES AND AC MACHINES** Dc machines – Types – Constructional details of DC machines – DC generators – Principle - Types – Principles – EMF equation – characteristics of shunt, series and compound generators – applications (simple problems) DC motor – Types – Motor action – Back EMF – Torque speed characteristics – Starting of motors using 4 point starters – Speed control of DC motor – Applications. Ac machines - 3φ Alternator – Construction and working – Relation between speed and frequency. 3φ induction motor – construction – Types – Principle of operation – Methods of starting of 3φ Induction motor – Slip.1φ induction motor – Principle of operation – Capacitor start – Applications	**14 Hrs**
V	**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. Transformer on NO load – Transformer on load – Condition for maximum efficiency.Auto transformer – Construction and working – Applications.	**14 hrs**

TEXT BOOK

1. B. L. THERAJA, "A text nook of Electrical Technology Vol. I & II", S. Chand & Co.

REFERENCE BOOKS

1. ARUMUGAM &PREMKUMAR , "Circuit Theory", Khanna Publishers.
2. NAGOOR KANI, "Circuit Theory", RBA Publications.
3. M. V. DESPANDE, "Electrical Machines" PHI learning Private Ltd.
4. M. M. Louis, "Elements of Electrical Engg. ", Khanna Publishers.
5. M. L. Gupta, "elementary of Electrical Engg. ", S.K. Kataria& Sons.

ELECTRICAL CIRCUITS AND MACHINES
MODEL QUESTION PAPER – I

TIME: 3 hours   **Maximum Marks: 75**

PART A

Note : **Answer any Fifteen Questions.**   **Marks: 15*1=15**
   **All Questions carry equal marks.**

1. State Kirchhoff's current law.
2. Define power.
3. State the unit of energy.
4. What is the equivalent resistance when two resistors are connected in parallel?
5. Define period.
6. Define crest factor.
7. Give the formula for inductive reactance.
8. Define power factor?
9. State the condition for series resonance.
10. Define quality factor.
11. Distinguish between impedance and admittance.
12. State any one advantage of three phase system over single phase system.
13. Give an application of shunt motor.
14. What is the necessity of starter?
15. Write the EMF equation of a DC generator.
16. What is slip?
17. What are the losses in transformer?
18. Define regulation of transformer.
19. Write the formula for turn's ratio of the transformer.
20. State any one advantage of auto transformer.

PART B   **Marks: 5*12=60**

II Answer all questions choosing either A or B from each question.
   Each question carries 12 marks.

21. a] State Superposition theorem. Explain the step by step procedure for superposition theorem with an example. (12)

(Or)

   b] i) Draw the Thevenin's equivalent circuit. (2)
      ii) Find the current through 10Ω resistor using Thevenin's theorem.(10)
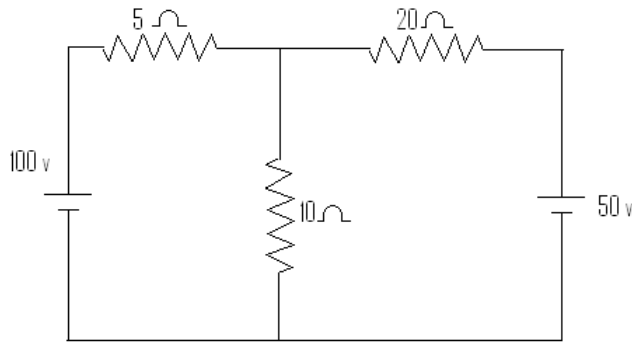
22. a] i) Define RMS value. Prove $V_{rms} = 0.707 \, V_m$. [6]
    ii) Derive expression for impedance in RL series circuit. [6]

(Or)

b] i) A coil has a resistance of 40 Ω and inductance of 0.2 Henry is connected to a 250 V, 50 Hz supply. Find the impedance, current, power factor and power.[12]

23. a] Derive the relationship between [i] line and phase voltage and
                              [ii] Line and phase current
    in a 3ɸ star and delta connected system. [12]

(Or)

b] Derive the expression for measurement of 3ɸ power by two watt meter method.[12]

24. a] Describe the construction and working of a DC generator with neat diagram and mention its types. [12]

(Or)

b] Draw and explain the working of four point starter. [12]

25. a] Explain in detail the OC and SC test on a 1ɸ transformer with neat circuit diagram.   [12]

(Or)

b] i) Define transformer efficiency and derive the condition for maximum efficiency.[8]
    ii) Define core loss and copper loss. [4]

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ELECTRICAL CIRCUITS AND MACHINES
MODEL QUESTION PAPER – II

TIME: 3 hours   **Maximum Marks: 75**
PART A
Note : **Answer any Fifteen Questions.**

   Marks: 15*1=15
      All Questions carry equal marks.

1. Define current.
2. Write the formula for total resistance when three resistors R1, R2, & R3 are connected in series.
3. State Ohm's law.
4. State Thevenin's theorem.
5. Define Frequency.
6. Give the value of form factor for a sine wave.
7. Convert 3 + j4 to polar form.
8. Define Bandwidth.
9. What is meant by resonance?
10. Write the expression for 3ф power.
11. Define line voltage.
12. Mention any one advantage of 3ф system over 1ф system.
13. State the purpose of commutator in DC generator.
14. State any one application of DC series motor.
15. Classify the single phase induction motors.
16. Write the torque equation of a DC motor.
17. Define transformer.
18. Which test gives core loss?
19. Define efficiency of the transformer.
20. Define transformation ratio in transformer.

PART B   Marks: 5*12=60

II] Answer all questions choosing either A or B from each question.
   Each question carries 12 marks.

21. a] Find the current through 6Ω resistance using Superposition theorem.   [12]

2 Ω   5 Ω

100 v

4 Ω   6 Ω   50 v   1 Ω
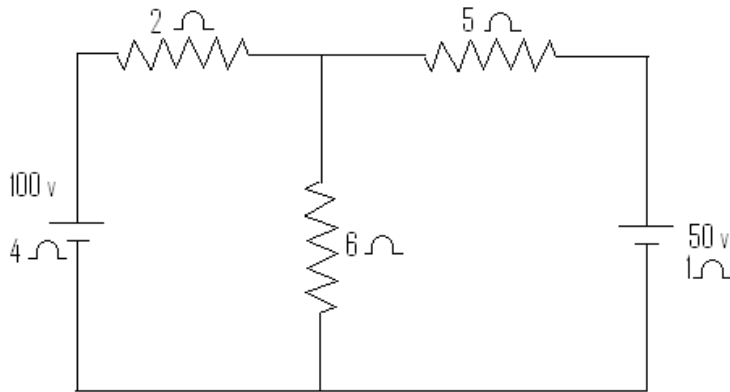
(Or)

b] i) State KCL and KVL. [4]

    ii) State maximum power transfer theorem and derive the condition for maximum power transfer. [8]

22. a] i) Derive expression for the energy stored in a capacitor. [6]

    ii) Derive formula for impedance in RC series circuit. [6]

(Or)

    b] i) A series RLC circuit with a resistance of 50 Ω, a capacitance of 40µf and an inductance of 0.15 H are connected across 230 V, 50 Hz supply. Determine inductive reactance,capacitive reactance, impedance, current, power factor and power. [12]

23. a] State the condition for series resonance. Derive the series resonance frequency and also draw the resonance curve. Compare series and parallel resonance circuits.

[12]

(Or)

    b] Three coils each having a resistance of 20 Ω and inductive reactance of 15 Ω are connected in (i) star (ii) delta to 400 V 3ϕ, 50 Hz supply. Calculate line current, power factor, power drawn from the supply in each case. [12]

24. a] (i) What are the types of DC motor. [2]
    (ii) Explain the different methods for speed control of DC motor. [10]

(Or)

    b] Explain with neat diagram, the principle and operation of capacitor start single phase induction motor. [12]

25. a] Explain the working principle of transformer and derive its EMF equation.   [12]

(Or)

b] i) Explain the working principle of auto transformer with a neat sketch.   [8]

ii) The number of turns of the primary and secondary windings of a single phase transformer are 500 and 50 respectively. If the primary is connected to 220 V 50 Hz supply, determine the secondary voltage.   [4]

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L-SCHEME
(Implements from the Academic year 2011-2012 onwards)

Course Name : DIPLOMA IN INSTRUMENTATION AND CONTROL ENGINEERING
Course Code : 1042
Subject code : **24233**
Semester   : III Semester
Subject title   : BASICS OF INSTRUMENTATION

Teaching and Scheme of Examination

No of Weeks per semester : 16

Subject Title	Instruction		Examination				
	Hrs. Week	Hrs Semester	Marks				Duration
			Internal Assessment	Board Examination	Total		
Basics of Instrumentation	5	80	25	75	100		3Hrs

Topics and Allocation of Hours :

UNIT	TOPICS	TIME (hrs)
I	Basics of Instrumentation	14
II	Performance characteristics of Instruments	14
III	Sensors and Transducers	12
IV	Mechanical and Optical Transducers	14
V	Electrical Transducers	14
	Revision / Test	12
	Total	80

RATIONALE:

Instrumentation and Control Engineers plays a major role in process industries. The students of Instrumentation and Control Engineering branch need a brief idea about the basic concepts of instrumentation, various transducers and their characteristics,

which can be helpful to them to study the core subjects during their academics. This subject covers the basic needs of instrumentation and it makes the students to understand the importance of instrumentation in industries.

Objectives

On completion of the Units mentioned above, the students would be able to

☐ Define measurement, Instrument, Instrumentation system.

☐ List and explain the major components of an Instrumentation system for bourdon tube and pressure thermometer.

☐ List the three types of standards and describe the purpose of each type of standard.

☐ Concept of calibration.

☐ Explain the classification of errors.

☐ Concept of statistical analysis of test data.

☐ List the static characteristics and describe the effect of each on the performance.

☐ List the dynamic characteristics and describe the effect of each on the performance.

☐ List the standard test input signals.

☐ Describe the dynamic response of instruments.

☐ Concept of time constant.

☐ Describe the purpose of major components in a transducer.

☐ Explain the difference between primary and secondary transducer.

☐ Explain the difference between Active and Passive transducer

☐ Explain the difference between Analog and Digital transducer

☐ Explain the difference between Transducer and Inverse transducer

☐ Explain the characteristics of transducer

☐ Discuss criteria to consider in choosing a transducer.

☐ Compare and contrast Electrical transducer and mechanical transducer.

☐ Describe the principle of working, construction, material used, range and application, of the mechanical transducer.

☐ Explain the elastic elements.

☐ Explain the mechanical pressure transducer.

☐ Explain the Thermal detector.

☐ Explain the Hydro pneumatic elements.

☐ Describe the principle of working, construction materials used, range and application of the optical transducer.

☐ Explain the Digital coding transducer.

☐ Explain the Optical Encoders.

☐ Describe the principle of working, construction, materials used, range and application of Electrical transducer.

☐ Explain variable resistive transducer and their types.

☐ Explain variable Inductive transducer.

☐ Explain variable capacitive transducer.

<p style="text-align: center;">24233 **BASICS OF INSTRUMENTATION**
DETAILED SYLLABUS</p>

UNIT	NAME OF THE TOPIC	HOURS
I	**BASICS OF INSTRUMENTATION** Definition – Measurement, Instrument, Instrumentation system. Generalized functional block diagram of an Instrumentation system – Examples – Bourdon tube pressure gauge, Pressure thermometer. Definition – standard, Primary, Secondary, Working standards – Error, True value, Correction. Calibration – Zero error, Backlash error, Classification of errors – Gross errors, Systematic errors, Random error. Statistical analysis of test data – Arithmetic mean, Deviation, Standard deviation, Variance, Simple problems.	14 HRS
II	**PERFORMANCE CHARACTERISTICS OF INSTRUMENTS** Static characteristics – Range, Span, Accuracy, Precision – Significant figures, Range of doubt, Dead time, Dead zone, Hysteresis, Threshold, Resolution, Sensitivity, Linearity, Reproducibility, Stability, Loading effect – Input and Output impedances. Dynamic characteristics – Speed of response, Measuring lag, Fidelity, Dynamic error. Standard test input signals. Dynamic response – Steady state and Transient response.	14 hrs
III	**UNIT – III SENSORS AND TRANSDUCERS** Transducer – Definition, classification – Primary and secondary transducer, Active and Passive transducers, Analog and Digital transducers, Transducers and Inverse Transducers (with one example for each classification) Characteristics of transducer – Input characteristics, Transducer response, Output characteristics. Selection of Transducers. Electrical Transducer – Advantages of electrical Transducer over Mechanical Transducer.	12 hrs

UNIT	NAME OF THE TOPIC	HOURS
IV	**MECHANICAL AND OPTICAL TRANSDUCER** Elastic element – Bourdon tube, Bellows, Diaphragms, Mechanical pressure transducer, Manometers – U Tube manometer, Well type manometer, Barometer, Inclined tube Manometer, Ring balance manometer, Micro manometer, Principle of working and applications only. Manometric fluids – Advantages and Disadvantages. Thermal detectors – Liquid in glass thermometer, Filled system thermometer, Bi-metallic strip, Hydro pneumatic elements – Static, Float –Hydrometer – Construction, Principle of working, Materials used, Range and the application of the above. Digital encoding transducer, Optical Encoders.	14 hrs
V	**ELECTRICAL TRANSDUCER** Variable, Resistive, Potentiometer – construction, working, Types, Materials used, Loading effect, Applications. Strain gauge , Piezo-Resistive effect – Working, construction, Types, semiconductor strain gauges, Associated circuits, Temperature effects, Variable Inductance Transducer - LVDT, variable capacitance transducer with solid dielectric and Variable air gap between parallel plates, working, construction, Application, Piezo-electric Transducer – Piezo electric effect, materials, Modes of operation, Properties of Piezo electric crystals, Equivalent circuit. Hall effect sensors, Incremental encoders, Pyro-electric sensors, Resistance temperature detectors, Thermistors, Thermo-diodes and transistors, Thermo-couples, Principle of working, construction, Material used, Range and Application of the above.	14 hrs

REFERENCE BOOKS

1. HERMAN. K. P NEUBERT, Instrument transducers, An Introduction to their performance and design, Oxford University Press, 2nd Edition.
2. A. K .SHAWNEY, PUNEET SHAWNEY, A course in Mechanical measurements and Instrumentation, Dhanpat Rai & co, 12th Edition, 2001 – 2002.
3. D. S. KUMAR, Mechanical measurements & control, Metropolitan Book co Pvt. Ltd, 3rd Edition 1989.
4. S.K. SINGH, Industrial Instrumentation & control, Tata McGraw Hill publishing company Ltd. 13th Edition 1997.
5. B. C. NAKRA, K. K. CHAUDRY, Instrumentation Measurement and Analysis, 2nd Edition, Tata McGraw Hill Publishing company.
6. Dr. S. RENGANATHAN, Transducer Engg., Allied Publishers Pvt. Ltd.

MODEL QUESTION PAPER – I

Time : 3 Hrs.   **Max Marks : 75**
PART A   **(15 x 1 = 15)**
Answer any FIFTEEN questions

1. Define an instrument.
2. Define Arithmetic mean.
3. Define primary standard.
4. List the basic elements in an instrumentation system.
5. Define Range.
6. Define sensitivity.
7. Define dead time.
8. What do you meant by loading effect?
9. Define an inverse transducer.
10. What is passive transducer?
11. List the factors to be considered while selecting a transducer.
12. List the input characteristics of a transducer.
13. What are the metals used in bimetallic strips.
14. What is the use of hydrometer?
15. List the types of bourdon tubes.
16. List the types of filled system.
17. What is loading effect?
18. List two materials used in thermocouple.
19. Define Piezo -electric effect.
20. Define Piezo resistive effect.

PART B   **(5 x 12 = 60 Marks)**
Answer all questions choosing either A or B from each question.
Each question carries 12 marks.

21.a.Draw and explain pressure thermometer as typical example of instrumentation
system.   (OR)

b. Define error .Explain various types of errors.

22.a.Define the terms

(i)Accuracy(ii)Precision(iii)Resolution(iv)Hystercsis(v)Stability(vi0Dead zone.

(OR)

b.(i).Explain about different types of standard test signals.(6)

(ii) Explain steady state and transient response.(6)

23.a.Discuss the criteria to be considered in choosing a transducer.

(OR)

b.(i)Discuss the advantages of electrical transducer over mechanical transducer.(4)

(ii)Explain with an example of active and passive transducer.(8)

24.a.Draw and explain any two types of elastic elements.

(OR)

b. Explain the construction and working of Hydrometer with neat sketch.

25.a.Explain the modes of operation of piezo electric transducer.

(OR)

b.With a neat diagram explain the working of LVDT.

MODEL QUESTION PAPER – II

Time : 3 Hrs.   **Max Marks : 75**

PART A   **(15 x 1 = 15)**
Answer any FIFTEEN questions

1. Define measurement.
2. Define secondary standard.
3. Define backlash error.
4. List the types of error.
5. Define precision.
6. Define linearity.
7. What is time constant.
8. List the standard test Input signals.
9. Define active transducer.
10. Define digital transducer.
11. List the classification of transducer.
12. Write any one advantage of electrical transducer over mechanical transducer.
13. List the elastic elements.
14. Give an advantages of well type manometer over U tube manometer.
15. List the types of manometer.
16. Write the principle of Hydrometer.
17. Define piezo resistive effect.
18. Define Hall effect.
19. Define encoder.
20. Draw the equivalent circuit of piezo electric transducer.

PART B   **(5 x 12 = 60 Marks)**
Answer all questions choosing either A or B from each question.
Each question carries 12 marks.

21.a.Draw the generalized functional block diagram of an instrumentation system and explain each block in detail.

(OR)

b. Explain the following terms (i)True value(ii)Backlash error.(iii)Gross error(iv)Primary standard.

22.a.Explain the following static characteristics.(i)Range of doubt(ii)Dead time(iii)Hysteresis(iv)Resolution(v)Threshold(vi)Sensitivity.

(OR)

b.Explain dynamic response steady state and transient response.

23.a.Define and explain with the example of primary and secondary transducer and its function

(OR)

b. Explain the input characteristics of a transducer.

24.a.Explain the construction and working of (i)Barometer(ii)micro manometer.

(OR)

b. Explain in detail about filled system thermometer with neat sketch.

25.a.With a neat diagram explain the working of LVDT.

(OR)

b. Explain the construction and working of thermocouple with neat diagram. Mention the methods used for measuring the output of thermocouple.

L-SCHEME
(Implemented from the Academic year 2011-2012 onwards)

Course Name : DIPLOMA IN INSTRUMENTATION AND CONTROL ENGINEERING
Course Code : 1042
Subject code : **24234**
Semester   : III Semester
Subject title   : **ELECTRICAL AND ELECTRONICS PRACTICAL**

Teaching and Scheme of Examination

No of Weeks per semester : 16

Subject Title	Instruction		Examination			
	Hrs. Week	Hrs Semester	Marks			Duration
			Internal Assessment	Board Examination	Total	
ELECTRICAL AND ELECTRONICS PRACTICAL	5	80	25	75	100	3Hrs

24234 - ELECTRICAL AND ELECTRONICS PRACTICAL

LIST OF EXPERIMENTS

ELECTRICAL PRACTICAL

1. Measurement of three phase power by two-wattmeter method.
2. Load test on DC shunt generator.
3. Load test on single phase Transformer.

ELECTRONICS PRACTICAL
4. HW, FW with and without filter.
5. Bridge Rectifier with and without filters.
6. Frequency response of RC coupled amplifier.
7. Emitter follower.
8. RC phase shift oscillator.
9. Hartley and Colpitts oscillator.
10. UJT relaxation oscillator.
11. SCR characteristics.
12. LDR and Photo diode characteristics.

EQUIPMENT REQUIRED:

S.NO	Name of the Equipments	Range	Required Nos.
1.	Dual power supply	0-15V	10
2.	High Voltage Power Supply	0-250V	2
3.	Signal Generator	1MHz	10
4.	Dual trace CRO	20 MHz & 60 MHz	5 + 5
5.	Transformer	12-0-12V	5
6.	DC Shunt Generator		1
7.	Digital Multi meter	-	10

Circuit diagram – 20 marks

Connections – 20 marks

Reading & Graph – 20 marks

Result – 10 marks

Viva voce – 5 marks

Total – 75 marks

L-SCHEME
(Implemented from the Academic year 2011-2012 onwards)

Course Name : DIPLOMA IN INSTRUMENTATION AND CONTROL ENGINEERING
Course Code : 1042
Subject code : **24235**
Semester   : III Semester
Subject title   : **BASICS OF INSTRUMENTATION PRACTICAL**

Teaching and Scheme of Examination

No of Weeks per semester : 16

Subject Title	Instruction		Examination				
	Hrs. Week	Hrs Semester	Marks				Duration
			Internal Assessment	Board Examination	Total		
BASICS OF INSTRUMENTATION PRACTICAL	5	80	25	75	100		3Hrs

24235 - BASICS OF INSTRUMENTATION PRACTICAL

LIST OF EXPERIMENTS (L SCH)

1. Calibration of Ammeter
2. Calibration of Voltmeter
3. Calibration of temperature instrument.
4. Calibration of Level instrument.
5. Measurement of resistance, voltage, current, polarity using Multimeter.
6. Testing of electronic components using Multimeter & CRO.
7. Linearity of Potentiometer.
8. Strain gauge characteristics.
9. LVDT characteristics.
10. Characteristics of Thermistor.
11. Characteristics of resistance thermometer.
12. Characteristics of thermocouple.

24235 BASICS OF INSTRUMENTATION PRACTICAL

Sr No	Name of the Equipments	Required Nos
1	Ammeter (0 - 50)Ma	4 nos
2	Voltmeter (0 - 10)V	4 nos
3	Regulated Power Supply (0-30)V	4 nos
4	Rheostat	4 nos
5	Thermometer	2 nos
6	Temperature gauge / Temperature transducer with	2 nos
7	Continuous Level measurement station	1 no
8	Digital Multimeter	6 nos
9	CRO Dual Trace 20 MHz / 30 MHz	2 nos
10	Strain measurement module using Strain gauge and	2 nos
11	Displacement measurement module using LVDT	2 nos
12	Thermistor with industrial standard	2 nos
13	3 wire RTD (PT-50 / PT-100) with industrial standard	2 nos
14	Thermocouple (J-type / K-type) with industrial	2 nos
15	Water bath with heater arrangement	3 nos
16	Furnace with blower arrangement	1 no

Circuit diagram – 20 marks

Connections – 20 marks

Reading & Graph – 20 marks

Result – 10 marks

Viva voce – 5 marks

Total – 75 marks

DIPLOMA IN COMPUTER ENGINEERING

L - SCHEME

2011 - 2012

25236 – C PROGRAMMING PRACTICAL

DIRECTORATE OF TECHNICAL EDUCATION
GOVERNMENT OF TAMILNADU

(Implemented from the academic year 2011 - 2012 onwards)

Course Name : DIPLOMA IN INSTRUMENTATION AND CONTROL ENGINEERING
Course Code : 1042

Subject Code	:	25236
Semester	:	III Semester
Subject Title	:	C Programming Practical

TEACHING AND SCHEME OF EXAMINATION

No. of weeks per semester: 16 weeks

Subject	Instructions		Examination			Duration
	Hours / Week	Hours / Semester	Internal Assessment	Board Examination	Total	
C PROGRAMMING PRACTICAL	6	96	25	75	100	3 Hrs

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 string handling functions.

- Write programs using user-defined functions, Structures and Union.

- Write programs using the concept of Pointers.

- Write programs using command line arguments.

- Create a file.

- Write programs using file handling functions.

- Write programs using compiler control directives.

PRACTICAL EXERCISES

PART - A

1. Write a C Program to calculate Simple and Compound interest

2. Write a C Program to swap two variables using (i) third variable and (ii) without using a third variable.

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

4. Program to check whether the given string is palindrome or not.

5. Read a string, which consists of both lower case characters and upper case characters. Convert the lowercase character into upper case and vice versa. Display the new string.

6. Program to prepare the total marks for N students by reading the Regno,, Name, Mark1 to Mark6 by using array of structures. .

7. Write a function to calculate the sum and average of given three numbers. Write a main function to call the above function

8. Using pointers, find the length of the given string.

9. Write a program to print the address of a variable and increase the content by 5 and print the new value.

10. Write a Macro in C to swap two data values.

PART – B

1. Read an integer number. Find the number of digits and sum of all individual digits and also print the above number in reverse order.

2. Using Switch… Case Statement, print the given number into equivalent Word. (For example if the input is 3, then the output should be THREE)

3. Write a program to find the factorial of a given number (i) Without recursion (ii) With recursion

4. Write a program to arrange the given N names in alphabetical order.

5. Write a program to read a string S1 from the terminal. Again read a string S2 from the terminal and check the given string S2 in the string S1. If it does, remove string S2 from the string S1 and print the updated string S1. (For example S1 = Concatenate and S2 = cat , then the final result should be "Conenate"

6. Program to read ten values to an array variable. Use pointers to locate and display each value.

7. Reverse the following using pointers (i) String (ii) N integer numbers stored in any array.

8. Write a C program to print the abbreviation of an Organization Name. (For example if the input is "BHARAT HEAVY ELECTRONICS LIMITED" , then the output should be "BHEL".)

9. Program to copy contents of one file to another file. Also find the number of characters, lines and words in the above file.

10. Read a sentence through command line argument. Write a program to write out the string arguments to main in reverse order.

SCHEME OF VALUATION	
Writing any one program from PART – A	10 Marks
Writing any one program from PART – B	15 Marks
Executing program (PART – A)	15 Marks
Executing program (PART – B)	20 Marks
Result with printout (PART – A)	5 Marks
Result with printout (PART – B)	5 Marks
VIVA – VOCE	5 Marks
TOTAL	75 Marks

Note : Student : Computer ratio in lab should be strictly 1:1

HARDWARE REQUIREMENT
- Desktop Computers – 36 Nos
- Laser Printer – 4 Nos

SOFTWARE REQUIREMNT
- C – Compiler with Editor

COMMON TO ALL BRANCHES

L - SCHEME

2011 - 2012

COMPUTER APPLICATIONS PRACTICAL

**DIRECTORATE OF TECHNICAL EDUCATION
GOVERNMENT OF TAMILNADU**

L-SCHEME
(Implements from the Academic year 2011-2012 onwards)

Course Name   :   COMMON TO ALL BRANCHES

Subject Code   :   20001

Semester   :   III Semester

Subject Title   :   COMPUTER APPLICATIONS PRACTICAL

TEACHING AND SCHEME OF EXAMINATION:

No of weeks per semester: 16 weeks

Subject Title	Instructions		Examination				
	Hours /Week	Hours /Semester	Marks				Duration
COMPUTER APPLICATIONS PRACTICAL	4 Hrs	64 Hrs	Internal Assessment	Board Examination	Total		
			25	75	100		3 Hrs

RATIONALE:

The application of Computer knowledge is essential to the students of all disciplines of Engineering in addition to their respective branch of study. The Computer Application Practical course facilitates the necessary knowledge and skills regarding creating, working and maintaining the documents, analyzing the data with charts manipulation of databases and presentation of documents with audio visual effects in a computer.

The learning of internet provides students with unprecedented opportunities to obtain information engage in discussion and liaise with individuals, organizations and groups world-wide. It provides the latest tools and technologies in helping the students to fetch better employment.

OBJECTIVES:

On completion of the following exercises, the students must be able to
- Understand the Windows operating systems
- Familiarize and customize the desktop
- Use the different facilities available in the word processor
- Analyze the data sheet
- Create and manipulate the database
- Prepare PowerPoint presentation
- Understand Internet concepts and usage of e-mail

GUIDELINES:

- All the eighteen experiments given in the list of experiments should be completed and all the experiments should included for the end semester practical examination.
- The end semester practical examination question paper contains two questions- the first question from section-I and the second question from section-II. Each question carries 35 marks and viva voce carries 5 marks.
- The computer systems should be 1:2 ratio for practical classes

ALLOCATION OF MARKS

1. Internal Assessment – 25 Marks

DESCRIPTION	MARKS ALLOTTED
Record with Printout	10
Assignment	5
Attendance	5
Model Examination	5
Total	**25 MARKS**

2. Board Examinations – 75 Marks

Content	Max. Marks	
	Section I	**Section II**
Writing steps	15	15
Execution of exercise	15	15
Result with Printout	5	5
Viva voce	5	
Total	**75 Marks**	

PRACTICAL EXERCISES

SECTION – I

WINDOWS

Introduction- History of Windows- screen saver and monitor resolution – Wallpaper setting-
Folder manipulation – properties of a folder – Recycle bin – Short cuts – Sorting Folder –
Switching between Application – Copying in CD/DVD settings – Recording Audio files.

Exercises

1. a. Installing screen saver and change the monitor resolution by 1280X960

    b. Setting wall papers

    c. Creating, moving, deleting and renaming a folder

    d. Copy, paste and cut a folder/file

    e. Displaying the properties for a file or folder

2. a. Restoring files and folders from Recycle bin

    b. Creating short cuts for folder/file

    c. Finding a file or folder by name

    d. Selecting and moving two or more files/folders using mouse

    e. Sorting folders/files.

3. a. Copying files into CD/DVD

    b. Switching between applications

    c. Making the taskbar wider and hiding the taskbar

    d. Recording and saving an audio file

    e. Set/Change the date and time.

WORD PROCESSING

Introduction – Menus – Tool bar – Create – Edit – Save – Alignment – Font Size – Formatting – Tables – Fill Colors – Mail Merge – Page Setup - Preview – Water marking – Header – Footer – Clip art.

Exercises

4. Create the following table and perform the operations given below

ABC PVT. LTD.

Chennai

Production Summary of various Units in every Quarter

Uunit	Product - ID	Jan-Mar	Apr-june	July-Sept.	Oct-Dec.
Unit - I	56	234.	50	74	125
Unit - II	142	236	126	175	251
Unit - III	213	541	216	60	43
Unit - IV	125	243	127	250	136
Unit - V	143	152	138	80	45

- Arrange Unit name as left align and other columns as right align.
- Use doubled Border to the Summary Title and fill with 15% gray colour.
- Implement merging and splitting two or more cells
- Give alternative fore colour for columns.
- Print the above table.

5. Create a standard covering letter and use mail merge to generate the customized letters for applying to a job in various organizations. Also, create a database and generate labels for the applying organizations.

6. Create a news letter of three pages with two columns text. The first page contains some formatting bullets and numbers. Set the document background colour and add 'confidential' as the watermark. Give the document a title which should be displayed in the header. The header/ footer of the first page should be different from other two pages. Also, add author name and date/ time in the header. The footer should have the page number.

SPREADSHEET

Introduction – Menus – Tool bar – Create – Edit – Save – Formatting cells – Chart wizard – Fill Colors – Creating and using formulas – Sorting – Filtering.

Exercises

7. Create a result sheet containing Candidate's Register No., Name, Marks for six subjects. Calculate the total and result. The result must be calculated as below and failed candidates should be turned to red.

      Result is Distinction if Total >= 70 %

      First Class if Total > = 60 % and < 70 %

      Second Class if Total >= 50 % and < 60 %

      Pass if Total >= 35 % and < 50 %

      Fail otherwise

      Create a separate table based on class by using auto filter feature.

8. Create a table of records with columns as Name and Donation Amount. Donation amount should be formatted with two decimal places. There should be at least twenty records in the table. Create a conditional format to highlight the highest donation with blue colour and lowest donation with red colour. The table should have a heading.

9. Prepare line, bar and pie chart to illustrate the subject wise performance of the class for any one semester.

<div align="center">

SECTION – II

</div>

DATABASE

Introduction – Menus – Tool bar – Create – Edit – Save – Data types – Insert – Delete – Update – View – Sorting and filtering – Queries – Report – Page setup – Print.

Exercises

10. Create Database to maintain at least 10 addresses of your class mates with the following constraints

      *   Roll no. should be the primary key.
      *   Name should be not null

11. Prepare a payroll for employee database of an organization with the following details:

      Employee Id, Employee name, Date of Birth, Department and

      Designation, Date of appointment, Basic pay, Dearness Allowance,

      House Rent Allowance and other deductions if any.

Perform simple queries for different categories.

12. Design a pay slip for a particular employee from the above database.

PRESENTATION

Introduction – Menus – Tool bar – Create – Edit – Save – Slide transition – Insert image – Hyper link – Slide numbers – View slide show with sound – Photo album – Clip art.

Exercises

13. Make a marketing presentation of any consumer product with at least 10 slides. Use different customized animation effects on pictures and clip art on any four of the ten slides.
14. Create a Presentation on "Communication Skills" with three different slide transitions with sound effect.
15. Create a photo album in PowerPoint.

INTERNET

Introduction – Browsers – Open a website – Email: Send, receive and delete – Email with Attachments Google docs – Search Engines – Searching topics

Exercises

16. Create an e-mail id and perform the following

- Write an e-mail inviting your friends to your Birthday Party.
- Make your own signature and add it to the e-mail message.
- Add a word attachment of the venue route
- Send the e-mail to at least 5 of your friends.

17. Create a presentation on Google docs. Ask your friend to review it and comment on it. Use "Discussion" option for your discussions on the presentation.

18. Find out the direction and distance about road travel from Delhi to Agra using the Internet search. Also   make a report of the Map and other details like place to stay and visit at Agra.

MODEL QUESTION PAPER

Year / Sem: **II / III**   Subject: **COMPUTER APPLICATIONS PRACTICAL**   Code: **20001**
Answer all the questions   **Max.Marks:75**

1	**Section - I** Prepare line, bar and pie chart to illustrate the subject wise performance of the class for any one semester.
2	**Section - II** Create an e-mail id and perform the following • Write an e-mail inviting your friends to your Birthday Party. • Make your own signature and add it to the e-mail message. • Add a word attachment of the venue route • Send the e-mail to at least 5 of your friends.

LIST OF EQUIPMENTS AND THE QUANTITY REQUIRED FOR A BATCH OF 30 STUDENTS

SOFTWARE REQUIREMENTS

Operating System	Windows XP or Windows Vista or Windows 7 / Linux
Office Package	Microsoft office 2000 or Office 2003 or Office 2007/Open Office

HARDWARE REQUIREMENTS

Desktop Computer System with latest configuration	30 Nos
Power Backup (UPS)	10 KVA
Laser Printer	3 Nos

SAFETY PRECAUTIONS TO BE FOLLOWED BY STUDENTS

- Do not touch, connect or disconnect any plug or cable without teacher's permission

- Don't attempt to touch any live wires

- Systems should be shutdown properly after completion of work

REFERENCES

TITLE	AUTHOR	PUBLISHER	Year of Publication
Computer Applications Practical Manual	Dr.V.Karthikeyan Mr.D.Arulselvan	Learning Resource Centre, Thiagarajar Polytechnic College, Salem- 636 005	2012
Windows 7 in easy steps	Harshad kotecha	Tata McGrawHill	2011
A First Course in Computer 2003	Sanjay Sasena	Vikas Publications	2009
MS Office – 2003	Ramesh Bangia	Kanna Book Publication	2005
Introduction to Computers with MS-Office 2000	Alexis Leon & Mathews Leon	Tata McGraw-Hill	2002
Mastering Microsoft Office 2000	Gini Courter & Annette Marquis	BPB Publications	1999

IV SEMESTER

L-SCHEME
(Implements from the Academic year 2011-2012 onwards)

Course Name : DIPLOMA IN INSTRUMENTATION AND CONTROL ENGINEERING
Course Code : 1042
Subject code : **24241**
Semester   : IV Semester
Subject title   : **ANALOG AND DIGITAL ELECTRONICS**

TEACHING AND SCHEME OF EXAMINATION :

No. of weeks per Semester   :   16

Subject Title	Instruction		Examination				
	Hrs. Week	Hrs Semester	Marks			Duration	
			Internal Assessment	Board Examination	Total		
ANALOG AND DIGITAL ELECTRONICS	5	80	25	75	100	3Hrs	

Topics and Allocation of Hours:

UNIT	TOPICS	TIME (hrs)
I	Linear ICs : op. Amp, Timer and their applications	14
II	Boolean Algebra	14
III	Combinational Logic	14
IV	Sequential Logic	12
V	D/A, A/D and Memory	14
	Revision / Test	12
	Total	80

RATIONALE:

Digital electronics replaces the analog circuits in many fields.Using digital circuits is easier . Diploma holders must have knowledge about the fundamental laws used in digital electronics and the working principle of digital circuits.Operational amplifiers find application in timer circuits . This subject deals with both analog and digital electronic circuits.

Objectives

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

- Explain the characteristics of Op-amp.
- Explain the various applications of Op-amp.
- Explain the functional block diagram of 555 Timer IC.
- Explain Astable, Monostable multivibrator.
- Explain the various number systems Binary, BCD, Octal and Hexadecimal.
- State and explain DeMorgan's theorem.
- Write the truth table and symbol of Logic gates OR, AND, NOT, NAND, NOR, EX-OR.
- Simplification of Logic functions using Karnaugh's map.
- Explain the operation of Half-adder, Full-adder, Half-subtractor, Full-subtractor.
- Explain Parity generator and checker.
- Explain Decoder and Encoder.
- Explain Multiplexer and Demultiplexer.
- Explain Asynchronous Binary counter, Decade counter, Synchronous counter.
- Explain shift register.
- Explain weighted register and R2R ladder type D/A converter.
- Explain Successive Approximation, Dual slope techniques.

24241 ANALOG AND DIGITAL ELECTRONICS
DETAILED SYLLABUS

UNIT	NAME OF THE TOPIC	HOURS
I	**LINEAR ICS: OP. AMPS, TIMERS AND THEIR APPLICATIONS** Operational amplifier –Ideal Charcteristics - Minus input follows Plus input and NO current through Minus and Plus input – Op-amp parameters – CMRR – Slew rate – Virtual ground – Applications of Op.Amp inverting amplifier – Summing amplifier – Non inverting amplifier – Voltage follower – Comparator – Zero crossing detector – Integrator – Differentiator – Op. Amp specifications – 555 timer – Functional block diagram – Astable and Monostable – Sequence timer.	14 hrs
II	**BOOLEN ALGEBRA** Number system – Decimal – Binary – Octal – Hexadecimal – BCD – Conversion from one number system to other – Boolean Algebra – Basic laws and Demorgan's theorems –Logic gates – OR – AND – NOT – NAND –NOR - EX-OR symbols. Truth table and Boolean expression – Realization of gates using universal gates NAND and NOR – Problems using 2, 3 and 4 variables – Boolean expression for output – Simplification of Boolean expression using Karnaugh's map (up to 4 variables) – Constructing logic circuits for the Boolean expressions.	14 hrs
III	**COMBINATIONAL LOGIC** Arithmetic circuits – Binary addition – Binary subtraction – 1's complement and 2's complement – signed binary numbers – Half adder – Full adder – Half subtractor – Full subtractor –Parity generator and checker – Digital comparator – Arithmetic Logic unit – Decoder – 3 to 8 decoder – BCD to 7 segment decoder – Encoder – Multiplexer – De-multiplexer	14 hrs
IV	**SEQUENTIAL LOGIC** Circuit Diagram, Working, Truth Table of Flip- Flops – RS – D – T – JK – Master slave Flip Flop – Edge triggered F/F – Block Diagram, Working Timing Diagram, Truth Table, Asynchronous Binary counter - Synchronous Binary counter –Decade counter – Shift register – 4 bit shift register.	12hrs

UNIT	NAME OF THE TOPIC	HOURS
V	**D/A , A/D AND MEMORY** D/A converter – Basic concepts – Weighted resistor D/A converter – R-2R ladder converter - Specification of DAC 5725 – Sampling and quantization – A/D using Successive Approximation method – Dual slope method – Voltage to frequency conversion – Frequency to voltage conversion – Specifications of ADC 7609 – Memory – Static memory – Dynamic memory – SDRAM – DDRRAM.	**14 hrs**

TEXT BOOK

1. R. P. JAIN - Modern Digital Electronics, TMH 2003.
2. K. MEENA – Principles of Digital Electronics - PHI learning Pvt. Ltd.

REFERENCE BOOKS

1. ALBERT PAUL MALVINO and DONOLD P. LEACH - Digital principles and applications – 1991
2. ROGER. L TOKHEIM MACMILLAN - Digital electronics McGraw Hill- 1994.
3. WILLIAM H GOTHMANN - Digital electronics an introduction to theory and practical – PHI 1998
4. SATNAM P. MATHUR and others - Electronic devices, applications and integral circuits
   Umesh Publications – 1982.

ANALOG AND DIGITAL ELECTRONICS
MODEL QUESTION PAPER – I

TIME: 3 hours   **Maximum Marks: 75**
PART A
Note: Answer any Fifteen Questions.   **Marks: 15*1=15**
        All Questions carry equal marks.

1. What is an OP-Amp?
2. What is voltage follower?
3. Define Slew rate.
4. Show the pin details of 555 timer IC.
5. Convert decimal number 9 to binary
6. What is Boolean algebra?
7. Expand BCD code.
8. Draw the logic symbol of a two input OR gate
9. What is a combinational logic circuit?
10. What is a demultiplexer?
11. Write the logic equations of half adder
12. What is parity generator?
13. How many FFs are required to construct a Decade counter?
14. What is meant by edge triggering?
15. What is a T flip flop?
16. Explain how a flip flop can store a data bit?
17. Define A/D conversion.
18. List various D/A conversion techniques?
19. State the difference between static and dynamic memory.
20. What is meant by quantization?

PART B   **Marks: 5*12=60**

II] A**nswer all questions choosing either A or B from each question.**
    Each question carries 12 marks.

21. a] Explain the working of an op-amp as [i] summer [ii] differentiator
                                [or]
    b] Draw the functional block diagram of 555 timer and explain its operation.

22. a] State and prove Demorgan's Theorems.
                                [or]
    b] Deduce different logic gate function using NAND gates only.

23. a] Draw and explain the working of ALU.
                                [or]
    b] What is MUX? Explain with neat diagram 1 of 8 multiplexer.

24. a] Explain the working of a 4 bit binary Asynchronous counter with a neat diagram and waveforms.

[or]

   b] Explain the working of JK MS flip-flop with a neat diagram.

25. a] Explain the working of a 4 bit R-2R ladder D/A converter with a neat diagram.

[or]

   b] Explain with a neat diagram, the Successive approximation type A/D converter.

ANALOG AND DIGITAL ELECTRONICS
MODEL QUESTION PAPER – II

TIME: 3 hours   **Maximum Marks: 75**

PART A

Note : **Answer any Fifteen Questions.**   **Marks: 15*1=15**
         All Questions carry equal marks.

1. Define CMRR of an op-amp.
2. What is virtual ground?
3. What are the two modes of operation of a timer IC 555?
4. Give any one application of 555 ICs
5. What is a logic gate?
6. Explain the term 'universal gate'
7. Convert binary 011011_2 to Hexadecimal.
8. State logic equation for EX-OR gate
9. State the difference between half adder and full adder
10. Define a multiplexer
11. What is meant by decoder?
12. What is 2's complement?
13. What is a D-type Flip-Flop?
14. Give the advantage of JK flip flop over an S-R flip flop?
15. What is race around condition?
16. State the difference between Synchronous and Asynchronous counter
17. Define D/A conversion.
18. What is meant by sampling?
19. Define resolution of a DAC
20. What is a volatile memory?

PART B   **Marks: 5*12=60**

II] A**nswer all questions choosing any two sub divisions from each question.**
     All sub divisions carry equal marks.

21. a][i] Explain the working of a Comparator using op-amp.   [6]
     [ii] With a neat diagram and waveforms, explain Zero Crossing detector using op-amp. [6]

                                        [or]
   b] Draw and Explain a Monostable multi-vibrator using 555 IC.

22. a] Simplify the given Boolean expression using karnaugh's map and stimulate its output using
      basic logic gates. F=ABC'D'+A'BC'D'+A'BCD'+ABCD'+A'B'C'D'+A'B'C'D+AB'CD'
                                        [or]
   b] Deduce different logic gate functions using NOR gates only.

23. a] Draw the logic diagram of a half adder and Full adder and explain its working with Truth table.

<div align="center">[or]</div>

b] Explain BCD to Seven segment decoder with a neat diagram.

24. a] Explain the working of a decade counter with neat diagram and waveforms.

<div align="center">[or]</div>

b] Explain serial in serial out 4 bit shift register with a neat diagram.

25. a] Draw and Explain the working of 4 bit weighted resister D/A converter.

<div align="center">[or]</div>

b] Explain with a neat diagram, the Dual slope A/D converter.

Course Name : DIPLOMA IN INSTRUMENTATION AND CONTROL ENGINEERING
Course Code : 1042
Subject code : **24242**
Semester   : IV Semester
Subject title   : **MEASUREMENTS AND INSTRUMENTS**

TEACHING AND SCHEME OF EXAMINATION :

No. of weeks per Semester   :   16

Subject Title	Instruction		Examination				
	Hrs. Week	Hrs Semester	Marks			Duration	
			Internal Assessment	Board Examination	Total		
MEASUREMENTS AND INSTRUMENTS	4	64	25	75	100	3Hrs	

Topics and Allocation of Hours

UNIT	TOPICS	TIME (hrs)
I	Measuring instruments	14
II	Bridges and oscilloscope	14
III	Test instruments	14
IV	Digital instruments	12
V	Operational amplifier applications	14
	Revision / Test	12
	Total	80

RATIONALE

Instrumentation engineers must be conversant with the details of measurement of process variables in industries. In any process industries, the major process variables involved are temperature, pressure, flow and level. This subject covers the detailed study of principle, construction, operation, advantages, limitations and applications of the various transducers used in process industries. It also helps the students to understand about the availability of various transducers by different principles to measure the same process variable. This subject gives an idea about the selection of transducers for a given process variable by analyzing the advantages and limitations of each transducer.

Objectives

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

- Realize the importance of three basic forces required in meters.
- Explain the construction and working of indicating instruments for voltage, current Power & Energy.
- Understand the working and applications of Multimeter for Ω, V, A measurement.
- Explain range extension methods for Ammeters and Voltmeters.
- Explain the construction and working and practical application of WB Bridge for Resistance measurement.
- Explain the construction and working of AC Bridges & measurement of L and C using three bridges.
- Explain the working and application of CRO.
- Explain the working and application of PS as a test instrument.
- Understand the use of Audio signal generator, Frequency generator, and Megger for testing of electronic/electrical circuits.
- Explain the working and use of CT's and PT's.
- Understand and write the working of recorders.
- Compare Digital Vs Analog Instruments.
- Explain the working of DVM, DFM.
- Use Digital Multimeter.
- Explain the working of EC and Digital Panel meter using LCD.
- Explain the application of Op-amp for wave generation.
- Explain the use of instrumentation Amplifiers and Charge Amps.
- Explain the working and applications of LPF, HPF, PLL.

24242 - MEASUREMENTS AND INSTRUMENTS
DETAILED SYLLABUS

UNIT	NAME OF THE TOPIC	HOURS
I	**MEASURING INSTRUMENTS** Basic forces for indicating instruments – constructional features of permanent magnet and moving coil instrument – moving iron instrument – attraction and repulsion types – rectifier type ac volt meter – ohm meter – series and shunt type – extension of range using shunt and multipliers – analog Multimeter circuits – dynamo meter type wattmeter - 1φ & 3φ induction type energy meter, Multifunctional Meters.	14 hrs
II	**BRIDGES AND OSCILLOSCOPE** Construction, working, balance equation (derivation not required) and application of measurement of resistance by Wheatstone bridge – measurement of capacitance by Schering bridge – measurement of inductance by Maxwell's bridge – RLC meter. Block diagram of oscilloscope – construction and working of CRT – horizontal deflection and vertical deflection – time base generator – applications of CRO.	14 hrs
III	**TEST INSTRUMENTS** Block diagram, working and applications of DC power supply – fixed and variable – Audio signal generator – Function generator – Megger – working and applications of Instrument transformer – CT and PT – block diagram, working of recorders – XY recorder – strip chart recorder.	14 hrs
IV	**DIGITAL INSTRUMENTS** Digital vs Analog instruments – integrated type and successive approximation digital voltmeter – digital Multimeter – auto ranging – auto zeroing – auto polarity – basics of DFM – digital frequency counter – electronic counter – digital tachometer – digital panel meter using LCD – digital storage oscilloscope, mixed storage oscilloscope.	12 hrs

UNIT	NAME OF THE TOPIC	HOURS
V	**OP - AMP APPLICATIONS**	**14 hrs**
	circuit diagram and working of ramp, triangular, square wave generators using op amps – PWM – instrumentation amplifier – charge amp with zero electric crystal –low pass and high pass filters using op. amps – PLL – Functional block diagram and applications.	

TEXT BOOKS

1. Electrical and electronic measurements and instrumentation – A. K. SAWHENY, DHANPAT RAI & sons. 1986.
2. Modern electronics Instrumentation and measurement techniques – ALBERT D. HELFRICK
3. Electrical and Electronics measurements and instrumentation UMESH SINHA, SATYAPRAKASHAN, Tech India publication 1992.

24242-MEASUREMENTS AND INSTRUMENTS

MODEL QUESTION PAPER-I

Time : 3 Hrs.   Max. Marks : 75

PART-A   15x1=15

Note: :Answer any FIFTEEN questions. All questions carry eqaual marks.

1. List the different forces necessary for an instrument?
2. What is the use of moving iron instrument?
3. How will you extend the range of a voltmeter?
4. Define induction type energy meter.
5. What is use of time base generator?
6. Write the formula to find the unknown resistance using wheatstone's bridge.
7. List the applications of CRO.
8. What is the use of Schering bridge.
9. List any two applications of audio signal generator.
10. What is a megger?
11. List any two applications of DC power supply.
12. What is the use of CT and PT?
13. Write any two advantages of digital multimeter.
14. Compare digital and analog instruments.
15. List the different types of digital voltmeter.
16. Give two advantages of digital panel meter using LCD.
17. What is an instrumentation amplifier?
18. List any two applications of PLL.
19. Draw the circuit diagram of low pass filter using op-amp.
20. What is VCO?

Answer all questions choosing either A or B from each question.
Each question carries 12 marks.

21   A) With a neat circuit diagram, explain the working of dynamometer type
         watt meter.

(or)

B) Explain with neat diagram the working principle of moving iron instrument.

22   A) With neat diagram show how Maxwell's bridge is used to measure
         inductance?

(or)

B) With neat block diagram explain the construction and working of CRT.

23   A) With a block diagram explain the working of an audio signal generator?

(or)

B) Explain the working of X-Y recorder with necessary diagram.

24   A) With a neat block explain the working of successive approximation type
         digital voltmeter.

(or)

B) Explain the working of digital frequency counter.

25   A) With a neat diagram explain the working of instrumentation amplifier.

(or)

B) What is PLL? Explain with functional block diagram.

24242-MEASUREMENTS AND INSTRUMENTS

MODEL QUESTION PAPER-II

TIME : 3Hrs.   Max. Marks :75

(15x1=15)

PART-A

Note: Answer any FIFTEEN questions. All questions carry equal marks.

1. Where Moving Ion instruments are used?
2. Define ohm meter.
3. Compare MI and PMMC instruments.
4. What is the use of shunt and multipliers?
5. Write the formula to find the unknown inductance using Maxwell's Bridge.
6. List any two applications of CRO.
7. What is RLC meter?
8. What for vertical deflection system is used?
9. What is PT?
10. List any two applications of function generator.
11. What is variable DC power supply?
12. What is the use of Recorders?
13. Define auto polarity.
14. What is meant by digital storage oscilloscope?
15. Define auto ranging.
16. What is mixed oscilloscope?
17. What is the use of PLL?
18. What is an instrumentation amplifier?
19. Define PWM.
20. What is function of high pass filter?

PART-B   5x12=60

**Answer all questions choosing either A or B from each question.
Each question carries 12 marks.**

21   A) Explain the principle of operation of PMMC instrument.

(or)

B) Explain the working principle of rectifier type AC voltmeter.

22   A) Explain how to measure capacitance using Schering bridge.

(or)

B) Draw the block diagram of CRO, and write its applications.

23   A) Explain the working of function generator.

(or)

B) Explain the working of strip chart recorder.

24   A) Draw the block diagram of digital tachometer, and explain briefly.

(or)

B) Explain the working of integrated type digital voltmeter.

25   A) Explain the working of high pass filter using op-amp.

(or)

B) Explain the working of square wave generator using op-amp.

L -SCHEME

(Implements from the Academic year 2011-2012 onwards)

Course Name : DIPLOMA IN INSTRUMENTATION AND CONTROL ENGINEERING
Course Code : 1042
Subject code : **24243**
Semester   : IV Semester
Subject title : **MEASUREMENT OF PROCESS VARIABLES**

TEACHING AND SCHEME OF EXAMINATION :

No. of weeks / Semester   :   16

Subject Title	Instruction		Examination				
	Hrs. Week	Hrs Semester	Marks				Duration
			Internal Assessment	Board Examination	Total		
MEASUREMENT OF PROCESS VARIABLES	5	80	25	75	100		3Hrs

Topics and Allocation of Hours

UNIT	TOPICS	TIME (hrs)
I	Measurement of Temperature	14
II	Measurement of Pressure	14
III	Measurement of Flow (Mechanical)	14
IV	Measurement of Flow (Electrical)	12
V	Measurement of Level, Humidity and Moisture	14
	Revision / Test	12
	Total	80

RATIONALE

Instrumentation engineers must be conversant with the details of measurement of process variables in industries. In any process industries, the major process variables involved are temperature, pressure, flow and level. This subject covers the

detailed study of principle, construction, operation, advantages, limitations and applications of the various transducers used in process industries. It also helps the students to understand about the availability of various transducers by different principles to measure the same process variable. This subject gives an idea about the selection of transducers for a given process variable by analyzing the advantages and limitations of each transducer.

Objectives

Completion of the following units of syllabus, the students must be able to

- Know what is temperature and its unit.
- Know the concepts of non-electrical methods of temperature measurements.
- Know the concept of electrical methods of temperature measurements.
- Know the Cold junction compensation of thermocouples.
- Know the concepts of high temperature measurements.
- Know the concepts of temperature transmitters.
- Know what is pressure, types of pressure and its units.
- Know the concepts of electrical methods of pressure measurements.
- Know the methods of measuring vacuum.
- Know the concepts of pressure transmitters.
- Know about the types of Flow.
- Know about the importance of Reynolds's number.
- Know about Bernoulli's theorem.
- Know about Differential pressure type flow meters.
- Know about positive displacement type flow meter.
- Know about Inferential flow meter.
- Know about different type of Electrical flow meters.
- Know about measurement of solid flow.
- Know the concepts of Non-electrical methods of Level measurements.
- Know the concepts of electrical methods of Level measurements.
- Know the concepts of Moisture and Humidity.

24243 - MEASUREMENT OF PROCESS VARIABLES

DETAILED SYLLABUS

UNIT	NAME OF THE TOPIC	HOURS
	MEASUREMENT OF TEMPERATURE	14
	Mechanical methods – pressure spring – liquid – gas – Vapour in glass – liquid in steel – Bimetallic Thermometer - Construction, Working, Range and applications of above meters. Electrical methods – Thermo couples – Cold junction compensation – Lead wire compensation – Thermoelectric laws – series and parallel combination – thermopile – Bolo meter – Measurement of output of thermocouples using potentiometer and ,Millivoltmeter – RTD – 3 wire and 4 wire - Thermistors.	
	High temperature measurement – Non contact methods – Total Radiation Pyrometers – Selective radiation pyrometer - Photo electric pyrometers – Optical pyrometers - Temperature transmitters.	
II	**MEASUREMENT OF PRESSURE**	14
	Types and units of pressure - mechanical methods – Manometers (all types) – Elastic elements – Bellows – Diaphragms – Bourdon Tube. Electrical methods – Pressure measurements using strain gauge, capacitive transducer, LVDT and Piezo Electric transducers. Pressure calibration – Dead weight tester. Transmitters – Differential pressure transmitters.	
III	**MEASUREMENT OF FLOW (MECHANICAL)**	14
	Bernoulli's theorem – Continuity equation – Reynolds's number – Types of flow – Inferential flow meters – Differential pressure type meters – Orifice plates – Venturi tube – Flow Nozzle – Dall tube - Pitot tube (No derivation) – Positive displacement type meters – Nutating type meter – Oscillation piston type –Principle, working, advantages and disadvantages of above.	

UNIT	NAME OF THE TOPIC	HOURS
IV	**MEASUREMENT OF FLOW (ELECTRICAL)** Electromagnetic flow meter – Ultrasonic flow meter – Doppler and Transit time method – Swirl meter – Vortex shedding meter - Cross correlation meter – Thermal mass flow meter – solid flow measurement using conveyor belt method – Turbine flow – Target flow meter – Hot wire anemometer, Principle, working, advantage and disadvantages of the above.	12
V	**MEASUREMENT OF LEVEL ,HUMIDITY AND MOISTURE** Level – Measurement of differential pressure to indicate level, Measuring the movement of float- electrical methods – change in conductance – Change in capacitance - Radiation method – sight glass – solid level – bin type and diaphragm type – level in closed vessel. Moisture – Moisture in granular materials – solid penetrable material in paper and textiles. Humidity – Measurement of humidity – Absolute humidity – Relative humidity – Psychrometer – Hair Hygrometer. Density and specific gravity – Definition – Measurement using weighing tube type.	14

TEXT BOOK

1.S. K. SINGH, Industrial Instrumentation and control Tata McGraw Hill 2005.

REFERENCE BOOKS

1. A. K. SHAWNEY, A course in Electrical & Electronic measurements and INSTRUMENTATION, DHANPAT RAI & CO, 2003.
2 .D. PATRANABIS, principles of Industrial Instrumentation,
Tata McGraw Hill 2005.
3.ARUN K. GHOSH, Introduction to measurements and Instrumentation, 3rd edition. PHI learning Pvt. Ltd.
4.V. PUGAZHENDHI, Electronic measurement and Instrumentation, RBA Publishers.

24243-MEASUREMENT OF PROCESS VARIABLES

MODEL QUESTION PAPER-I

Time: 3 Hrs.   Max. Marks: 75

PART-A   15x1=15

Note: Answer any FIFTEEN questions. All questions carry equal marks.

I   1. Name any one mechanical method of temperature measurement.

2. What is pyrometer?

3. Define temperature.

4. List any two uses of temperature transmitters.

5. Name the fluids used in manometer.

6. What is the expansion of LVDT?

7. Define pressure.

8. What is the use of dead weight tester?

9. What are the different types of orifice plates?

10. State the advantages of oscillation piston type meter.

11. What is Reynolds number?

12. Mention the difference between venture tube and Dall tube.

13. What is Doppler effect?

14. State the working principle of vortex shedding meter.

15. Write the working principle of thermal mass flow meter.

16. State the working principle of swirl meter?

17. Define humidity.

18. Define specific gravity.

19. Define density.

20. What is hair hygrometer?

PART-B   5x12=60

Answer all questions choosing either A or B from each question.
Each question carries 12 marks.

21   A) Explain any one electrical method of temperature measurement.

(or)

B) With a neat diagram explain the working of temperature transmitter.

22   A) Describe the working of "C" type Bourdon tube.

(or)

B) Explain pressure measurement using strain gauge.

23   A) Explain with a neat diagram the construction and working of pitot tube in

flow measurement.

(or)

B) Explain the working of Nutating type flow meter with a neat diagram.

24   A) Explain in detail any one method solid flow measurement.

(or)

B) Explain the working of turbine flow meter with a neat diagram.

25   A) Explain with neat sketch how moisture in solid penetrable materials is

measured.

(or)

B) Explain the level measurement using change in capacitance method.

24243-MEASUREMENT OF PROCESS VARIABLES

MODEL QUESTION PAPER-II

Time: 3 Hrs.   Max. Marks: 75

PART-A   15x1=15

Note: Answer any FIFTEEN questions. All questions carry equal marks.

I   1. Write the metals used in bi-metallic thermometers?

2. What is thermopile?

3. What is Bolometer?

4. What is the expansion of RTD?

5. What is manometer?

6. List any two uses of differential pressure transmitters.

7. What are Bellows?

8. What are the different units used for pressure measurement?

9. Define Bernoulli's Theorem.

10. List the types of flow meters.

11. Compare flow nozzle and venture tube.

12. Write the advantages positive displacement type flow meters.

13. Mention the advantages of ultrasonic flow meter.

14. What are the advantages of hot wire anemometer?

15. State the working principle of swirl meter.

16. State the working principle target flow meter.

17. What is psychometer?

18. Define absolute humidity.

19. Define relative humidity.

20. Define moisture.

PART-B   5x12=60

Answer all questions choosing either A or B from each question.
  Each question carries 12 marks.

21   A) Explain the working of photo electric pyrometer.

                              (or)

      B) Explain the working of Bi-metallic thermometer.

22   A) Explain pressure measurement using capacitive transducer.

                              (or)

      B) Explain in detail about manometers.

23   A) Explain the working of venturi tube in flow measurement.

                              (or)

      B) Explain in detail about the working of oscillation piston type flow meter.

24   A) Explain with a neat diagram the working of target flow meter.

                              (or)

      B) Explain the principle and working of hot wire anemometer.

25   A) Explain the level measurement using change in conductance method.

                              (or)

      B) Explain the following in detail:

            i) Sight glass.   ii) Hair hygrometer.

L-SCHEME
(Implements from the Academic year 2011-2012 onwards)

Course Name : DIPLOMA IN INSTRUMENTATION AND CONTROL ENGINEERING
Course Code : 1042
Subject code : **24244**
Semester   : IV Semester
Subject title   : **INDUSTRIAL INSTRUMENTATION**

TEACHING AND SCHEME OF EXAMINATION

No. of weeks / Semester   :   16

Subject Title	Instruction		Examination			
	Hrs. Week	Hrs Semester	Marks			Duration
			Internal Assessment	Board Examination	Total	
INDUSTRIAL INSTRUMENTATION	5	80	25	75	100	3Hrs

Topics and Allocation of Hours :

UNIT	TOPICS	TIME (hrs)
I	Comparators	14
II	Measurement of velocity and Acceleration	14
III	Measurement of Force, Torque and Shaft power	14
IV	Measurement of PH and Gas analysis	12
V	Chromatography and spectral method of analysis	14
	Revision / Test	12
	Total	80

RATIONALE

Industrial Instrumentation covers the topics of measurement of variables related to Mechanical instrumentation and Analytical instrumentation. It gives detailed

information to the students about the measurement of variables related to velocity, acceleration, force, torque, shaft power, pH and gas analysis. It also provides an idea about Chromatographs, detectors and spectral analysis. This subject provides an exposure to the environmental pollution monitoring and control.

Objectives

- Know about the various Mechanical, Optical, Electronic and Pneumatic comparators.
- Study the different method of measurement of Linear and Angular velocity and Accelerometer.
- Study the different methods of Force, Torque and Shaft power measurement.
- Study about PH and its measuring electrode and PH measurement methods.
- Study about various Gas analysis.
- Study about Chromatography and Spectroscopy.

24244 - INDUSTRIAL INSTRUMENTATION
DETAILED SYLLABUS

UNIT	NAME OF THE TOPIC	HOURS
I	**COMPARATORS** **Mechanical comparators**: Dial gauge – reed type comparator – Johnson "Mikrokator" comparator – advantage and disadvantage of mechanical comparators. **Optical Comparators**: Optical lever - Cooke optical – the Zeiss ultra Optimeter – advantages and disadvantages of optical comparators. **Electrical Comparators, Electronic Comparators** – advantages and disadvantages of electrical, electronic comparators. **Pneumatic Comparators**: Solex pneumatic comparator - advantages and disadvantages of pneumatic comparators.	14 hrs
II	**MEASUREMENT OF VELOCITY AND ACCELERATION** **Linear Velocity Measurement**: Doppler Effect method – linear encoder. **Angular Velocity Measurement**: tachometer – eddy current or Dragcup tachometer – Angular encoder. **Accelerometer**: Seismic accelerometer – Piezo electric accelerometer – strain gauge accelerometer – advantages and disadvantages of Piezo electric accelerometer.	14hrs

UNIT	NAME OF THE TOPIC	HOURS
III	**MEASUREMENT OF FORCE, TORQUE AND SHAFT POWER** **Force Measurement**: Equal and unequal arm balance – pendulum scale – elastic element springs –proving ring -load cell – hydraulic load cell – pneumatic load cell – strain gauge load cell. **Torque measurement**: Gravity balance method – optical torsion method – electrical torsion method – strain gauge torsion method. **Shaft power measurement**: Prony brake dynamometer – Rope brake dynamometer - Fluid Friction (hydraulic) dynamometer – Eddy current dynamometer – D.C. dynamometer.	14hrs
IV	**MEASUREMENT OF PH AND GAS ANALYSIS** **PH definitions** – electrodes: hydrogen electrodes – calomel electrode – Quinhydrone electrode – antimony electrode – glass electrode. **Gas Analyzer**(principles of operation and working): oxygen analyzer – paramagnetic oxygen analyzer – CO analyzer - SO_2 analyzer.	12 hrs
V	**CHROMATOGRAPHY AND SPECTRAL METHOD OF ANALYSIS** **Chromatography**: gas chromatography – liquid chromatography – partition coefficient – retention time – retention ratio – band widening. **Detectors**: TCD, FID, FPD, ECD **Spectral Analysis**: Filters – Apparatus Nomenclature – Monochromators – sample cells EMR spectrum – beer's law – IR/UV photometer, working and applications	14 hrs

TEXT BOOKS

1. PUGAZHENDULU, "Electronic measurement and Instrumentation", RBA publications.
2. A. K. SAWHENY, "Mechanical measurements and Instrumentation", DhanpatRai&Co, Pvt. ltd.
3. R. K. RAJPAT, "Mechanical measurements and Instrumentation", S. K. Kataria& sons.
4. ARUN K. GHOSH, Introduction to measurements and Instrumentation, 3rd edition. PHI learning Pvt. Ltd.
5. GURDEEP R.CHASWAL and SHAM K. ANAND, "Instrumentation method and chemical analysis", Himalaya publishing house.
6. EMEST O. DOEBLIN, "Measurement systems, Applications and design". Tata McGraw Hill publishing company.

INDUSTRIAL INSTRUMENTATION

Model Question Paper - I

Time – 3 hours   (Maximum marks:75)

PART-A   (MARKS: 15×1=15)

[N.B:- (1) Answer any fifteen questions

(2)All questions carry equal marks]

1. What is a reed type comparator?

2. State the two advantages of Electronic comparator?

3. List any two advantages of sigma comparator?

4. What is the use of zeiss optimeter?

5. What is the unit of acceleration?

6. List any two uses of accelerometer?

7. What is a linear encoder?

8. What is the unit of velocity?

9. What are the different types of load cell?

10. Dynamometer is used for what measurement?

11. What is a torsion meter?

12. What are the different types of dynamometer?

13. What are the two different reference electrodes?

14. If ph of a solution is 8.5, state whether the solution is acid or base?

15. What is the value of ph of distilled water?

16. What is an analyzer?

17. What is the use of detector?

18. What are the different types of filters?

19. What is chromatography?

20. What are the uses of sample cells?

PART-B

(Marks : 5×12=60)

Answer all questions choosing either A or B from each question.
Each question carries 12 marks.

21   (a) With a neat diagram, explain the working of Johnson microkator?(12)

       (or)

       (b) Describe the construction & working of a solex pneumatic
comparator?(12)

22   (a) Describe the method of measuring acceleration using LVDT?(12)

       (or)

(b) With a neat diagram, explain how a drag cup tachometer is used to measure
angular velocity?

23.   (a) Explain in detail how a pneumatic load cell is used to measure force?

       (or)
       (b) With a neat diagram, explain how the shaft power is measure using fluid
friction dynamometer?

24.   (a) Explain in detail the construction & working of calomel electrodes?

       (or)

(b) With a neat diagram, explain the working of oxygen analyzer?

25   (a) What is band widening? Explain

       (or)

(b) Explain in detail the working of IR photometer?

L-SCHEME
(Implemented from the Academic year 2011-2012 onwards)

Course Name : DIPLOMA IN INSTRUMENTATION AND CONTROL ENGINEERING
Course Code : 1042
Subject code : **24245**
Semester   : III Semester
Subject title : **ANALOG AND DIGITAL ELECTRONICS PRACTICAL**

TEACHING AND SCHEME OF EXAMINATION

No. of weeks / Semester : 16

Subject Title	Instruction		Examination			
	Hrs. Week	Hrs Semester	Marks			Duration
			Internal Assessment	Board Examination	Total	
ANALOG AND DIGITAL ELECTRONICS PRACTICAL	6	96	25	75	100	3Hrs

24245 - ANALOG AND DIGITAL ELECTRONICS PRACTICAL

LIST OF EXPERIMENTS

1. Construct and test a) Inverting b) Non-inverting amplifier using Op.Amp.

2. Construct and test a) Differentiator circuit b) Integrator circuit using Op.Amp

3. Construct and test a Astable Multivibrator using 555 IC and test its performance.

4. Construct and test a Monostable Multivibrator using 555 IC and test its performance.

5. Verify the Truth table of the following gates AND, OR, NOT, NAND, NOR, EX-OR using 74xx ICs

6. Construct other gates using NAND gates.

7. Construct a half Adder/Full adder using 7408, 7432, 7486, 7404 ICs and verify its truth table.

8. Construct Half Subtractor/full substractor and verify the Truth table

9. Construct and verify the Truth table of RS,D and JKMS FF

10. Construct a 4 bit BCD counter using 7473 ICs and observe the output waveform.

11. Construct a R-2R resistor D/A converter and test its performance.

12. Verify the operation of ADC using 0808IC.

EQUIPMENTS REQUIRED FOR THIRTY STUDENTS

S.No	NAME OF THE EQUIPMENT	QUANTITY REQUIRED
1.	IC TRAINER WITH POWER SUPPLY FACILITY	10
2.	CATHODE RAY OSCILLOSCOPE	1
3.	AUDIO OSCILLATOR	1

Circuit diagram – 20 marks

Connections – 20 marks

Reading & Graph – 20 marks

Result – 10 marks

Viva voce – 5 marks

Total – 75 marks

L-SCHEME
(Implemented from the Academic year 2011-2012 onwards)

Course Name : DIPLOMA IN INSTRUMENTATION AND CONTROL ENGINEERING
Course Code : 1042
Subject code : **24246**
Semester   : IV Semester
Subject title   : MEASUREMENT OF PROCESS VARIABLE PRACTICAL

TEACHING AND SCHEME OF EXAMINATION

No. of weeks / Semester   :   16

Subject Title	Instruction		Examination			
	Hrs. Week	Hrs Semester	Marks			Duration
			Internal Assessment	Board Examination	Total	
MEASUREMENT OF PROCESS VARIABLES PRACTICAL	6	96	25	75	100	3Hrs

24246 - MEASUREMENT OF PROCESS VARIABLES PRACTICAL

LIST OF EXPERIMENTS

1. Range Extension of an Ammeter.
2. Range Extension of a Voltmeter.
3. Measurement of voltage, current using CRO.
4. Measurement of frequency using CRO and Lissajous pattern.
5. Construction and Measurement of resistance using Wheatstone bridge.
6. Verification of thermoelectric laws.
7. Measurement of flow.
8. Measurement of viscosity using say bolt viscometer.
9. Calibration of pressure gauge using master gauge.
10. Transient response of Thermocouple with and without well for step input.
11. Calibration of Temperature transmitter.
12. Calibration of differential pressure transmitter.

MEASUREMENT OF PROCESS VARIABLES PRACTICAL

Sr No	Name of the Equipments	Required Nos
1	Ammeter (0-10)mA, (0-50)mA	2 + 2 nos
2	Voltmeter (0-10)V, (0-50)V	2 + 2 nos
3	Regulated Power Supply (0-30)V	4 nos
4	Rheostat	4 nos
5	CRO Dual trace 20 MHz / 30 MHz	3 nos
6	Signal generator 1 MHz	3 nos
7	Decade Resistance box	2 nos
8	Galvanometer	2 nos
9	Breadboard	2 nos
10	Thermocouple (J Type / K-Type)	4 nos
11	Flow measurement station	1 no
12	Saybolt Viscometer	1 no
13	Pressure Gauges of two different ranges	2 + 2 nos
14	Dead weight tester	1 no
15	Thermowell for Thermocouple	2 nos
16	Stop watch	2 nos
17	Temperature transmitter with indicator	1 no
18	Differential Pressure Transmitter setup with indicator	1 no
19	Water bath with heater	3 nos

Circuit diagram – 20 marks

Connections – 20 marks

Reading & Graph – 20 marks

Result – 10 marks

Viva voce – 5 marks

Total – 75 marks

DIPLOMA IN ENGINEERING/TECHNOLOGY

L - SCHEME

2011 - 2012

COMMUNICATION AND LIFE SKILLS PRACTICAL

DIRECTORATE OF TECHNICAL EDUCATION
GOVERNMENT OF TAMILNADU

L-SCHEME

(Implemented from the Academic year 2011-2012 onwards)

Course Name : DIPLOMA IN ENGINEERING/TECHNOLOGY

Subject Code : **20002**

Semester   : **IV SEMESTER**

Subject Title   : **COMMUNICATION AND LIFE SKILLS PRACTICAL**

TEACHING AND SCHEME OF EXAMINATION:

No. of Weeks per Semester: 16 Weeks

Subject Title	Instructions		Examination				Duration
	Hours/ Week	Hours/ Semester	Marks				
			Internal assessment	Board Examination	Total		
COMMUNICATION AND LIFE SKILLS PRACTICAL	4 Hours	64 Hours	25	75	100		3 Hours

Topics and Allocation of Hours:

Sl. No.	Section	No. of Hours
1	**Part-A:Monodic Communication**	**16**
2	**Part-B:Dyadic Communication**	**16**
3	**Part-C:Professional Communication**	**16**
4	**Part-D:Life Skills**	**16**
Total		**64**

RATIONALE

Nowadays, effective and errorfree communication is a basic need. Communication through English is the order of the day for entry and survival in any corporate. Training in Monodic communication (one man communication) Dyadic communication (a pair communication) and Professional communication (may be Monodic, Dyadic or Group communication) is attempted through these practical modules. One can improve one's communication skills by enriching one's vocabulary ,particularly active vocabulary and standard everyday expressions and using them in various contexts. Practice alone, both on the campus and outside the campus, can help a learner to grow proficient in the art of Communication.

Language is the most commonly used and effective medium of self-expression in all spheres of human life - personal, social and professional. A student must have a fair knowledge of English language use and various communicative functions. He/she must be able to pursue the present course of study and handle the future jobs in industry. The objective of the course is to assist the diploma holders to acquire proficiency in monodic, dyadic and professional communication skills and selective but most important life skills. At the end of the course, the student will be able to communicate his ideas fearfree and errorfree, in social and professional spheres of life and imbibe life skills.

SPECIFIC INSTRUCTIONAL OBJECTIVES

Communication is crucial as it influences every aspect of one's personal development. Having a sound grounding in reading and writing techniques allows a student to progress on to higher level literacy skills. Many students struggle because their basic decoding is so inaccurate that advanced comprehension is difficult for them. Because of their poor exposure and poor use of English language in various spheres of life they suffer proper communication. They also tend to be 'afraid' of words and in turn they are not able to develop their personal vocabulary. In otherwords, without solid literacy skills, the student's prospects and life chances are limited. It is a fact that Communication skills and Life Skills shapes one's personality.

MONODIC COMMUNICATION

The student is able to:

1. Practise using departmental words and terminology in sentences.
2. Prepare and perform oral presentations.
3. Introduce oneself and others.
4. Deliver welcome address and vote of thanks.
5. Compere a program.
6. Describe the visuals.
7. Take notes, answer very short questions.
8. Comprehend an auditory/oral passage.

DYADIC COMMUNICATION

The student is able to:

1. Adopt various communicative functions.
2. Prepare and perform a dialogue.
3. Adopt the basics of telephone etiquette.

PROFESSIONAL COMMUNICAITON

The student is able to:

1. Prepare a resume.
2. Take part in a group discussion.
3. Communicate through body language.
4. Adopt the interview skills with professional presence.
5. Perform mock interview.

LIFE SKILLS

The student is able to:

1. Prepare for and deal with change.
2. Adopt motivation, goal-setting and self-esteem.
3. Adopt Teamwork skills.
4. Adopt Time management.
5. Adopt Emotional intelligence skills.
6. Assert Positively.
7. Adopt Interview etiquette.
8. Plan career.
9. Understand Strength, weakness (long term, short term).

LEARNING STRUCTURE

To enable the students to practise monodic communication, dyadic communication professional communication and imbibe life skills through various modes of practical learning and assignments.

PROCEDURE	MONODIC COMMUNICATION	DYADIC COMMUNICATION	PROFESSIONAL COMMUNICATION	LIFE SKILLS
PRINCIPLES	Identifying various platforms	Exposure to dialogue situations, exposure to telephone etiquette.	Exposure to resume writing, group discussion, interviews.	Exposure to selective life skills/problem solving skills.
CONCEPTS	Sharing opinions, feeling, with or without audience.	Understanding the basic communicative functions. Conversing with a neighbour	Writing resume, performing group discussion, facing interviews.	Imbibe and practise the selective life skills.
FACTS	Oral presentation, art of introduction, enhancing the list of active vocabulary, listening skills, note taking skills, describing skills.	Audio tapes, compact disk, mikes, various contexts.	FAQ, Resume models, Audio tapes, compact disk, mikes.	Stories, anecdotes, incidences, case studies and assignments.

COMMUNICATION AND LIFE SKILLS PRACTICAL

SYLLABUS

PART A: MONODIC COMMUNICATION (16 hours/ periods)

a) **Vocabulary enrichment**: recording important words and terminology alphabetically connected to the concerned department – playing antakshari.
b) **Introducing oneself**: using greeting phrases – opening and closing with courteous notes – supplying personal information.
c) **Introducing others**: using greeting phrases – opening and closing with courteous notes – with information.
d) **Welcome address, vote of thanks and compering a program:** keeping notes – and personal information of the dignitaries – concerned.
e) **Making an Oral Presentation**: Preparing the presentation - Talking about people, animals and places – Keywords technique and the rehearsal – Presentation outline – Performing the presentation – answering the questions.
f) **Oral description**: a picture from an English magazine – a visual ad – a natural scene.
g) **Auditory/Oral comprehension** – small passage – small dialogue -very short story – note - taking skill.
h) **News Caption**: giving caption for a news item from an English daily.

PART B: DYADIC COMMUNICATION: COMMUNICATIVE FUNCTIONS (16 hours/ periods)

a) **Dialogue**: preparing and performing - Meeting people, exchanging greetings and taking leave – Giving instructions and seeking clarifications – Thanking someone and responding to thanks - minimum seven exchanges including the courteous openings and closings – ten common contexts.
b) **Telephonic dialogue**: telephonic etiquette - Answering the telephone and asking for someone – Dealing with a wrong number – Taking and leaving messages – Making enquiries on the phone-ordering for supply-bookings and arrangements-handling the complaints – calling for appointment.

PART C: PROFESSIONAL COMMUNICATION (16 hours/ periods)

a) Group Discussion - Taking part in a Group Discussion – focus on team spirit.
b) Interview - Frequently asked questions in an interview – Mock interview - Body language.
c) Resume Writing – components.

PART D: LIFE SKILLS (16 hours/ periods)

a) Preparing for and dealing with change.
b) Motivation, goal-setting and self-esteem.
c) Teamwork skills.
d) Time management
e) Emotional intelligence skills
f) Career planning.
g) Assertive Skills.
h) Interview skills.

References :-

1) Malcolm Goodale, Professional Presentations with VCD, Cambridge University Press
2) B.Jean Naterop and Rod Revell, Telephoning in English with 2 Audio CDs Cambridge University Press
3) Priyadarshi Patnaik, Group Discussion and Interview Skills with VCD, Cambridge University Press
4) Kamalesh Sadanand and Susheela Punitha, Spoken English: A Foundation Course for Speakers of Tamil, Orient BlackSwan.
5) S. P. Dhanavel, English and Soft Skills, Orient BlackSwan
6) Robert Sherfield and et al, Developing Soft Skills, Pearson Education.
7) Poly Skills: A course in communication skills and Life skills, Cambridge University Press.
8) English and Communication Skills for Students of science and Engineering by S.P.Dhanavel , Orient BlackSwan.
9) Speak Well, edited by Kandula Nirupa Rani, Jayashree and Indira,OrientBlackSwan.
10) Fifty ways to improve your telephoning and teleconferencing Skills by Ken Taylor -

COMMUNICATION AND LIFE SKILLS PRACTICAL

Model Question Paper - 1

Time: 3 hrs   Max Marks: 75

PART –A (35 Marks)

Monodic Communication:

1. Introduce one self   (5)
2. Use the mentioned words orally in sentence   (2x2 ½ =5)
3. Prepare and present a welcome address for your college annual day programme. (5)
4. Listen to the passage read out from the English daily of the week of the examination.

   Please note: No prerecorded passage   (10)
5. Write a news caption for the passage given from the English daily.   (5)
6. a) Describe orally the visual or the picture found in the English daily of the week of the examination.   (5)

   (Or)

   b) Make an oral presentation about an animal.

PART – B (15 Marks)

Dyadic Communication:

1. Play antakshari of five pairs of departmental words with your partner.   (5)
2. Prepare and perform a dialogue with your partner on the given situation   (10)

   (minimum seven exchanges)

   Or

   Prepare and perform a telephonic dialogue on a flight booking.

   (minimum seven exchanges)

PART-C (25 Marks)

Professional Communication:

1. Form a group of six members and perform a discussion on the given theme.   (10)

   2.Imagine you are V.Gokulraj ,a diploma holder. Prepare a resume for the post of supervisor in Oberoi computers Ltd.Chennai.
   (10)

   Professional appearance: Interview etiquette-dress code- Body language   (5)

COMMUNICATION AND LIFE SKILLS PRACTICAL

Model Question Paper - 2

Time: 3 hrs   Max Marks: 75

PART –A (35 Marks)

Monodic Communication:

1. Introduce your friend S.Mohan an a excutive engineer to a group of audience.   (5)
2. Use the mentioned words in sentence orally.   (2x2 ½ =5)
3. Prepare and present a Vote of thanks in your college sports day programme.   (5)
4. Listen to the passage read out from the English daily of the week of the examination.
   Please note: No prerecorded passage   (10)
5. Write a news caption for the passage given from the English daily.   (5)
6. a) Describe the visual or the picture found in the English daily of the week of the conduct
   of the examination.   (5)

                                (Or)

   b) Make an oral presentation about your polytechnic college.

PART – B (15 Marks)

Dyadic Communication:

1. Play antakshari of five pairs of your departmental words with your partner.   (5)
2. Prepare and perform a dialogue with your partner on the given situation   (10)

                   (minimum seven exchanges)

                                (Or)

   Prepare and perform a telephonic dialogue on ordering the supply of a computer

                   (minimum seven exchanges)

PART-C (25 Marks)

Professional Communication:

1.Form a group of six members and perform a discussion on the given theme.   (10)

2. Imagine you are M.Kishore a diploma holder. Prepare a resume for the post of operating
   engineer in REC Electricals Ltd.Madurai.   (10)
   Professional appearance: Interview etiquette-dress code- Body language   (5)

NOTES OF GUIDANCE

Role of the media:

To equip a learner with vocabulary, particularly active vocabulary and standard everyday expressions ,using English dailies and watching selective English T.V. channels both in the classroom and outside the classroom is focused. Such a provision is recommended for the students to establish familiarity with the English dailies and selective English T.V. channels.

Minimum two copies of two English dailies in the laboratory room (students can bring their own copies also).Minimum two systems with net connection for information collection in the laboratory itself.

Synopsis of the news item:

During every lab work day, students must choose a news item from the English daily or weekly or monthly, and write a synopsis of the chosen news item, in not more than five lines. The news item should be pasted on the left page and synopsis on the right page (the chosen news item should not be politically, socially or communally controversial). Students should exercise care in choosing the news items. Teachers have to advise them on this aspect. This can be done outside the class hours also but every record exercise should begin with the synopsis of news item of the date of the lab session.

For example, first lab exercise namely departmental vocabulary and antakshari is performed on 15/12/2011. The student should choose a news item from any English daily of 15/10/2011 and record the synopsis on the right page (in not more than 5 lines) under the caption **Synopsis of the news item of the day/date 15/10/2011.**There is no harm in repeating or copying the lines form the passage. The essence of the passage should be there. The cutout news item for presenting the synopsis should be pasted on the left page of the record notebook.

This is to be done with interest for developing one's personality. This work **does not carry any marks** but without which the record exercise should not be valued. This is the precondition for valuing the record exercise. Each record exercise follows the synopsis of the chosen news item.

At the bottom of the synopsis, the student should record the **dictionary meaning** of atleast **one strange word** found in the chosen news item. At the end of every month, a minimum of 10 Headlines of 10 different days i.e. one Headline a day from anyone English daily should be pasted on the right or left page of the Record Note Book. (This work does not carry marks but this is the precondition for marking the record exercises)

External examiner**,** before signing the record notebook, should verify whether the Newspaper works were recorded/pasted in the record notebook.

Verbal communication in any language begins with sounds in isolation, union and word formation. Learning everyday words and expressions is the primary factor. Grammar comes next. One can enrich one's every day vocabulary by reading English magazines and listening to

or watching an English channel on television. So an English laboratory should be equipped with a minimum of two copies of two English dailies and English weeklies or monthlies.

Watching English channels helps the students improve their vocabulary and expressions. If there is a provision, students may be permitted to watch selective, mind corruption free English channels (sports, education, news, animal channels and so on) for at least 15 min. during the English lab sessions. This will serve as motivation for the students and help them shed their inhibition.

What is antakshari? (Polar word game)

This game can be played on the stage by two or three students using the departmental words. Suppose Mr. A belongs to Dept.of Electrical and Electronics and he says his departmental word ' **ampere** 'Mr. B has to supply a word beginning with the ending letter of Mr. A's word. The word **ampere** ends with the letter **' e'** so Mr. B says ' **electrical** '.Mr. A has to continue with the letter ' **l** '. Like that five pairs of words are to be spoken.(**Letter ending only, not sound ending.)** Suppose departmental words are not available in some English letters like

' x ' ' y ' ' z ' the students may be permitted to use common words.

ANTAKASHARI (Five Exchanges)

(Dept. of Mechanical Engineering.)

EXAMPLE:

Mr. A	Mr. B
1. Governo**r**	**R**eservoi**r**
2. **R**ac**k**	**K**elvi**n**
3. Nu**t**	**T**oo**l**
4. **L**athe	**E**missio**n**
5. Naphth**a**	**A**nvil

Introducing oneself:

One is not expected to introduce one's family. One or two sentences on his family will do. Care must be taken to include general proficiency, titles and merits, awards possessing or secured in academic activities like paper presentation, participation in inter polytechnic or intra polytechnic competitions, sports activity, forums like NCC,NSS, hobby, ambition, strengths and weaknesses.

Introducing others – merits – credentials—one or two points on his family.

Vote of thanks / Welcome address. No doubt it should be all-covering but Focus should be on the important persons/invitees/chief guest and the message of the speaker.

Description (pictures from English weekly/daily) Pictures may be displayed through projector or Magazine cuttings may be used. Just five lines on the picture will do.

Auditory/oral comprehension: A Passage from any English daily of the week of the examination is to be read out for two to three minutes in the end examination. Display of recorded passages can be used as an addition in the class room. The use of pre-recorded passage discouraged in the end examination.

Oral presentation: Students must be encouraged to use English magazines and internet for collecting information on the topic, noting keywords and use them in their presentation in his own language. One must be able to talk extempore for 2 min on any topic, given a time of two minutes for organizing his/her thoughts. The topics can be kept simple and general (current events of interest like sporting event for headline of the day). It must be totally an oral activity without the aid of any other media.

News Caption: A news item ,without heading,of not more than ten lines from an English daily of the week of the conduct of Examination is to be given. The caption may be a passive construction or a catchy phrase on the given news item.

Face to face dialogue: Selective nine situations / topics are to be performed in the class room. (Minimum seven exchanges with courteous openings and closings).

Telephonic dialogue: Selective seven situations to be given. (Minimum seven exchanges).

Resume writing: cover letter—the components of a resume like sender's address, recipient's address, career objective to be explained.

Group Discussion: Topics of common interest, avoiding controversial ones, are to be given for discussion. A group may consist of six members.

Students should be exposed to 44 phonemes (sounds) in English language and their symbols.

There shall be no question on this end examination.

COMMUNICATION SKILLS EXERCISES:-

1. Departmental Vocabulary alphabetically (using it in sentence, antakshari).Using the words orally in sentences
2. Introducing oneself and others
3. Vote of thanks / Welcome address
4. Description (pictures from English weekly/daily)
5. Auditory/oral comprehension
6. Oral presentation
7. Face to face dialogue
8. Telephonic dialogue
9. Resume writing
10. Group Discussion

Communication Skills:

Ten Marks for each exercise leading to a maximum of hundred marks in total.

The total marks to be reduced to an average of ten marks.

Texts of the performed activities to be recorded in the Record Note book. Synopsis of the news item of the day/date is mandatory at the beginning of every record exercise.

Life Skills:

i) Preparing for and dealing with change.
j) Motivation, goal-setting and self-esteem.
k) Teamwork skills.
l) Time management
m) Emotional intelligence skills
n) Career planning.
o) Assertive Skills.
p) Interview skills.

Life skills are to be intensely inculcated through lectures, quotes, anecdotes and case studies. An excellent awareness of the eight essential life skills is to be created through continuous internal assessment. Five assignments in these topics are to be recorded in the record note book.

➢ A minimum of five assignments on five different topics.
➢ Each assignment to be assessed for twenty marks.
➢ The total marks to be reduced to an average of ten marks.
➢ All the topics to be covered in the lab.

TIME MANAGEMENT IN THE END EXAM.

For written part 30 min

- Written part of the examination should be the first / beginning of the examination, monadic oral exam to start during the written exam.
  Written Part exercises:

- auditory / oral comprehension.
- Resume writing.
- Giving news caption for the passage.
- During the written examination time of 30 minutes, monodic communication examination may also take place simultaneously.

MONODIC COMMUNICATION (ONE MAN COMMUNICATION)

Oral part – 75 min.

Both internal and external examiners (simultaneously) are to examine the students.

Five minutes for each student. 15 students for external & 15 students for internal and within 75 minutes both internal and external examiners complete the monadic communication exam.

DYADIC COMMUNICATION (ONE PAIR COMMUNICATION)

- 5 min for each pair.
- 15 pairs in total. 8 pairs for external and 7 pairs for internal examiner. (8x5=40 min) within **40 min** both internal and external examiners completes the dyadic communication exam.
- The students examined by the external for monadic exam are to be examined by the internal for dyadic and vice versa.

PROFESSIONAL COMMUNICATION

- 30 min for group discussion.
- 6 members in each group.
- 5 min for discussion for each group.
- Both internal and external examiners to supervise / examine simultaneously one group each.
- Within fifteen minutes all the six groups to be examined.

LABORATORY REQUIREMENT

1. An echo-free room for housing a minimum of sixty students.
2. Necessary furniture and comfortable chairs
3. Public Address System.
4. A minimum of two Computers with internet access, with Audio for Listening Skill and related software packages.
5. A minimum of Two different English dailies.
6. A minimum of one standard Tamil daily.
7. Headphone units – 30 Nos. with one control unit with a facility to play and record in Computer.
8. A minimum of Three Mikes with and without cords.
9. Colour Television (minimum size – 29").
10. DVD/VCD Player with Home Theatre speakers.
11. Clip Chart, white board ,smart board.
12. Projector.
13. video camera.
14. Printer,Xerox,scanner machines **desirable.**
15. English Weeklies/monthlies/journals like ELTOI **desirable.**
16. Frozen thoughts –monthly journal for Lifeskills by Mr.Rangarajan / www.frozenthoughts.com

Mark Pattern

End Examination –   **75 Marks**

Monodic Communication –   35 Marks

Dyadic Communication –   15 Marks

Profession Communication – 20 Marks

Professional Appearance –   5 Marks

Internal Assessment	**25 Marks**
Communication skills Record Notebook	10 Marks
Life skills assignments	10 Marks
Attendance	5 Marks

COMMUNICATION AND LIFE SKILLS PRACTICAL

Allocation & Statement of Marks

Duration:3Hrs.

Name of the Candidate   Reg. No.

A. Monodic communication : 35 Marks

Introduction (5 mks)	Use in sentence (5 mks)	Vote of thanks / welcome address (5 mks)	Auditory/Oral comprehension (10 mks)	Description/ Oral presentation (5 mks)	News caption (5 mks)	Total (35 mks)

B. Dyadic communication: 15 Marks

Antakshari (5 mks)	Dialogue (10 mks)	Total (15 mks)

C. Professional communication: 20 Marks

Group Discussion (10 mks)	Resume (10 mks)	Total (20 mks)

D. Internal Assessment: 25 Marks

Record Notebook Commn.skills (10 mks)	Assignments Life Skills (10 mks)	Attendance (5 mks)	Total (25 mks)

E. Professional Appearance: /5 Marks

Total :   **/100 Marks**

Internal examiner   **External examiner**

FACE TO FACE DIALOGUE TOPICS

1. Between Friends (On any acceptable topic).

2. Between a conductor and a passenger.

3. Between a doctor and a patient.

4. Between a Shopkeeper and a Buyer.

5. Between a Teacher and a Student.

6. Between a tourist and a guide.

7. In a Bank.

8 At a railway enquiry counter.

9. Lodging a complaint.

 Note: A resourceful teacher may add a few more topics of common interest.

TELEPHONIC DIALOGUE TOPICS

1. Placing an order.

2. Making Enquiries.

3. Fixing appointments

4. Making a hotel reservation.

5. Dealing with a wrong number.

6. Travel arrangements.

7. Handling complaints.

MECHANICAL DEPARTMENTAL VOCABULARY FOR ANTAKASHARI AND USING IN SENTENCES

EXAMPLE:

A:

1. Anvil – made of cast Iron used in foundry shop.
2. Axle – A metal rod that connects two wheels.
3. Alloy – alloy is a mixture of two or more metals.
4. Addendum – distance between top of gear teeth and pitch circle.
5. Annealing – It is a heat treatment process for softening the metals.

B:

1. Bearing – it is which supports the shaft.
2. Bolt – it is a type of fastener. Combined with screw.
3. Brake – it is used to halt an auto mobile vehicle.
4. Beed – steel wiring used in tyres to withstand stress.
5. Baffles – it is used to reduce noise, filter dust particles in auto mobile.

C:

1. Cam – it is a lobe like structure, which actuates the valve.
2. Crown – the slope like structure in the piston.
3. Calipers' – they are measuring instruments.
4. Clutch – it is used to disengage and engage the fly wheel and main shaft.
5. Chamber – it is the distance between vertical line and tyre center line.

D:

1. Damper – it is a type of shock absorber, reduces the vibration.
2. Differential – it controls the speed of rotating wheel in the rear axis.
3. Diaphram – it is used to separate two layers.
4. Detonation – it is the continuous knocking with serious effect on cylinder head.

E:

1. Evaporator – it absorbs heat to vapourise liquid into air
2. Engine-the place where fuel is burnt and heat energy is converted. mechanical energy
3. Electrolyte-it is a liquid substance which is used to transfer current or any metal particle.
4. Emission-the release of burnt gas from automobile.
5. Elongation-the increase of dimension due to application of load.

F:

1. Filter-which is used to remove dust particles.
2. Friction-the resistance on wear occur due to rubbing of two metals.
3. Fly wheel-the wheel like structure used to balance the uneven weight in engine.
4. Fuel – it is a substance that burns with oxygen in the air.
5. Factor of safety - it is the safety limit after which the material will break down.

G:

1. Governor – it is used to control the flow of fuel according to load.
2. Gear – it is used to transmit power from one place to another.
3. Generator – it is used to generate power.
4. Gasket – it prevents the leakage and to provide sealing effect.
5. Goggle – the protective device used to guard the eyes.

H:

1. Hub – it is the center part of wheel.
2. Hammer – it is used to beat sheet metals.
3. Hydraulics – it deals with fluid for various function.
4. Hatching – it is used to highlight the parts in drawings.
5. Head stock – it is the main function unit of lathe.

I:

1. Ignition – it is the function by which fuel is burnt.
2. Injection – it is the process of spraying fuel into engine block.
3. Impeller – it is which converts kinetic energy into pressure energy.
4. Inventory – it is the place where raw materials are stored.
5. Idling – it is the condition at which the automobile engine at stationary state.

J:

1. Jig – it guides the tool and hold the job.
2. Jaw – it is teeth like structure used to hold work pieces.
3. Jog mode – Jog mode is used to give manual feed for each axis continuously.
4. Junk – it is known as waste material in industry.
5. Journal – It is a type of bearing.

K:

1. Keyway – it is a specific path made in shaft to joint parts.
2. Knocking – the sound produced due to Burning of uncompleted burnt fuel.
3. Kelvin – it is the degree of hotness.
4. Knurling – it is the process of lathe done to work piece to improve the gripness.
5. Knuckle joint – It is a type of joint used to connect two work pieces.

L:

1. Lubrication – process of reducing heat by applying cooling substances.
2. Layering – it is used to draw parts of a machine separately and combine together.
3. Lever – it is a supported arm used to engage gears.
4. Lathe – it is the father of machines used in turning operations.
5. Lead screw - it is the screw through which the carriage travels.

M:

1. Manometer – it is used to measure the pressure of fluids.
2. Milling – process of removing metal from work piece by rotating cutting tool.
3. Manifold – it is a passage made for flow of fuel in automobile.
4. Moulding – it is the process of passing hot liquid metal into mould made through sand.
5. Module – it is a metric standard used to identify or specify pitch.

N:

1. Nozzle – it is used to reduce the pressure and increases the velocity.
2. Nut – it is a type of fastener used to couple with screw.
3. Nomenclature – Dimensional property of specific part on component is notified by nomenclature.
4. Neck – Distance between drills body and shank.
5. Naphtha – kind of inflammable oil.

O:

1. Orthography – it is the three dimensional view of an object.
2. Ovality – Elliptical shape of piston.
3. Over haul – it is the complete checking and servicing of a machine or vehicle.
4. Optimum temperature – suitable temperature condition for certain process on working.
5. Offset – it is by which the axis of certain job is defined.

P:

1. Pinion – a small gear is called pinion.
2. Pulley – A cylindrical object used to connect belt for transmitting power.
3. Pump – it is which transfers fluid from one place to another.
4. Piston – it is which transfer power from combustion chamber to connecting rod.
5. Port – it is the opening in two stroke engine for movement of fuel and exhaust.

Q:

1. Quilt – it is used to give automatic feed in machines.
2. Quality control – it is an inspection processl.

R:

1. Reaming – it is the operation used to finish inner surface of a hole.
2. Reservoir – it is used to store fuel or any liquid.
3. Rack – it is a spur gear with infinite radius.
4. Retainer – it is used to bring back to the original position.
5. Radiator – it is the part used in automobile for cooling water.

S:

1. Shackle – it is a rod connected to leaf spring.
2. Spring – it is a circular rod which compresses on load and retracts when released.
3. Strainer – it is used to remove micro particles.
4. Shock absorber - it is used to reduce vibration and give cushioning effect.
5. Suspension- it is used to absorb shocks and give cushioning effect.

T:

1. Tail stock – it is used in lathe to support the job.
2. Tool – it is a metal.removal device.
3. Torque – it is the twisting load given on a work piece.
4. Trimming – it s the process of removing excess metal .
5. Turning – it is a metal cutting process used to reduce diameter.

U:

1. Universal joint-it is used to connect propeller shaft and differential unit.
2. Universal divider head- it is used to index various components.

V:

1. Valve – valve is the part used in automobile for flow of fuel and exhaust to cylinder head.
2. Vent hole – it is the hole made in casting for ventilation purpose.
3. Vulcanizing – it is the process of adding carbon to rubber.
4. Vibration – it is caused due to the movement in an uneven surface.
5. Velocity-rate of change of displacement.

W:

1. Wheel-it is a circular object which rotates and moves the vehicle.
2. Wiper-it is used in wind shield to remove water droplets.
3. Work piece-it is the material in which various processes are done to make a component.
4. Wage-it is the amount paid to a worker for his work.
5. Washer-washer is a component used in fasteners to reduce gap.

Y:

1. Yawing-the turning of wind mill towards direction of air is called yawing.
2. Yoke-it is which holds the other end of spindle in milling machine.
3. Yield stress-It is the stress above which it will attain the breaking stress.
4. Young's modulus-it is the ratio between stress and strain.

Pl.note: Suppose departmental words are not available in some English letters like

' x ' ' y ' ' z ' the students may be permitted to use common words. This is only an example. Another student of Mechanical Engineering can have different sets of words under each letter of the English alphabet.Like that there may be variety of sets. The most important point is that One is not supposed to murmur but speak the words intelligibly in an audible manner. Swallowing the words will deprive a student of winning a selection in an interview. In the same way, students of other Departments can have different sets of words of their departments under each letter of the English alphabet.

TELEPHONE LANGUAGE AND PHRASES IN ENGLISH

Answering the phone

" Good morning/afternoon/evening, Madras Enterprises, Premila speaking."

" Who's calling, please?"

Introducing yourself

" This is Raghavan speaking."

" Hello, this is Raghavan from Speak International."

Asking for someone

" Could I speak to Mr. Raman, please?"

" I'd like to speak to Mr Raman, please."

" Could you put me through to Mr Raman, please?"

" Could I speak to someone who …"

Explaining

" I'm afraid Mr. Raman isn't in at the moment".

" I'm sorry, he's in a meeting at the moment."

" I'm afraid he's on another line at the moment."

" Putting someone on hold"

" Just a moment, please."

" Could you hold the line, please?"

" Hold the line, please."

Problems

" I'm sorry, I don't understand. Could you repeat that, please?"

" I'm sorry, I can't hear you very well. Could you speak up a little, please?"

" I'm afraid you've got the wrong number."

" I've tried to get through several times but it's always engaged."

" Could you spell that, please?"

Putting someone through

" One moment, please. I'll see if Mr Raman is available."

" I'll put you through."

" I'll connect you."

" I'm connecting you now".

Taking a message

" Can I take a message?"

" Would you like to leave a message?"

" Can I give him/her a message?"

" I'll tell Mr. Raman that you called"

" I'll ask him/her to call you as soon as possible."

" Could you please leave your number? I shall ask him to get back to you."

Pl.note: The above ones are samples only. A resourceful teacher may add more.

DAY-TO-DAY EXPRESSIONS (For dialogues)

COMMON PARLANCE
How are you?
Fine. Thank you.
How are you?
Me too.
How do you do?
How do you do?
It's good to see you again.
Glad to meet you.
Thank you.
Thanks very much.
Welcome.

Hello! How is everything?
Just fine. Thanks. What's new?
Nothing much.

I'm pleased to meet you.
The pleasure is mine.
I've heard Paul speak about you often.

Only good things! I hope.

Look who's here!
Are you surprised to see me?
Sure. I thought you were in Chennai.
I was, but I got back yesterday.

Sorry, May I help you?
So kind of you.
That's so nice of you.
Nice talking to you.
Nice meeting you.
It's getting late, and I've to go now.
Certainly. Come back soon.
In that case, I'll be seeing you.
Fine.
Thank you.
Welcome
So long. See you later.
Take care. Bye.
Good-bye.

Could you tell me the time, please?
Certainly. It is 5.35 p.m.
My watch says 5.40 p.m.
Then your watch is five minutes fast.

Excuse me. Can you tell me the way to …?
May I come in?
How is the weather today?
It is pleasant. / sunny / rainy / warm /windy.

I am sorry, Can you repeat what you have said.
I am sorry, I can't hear you properly.
It is not audible. Can you please repeat it?
Beg your pardon; I don't get your words clearly.
How do you feel now?
Are you ok?
I am fine. And how about you?
I am fine. Thank you.

GROUP DISCUSSION
Let me begin with introducing this concept,
Well, this is to convey that

At the outset, I am here to convey
At this juncture, I would like to
May I intervene?
May I add?
Kindly permit me to say
If you could allow me to say
Let me add a few words
Let me first answer your question
Can you please allow me to convey
Excuse me; I would like to add further

On behalf of my colleagues,
On their behalf
Firstly/ secondly/ thirdly.
Finally/ conclusively/ at the end / Summing up
Eventually/ in the event of
In spite of / otherwise/ although/ though

Please Note:

- The above ones are samples only.
- A resourceful teacher may add more.
- A potential student may exhibit variety.

V SEMESTER

L-SCHEME
(Implements from the Academic year 2011-2012 onwards)

Course Name : DIPLOMA IN INSTRUMENTATION AND CONTROL ENGINEERING
Course Code : 1042
Subject code : **24251**
Semester   : V Semester
Subject title   : **PROCESS CONTROL INSTRUMENTATION**

<u>**TEACHING AND SCHEME OFEXAMINATION:**</u>

  Number of Weeks/ Semester   :   16 weeks

Subject Title	Instruction		Examination				
	Hrs. Week	Hrs Semester	Marks			Duration	
			Internal Assessment	Board Examination	Total		
PROCESS CONTROL INSTRUMENTATION	5	80	25	75	100	3Hrs	

Topics and Allocation of Hours :

UNIT	TOPIC	TIME (Hrs)
UNIT I	Simple process control systems and terminology	15
UNIT II	Control principles	15
UNIT III	Tuning of controllers	12
UNIT IV	Final control elements	15
UNIT V	Complex control systems	15
	Revision, Test	8
	Total	80

RATIONALE :

      In industries, there is a huge demand of qualified engineers in the areas of Process Control Instrumentation. The basic concepts and the detailed study of Process Control are covered in this subject. The importance is given to make the students to understand about the elements of Closed Loop Control System in detail. The students of Instrumentation and Control engineering branch are having wide career options in process industries. This subject provide a general idea to the students to select any one of the career options like Project engineers, Maintenance engineers, Erection and Commissioning engineers, Automation engineers, Design engineers etc.

OBJECTIVES:

*Describe the difference between controlled variable ,manipulated variable& Load variable

* List the advantages of automatic process control system

* Explain the concepts of self regulation and transportation Lag.

* Concepts Reverse & direct action.

* Compare P,I,D, PI,PD,PID controller action.

* Concept of P\I and I\P converter.

*List the characteristics of control valve.

* Concept of cavitation & Flashing .

* Describe feed forward control system.

* List the advantages of FLC

24251 - PROCESS CONTROL INSTRUMENTATION
DETAILED SYLLABUS

UNIT	NAME OF THE TOPIC	HOURS
I	**SIMPLE PROCESS CONTROL SYSTEMS AND TERMINOLOGY** Definition – 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 – simple liquid level control system – flow control system – temperature control system with transportation lag – self regulation – capacitance and capacity	15 Hrs
II	**CONTROL PRINCIPLES** Controller – block diagram, types, general properties – reverse and direct action, controller modes – discontinuous – ON-OFF Control with differential gap, without differential gap – neutral zone – continuous – proportional controller – proportional band (PB) – effect of PB on a controller output – offset – integral control – PI – PD-PID definition, salient features, applications and limitations of above controllers – selection of control action – electronic controllers – error detector – two position controller – P,I,D, PI, PD, PID controllers – reverse action – pneumatic controllers – flapper – nozzle mechanism, pneumatic relay	15 Hrs
III	**TUNING OF CONTROLLERS** Concept of tuning – criteria for controller tuning – quarter Decay ratio, IAE, ISE, ITAE – methods of tuning – open loop response method – process reaction curve – closed loop response method – ultimate cycle method, damped oscillation method.	12 Hrs

IV	**FINAL CONTROL ELEMENTS** Signal converters – P to I converter, I to P converter – actuator – electrical, pneumatic, hydraulic–control valve – characteristics - quick opening, linear, equal percentage- pneumatic valve – solenoid valve –split range control valve – single seat and double seat plug – electric motor actuated control valve – control valve sizing – CV rating – selection of a control valve – effect of cavitation and flashing on control valve performance	**15 Hrs**
V	**COMPLEX CONTROL SYSTEMS** Cascade control system, ratio control system, feed forward control system, comparison of feedback control system and feed forward control system –(one specific application for each of the above systems) Introduction DCS Fuzzy Logic Control System – concept of Artificial Neural Network.	**15 Hrs**

REFERENCE BOOKS:

1) Process control by Donald P Eckman, Wiely eastern limited,1991.
2) Process control by Peter Hariot, Tata Mc Graw Hill.
3) Neural networks by James A Freeman/David M s Kapura, Pearson education, eighth reprint, 2003.
4) Process control instrumentation technology by C.D. JOHNSON

PROCESS CONTROL & INSTRUMENTATION

MODEL QUESTION PAPER

PART – A

Answer any Fifteen Questions. Each question carries 1 mark.

1. Define Controller.
2. What is meant by Self-Regulation?
3. Define Capacitance.
4. Define transportation lag.
5. What are the types of controller?
6. Define Integral time.
7. What are the conditions used to determine the characteristics of closed loop system?
8. What is the use of Needle Valve in Pneumatic controller?
9. Define Tuning.
10. Expand ISE.
11. Define process reaction curve.
12. What is meant by Inflection Point?
13. What is a signal converter?
14. What are the two types of valve characteristics?
15. Define Minimum flow.
16. Define cv rating.
17. Give any two applications for ratio control system.
18. Mention the characteristics of NN.
19. Define Activation Value.
20. What are the interconnect technologies used for distributed control?

PART – B

Answer all questions choosing either A or B from each question.
Each question carries 12 marks.

21(a)   Explain the Basic Elements of a Control System with suitable Functional Block Diagram.(12)

(OR)

(b)i) With neat diagram, explain the operation of Simple Liquid Level Control System.(8)

(ii) Mention the advantages of Automatic control system.(4)

22(a) Compare the control actions and Mention the conditions to select the control actions.(12)

(OR)

(b)Explain the operation of proportional controller with neat diagram.

.

23 (a) Explain the operation of Ziegler-Nicholas Method of controller tuning.(12)

(OR)

(b) Explain the operation of Damped Oscillation Method of controller tuning.(12)

24 (a) Explain the operation of Pneumatic and Solenoid Valve.(12)

(OR)

(b) Explain the operation of Motor Actuator.(12)

25 (a) What is meant by Cascade Control Action? Explain with suitable example.(12)

(OR)

(a) With neat diagram, explain Feed forward control system.(12)

MODEL QUESTION PAPER- II

PROCESS CONTROL & INSTRUMENTATION

PART – A

Answer any Fifteen Questions. Each question carries 1 mark.

1. Define Process.
2. Define Disturbance.
3. Define dead time.
4. Define capacity.
5. What is meant by Neutral Zone?
6. Define error .
7. Define offset.
8. Define Reset Rate.
9. What are the criteria for controller tuning?
10. Define Quarter Decay ratio.
11. Expand ITAE.
12. Give the mathematical equation for PID Mode in Damped Oscillation Method.
13. Define CV rating.
14. What is an actuator?
15. Mention two advantages of Piston actuator.
16. Define Turndown.
17. Give any two features of DCS.
18. Draw the block diagram for Cascade Control System.
19. Mention the characteristics of NN terminology.
20. Mention any two advantages of fuzzy logic.

PART – B

**Answer all questions choosing either A or B from each question.
Each question carries 12 marks.**

21 (a) Explain with a neat diagram a temperature control system with transportation lag.(12)

(or)

(b)   With a neat diagram, explain a simple liquid level control system.(12).

22(a) Explain the flapper-nozzle system in pneumatic controller.(12)

(or).

(b) Explain the PID controller.Derive the equation. (12)

23(a) Explain the Ultimate cycle method of controller tuning.(12)

(or)

(b) Explain the open loop response method of controller tuning.(12)
.

24(a) Explain the operation of electric motor actuated control valve.(12)

(or)

(b)i) Explain the operation of spring actuator with valve positioner.(6)

(ii) Mention the factors to select the control valves & explain the effects of cavitation.(6)

25(a) Explain the distributed control system with a neat diagram.(12)

(or)

(b) Explain the functional block diagram of fuzzy logic controller.(12)

L-SCHEME
(Implements from the Academic year 2011-2012 onwards)

Course Name : DIPLOMA IN INSTRUMENTATION AND CONTROL ENGINEERING
Course Code : 1042
Subject code : **24052**
Semester   : V Semester
Subject title   : MICROCONTROLLER

TEACHING AND SCHEME OFEXAMINATION:

No of Weeks/ Semester   :   16 weeks

Subject Title	Instruction		Examination				
	Hrs. Week	Hrs Semester	Marks				Duration
			Internal Assessment	Board Examination	Total		
Micro controller	5	80	25	75	100		3Hrs

TOPICS AND ALLOCATION OF HOURS :

Unit	Topic	Time (Hrs.)
I	Architecture & Instruction set of 8051	16
II	Programming Examples	12
III	I/O and Timer	14
IV	Interrupt and Serial Communication	14
V	Interfacing Techniques.	16
	Revision - Test	8
	TOTAL	80

OBJECTIVES:
- On completion of the following units of syllabus contents, the students must be able to
- Explain Architecture of 8051 Microcontroller.
- Explain the functions of various registers.
- Understand interrupt structure of 8051.
- Understand serial data communication concepts.
- Understand the programming techniques.
- Explain various addressing modes.
- Write simple programs using 8051.
- Understand the block diagram and control word formats for peripheral devices.
- Understand how to interface with RS232C.
- Understand how to interface with 8255.
- Understand various application of 8051 Microcontroller

24052 MICROCONTROLLER
DETAILED SYLLABUS

UNIT	NAME OF THE TOPIC	HOURS
I	**Architecture & Instruction set of 8051:** Comparison of Microprocessor and Microcontroller - Block diagram of Microcontroller –Functions of each block. Pin details of 8051 – ALU – ROM – RAM – Memory Organization of 8051 - Special function registers – Program Counter – PSW register –Stack - I/O Ports – Timer – Interrupt – Serial Port – Oscillator and Clock - Clock Cycle – State - Machine Cycle – Instruction cycle – Reset – Power on Reset – Overview of 8051 family Instruction set of 8051 – Classification of 8051 Instructions - Data transfer instructions – Arithmetic Instructions – Logical instructions – Branching instructions – Bit Manipulation Instructions.	16
II	**Programming Examples:** Assembling and running an 8051 program –Structure of Assembly Language –Assembler directives - Different addressing modes of 8051 – Programmes – Multibyte Addition – 8 Bit Multiplication and Division – Biggest Number / Smallest Number – Ascending order / Descending order – BCD to HEX Conversion – HEX to BCD Conversion – BCD to ASCII Conversion – ASCII to Binary Conversion – Odd Parity Generator – Even Parity Generator - Time delay routines.	12
III	**I/O and Timer:** Bit addresses for I/O and RAM – I/O programming – I/O bit manipulation programming – Programming 8051 Timers – Timer 0 and Timer 1 registers – Different modes of Timer – Mode 0 Programming – Mode 1 Programming - Mode 2 Programming - Mode 3 Programming - Counter programming – Different modes of Counter – Mode 0 Programming – Mode 1 Programming - Mode 2 Programming - Mode 3 Programming (simple programs).	14
IV	**Interrupt and Serial Communication:** Basics of Serial programming – RS 232 Standards - 8051 connection to RS 232 – 8051 Serial Communication Programming – Programming 8051 to transmit data serially - Programming 8051 to Receive data serially – 8051 Interrupt s – Programming Timer Interrupts – Programming external hardware interrupts – Programming the serial communication interrupt – Interrupt priority in 8051 (simple programs).	14
V	**Interfacing Techniques:** IC 8255 – Block Diagram – Modes of 8255 - Interfacing external memory to 8051– 8051 interfacing with the 8255 – ASM Programming – Relays – Sensor interfacing – ADC interfacing – DAC interfacing - Keyboard interfacing – Seven segment LED Display Interfacing - Stepper Motor interfacing – DC motor interfacing using PWM.	16

TEXT BOOKS:
1. Microcontrollers, Principles and Applications – Ajit pal – PHI Ltd., - 2011.

REFERENCE BOOKS:
1. 8051 Microcontroller and Embedded Systems using Assembly and C by Mazidi, Mazidi and D.MacKinlay, 2006 Pearson Education Low Price Edition.
2. Microprocessor and Microcontroller by R.Theagarajan, Sci Tech Publication, Chennai
3. 8051 Microcontroller by Kenneth J.Ayala.

24052 - MICROCONTROLLER
Model question paper – I

Time: 3 Hrs.   **Max. Marks: 75**

<div align="center">

Part – A   **15x1=15**

</div>

Note : Answer any 15 Questions. – All Questions carry equal marks

1. What is Microcontroller?
2. Mention the number of bytes in internal RAM and internal ROM of 8051?
3. State any two differences between microprocessor and microcontroller.
4. When 8051 is reset, all interrupts are disabled. How to enable these interrupts?
5. What are the instructions used to access external RAM.
6. List the Addressing modes in 8051?
7. What is meant by assembler directives?
8. List any four assembler directives.
9. Calculate the reload value of timer 1 for achieving a baud rate of 4800 in 8051 for a crystal frequency of 11.0592 MHz.
10. Mention the timers of 8051.
11. Mention the operating modes of 8051 timers
12. Mention the control registers related to timer/counters of 8051
13. How will you double the baud rate in 8051?
14. List the interrupts available in 8051?
15. What is meant by interrupt priority in 8051?
16. What is the function of SMOD bit in PCON register?
17. Write the BSR control words to set PC0 and to reset PC4 in 8255.
18. What is the instruction used to transfer a data byte between microcontroller and 8255.
19. Define a stepper motor.
20. Give the normal 4 step sequence.

<div align="center">

Part – B   **5x12 = 60**

</div>

Answer all questions choosing either A or B from each question.
Each question carries 12 marks.

21 A) Draw and explain the block Diagram of 8051 microcontroller

<div align="center">(Or)</div>

B) i) List the special function registers with their addresses and explain anyone of them
ii) Draw and explain the Structure of Internal RAM of 8051

22 A) Write an assembly language program to arrange the given set of 'n' numbers in ascending order

<div align="center">(Or)</div>

B) Explain the various addressing modes in 8051 with examples.

23 A) Explain in details about the programming of 8051 timer

<div align="center">(Or)</div>

B) Write a program to generate square wave of 50 Hz frequency on pin P1.2 using timer 0 interrupt. Assume crystal = 11.0592 MHz

24 A) Explain about the programming of 8051 serial port

<div align="center">(Or)</div>

B) Explain the functions of each bit of Serial Control Register (SCON) and Power Control Register (PCON) in detail.

25 A) Explain about 8051 interfacing with 8255

<div align="center">(Or)</div>

B) Explain about stepper motor interfacing with 8051

24052 - MICROCONTROLLER
Model question paper – II

Time: 3 Hrs.   **Max. Marks: 75**

Part – A   **15x1=15**

Note: Answer any 15 Questions. – All Questions carry equal marks

1. Give the PSW setting for masking register bank 2 as default register bank in 8051 Microcontroller?
2. Define the clock cycle of 8051.
3. Define the machine cycle of 8051.
4. Define the instruction cycle of 8051.
5. How can you perform multiplication using 8051 Microcontroller?
6. What is the operation carried out when 8051 executes the instruction MOVC A, @A + DPTR?
7. Write a delay routine for 1 millisecond using timer 0 of 8051 for 12 MHz crystal frequency.
8. List the addressing modes of 8051.
9. What is the function of C/T bit of TMOD register?
10. Find the timer's clock frequency for the crystal frequency of 11.0592 MHz
11. What is the function of C/T bit of TMOD register?
12. State the function of timer flag TF in TCON register.
13. List the serial modes. ?
14. What is the function of REN bit in SCON register?
15. What is the function of SMOD bit in PCON register?
16. State the two methods of serial data communication.
17. Define a transducer.
18. Define step angle.
19. What is meant by signal conditioning?
20. Define DAC.

Part – B   **5x12 = 60**

Answer all questions choosing either A or B from each question.
Each question carries 12 marks.

21 A) Explain with neat sketch memory organisation of 8051
                                     (Or)
   B) Draw the pin diagram of 8051 and explain the function of each pin.

22 A) Write an assembly language program (ALP) for multi-byte addition
                                     (Or)
   B) Write an ALP for finding maximum number in an array.

23 A) Explain the TMOD register and TCON register
                                     (Or)
   B) Explain the steps to program the timer in mode 1 and mode 2.

24 A) Write the steps involved in programming 8051 to transfer and receive data serially.
                                     (Or)
   B) Explain the interrupt priority in 8051.

25 A) Explain ADC interfacing with 8051.
                                     (Or)
   B) Explain seven segment LED display interfacing with 8051.

L-SCHEME
(Implements from the Academic year 2011-2012 onwards)

Course Name : DIPLOMA IN INSTRUMENTATION AND CONTROL ENGINEERING
Course Code : 1042
Subject code : **24253**
Semester   : V Semester
Subject title   : **CONTROL ENGINEERING**

TEACHING AND SCHEME OFEXAMINATION:

No of Weeks/ Semester   :   16 weeks

Subject	Instruction		Examination			
	Hrs. Week	Hrs Semester	Marks			Duration
			Internal Assessment	Board Examination	Total	
CONTROL ENGINEERING	5	80	25	75	100	3Hrs

Topics and Allocation of Hours :

UNIT	TOPIC	TIME (Hrs)
UNIT I	Basics of control systems, laplace transform and transfer function	14
UNIT II	Block diagram, signal flow graph representation and components	16
UNIT III	Time response	14
UNIT IV	Frequency response	14
UNIT V	Stability	14
	Revision, Test	8
	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.

24253 - CONTROL ENGINEERING

DETAILED SYLLABUS

UNIT	NAME OF THE TOPIC	HOURS
I	**BASICS OF CONTROL SYSTEMS, LAPLACE TRANSFORM AND TRANSFER FUNCTION** Introduction – definition – classification of control systems – open loop & closed loop , Linear & Non Linear, SISO& MIMO, Static & Dynamic , Continuous & Discrete systems- Transfer function – basics of Laplace transform – inverse Laplace transform – uses of Laplace Transform for second order differential equations – order and type of a transfer function – pole/ zero plot – transfer function of RL & RC network	**14 HRS**
II	**BLOCK DIAGRAM AND SIGNAL FLOW GRAPH REPRESENTATION** Block diagram: Introduction – advantages – rules for block diagram reduction – simple problems. Signal flow graph: Introduction – Mason's gain formula – applications of Mason's formula – simple problems – comparison of block diagram reduction and signal flow graph methods.	**16 HRS**
III	**TIME RESPONSE** Standard test signals (step, ramp, sine and impulse) – order and Type of system - I order, II order system – derivation – step response of I order, II order system – time domain specifications (definition & formulas only) – steady state error, static error constants – problems.	**14 HRS**
IV	**FREQUENCY RESPONSE** Frequency response of linear system – specifications only definitions – bode plot – gain margin – phase margin – problems – polar plot – problems.	**14 HRS**

V	**STABILITY** Definition – absolute stability – relative stability – characteristic equation – Routh's stability criterion techniques – construction of root locus – problems only for real values.	**14 HRS**

TEXT BOOKS:
1) Automatic control systems by S. N.Verma, Khanna publishers,2006.
2) Control systems by A.Nagoorkani, RBA publishers,2006

REFERENCE BOOKS

1. Automatic control system by Benjamin S.Kuo,Printice Hall of India Pvt. Ltd., Seventh edition,1995.
2. Advanced control theory by I.J.Nagrath and M.Gopal, New Age international publishers, II edition, 2002
3. Control systems by A. Anandkumar, EEE, PHI
4. Control Engineering Theory & Practice by M.N. Bandyopadhiyay, PHI

CONTROL ENGINEERING

Time: 3 hrs   Max. marks: 75

PART- A

Marks: 15x1=15

[NB: 1) Answer any fifteen questions
2) All questions carry equal marks]

1   Define open loop system

2   What is the laplace transform of cos ωt?

3   Define order of a system

4   What is the characteristics equation?

5   Mention the elements of block diagram.

6   What is the signal flow graph?

7   State mason's gain formula.

8   What is synchros?

9   What is time response?

10 What is the response of undamped 2nd order system for unit step

11 List the standard test signals

12 Define steady state error.

13 State any two advantages of bode plot.

14 What is phase cross over frequency?

15 Define gain margin.

16 Define corner frequency.

17 What is the necessary condition for stability?

18 What is Root locus?

19 Define centroid

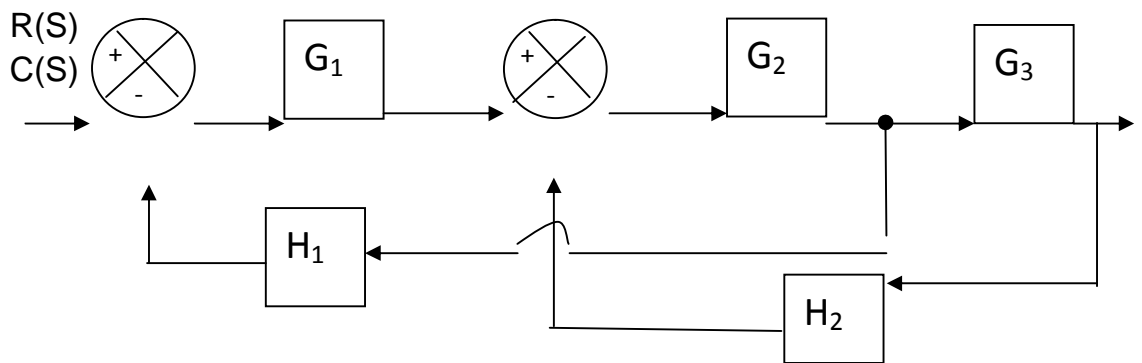20 What is breakaway points?

PART – B

Marks: 5 X 12 = 60

**Answer all questions choosing either A or B from each question.
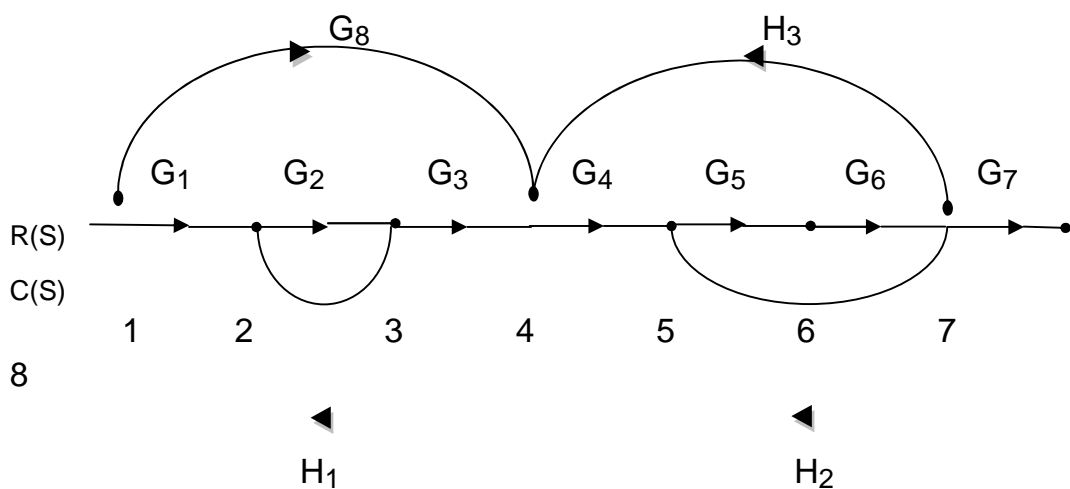Each question carries 12 marks.**

21 a Define open loop and closed loop control system and differentiate them

(or)

b Find the inverse laplace transform of $F(S) = \dfrac{S+2}{S(S^2+4)}$

22 a Reduce the following block diagram

(or)

b Using mason's Gain formula find the over all transfer function for the SFG given

23 a   Draw the unit step response curve of a control system and define t_d, t_r, t_p, t_s and peak over shoot

(or)

b   A unity feedback has the forward path TF $G(S) = \dfrac{10}{S+1}$ .Find the generalized error coefficient for r(t) = 1+2t and also find the steady state error.

24 a   What is Bode plot & polar plot give any three of its advantages.

(or)

b   Construct a magnitude plot on a semi log graph for a unity feedback system whose open loop transfer function is given by $G(S) = \dfrac{10}{S(1+S)(1+0.02S)}$

25 a   Explain the steps in the construction of root loci for the given transfer function

(or)

b   Using Routh's criterion, determine the stability of the systems whose characteristic equations are $3S^4 + 10S^3 + 5S^2 + 5S + 1 = 0$

L-SCHEME
(Implements from the Academic year 2011-2012 onwards)

Course Name : DIPLOMA IN INSTRUMENTATION AND CONTROL ENGINEERING
Course Code : 1042
Subject code : **24271**
Semester   : V Semester
Subject title   : **INSTRUMENTATION SYSTEM   DESIGN**

TEACHING AND SCHEME OFEXAMINATION:

Number of Weeks/ Semester   :   16 weeks

Subject	Nstruction		Examination				
	Hrs. Week	Hrs Semester	Marks				Duration
			Internal Assessment	Board Examination	Total		
INSTRUMENTATION SYSTEM DESIGN	5	80	25	75	100		3Hrs

Topics and Allocation of Hours :

UNIT	TOPICS	TIME (hrs)
I	Design of Transducers and Signal Conditioning Circuits	14
II	Design of Transmitters and Controllers	14
III	Control Valve Selection	14
IV	Engineering Design Criteria	14
V	Safety in Instrumentation and Control Systems	12
	Revision / Test	12
	Total	80

RATIONALE

Instrumentation engineers must be conversant with the basic design of instrumentation systems. This subject covers the basic design procedure of transducers and signal conditioning circuits, transmitters and controllers. It also includes the concept of Control Valve Selection, Engineering design criteria and Safety in instrumentation and control systems. This subject provides an opportunity to the students to opt for a career in the Design department of instrument manufacturing companies.

Objectives

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

- Understand the design of Thermocouple circuit with Cold junction compensation.
- Understand the design of RTD bridge circuit with Lead wire compensation.
- Know about the design of flow measurement devices such as Orifice Plate, Venturi meter and Flow Nozzle.
- Know about the design of Charge amplifier and Instrumentation amplifier.
- Acquire knowledge about the design of 2 wire and 4 wire transmitters.
- Know about the design of Pneumatic and Electronic PID Controller.
- Acquire knowledge about the design of annunciators.
- Understand the Control Valve selection in detail.
- Acquire knowledge about the Engineering design criteria.
- Know about the specifications for various measurement and control systems.
- Understand about the Safety in Instrumentation and Control Systems.
- Know about the design of Intrinsically safe systems.

INSTRUMENTATION SYSTEM DESIGN
DETAILED SYLLABUS

UNIT	NAME OF THE TOPIC	HOURS
I	**DESIGN OF TRANSDUCERS AND SIGNAL CONDITIONING CIRCUITS** Design of Thermocouple Circuit with Cold Junction Compensation, Linearization, Amplification and Conversion of its output to 4 to 20 mA current – Design of RTD bridge circuit with lead wire compensation and conversion of its output to 4 to 20 mA current –Design of Flow measurement devices – Orifice Plate, Venturi meter- Design of Charge amplifier – Instrumentation amplifier	14 hrs
II	**DESIGN OF TRANSMITTERS AND CONTROLLERS** Design of two and four wire transmitters with 4-20 mA output –Smart Transmitters –Design of On-Off Controller – Design of Pneumatic and Electronic PID Controller – Design of annunciators –Low Level and High Level annunciators	14 hrs
III	**CONTROL VALVE SELECTION** Function in the system –Pressure drop requirements for good control – Capacity requirements –Valve Rangeability– Choosing the Flow Characteristic – Choosing the Body Design – Body materials – End Connections – Choice of Single Seat Versus Double Seat design – Selection of Actuators – Split ranging Control Valves – Control Valve Sizing Equations – Constant Pressure System –Variable Pressure system –Valve selection guidelines.	14 hrs
IV	**ENGINEERING DESIGN CRITERIA** Pneumatics Versus Electronics – Control Center design– Specifications for various Measurement and Control Systems – Flow measurement, Pressure measurement, Level measurement, Temperature measurement, Control Valves, Control Panels – Pneumatic and Electronic Transmission systems –Process Connections – Location of taps, Sealing instruments from the Process – Mounting instruments – Selections of Units, Charts and Ranges – Instrument Identification– Construction material	14 hrs

UNIT	NAME OF THE TOPIC	HOURS
V	**SAFETY IN INSTRUMENTATION AND CONTROL SYSTEMS** 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 – Intrinsic Safety – Definition – Design of Intrinsically Safe Systems – Basic techniques in the design of intrinsically safe apparatus – Mechanical and Electrical Isolation – Current and Voltage Limiting – Shunt Elements – System design using Commercially available Intrinsically safe and associated apparatus	12 hrs

.

REFERENCE BOOKS
1. Sheingold D.H, 'Transducer interfacing Handbook – A guide to analog signal conditioning'.
2. Anderson N.A, 'Instrumentation for Process Measurement and Control', Chilton book company, 1980.
3. Andrew W, 'Applied Instrumentation in Process Industries', Vol.II Gulf Publications.
4. C.D. Johnson, 'Process Control Instrumentation Technology, Prentice Hall of India.
5. Doebelin E.O. Measurement Systems, applications and design, McGrawHill.
6. Douglas M. Considine, Gregory K. Mcmillan, Process/Industrial Instruments and Controls Handbook', McGraw Hill, Fifth Edition.f

24271 - INSTRUMENTATION SYSTEM DESIGN

MODEL QUESTION PAPER - I

Time: 3 hrs   Max Marks: 75

PART -A

Answer any 15 questions   (15 x 1 = 15 Marks)

1. What is Cold junction compensation in thermocouple?
2. What is the importance of Lead wire compensation in RTD bridge circuit?
3. Mention any two devices used to measure the flow.
4. What is Charge amplifier?
5. What is On-Off Controller?
6. Define Smart transmitter.
7. What is the control equation of electronic PID controller?
8. What is an annunciator?
9. What is Valve rangeability?
10. List two applications of Quick opening valve.
11. Mention the control valve sizing equation.
12. What is a variable pressure system?
13. Mention the signal level used in Pneumatic signal transmission.
14. Name two methods for mounting an instrument.
15. What is meant by instrument identification?
16. Name the materials used in thermo well.
17. Expand IEC.
18. What is LEL and UEL?
19. Name two techniques to reduce the explosion hazards.
20. Define intrinsic safety.

PART – B 5*12 =60 marks

**Answer all questions choosing either A or B from each question.
Each question carries 12 marks.**

21 (a) Explain the design of RTD bridge circuit with lead wire compensation
                              .(OR)
   (b) Explain in detail the design of an instrumentation amplifier.

22 (a) Explain in detail the design of two wire transmitter with 4-20 mA output.
                              .(OR)

(b) Explain in detail the design of an Electronic PID Controller.

23 (a) Explain in detail the choosing of flow characteristics in Control valve.

.(OR)

(b) Explain the Constant and Variable pressure system in detail with a neat sketch.

24 (a) Discuss Pneumatics versus Electronics related to the various issues in engineering design.

.(OR)

(b) Explain Pneumatic and Electronic transmission system related to engineering design.

25(a) Discuss in detail the techniques used to reduce explosion hazards.
.(OR)
(b) Explain in detail the basic techniques used in the design of intrinsically safe systems.

24271 - INSTRUMENTATION SYSTEM DESIGN

MODEL QUESTION PAPER - II

Time: 3 hrs   Max Marks: 75

PART -A

Answer any 15 questions   (15 x 1 = 15 Marks)
1. Define Cold junction compensation in thermocouple.
2. What is lead wire compensation in RTD?
3. What is an orifice plate?
4. What is an instrumentation amplifier?
5. List two advantages of Smart transmitter.
6. What are the drawbacks of On-off Controller?
7. What are the advantages of PID Controller?
8. Define an annunciator.
9. Mention two limitations of Single port globe valve.
10. Mention any two factors for the selection of Valve actuators.
11. Define Split range control valve.
12. What is a constant pressure system?
13. Name the materials used for Pneumatic signal transmission.
14. Mention the different methods to mount the field instrument.
15. Give two examples for instrument identification
16. List any two construction materials used in the instrument.
17. How sealing is used to reduce the explosion hazards?
18. What is intrinsic safety?
19. Mention two techniques to design the intrinsic safe apparatus.
20. Expand ISA.

PART – B   (5 x 12 = 60 Marks)
Answer all questions choosing either A or B from each question.
Each question carries 12 marks.

21 (a) Explain the design of thermocouple circuit with Cold junction compensation.

.(OR)
   (b) Explain in detail the design of an orifice plate for flow measurement.

22 (a) Explain in detail the design of On-off Controller.

.(OR)

(b) Explain in detail the design of Pneumatic PID Controller

23 (a) Describe the pressure drop and capacity requirement in Control valve for good control.

.(OR)

(b) Discuss in detail the selection of Valve actuators.

24 (a) Describe the specifications for various measurement and control systems in engineering design.

.(OR)

(b) Explain the various process connections used in engineering design.

25 (a) Describe about the type of pressurization systems used to reduce explosion hazards.

.(OR)

(b) Explain the design of intrinsically safe system by Current and Voltage limiting technique.

L-SCHEME

(Implements from the Academic year 2011-2012 onwards)

Course Name : DIPLOMA IN INSTRUMENTATION AND CONTROL ENGINEERING
Course Code : 1042
Subject code : **24272**
Semester   : V Semester
Subject title   : EMBEDDED SYSTEMS

TEACHING AND SCHEME OFEXAMINATION:

Number of Weeks/ Semester   :   16 weeks

Subject Title	Instruction		Examination			
	Hrs. Week	Hrs Semester	Marks			Duration
			Internal Assessment	Board Examination	Total	
EMBEDDED SYSTEMS	5	80	25	75	100	3Hrs

Topics and Allocation of Hours :

UNIT	TOPIC	TIME (Hrs)
UNIT I	Introduction to Embedded system and LPC 2148 ARM controller	15
UNIT II	Embedded C basics,GPIO(Slow),Timer and Interrupt	15
UNIT III	PWM,ADC,DAC,and RTC	12
UNIT IV	I^2C ,I^2C feature ,UART	15
UNIT V	RTOS and μc OS II	15
	Revision, Test	8
	Total	80

RATIONALE:

Increasingly, embedded systems developers and system-on-chip designers select specific microprocessor cores and a family of tools, libraries, and off-the-shelf components to quickly develop embedded system-based products. A major processor in this industry is ARM. Since 1985, the ARM architecture has become the most pervasive 32-bit architecture in the world. ARM processors are embedded in products ranging from cell/mobile phones to automotive braking systems. A worldwide community of ARM partners and third-party vendors has developed among semiconductor and product design companies, including hardware engineers, system designers, and software developers. This course has been to describe the operation of the ARM core from a product developer's perspective with a clear emphasis on its architecture by assuming no previous ARM experience.

OBJECTIVES:

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

- Distinguish between CISC and RISC architecture

- Understand the ARM design philosophy

- Explain the ARM architecture and the pipeline structure

- Describe the little and big endian methods of representation

- Explain the Instruction sets of ARM processor.

- Understand various operational modes in ARM processor

- List the various exceptions and handling methods

- Develop an assembly level code for basic arithmetic primitive operations

- Understand the cache mechanism and cache policies

- List and explain various cache mechanisms

- Explain the essential of cache memory, write buffers and its policies

- Explain the importance of Lockdown and its method

- Explain the importance of MPU and MMU

- Understand the functionality of virtual memory

- Relate and distinguish between OS and RTOS in their functionality

- Understand hard time and soft time RTOS

- Explain multitasking, scheduling, ITC, and synchronization

Embedded system

Note: 1.program should not be asked in board theory Examination

2. Bit level details registers should not be asked in board theory Examination

24272 - EMBEDDED SYSTEMS

DETAILED SYLLABUS

UNIT	NAME OF THE TOPIC	HOURS
I	**Introduction to Embedded system and LPC 2148 ARM controller** Definition of Embedded system-Features of Embedded system-Types of Embedded system-list of Embedded System-list of embedded system Devices- LPC2148 ARM controller-Block diagram- Memory and on chip Peripheral devices-ARM 7 TDMI-S-Debug and emulation trace facility-memory map- memory re-map and boot block-CPU registers-modes of operation-PSW- Instruction set-Assembly language program for addition, subtraction, multiplication, and division.	**15 HRS**
II	**Embedded C basics,GPIO(Slow),Timer and Interrupt** Embedded C basics-GPIO(slow)register map-pin connect block-8 bit LED'S-8 bit switches-Buzzer- relay-stepper Motor interfaces-Embedded C programs for the above-Timer/counter-Block diagram- Register map-Program for- Time delay and counter operation-vector Interrupt controller (VIC)-register map-external Interrupts-Timer/counter based interrupt-programs for the above.	**15 hrs**

UNIT	NAME OF THE TOPIC	HOURS
III	**PWM,ADC,DAC,and RTC** PWM features-Block diagram-register map-program for generating single ended PWM –ADC feature- block Diagram-register map-program for ADC and temperature sensor LM 35 interface –DAC features-Block diagram -Registers map-Program for generating analog output –RTC feature-block diagram-registers map-program for displaying the time in LCD display.	**12 hrs**
IV	**UNIT: I^{2}C ,I^{2}C feature ,UART** Introduction to I'2c –start, stop, ACK, restart NACK signals – Data transfer from master to slave to master- I^{2}C Feature in LPC 2148 –block diagram –register map-I'2C master mode, operation interfacing I^{2}C based I/O Expander PCF 8574-interfacing LED -7 segment display-interfacing I'2c based EEPROM-program for the above -UART feature-UART0-Register map-Transmission and reception of message for pc.	**15 hrs**
V	**RTOS and µc OS II** Foreground/back ground systems- function of OS –Introduction to RTOS –Resources-shared resources-critical section-Multi tasking-Tasks-KERNAL –scheduler-round robin- Non PRE-emptive and Pre –emptive-context switch-Event flag-MUTUAL exclusion –semaphore-message mail Boxes –click ticks-task states-task stacks-task control blocks(TCB)-introduction to us OS II to Micro controller-RTOS functions-OS_STK – OS_EVENT-OS INIT( )-OS start ( )-OS create( )-OS Task DEL ( )-OSSem create( )-OSSemfend( )-OSSem post( )-Task stk[ ] [ ]-OSTime dly( )-application programs using the above functions.	**15 hrs**

Reference:

1. LPC 2148 User Manual.

2. Micro C/OS –II THE REAL TIME KERNAL-Jean J. Labrosses.

MODEL QUESTION PAPER

EMBEDDED SYSTEMS

Time-3Hours   **(Maximum Marks: 75)**

PART-A

(Marks: 15x1=15)

[N.B:- (1) Answer any Fifteen questions.

(2) All questions carry equal marks.]

1. List any two embedded system based devices.

2. Expand the term LPC and TDMI.

3. What is memory map?

4. List condition code flags.

5. State the use of pin connected block.

6. What is the use of PINSEL register?

7. What are the types of Vectored Interrupt Controller in LPC2148 ARM?

8. Which interrupt has lowest priority?

9. How many match registers are available in PWM?

10. List any two features of ADC.

11. State the use of Real Time Clock.

12. What is the conversion time required for an ADC?

13. Expand the term I2C.

14. List the NACK signals.

15. What is the data transfer rate in I2C bus?

16. List any two features of UART.

17. Define multitasking.

18. Define shared resource.

19. What is message mail box?

20. List the five states of task.

PART-B

(Marks: 5 x 12=60)

Answer all questions choosing either A or B from each question.
Each question carries 12 marks.

21   (a) Draw the block diagram of LPC2148 and explain its features.

.(OR)

(b) Draw the block diagram of ARM7TDMI S core and explain its features.

22   (a) Draw the block diagram of timer/counter explain its features.

.(OR)

(b) Explain the register map of a vectored interrupt controller.

23   (a) Draw the block diagram of PWM and explain.

.(OR)

(b) Explain the registers of ADC and DAC.

24   (a) explain data transfer from master to slave and slave to master through I2C

bus with cycle diagram.

.(OR)

(b) Explain the I2C based EEPROM interfacing with diagram.

25   (a) Explain pre-emptive and non-pre-emptive kernel.

.(OR)

(b) Write short notes on   (i) TCB.

(ii) Task states.

(iii) Mutual exclusion.

L-SCHEME

(Implements from the Academic year 2011-2012 onwards)

Course Name : DIPLOMA IN INSTRUMENTATION AND CONTROL ENGINEERING
Course Code : 1042
Subject code : **24273**
Semester   : V Semester
Subject title   : **INDUSTRIAL POWER ELECTRONICS**

TEACHING AND SCHEME OFEXAMINATION:

Number of Weeks/ Semester   :   16 weeks

Subject Title	Instruction		Examination			
	Hrs. Week	Hrs Semester	Marks			Duration
			Internal Assessment	Board Examination	Total	
INDUSTRIAL POWER ELECTRONICS	5	80	25	75	100	3Hrs

Topics and Allocation of Hours :

Unit	Topic	Time (Hrs.)
I	Power devices and Trigger circuits	14
II	CONVERTERS (Qualitative treatment only)	14
III	CHOPPERS	14
IV	INVERTERS & APPLICATIONS	13
V	NUMERICALLY CONTROLLED SYSTEMS	13
	Revision - Test	12
	TOTAL	**80**

OBJECTIVES :

- To Study working principle of power devices.

- To Study the methods of triggering

- To know about use of pulse transformer & opto isolator.

- To learn about converters and its types.

- To understand commutation concepts in SCR

- To Learn about choppers.

- To Study about inverters and types.

- To understand the concept of HVDC.

- To know about UPS and its types.

- To understand about PLC.

- To learn about logic functions & instrutions.

- To discuss about ladder diagrams.

- To study about basics of numerical control of machines.

- To learn about CNC ,DNC systems.

- To know about the basics of Robotics

24273 - INDUSTRIAL POWER ELECTRONICS
DETAILED SYLLABUS

UNIT	NAME OF THE TOPIC	HOURS
I	**POWER DEVICES AND TRIGGER CIRCUITS** Thyristor family –Working principle ,VI characteristics, Applications of SCR – Definitions for holding current, latching current, dv/dt rating, di/dt rating– Symbol, principle of working ,VI characteristics ,applications of Insulated gate bipolar transistor (IGBT), MOSFET and GTO. Triggering of SCR - Gate triggering –Types – Concepts of DC triggering, AC triggering, Pulse gate triggering – Pulse transformer in trigger circuit – Electrical isolation by opto isolator - Resistance firing circuit and waveform – Resistance capacitor firing circuit and waveform, Synchronized UJT triggering (ramp triggering) and waveform – Ramp and pedestal trigger circuit for ac load.	**14 hrs**
II	**CONVERTERS (Qualitative treatment only)** Converters – Definition – Single phase Half controlled bridge converter with resistive load and resistive inductive load- importance of flywheel diode – Single phase fully controlled bridge converter with resistive load – voltage and current waveforms – Single phase fully controlled bridge converter with RL load ––voltage and current waveforms. Commutation- Natural commutation – Forced commutation – Types of forced commutation (mention the types only) 3 phase half controlled bridge converter with resistive load - current and voltage waveform -3 phase fully controlled bridge with resistive load – current and voltage waveforms. Dual converter – modes of Dual converter	**14 hrs**

UNIT	NAME OF THE TOPIC	HOURS
III	**CHOPPERS** Introduction – applications -principle of chopper-control strategies (time ratio and current limit control)-types of chopper-type A, B, C, D, and E - step up chopper –Jones chopper – Morgan chopper-chopper using MOSFET – PWM control circuit for driving MOSFET in chopper. DC Transmission- principle – advantages – drawbacks.	14 hrs
IV	**INVERTERS & APPLICATIONS** Inverter Definition Requirement of an inverter –Single phase inverter with resistive load – Single phase inverter with RL load –Methods to obtain sine wave output from an inverter- output voltage control in inverters - McMurray inverter – advantages- Basic 3 phase bridge inverter with 120° conduction mode – circuit, trigger sequence, waveform – Through pass inverter –Parallel inverter using IGBT. UPS – Need for UPS –ON Line UPS -OFF Line UPS - Comparison of ON line and OFF line UPS	13
V	**NUMERICALLY CONTROLLED SYSTEMS** Basic concepts of numerical control- Block diagram of numerical control system– Advantages, disadvantages , applications of numerical control system – Driving devices – Hydraulic system , Stepper motor - Programming systems (mention the names only) – Data processing unit – Data reading – Part programming – steps - Post processor Introduction to CNC / DNC – Basic concepts of CNC , DNC and AC system - Types of AC system - -Block diagram of ACO , ACC – Comparison between NC & CNC – Typical CNC system – Block diagram - Advantages of CNC system .	13 HRS

REFERENCE BOOKS

1.Industrial & Power Electronics –Harish C. Rai – Umesh Publication -5th edition-1994
2.Power Electronics – Dr.P.S. Bimbhra –Khanna publishers -2nd edition-1998
3.Power Electronics –M.H.Rashid-PHI Publication-3rd edition-2005
4.Programmable Logic Controller –Pradeep Kumar& Srivashtava-BPB REFERENCE BOOKS Publications
5.Numerical control of Machines – Yoram Korean &Joseph Ben

MODEL QUESTION PAPER

INDUSTRIAL POWER ELECTRONICS

Time-3Hours   **(Maximum Marks: 75)**

PART-A

(Marks: 15x1=15)

[N.B:- (1) Answer any Fifteen questions.

(2) All questions carry equal marks.]

I   1. Draw the V-I characteristics of SCR.

   2. Define : Holding current.

   3. What is MOSFET?

   4. Mention the different methods of gate triggering.

   5. What is converter?

   6. What are the advantages of phase controlled converters?

   7. Mention the types of commutation.

   8. Mention the two modes of dual conversion?

   9. Mention the types of chopper.

  10. What are the applications of chopper?

  11. Short notes on class A chopper.

  12.Mention the different types of DC transmission system?

  13. What is inverter?

  14. What are the advavtages of MCMURRAY inverter?

  15. What are the types of UPS?

  16. Compare OFF-Line and ON-Line UPS.

  17. What are the advantages of numerical control system?

  18. Name the different types of driving devices.

  19. Mention the different elements of post processor.

  20. Expand ACC and ACO.

PART-B

(Marks: 5 x 12=60)

Answer all questions choosing either A or B from each question.
Each question carries 12 marks.

21 (a) Draw the switching characteristics of IGBT and explain it.

.(OR)

(b) With the diagram explain the operation of power MOSFET?

22 (a) Explain the operation of 1φ half controlled bridge converter with resistive

load?

.(OR)

(b) Explain line commutation in converters?

23 (a) Explain the operation of class C chopper with proper diagrams?

.(OR)

(b) Explain the circuit diagram of PWM control circuit for driving MOSFET in chopper.

24 (a) With the diagram explain the operation of 1φ inverter with resistive load.

.(OR)

(b) With the diagram explain parallel inverter using IGBT.

25 (a) Draw the block diagram of NC system and explain each block.

.(OR)

(b) With the diagram explain hydraulic system.

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L-SCHEME
(Implemented from the Academic year 2011-2012 onwards)

24255 - PROCESS CONTROL INSTRUMENTATION PRACTICAL

Course Name : DIPLOMA IN INSTRUMENTATION AND CONTROL ENGINEERING
Course Code : 1042
Subject code : **24254**
Semester   : V Semester
Subject title   : **PROCESS CONTROL INSTRUMENTATION PRACTICAL**

TEACHING AND SCHEME OF EXAMINATION :

Number of Weeks/ Semester   :   16 weeks

Subject Title	Instruction		Examination				
	Hrs. Week	Hrs Semester	Marks				Duration
			Internal Assessment	Board Examination	Total		
PROCESS CONTROL INSTRUMENTATION PRACTICAL	5	80	25	75	100		3Hrs

LIST OF EXPRIMENTS:

1. Effect Of dead time & dead zone

2. On - Off Control of Temperature Process

3. On-Off Control of Level Process

4. On-Off Control of Pressure Process

5. P response for Temperature Process

6. PI response for Pressure Process

7. PID response for Level Process

8. PD response for Level Process

9. Characteristics of Control Valve

10. Response of PID controller

11. Tuning of Controller

12. Experiments on the application of Motorized control valve

13. P to I conversion

14. Closed loop control of temperature process using thermistor

EQUIPMENTS REQUIRED

Sr No	Name of the Equipments	Required Nos
1	Experiment setup to study the effect of dead time & dead zone	1 no
2	Temperature Control Station with accessories	1 no
3	Level Control Station with accessories	1 no
4	Pressure Control Station with accessories	1 no
5	Control Valve setup with accessories	1 no
6	Motorized Control Valve Setup with accessories	1 no
7	P/I Conversion Setup with accessories	1 no
8	Compressor unit	1 no

Closed Loop Block diagram – 20 marks

Procedure & Observation – 20 marks

Reading & Graph – 20 marks

Result – 10 marks

Viva voce – 5 marks

Total – 75 marks

Course Name : DIPLOMA IN INSTRUMENTATION AND CONTROL ENGINEERING
Course Code : 1042
Subject code : **24255**
Semester   : V Semester
Subject title   : **lab VIEW & MATLAB PRACTICAL**

TEACHING AND SCHEME OF EXAMINATION

No. of weeks / Semester   :   16

Subject Title	Instruction		Examination				
	Hrs. Week	**Hrs Semester**	**Marks**				**Duration**
			Internal Assessment	**Board Examination**	**Total**		
labVIEW & MATLAB	5	80	25	75	100		3Hrs

24256 - labVIEW & MATLAB
(Note: Any 12 Experiments)

Experiments using labVIEW

1. Generation of signals using function generator and the measurement of frequency and amplitude using CRO
2. Simulation of Temperature control system.
3. Simulation of flow control system
4. Familiarization of logic gate function
5. Generation of PWM using data acquisition card
6. Diode characteristics using DAQ card
7. Add wave form
8. Linear algebra calculator

Experiments using MATLAB

1. Matlab program to find greatest of two numbers
2. Matlab program to find factorial of a number
3. Mat lab program to find average of n numbers
4. Frequency response of low pass filter
5. Bode plot for the given transfer function
6. Implement the PID and study the response for step input

Sr No	Name of the Equipments	Required Nos
	Software required:-	
1	LabVIEW Software for Multiuser	1 no
2	MATLAB Software for Multiuser	1 no
	Hardware required:-	
1	PC Pentium Dual Core	30 nos
2	Data Acquisition Card	1 no
3	Laser Printer	2 nos
4	UPS 5KVA with one hour backup	1 no

SCHEME OF VALUATION

LabVIEW/MATLAB PROGRAM	20 MARKS
EXECUTION OF PROGRAM	20 MARKS
OBSERVATION & PROCEDURE	20 MARKS
RESULT	10 MARKS
VIVA VOCE	5 MARKS
TOTAL	75 MARKS

L-SCHEME
(Implements from the Academic year 2011-2012 onwards)

Course Name : DIPLOMA IN INSTRUMENTATION AND CONTROL ENGINEERING
Subject code : **24256**
Semester   : V Semester
Subject title : **Micro controller practical**

TEACHING AND SCHEME OF EXAMINATION:

 Number of Weeks/ Semester   :   16 weeks

Subject Title	Instruction		Examination			
	Hrs. Week	Hrs Semester	Marks			Duration
			Internal Assessment	Board Examination	Total	
Micro controller practical	5	80	25	75	100	3Hrs

ALLOCATION OF MARKS

Scheme of Examinations
The Evaluation has to be done as given below

Allocation of marks for Board Practical Examination

I)	Programme	- 30 Marks
II)	Debugging and Execution	- 30 Marks
III)	Result	- 10 Marks
IV)	Viva – Voce	- 5 marks

           Total   **- 75 Marks**

EQUIPMENTS REQUIRED

S.No	Name of the Equipments	Required Nos
1.	8051 Microcontroller Kit	15 Nos
2.	Digital I/O Interface Board	02 Nos
3.	LCD Interface Board	02 Nos
4.	Seven segment LED display Interface Board	02 Nos
6.	8 bit ADC Interface Board	02 Nos
7.	8 bit DAC Interface Board	02 Nos
8.	Stepper Motor Control Interface Board	02 Nos

24256 - MICROCONTROLLER PRACTICAL

Minimum 15 Experiments to be conducted

1. Introduction of Microcontroller Kit
2. Addition, Subtraction
3. Multi-byte addition
4. Multiplication of two numbers
5. Finding the maximum value in an array
6. Arranging the given data in Ascending order
7. BCD to Hex conversion
8. Hex to BCD conversion
9. Hex to ASCII
10. ASCII to Binary
11. SquareRoot of an given data
12. Least Common Multiple
13. Greatest Common Divisor
14. Parity bit generation
15. Program using I/Os in port 1
16. Counter using timer
17. Program using interrupt

Interfacing with application boards

Minimum Three Experiments to be conducted

18. Digital I/O
19. Seven segment displays
20. LCD Displays
21. 8 bit ADC and 8 bit DAC
22. Stepper motor control

VI SEMESTER

L-SCHEME

(Implements from the Academic year 2011-2012 onwards)

Course Name : DIPLOMA IN INSTRUMENTATION AND CONTROL ENGINEERING
Course Code : 1042
Subject code : **24261**
Semester   : VI Semester
Subject title   : INDUSTRIAL PROCESS CONTROL INSTRUMENTATION

TEACHING AND SCHEME OFEXAMINATION:

Number of Weeks/ Semester   :   16 weeks

Subject	Instruction		Examination			
	Hrs. Week	Hrs Semester	Marks			Duration
			Internal Assessment	Board Examination	Total	
INDUSTRIAL PROCESS CONTROL INSTRUMENTATION	5	80	25	75	100	3Hrs

Topics and Allocation of Hours :

UNIT	TOPICS	TIME (hrs)
I	Control of Heat Transfer Unit Operations	14
II	Control of Heat and Mass Transfer Unit Operations	14
III	Control of Pumps and Compressors	14
IV	Instrumentation and Control in Paper and Pulp Industry	14
V	Instrumentation and Control in Pharmaceutical and Fermentation Industry	12
	Revision / Test	12
	Total	80

RATIONALE

The aim of introducing this subject is to make the students more conversant with the process terminology and all types control involved in process industries. This subject covers the detailed instrumentation and control of Heat exchanger, Steam boiler, Distillation column, Dryer, Pump and Compressor. Also it provides an idea about the instrumentation and control in Paper and Pulp industry and Pharmaceutical industry briefly. This subject gives more confident to the students to opt their career as Instrumentation engineers in process industries.

Objectives:

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

- Know about the basic concepts of Heat exchanger
- Understand the Control of Heat exchangers
- Know about Evaporator terminology
- Understand the Control System of Evaporators
- Acquire knowledge about the instruments used in Drum type boiler
- Understand the Control of Steam Boiler
- Know about the basic concepts of Distillation Column
- Understand the Control of Distillation Column
- Know about the Principle of Dryers
- Understand the Control of Batch and Continuous Dryers
- Acquire knowledge about the Temperature and Pressure Control of Chemical Reactor
- Understand the Control of Pumps and Compressors
- Know about the process of Paper and Pulp Industry
- Understand the Instrumentation and Control in Paper and Pulp Industry
- Know about the process of Pharmaceutical and Fermentation Industry
- Understand the Instrumentation and Control in Pharmaceutical and Fermentation Industry

24261 - INDUSTRIAL PROCESS CONTROL INSTRUMENTATION

DETAILED SYLLABUS

UNIT	NAME OF THE TOPIC	HOURS
I	**CONTROL OF HEAT TRANSFER UNIT OPERATIONS** Control of Heat exchanger – Variables and Degrees of Freedom – Liquid-To-Liquid Heat Exchangers – Feedback Control – Steam Heated Exchanger – Feedback Control – Bypass Control – Cascade Control Control of Steam Boiler – Boiler Equipment – In-line instruments of Drum type Boiler – Combustion Control – Fuel Controls by measurable fuels – Desuperheater Spray Controls	14 hrs
II	**CONTROL OF HEAT AND MASS TRANSFER UNIT OPERATIONS** Control of Distillation Column – Distillation Equipment – Variables and degrees of freedom – Pressure Control – Feed Control – Reboiler Control – Reflux Control Control of Dryers – Principles – Control – Batch dryers – Atmospheric tray dryer – Batch Fluid bed dryer – Continuous dryers – Double drum dryer – Rotary dryer	14 hrs
III	**CONTROL OF PUMPS & COMPRESSORS** Control of Pumps –Pump control methods –Centrifugal Pump –On-Off Level Control –On-Off Flow Control – On-Off Pressure Control – Speed Variation – Rotary Pump – On-Off Control – Safety and Throttling Control – Reciprocating Pump – On-Off Control – Throttling Control. Control of Compressors – Capacity control methods of Compressors – Centrifugal Compressor –Surge Control – Antisurge Control – Rotary Compressor – Bypass and Suction Control – Reciprocating Compressor – On-Off Control – Constant Speed Capacity Control	14 hrs

IV	INSTRUMENTATION AND CONTROL IN PAPER AND PULP INDUSTRY	14hrs
	Description of the Process – Basis weight measurement – Consistency Sensors – Typical Control Systems in the Paper industry – Blow down Tank Control – Digester Liquor Feed Pump Control – Brown Stock Washer Level Control – Stock Chest Level Control – Basis Weight Control of a Paper Machine – Valves in the Paper industry.	
V	INSTRUMENTATION AND CONTROL IN PHARMACEUTICAL AND FERMENTATION INDUSTRY	12 hrs
	Description of the Process – Fermentation – Measurement Hardware in the Pharmaceutical industry – Flow measurement – Level measurement – Pressure measurement – Temperature measurement – Smoke detector – Analyzers in the Pharmaceutical industry – Fermentation Control System – pH Control – Temperature Control – Tablet Coating Control.	

REFERENCE BOOKS

5. Bela G.Liptak, 'Instrument Engineers Handbook – Process Control', Third edition
6. Bela G.Liptak,'Instrumentation in Processing Industries'.
7. Andrews & William, 'Applied Instrumentation in Process Industries'.
8. Douglas M. Considine, Gregory K. Mcmillan,'Process/Industrial Instruments and Controls Handbook', McGraw Hill, Fifth Edition.
9. Dale R. Patrick and Stephan W. Fardo, 'Industrial Process Control Systems', Vikas Publishing House.

24261- INDUSTRIAL PROCESS CONTROL INSTRUMENTATION

MODEL QUESTION PAPER - I

Time: 3 hrs   Max Marks: 75

PART -A

Answer any 15 questions   (15 x 1 = 15 Marks)

1. What is degree of freedom?
2. What is cascade control?
   3. List out the fuels used in boilers.
4. What is desuperheater in Steam boiler?
5. What is a distillation column?
6. What is reboiler control?
7. What is the principle of dryer?
8. Give two examples for Continuous dryers.
9. Mention two reasons that affect the pump capacity.
10. What is meant by speed variation in Centrifugal pump?
11. What is a surge control in Centrifugal compressor?
12. What is constant speed capacity control in reciprocating compressor?
13. What is basis weight measurement?
14. Mention two typical control systems used in the paper industry.
15. Name any two Consistency sensors used in the paper industry.
16. What are the valves used in the paper industry?
17. Mention the sources for drugs in pharmaceutical industry?
18. What is meant by fermentation?
19. What is a total carbon analyser?
20. What are the various analyzers used in the Pharmaceutical industry?

PART - B

**Answer all questions choosing either A or B from each question.
Each question carries 12 marks.**

21 (a) Explain Cascade control in Steam heated exchanger with a neat sketch.

.(OR)

(b) With a neat sketch explain Combustion control in Steam boiler.

22 (a) Explain Reboiler control in distillation column with a neat sketch.

.(OR)
(b) Explain Rotary dryer with a neat sketch.

23 (a) Explain On-Off Level and On-Off Flow Control of Centrifugal pump in detail.
.(OR)

(b) Explain Constant speed capacity control of reciprocating compressor with a neat sketch.

24 (a) With a neat sketch, explain Blow down Tank control system.

.(OR)
(b) Write a detailed note on the valves used in the paper industry.

25 (a) Write a detailed note on the analyzers used in the pharmaceutical industry.

.(OR)
(b) Explain Tablet coating control system with a neat sketch.

24261- INDUSTRIAL PROCESS CONTROL INSTRUMENTATION

MODEL QUESTION PAPER - II

Time: 3 hrs   Max Marks: 75

PART -A

Answer any Fifteen Questions. Each question carries 1 mark.

1. Mention two types of Heat exchanger.
2. What is bypass control in Steam heated exchanger?
3. Give any two inline instruments used in drum type boiler.
4. What is desuperheater spray control in Steam boiler?
5. List any two variables related to distillation column.
6. Why reboiler is used in distillation column?
7. What is the principle of dryer?
8. Name any two batch dryers.
9. Which is the most commonly used process pump?
10. Mention any two pump control methods.
11. Name any two capacity control methods of compressors.
12. What is antisurge control in Centrifugal compressor?
13. What is basis weight measurement?
14. What is consistency in paper industry?
15. List any two control systems used in the paper industry.
16. Name any two valves used in paper industry.
17. Define fermentation.
18. What is the use of smoke detector in Pharmaceutical industry?
19. List out two analyzers used in the pharmaceutical industry.
20. Name any two control systems used in the Pharmaceutical industry.

PART - B

Answer all questions choosing either A or B from each question.
Each question carries 12 marks.

21 (a) Explain Feedback control in Liquid to Liquid heat exchanger with a neat sketch.

.(OR)

(b) Explain about the fuel control by measurable fuels in a steam boiler with a neat sketch.

22 (a) Explain feed control in distillation column with a neat sketch.

.(OR)

(b) Explain any one batch dryer with a neat sketch.

23 (a) With a neat sketch explain Safety and throttling control in Rotary pump.

.(OR)

(b) Explain in detail the Surge and Anti-surge control of Centrifugal compressor with a neat sketch.

24 (a) Explain about the various consistency sensors used in the paper industry with a neat sketch.

.(OR)

(b) Explain Basis weight measurement of a paper machine with a neat sketch.

25 (a) Explain in detail about the measurement devices used in the pharmaceutical industry.

.(OR)

(b) Explain Fermentation control system with a neat sketch.

L-SCHEME
(Implements from the Academic year 2011-2012 onwards)

Course Name : DIPLOMA IN INSTRUMENTATION AND CONTROL ENGINEERING
Course Code : 1042
Subject code : **24262**
Semester : VI Semester
Subject title : **INDUSTRIAL AUTOMATION AND DRIVES**

TEACHING AND SCHEME OF EXAMINATION

No. of weeks / Semester : 16

Subject Title	Instruction		Examination			
	Hrs. Week	Hrs Semester	Marks			Duration
			Internal Assessment	Board Examination	Total	
INDUSTRIAL AUTOMATION AND DRIVES	5	80	25	75	100	3Hrs

Topics and Allocation of Hours :

UNIT	TOPICS	TIME (hrs)
I	Industrial Drives	14
II	Hydraulic and Pneumatic Systems	14
III	Programmable Logic Controller (PLC)	14
IV	Distributed Control System (DCS)	14
V	Robotics	12
	Revision / Test	12
	Total	80

RATIONALE

Industrial Automation and Drives, a latest field in engineering and technology is having a rapid growth with excellent features like accurate control, safety, reduction of manpower, waste management etc. This subject covers the details of Industrial Drives, Hydraulic and Pneumatic Control System, Programmable Logic Controller (PLC), Distributed Control System (DCS), Robotics etc. Industrial automation is another field of engineering, where there is a huge demand of qualified engineers.

24262 - INDUSTRIAL AUTOMATION AND DRIVES
DETAILED SYLLABUS

UNIT	NAME OF THE TOPIC	HOURS
I	**INDUSTRIAL DRIVES** Concept of Electric drive – Parts of Electrical Drive – Types of electric drive – Group drive – Individual drive – Multi motor drive – Selection of motors – Stepper Motor – Applications – Automation – Variable Reluctance and Hybrid Stepper Motor working – Static torque characteristics – Drive circuits for Stepper Motor – Control voltage, Current force and Chopper drive – Servomotor – Brushless Servo Motor and Permanent Magnet Servo Motor working – Eddy Current Drive and Variable Frequency Drive for speed control of Induction motor.	14 Hrs
II	**PNEUMATIC AND HYDRAULIC SYSTEMS** Difference between Hydraulics and Pneumatics – Hydraulic power supply and Accumulator – Pneumatic power supply– Directional Control Valves – Poppet and Spool Valve – Valve Symbols – Pilot operated valves – Directional Valves– Pressure Control Valves – Cylinders – Control of a Single acting Cylinder and Double acting Cylinder – Sequencing of Cylinders – Filter Regulator Lubricator (FRL) unit.	14 Hrs
III	**UNIT - III PROGRAMMABLE LOGIC CONTROLLER (PLC)** Introduction – Architecture of PLC – Fixed and Modular PLC – Differences between Computer and PLC – PLC Input and Output Modules – List of Input and Output devices interfaced with PLC – Programming fundamentals – Ladder Logic – Basic Relay instructions – Latching and Logical functions – Timer and Counter instructions – PLC networking–PLC Advantages and Disadvantages – List of various PLC's and their manufacturers.	14 Hrs

UNIT	NAME OF THE TOPIC	HOURS
IV	**UNIT – IV DISTRIBUTED CONTROL SYSTEM (DCS)** Evolution of Distributed Control System – Definition of DCS – Functional elements of DCS – Elements of Local Control Unit – Operator Interfaces – Engineering interfaces – Types of information displays - Architecture of anyone commercial DCS – Advantages of DCS – Selection of DCS – List of Various DCS and their manufacturers.	14 Hrs
V	**UNIT – V ROBOTICS** Definition of Robot – Robot Anatomy – Classification of robots – Contact and Non-contact Sensors – Touch, Tactile, Range and Proximity sensor – Robot end effectors and types – Robot Programming languages – Robot drives – Applications of Industrial robots.	12 Hrs

REFERENCE BOOKS

1. R. Krishnan, 'Electric Motor and Drives, Modeling, Analysis and Control', Pearson Education, 2001.
2. G.K. Dubey,'Fundamentals of Electrical Drives', Narosa Publication,2002.
3. M.S.Berde, 'Electric Motor Drives'.
4. V. Subramaniam, 'Thyristor control of electric drives'.
5. Bimal K. Bose, 'Modern Power Electronics and AC Drives', Prentice Hall of India 2003.
6. William Bolton, 'Mechatronics-Electronic Control Systems in Mechanical and Electrical Engineering,' Fourth Edition, Pearson Education.
7. Gary Dunning, 'Introduction to Programmable Logic Controllers', Third edition.
8. Pradeep Kumar Srivastava, 'Programmable Logic Controllers with Applications', BPB Publications.
9. John W.Webb, Ronald A.Reis, 'Programmable Logic controllers-Principles and Applications', Fifth edition, Prentice Hall of India.
10. Michael P.Lukas, 'Distributed Control System', Van Nostrand Reinhold Co, 1986.
11. Fu K.S, Gonzales et al, 'Robotics-Control, Sensing, Vision and intelligence, McGraw Hill.
12. Michel P. Groover, 'Industrial Robots-Technology, Programming and Applications', McGraw Hill.

24262 INDUSTRIAL AUTOMATION AND DRIVES

MODEL QUESTION PAPER - I

Time: 3 hrs   Max Marks: 75

PART -A

Answer any Fifteen Questions. Each question carries 1 mark.

     a. 1List out the parts of electrical drive.
2. What is a group drive?
3. Name any two factors for the selection of motors.
4. What is a Variable frequency drive?
5. Name any two types of Directional Control Valve.
6. What is directional valve?
7. Draw the symbol for Valve actuation by Solenoid.
8. Expand FRL.
9. What is a Modular PLC?
10. Mention two input devices which can interfaced with PLC.
11. What is latching in PLC?
12. List any two manufacturers of PLC.
13. Define DCS.
14. What is LCU in DCS?
15. Mention any two information displays provided in DCS.
16. List any two advantages of DCS.
17. Give one example for Contact and Non-contact sensor used in robots.
18. What is an end effector?
19. List out the various robot drives.
20. Mention any two applications of industrial robots

PART - B

**Answer all questions choosing either A or B from each question.
  Each question carries 12 marks.**

21 (a) Describe the operation of a Stepper motor drive circuit.

.(OR)

  (b) Explain in detail the working of a Permanent magnet Servomotor.

22 (a) Explain in detail the types of Directional Control Valve.

.(OR)

  (b) Describe the operation of the sequencing of cylinders.

23 (a) Discuss in detail the differences between Computer and PLC

.(OR).

(b) Explain the Timer and Counter instructions used in PLC programming with an example.

24 (a) Elaborate the Operator and Engineering interfaces used in DCS.

.(OR)

(b) Explain the architecture of anyone commercial DCS.

25 (a) With a neat sketch explain Proximity sensor.

.(OR)

(b) Write a detailed note on Robo Programming Language.

24262 INDUSTRIAL AUTOMATION AND DRIVES

MODEL QUESTION PAPER - II

Time: 3 hrs   Max Marks: 75

PART -A

Answer any Fifteen Questions. Each question carries 1 mark.

1. Mention the types of electrical drive.
2. What is a multi motor drive?
3. Mention two applications of Stepper motor.
4. What is an eddy current drive?
5. What is the use of an accumulator in Hydraulic power supply?
6. Draw the symbol for 2/2 Poppet valve.
7. What is a directional valve?
8. What is the use of FRL unit?
9. Name the types of PLC.
10. List one input and output device interfaced with PLC.
11. List out the basic relay instructions used in PLC.
12. What are the various PLC's available by different manufacturers?
13. Define DCS.
14. What are the various functional elements of DCS?
15. List out any two factors for the selection of DCS.
16. Mention any two manufacturers of DCS.
17. What is meant by robot anatomy?
18. What is a Proximity sensor?
19. What are the various end effectors used in robots?
20. List two robot programming language.

PART - B

Answer all questions choosing either A or B from each question.
Each question carries 12 marks.

21 (a) Explain in detail the application and automation of Variable reluctance Stepper motor.

.(OR)

(b) Explain in detail the working of a Brushless Servomotor.

22 (a) With a neat sketch explain Hydraulic and Pneumatic power supply.

.(OR)

(b) Describe the Control of a Single acting cylinder and Double acting cylinder.

23 (a) Explain in detail the architecture of a PLC with a neat sketch.

.(OR)

(b) Explain in detail the networking of PLC's.

24 (a) With a neat sketch explain the functional elements of DCS.

.(OR)

(b) Write a detailed note on types of information displays.

25 (a) Explain in detail how robots are classified.

(OR)

(b) Describe the working of Range sensor.

L-SCHEME

(Implements from the Academic year 2011-2012 onwards)

Course Name : DIPLOMA IN INSTRUMENTATION AND CONTROL ENGINEERING
Course Code : 1042
Subject code : **24281**
Semester   : VI Semester
Subject title : **BIO MEDICAL INSTRUMENTATION**

TEACHING AND SCHEME OFEXAMINATION:

Number of Weeks/ Semester   :   16 weeks

Subject Title	Instruction		Examination			
	Hrs. Week	Hrs Semester	Marks			Duration
			Internal Assessment	Board Examination	Total	
BIO MEDICAL INSTRUMENTATION	5	80	25	75	100	3Hrs

Topics and Allocation of Hours :

UNIT	TOPIC	TIME (Hrs)
UNIT I	Physiological & Clinical Measurements	15
UNIT II	Bio – Medical Recorder	15
UNIT III	Therapeutic Instruments	12
UNIT IV	Bio-telemetry and patient safety	15
UNIT V	Modern imaging Techniques.	15
	Revision, Test	8
	Total	80

RATIONALE

Biomedical Instrumentation engineers play a major role in hospital nowadays due to the latest instrumentation techniques implemented in biomedical instruments. This subject gives an adequate knowledge about the physiological systems of the human body and the parameters related to it. The biomedical equipment's which are widely used nowadays are introduced in this subject. Instrumentation and Control engineering branch students can also start a career as biomedical engineer, which provides promising career opportunities to them.

24281 - BIOMEDICAL INSTRUMENTATION
DETAILED SYLLABUS

UNIT	NAME OF THE TOPIC	HOURS
I	**Physiological & Clinical Measurements** 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 (Electro magnetic blood flow meter, Ultrasonic blood flow meter). – blood PH. Measurement of Respiration rate – Lung Volume – Heart rate – Temperature(Body temperature & Skin Temperature). Chromatography , photometry, Flurometry.	**15 hrs**
II	**Bio – Medical Recorder**. Electro cardiography (ECG),- Lead system –ECG Electrodes – ECG Amplifiers –ECG recording –analysis of ECG curves. Nervous system- EEG recorder -10-20 lead Sytem-EEG wave types – Clinical use of EEG – brain Tumour. Electro – myo graph (EMG)- EMG Waves –Measurement of conduction velocity- Electro Retinography.(ERG). Audiomter-Types –Basic Audiometer.	**15 hrs**

UNIT	NAME OF THE TOPIC	HOURS
III	**UNIT-III Therapeutic Instruments**. 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 – Oxygenerators – Blood pumps-Peristolic pump-Heart valves-problems of artifial heart valves. Dialysis- Hemo dialysis – peritoneal dialysis. Endoscopy- principle of Working ang applications.	12 hrs
IV	**UNIT-IV Bio-telemetry and patient safety** Introduction –Physiological parameter adaptable to bio telemetry-components of a bio telemetry system-application of telemetry in patient care- problems associated with implatable telemetry.. Physiological efforts of electric current-Micro and Macro shock-Leakage Current- Shock hazards from electrical equipments. Telemedicine –Introduction –working –applications.	15 hrs
V	**UNIT –V Modern imaging Techniques**. Laser beam properties- principles-application of laser in medicine. X-Ray apparatus –Block Diagram- operation –special Techniques in X -ray imaging-Tomogram – Computerised Axial Tomo graphy-Ultrasonic imaging techniques- Echo cardiography – Angiography –CT Scanner – Magnetic resonance imaging Technique.	15 hrs

Reference Books.

1.Leslie Cromwell –Fred j. Wibell, Erich A.P Feither – Bio medical Instrumentation and measurements, II Edition.

2. B.R .Klin – Introduction to medical Electronics.

3.Kumaradoss –Medical Electronics.

4. Jacobson and Webstar – Medicine and clinical Engineering.

5.R.S .Khandpur – Hand book of Bio –Medical Instrumentation.

6.R.Ananda Natarajan –BioMedical Instrumentation and Measurements PHI Learning private Limited.

7. Mandeep Singh – Introduction to Bio –M edical Instrumentation.

Bio-medical Instrumentation
MODEL QUESTION PAPER - I

Time : 3 Hrs   Max. Marks: 75

PART – A (15 x 1 = 15 Marks)

Answer any Fifteen Questions. Each question carries 1 mark.

1. What is bioelectric potential?
2. List the types of bio-electrodes
3. State any one method of measuring blood flow.
4. Mention Systolic & diastolic blood pressure of a normal person.
5. Draw ECG Wave with amplitude and duration.
6. State the use of EMG.
7. What is ERG?
8. State the use of Audiometer.
9. What is pacemaker?
10. What is the use of Heart Lung Machine?
11. What is oxygenator?
12. What is cardiac defibrillator?
13. What is bio telemetry?
14. What is macro shock.
15. State any one application of bio –Telemetry
16. State the types of modulation used in bio- telemetry.
17. State any one application of laser in medicine?
18. Give abbreviation for CT.
19. What is MRI.
20. State any one application of CT.

PART – B (5 x 12 = 60 Marks)

Answer all questions choosing either A or B from each question. Each question carries 12 Marks

21A) Explain in detail about resting   & Action potential.   [12]
                         (OR)

B) Explain in detail about ultra sonic blood flow measurement [12]

.   22.   A) (i) Explain ECG Recording in detail.   [12]

(OR)

B) (i) Explain how the conduction velocity is measured using EMG. [12]

23. A) 1.Give the difference between External & Internal pacemaker.   [6]

(ii) Explain the operation of double square pulse defibrillator.   [6]

(OR)

B) Explain the operation of Hemo dialysis in detail.   [12]

24.A) What is bio telemetry? Explain the components of Biotelemetry.   [12]

(OR)

B)Explain   biotelemetry in coronary care unit.   [12]

25A).Explain the operation of ultrasonic imaging technique.   [12]

(OR)

B). Explain the operation of computer tomography.   [12]

Bio-medical Instrumentation
MODEL QUESTION PAPER - II

Time : 3 Hrs   Max. Marks: 75

PART – A (15 x 1 = 15 Marks)

Answer any Fifteen Questions. Each question carries 1 mark.

1.   What is action potential?
2.   State the use of needle electrode
3.   .State any one method of measuring blood pressure.
4.   Mention the heart rate of a normal person.
5.   Give abbreviation for EEG.
6.   State the use of ERG.
7.   What is the use of audiometer?
8.   What is EMG?
9.   What is pacemaker?
10. What is the use of dialysis?
11. What is bubble type oxygenator?
12. What is cardiac defibrillator?
13. Define bio telemetry?
14. What is micro shock?
15. State any one application of bio –Telemetry
16. State the Components used   in bio- telemetry.
17. State any one Properties of laser.
18. Give abbreviation for CAT.
19. Give abbreviation for MRI.
20. State any one application of CT.

PART – B (5 x 12 = 60 Marks)

Answer all questions choosing either A or B from each question. Each question carries 12 Marks

21   A) Explain in detail about Surface & needle Electrodes .State its uses.   [12]
                              (OR)

           B) Explain in detail about Electro magnetic blood flow measurement [12]

.   22.   A) (i) Explain EEG Recording Technique in detail.   [12]

                              (OR)

B) (i) Explain the operation of ERG Recording Technique.   [12]

23. A) (i) Explain External & Internal pacemaker.   [6]

(ii) Explain the operation of peritoneal dialysis.   [6]

(OR)

B) Why do we require Heart –Lung Machine? Draw a block diagram of it and

explain its working   [12]

24. A) what is bio telemetry? Explain the types of modulation used in biotelemetry.   [12]

(OR)

B) Explain in detail about physiological parameter adaptable to bio –telemetry. [12]

25. A).Explain the operation computer axial tomography   [12]

(OR)

B). Explain the operation of MRI.   [12]

L-SCHEME
(Implements from the Academic year 2011-2012 onwards)

Course Name : DIPLOMA IN INSTRUMENTATION AND CONTROL ENGINEERING
Course Code : 1042
Subject code : **24763**
Semester   : V Semester
Subject title   : **ROBOTICS AND AUTOELECTRONICS**

TEACHING AND SCHEME OFEXAMINATION:

Number of Weeks/ Semester   :   16 weeks

Subject Title	Instruction		Examination			
	Hrs. Week	Hrs Semester	Marks			Duration
			Internal Assessment	Board Examination	Total	
ROBOTICS AND AUTOELECTRO NICS	5	80	25	75	100	3Hrs

Topics and Allocation of Hours :

UNIT	TOPIC	TIME (Hrs)
UNIT I	Basic Configuration of Robotics and its Working	14
UNIT II	Robot Controller, Servo Systems	16
UNIT III	Robot Motion Analysis and Vision System	14
UNIT IV	Robot Programming	14
UNIT V	Robot Application in Manufacturing and Auto Electronics	14
	Revision, Test	8
	Total	80

24763 - ROBOTICS AND AUTOELECTRONICS

DETAILED SYLLABUS

UNIT	NAME OF THE TOPIC	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.	14 hrs
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.	16 hrs
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 hrs

UNIT	NAME OF THE TOPIC	HOURS
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.	**14 hrs**
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 hrs**

Reference Books

1. Industrial Robotics – Technology – Programming and Applications -
Mikell P. Groover, Mite chell weiss, Roger Negal and Nicholes G. Odress.
2. Robotics – An Introduction – Doughales – R. Halconnjr.
3. JUDGE. AW – Modern Electric Equipments for Automobile – Chapman & Hall London 1975
4. Walter E Billet& Leslie. F GOINGS – Automotive

24763 – Robotics and Auto Electronics
MODEL QUESTION PAPER - I

Time : 3 Hrs

Max. Marks: 75

PART – A (15 x 1 = 15 Marks)

Answer any Fifteen Questions. Each question carries 1 mark.

1. Define the term 'Robot'.
2. State the Degree of freedom associated with Rist.
3. What is meant by work Envelope?
4. Define End effector.
5. What is meant by open loop control system?
6. What is on line Programming?
7. Give any two basic commands used in Robot.
8. What is meant by accuracy of Robot?
9. Define transducer.
10. What is SCARA?
11. Define motion interpolation.
12. State any two techniques in image Processing and analysis.
13. What is meant by Reverse Kinematics?
14. What is Lead through Programming?
15. Give any two Robot Programming Languages.
16. What is teach Pendant?
17. State one advantage of future Robots.
18. State the Purpose of Automated guided Vehicle.
19. Name one sensor for Air pressure warning system.
20. Give any two applications of sensor in Automobile.

PART – B (5 x 12 = 60 Marks)

Answer all questions choosing either A or B from each question. Each question carries 12 Marks

21. A) (i) Explain the basic configuration of robot with a neat sketch.   [6]

    (ii) Describe the Robot components.   [6]

                                    (OR)

    B) (i) Explain the structural Characteristics of a Robots.   [6]

       (ii)Explain the types of links with a neat sketch.   [6]

22. A) (i) Explain the types of drive system used in Robots.　　　[6]

(ii) Describe the types of Electromagnetic Grippers.　　　[6]
(OR)

B) (i) Illustrate the various types of stepper motors with its neat sketches.　　　[6]

(ii)Explain the factors to be considered for selection and Design of Grippers.　　[6]

23. A) (i) Explain the machine vision applications in Robots.　　　[6]

(ii) Explain the operation of ultrasonic sensor with a neat sketch.　[6]
(OR)

B) (i) Describe the types of optical encoders with a neat sketches.　　　[6]

(ii)Explain the various techniques in image processing and analysis.　　[6]

24. A) (i) Explain forward transformation of manipulator with two degrees of freedom.　[6]

(ii) Explain the generations of Robot programming languages.
[6]
(OR)

B) (i) Explain Reverse kinematics of manipulator with two degrees of freedom.　　[6]

(ii)Explain motion commends and sensor commands

with an example.　　　[6]

25. A) (i) Explain forward Requisite and Non Requisite robot characteristics .　　[6]

(ii) Explain the Robot applications in the field of machine tool loading and unloading
[6] operation.
(OR)

B) (i) Explain various social consternation for implementing the Robots.　　[6]

(ii Explain the speed warning system in Automobile.　[6]

24763 – Robotics and Auto Electronics
MODEL QUESTION PAPER - II

Time : 3 Hrs

Max. Marks: 75

PART – A (15 x 1 = 15 Marks)

Answer any Fifteen Questions. Each question carries 1 mark.

1. Define degrees of freedom?
2. What is manipulator?
3. What is open loop controller?
4. What is an actuator?
5. Classify the sensor.
6. What is tactile sensor?
7. List any two commands used for robot Programming.
8. What is Gripper?
9. Define image processing.
10. What you mean by feedback?
11. Define on line programming.
12. Differentiation between speed sensor and temperature sensor.
13. Define pay load.
14. List the robot wrist characteristics.
15. List one device for linear to rotary motion conversion.
16. What is meant by interpolation?
17. List one advantage of on line programming.
18. State one advantage of future Robot.
19. Name one sensor for Air pressure warning system.
20. Give any two applications of sensor in Automobile.

PART – B (5 x 12 = 60 Marks)

Answer all questions choosing either A or B from each question. Each question carries 12 Marks

21. A) (i) Explain the open loop controller and closed loop controller.   [6]

    (ii) Draw the neat diagram of SCARA and list the advantages.   [6]
                            (OR)

    B) (i) Illustrate the Cartesian and spherical configurations of Robot.   [8]

    (ii) Describe the various Robot wrist rotations   .   [4]

22. A) (i) Explain the different feedback device used in Robots.   [8]

    (ii) Explain the working of potentiometer in Robot.   [4]
                                (OR)

    B) (i) Explain the working of DC Servo motor.   [8]

    (ii)Explain the working of stepper motor.   [4]

23. A) (i) Explain the working of vacuum gripper.   [8]

    (ii) Write brief notes on Photo electric sensor.   [4]
                                (OR)

    B) (i) Explain the function of vision system   [8]

    (ii)Explain the feature of magnetic gripper.   [4]

24. A) (i) Explain in detail about the lead through programming methods.   [8]

    (ii) Explain the Purpose of weight and signal commands.   [4]
                                (OR)

    B) (i) Discus about the characteristics of future Robot task.   [8]

    (ii)Explain the working of Engine oil temperature sensor.   [4]

25. A) (i) Explain a speed warning system in automobiles .   [8]

    (ii) Draw the oil pressure sensor used in Automobile   [4]
                                (OR)

    B) (i) With neat diagram explain the working of fuel level sensor used in automobile.
[8]

    (ii Mention the request Robot Characteristics.   [4]

L-SCHEME

(Implements from the Academic year 2011-2012 onwards)

Course Name : DIPLOMA IN INSTRUMENTATION AND CONTROL ENGINEERING
Course Code : 1042
Subject code : **24283**
Semester   : VI Semester
Subject title   : **MECHATRONICS**

TEACHING AND SCHEME OFEXAMINATION:

Number of Weeks/ Semester   :   16 weeks

| Subject | Instruction | | Examination | | | |
| | Hrs. Week | Hrs Semester | Marks | | | Duration |
			Internal Assessment	Board Examination	Total	
MECHATRONICS	5	80	25	75	100	3Hrs

Topics and Allocation of Hours :

UNIT	TOPIC	TIME (Hrs)
UNIT I	Introduction to Mechatronics	15
UNIT II	Micro Electro Mechanical System	15
UNIT III	Fault detection Technique	12
UNIT IV	Mechatronic Systems	15
UNIT V	Application of computers in Mechatronics	15
	Revision, Test	8
	Total	80

RATIONALE

Mechatronics plays a major role in the field of engineering nowadays especially in the automobile industry. The aim of introducing this subject is to integrate the two disciplines mechanical and electronics and to implement in the engineering field. This subject provides a detailed knowledge about the latest technology MEMS, It also includes more applications to understand the concept of Mechatronics by the students. The knowledge of this subject provides an excellent career opportunity to the students in the automobile and other engineering industries.

24283 – MECHATRONICS

DETAILED SYLLABUS

UNIT	NAME OF THE TOPIC	HOURS
I	**Introduction to Mechatronics** Automation - need for automation - Role of mechatronics in Automation - What is mechatronics- definition- Benefits. Elements of mechatronics- mechatronics in manufacturing - A hierarchical communication system for manufacturing control ,Traditional approach Vs Mechatronics approach- Mechatronics and engineering design- The engineer and Mechatronics – Mechatronics and Technologies.	15 hrs
II	**Micro Electro Mechanical System** Introduction – Block diagram of MEMS - MEMS micro system - MEMS micro actuator –Manufacturing process of MEMS - Bulk micromachining, Surface micromachining- MEMS Micro sensor - MEMS Accelerometer- MEMS Humidity micro sensor – Advantages of MEMS –Application of MEMS.	15 hrs
III	**Fault detection Technique** Introduction –Types of Technique to detect faults – Watch dog timer – Parity and error coding checks - Common Hardware faults – Sensor – Switches and Relays – Motors – Hydraulic and Pneumatic systems – Microprocessor system –Fault finding techniques in microprocessor based system – Emulation and Simulation – PLC Systems – Program testing – Testing inputs and outputs – PLC as a monitor of systems	12 hrs

UNIT	NAME OF THE TOPIC	HOURS
IV	**UNIT – Mechatronic Systems** Mechatronics solutions to design problems – Timed switch – Windscreen wiper motion – Weighing machine – Pick and Place robot – Car park barriers – Car engine management – Hard disk drive.	**15 hrs**
V	**UNIT- Application of computers in Mechatronics** Data communication in Industries- Types of data in Industries, network architecture, Industrial communication System ,Communication Management System Computer networks –Local area Network,Requirement of LAN ,LAN Topologies, Man Machine Interface Computer aided Design - Computer aided manufacturing – Computer integrated manufacturing -Computer aided process control –Block diagram, classification, Computer Aided process control software- Algorithms-advantages of computers in process control.	**15 hrs**

Mechatronics
MODEL QUESTION PAPER - I

Time : 3 Hrs   Max. Marks: 75

PART – A (15 x 1 = 15 Marks)

Answer any Fifteen Questions. Each question carries 1 mark.

1. What is Automation?
2. State the role of mechatronics in Automation
3. What is mechatronics?
4. List the elements of mechatronics
5. Give abbreviation for MEMS?
6. What is MEMS micro actuator?
7. State any one advantages of MEMs
8. State two types manufacturing process of MEMS
9. List any two types of technique to detect faults
10. List common hardware faults.
11. What is relays?
12. State the uses of PLC
13. What is TIMED switch.
14. What is windscreen wiper motion.
15. State anyone application of robot.
16. What is HDD
17. What is LAN?
18. What is the use of computer networks
19. What is CAM?
20. State any two advantages of computers in process control.

PART – B (5 x 12 = 60 Marks)

Answer all questions choosing either A or B from each question. Each question carries 12 Marks

26. A) Explain the elements mecha tronics in detail   [12]

(OR)

B) Explain in detail about mechatronics and technologies.[12]

. 22.   A) (i) Explain Manufacturing process of MEMS   [12]

(OR)

B) (i) Explain MEMS humidity micro sensor   [6]

   (II)   State the uses of MEMS actuator   [6]

23. A) 1.Explain parity & error code   [12]

                          (OR)

   B) Explain different types of   fault finding techniques in microprocessor

    Based   system   [12]

24. A).Explain Weighing machine design solution   [12]

                          (OR)

   B) Explain Car engine management in detail   [12]

25. A).   Explain   in detail   about network architecture   [12]
                          (OR)
   B). Explain Computer aided manufacturing with a neat diagram   [12]

Mechatronics
MODEL QUESTION PAPER- II

Time : 3 Hrs   Max. Marks: 75

PART – A (15 x 1 = 15 Marks)

Answer any Fifteen Questions. Each question carries 1 mark.

1. State the need for mechatronics in Automation.

2. What is mechatronics?
3. Define mechatronics in manufacturing
4. List the elements of mechatronics.
5. Give abbreviation for MEMS
6. What is MEMS?
7. What is MEMS micro sensor?
8. State any two advantages of MEMS.
9. State the manufacturing   process of MEMS.
10. What is Watch Dog Timer.
11. State the uses of Sensor.
12. What is PLC?
13. State any one application of robot.
14. State the use of car park barriers.
15. State anyone application of robot.
16. What is HDD? State its use.
17. What is Man Machine interface?
18. What is the use of computer networks
19. What is CIM?
20. State any two applications of computers in process control.

PART – B (5 x 12 = 60 Marks)

Answer all questions choosing either A or B from each question. Each question carries 12 Marks

21. A) Explain Traditional approach Vs   Mechatronics approach in
    manufacturing control.   [12]

                          (OR)

    B)(i) Explain the role of mechatronics in   Automation .[6]

    (ii) With a neat block diagram explain the elements of mechatronics. [6].

. 22.   A) (i) Explain any one method Manufacturing process of MEMS   [12]

(OR)

B) (i) Explain MEMS accelerometer   [6]

(II) Explain MEMS Sensor.   [6]

23. A) 1.Explain   the types technique used to detect fault.   [12]

(OR)

B) Explain program, inputs & outputs testing of PLC system.   [12]

24. A).Explain   Windscreen wiper motion with design solution   [12]

(OR)

B) Explain Car engine management in detail   [12]

25.A).   What is Local area Network, State the requirement of LAN,.

Explain the LAN   topologies in detail.   [12]

(OR)

B). Explain   Computer aided process control in detail with block diagram. [12]

L-SCHEME
(Implemented from the Academic year 2011-2012 onwards)

Course Name : DIPLOMA IN INSTRUMENTATION AND CONTROL ENGINEERING
Course Code : 1042
Subject code : **24264**
Semester   : VI Semester
Subject title : **INDUSTRIAL AUTOMATION PRACTICAL**

TEACHING AND SCHEME OF EXAMINATION

No. of weeks / Semester   :   16

Subject Title	Instruction		Examination				
	Hrs. Week	Hrs Semester	Marks				Duration
			Internal Assessment	Board Examination	Total		
INDUSTRIAL AUTOMATION PRACTICAL	5	80	25	75	100		3Hrs

24264 - INDUSTRIAL AUTOMATION PRACTICAL

List of Experiments

1. Direct operation of a single and Double Acting cylinder.
2. Operation of Single Acting Cylinder controlled from two different positions using shuttle valve.
3. Speed control of Double Acting cylinder using metering in and metering out circuit.
4. Automatic operation of Double Acting cylinder in multi cycles -Using limit switches and memory valves.
5. Direct operation of Hydraulic Motor.
6. Speed control of Double Acting cylinder - Using metering-in and metering out control.
7. Speed control Hydraulic Motor Using metering-in and metering-out control.
8. Operation of a Double Acting cylinder using solenoid operated Directional

control valve.

9. Measurement of resistances -volt drops method.
10. SCR method of speed control of DC motor.
11. Measuring voltage ratio and efficiency of transformer by loading the transformer.
12. Load characteristics of 3-phase induction motor.
13. Load characteristics of 1 phase induction motor.

Sr No	Name of the Equipments	Required Nos
1	Pneumatic Control Station with accessories	1 no
2	Hydraulic Control station with accessories	1 no
3	SCR method of speed control of DC motor setup with accessories	1 no
4	Load test on Single phase transformer setup with accessories	1 no
5	Load characteristics of Three phase induction motor setup with accessories	1 no
6	Load characteristics of Single phase induction motor setup with accessories	1 no

Block/Circuit diagram – 20 marks

Connections – 20 marks

Reading & Graph – 20 marks

Result – 10 marks

Viva voce – 5 marks

Total – 75 marks

L-SCHEME
(Implemented from the Academic year 2011-2012 onwards)

Course Name : DIPLOMA IN INSTRUMENTATION AND CONTROL ENGINEERING
Course Code : 1042
Subject code : **24265**
Semester   : VI Semester
Subject title : **P& I DRAWINGS USING CAD PRACTICAL**

TEACHING AND SCHEME OF EXAMINATION :

Number of Weeks/ Semester   :   16 weeks

Subject Title	Instruction		Examination			
	Hrs. Week	Hrs Semester	Marks			Duration
			Internal Assessment	Board Examination	Total	
P&I DRAWINGS USING CAD PRACTICAL	5	80	25	75	100	3Hrs

(Any twelve)

Software requirement: CAD package / CAD P&ID 2012

24265 - P&I DRAWINGS USING CAD PRACTICAL

List of Experiments

1. **Study of various symbols and abbreviations used in P&ID diagram**
2. Draw the P&I diagram of Feedback Control System and Cascade Control System
3. Draw the P&I diagram of Feed forward Control system and Ratio Control System
4. Draw the P&I diagram of Feedback and Cascade Control System for Evaporators.
5. Draw the P&I diagram of a Drum type Boiler with only measurement points.
6. Draw the P&I diagram of Distillation Equipment, Reboiler and Reflux Control of Distillation Column.
7. Draw the P&I diagram of any one Batch Dryer.

8. Draw the P&I diagram of Temperature and Pressure Control of a Chemical Reactor.
9. Draw the P&I diagram of On/Off Level, Flow and Pressure Control of Centrifugal Pump.
10. Draw the P&I diagram of Surge and Antisurge Control of a Centrifugal Compressor.
11. Draw the P&I diagram of Fermentation Control System.
12. Draw the P&I diagram of Tablet Coating Control System.
13. Draw the P&I diagram of Basis weight control of a Paper machine.

REFERENCE BOOKS

Refer the below books for the P&ID Diagram of the listed experiments

1. Bela G.Liptak, 'Instrument Engineers Handbook – Process Control', Third   edition
2. Bela G.Liptak,'Instrumentation in Processing Industries'.
3. Andrews & William, 'Applied Instrumentation in Process Industries'.
4. C.D. Johnson, 'Process Control Instrumentation Technology, Prentice Hall of India.

Sr No	Name of the Equipments	Required Nos
	Software required:-	
1	CAD/ CAD P&ID 2012 Software for multiuser	1 no
	Hardware required:-	
1	PC Pentium Dual Core	30 nos
2	Laser Printer	2 nos
3	UPS 5KVA with one hour backup	1 no

SCHEME OF VALUATION

P&ID DRAWING USING CAD	35 MARKS
OBSERVATION & PROCEDURE	20 MARKS
RESULT	15 MARKS
VIVA VOCE	5 MARKS
TOTAL	75 MARKS

L-SCHEME
(Implemented from the Academic year 2011-2012 onwards)

Course Name : DIPLOMA IN INSTRUMENTATION AND CONTROL ENGINEERING
Course Code : 1042
Subject code : **24266**
Semester   : VI Semester
Subject title   : **PROGRAMMABLE LOGIC CONTROLLER PRACTICAL**

TEACHING AND SCHEME OF EXAMINATION :

Number of Weeks/ Semester   :   16 weeks

Subject Title	Instruction		Examination			
	Hrs. Week	Hrs Semester	Marks			Duration
			Internal Assessment	Board Examination	Total	
Programmable Logic Controller Practical	5	80	25	75	100	3Hrs

24266 – Programmable Logic Controller Practical

List of Experiments

(Compulsory experiments)

1. Write and implement a Ladder logic program using Latch circuit.

2. Write and implement a Ladder logic program for the Logical functions.

3. Write and implement a Ladder logic program for the On delay and Off delay timer functions.

4. Write and implement a Ladder logic program for the Cyclic On/Off of an output using Timer instructions.

5. Write and implement a Ladder logic program to count an event.

6. Write and implement a Ladder logic program to toggle an output.

7. Write and implement a Ladder logic program for the sequence control of four outputs repetitively.

8. Write and implement a Ladder logic program for the Alarm and Acknowledge of a fault signal.

(The below experiments can be conducted by interfacing PLC with I/O devices)

(Conduct any six experiments)

9. Write and implement a Ladder Logic program for the On/Off Control of a motor.

10. Write and implement a Ladder logic program for the On/Off Level Control.

11. Write and implement a Ladder logic program to decode the number from 0 to 9 on seven segmental LED display.

12. Write and implement a Ladder logic program for the sequencing and counting of outputs in simple mixing applications.

13. Write and implement a Ladder logic program for Conveyor control.

14. Write and implement a Ladder logic program for Lift control.

15. Write and implement a Ladder Logic program to count the number of students inside a Classroom by placing photoelectric sensor at the entry and exit.

16. Write and implement a Ladder logic program for the automatic On/Off of a light in a room.

Sr No	Name of the Equipments	Required Nos
1	Programmable Logic Controller (PLC) with battery backup	4 nos
2	PC Pentium Dual Core	4 nos
3	PC to PLC interface cable	4 nos
4	Hand Held Terminal (HHT)	1 no
5	Laser Printer	2 nos
6	UPS 5KVA with one hour backup	1 no
	Models required for PLC interfacing experiments:-	
1	On / Off Motor module with provision for PLC interface	1 no
2	On / Off Level Control System with provision for PLC	1 no
3	Seven Segmental LED display with provision for PLC	1 no
4	Mixing system with provision for PLC interface	1 no
5	Conveyor Control System with provision for PLC interface	1 no
6	Lift Control System with provision for PLC interface	1 no
7	Photo electric sensor	4 nos

Note:- The models required for the PLC interfacing experiments can be developed by the students.

SCHEME OF VALUATION

LADDER LOGIC	20 MARKS
EXECUTION OF PROGRAM	20 MARKS
OBSERVATION & PROCEDURE	20 MARKS
RESULT	10 MARKS
VIVA VOCE	5 MARKS
TOTAL	75 MARKS

L-SCHEME
(Implements from the Academic year 2011-2012 onwards)

Course Name : DIPLOMA IN INSTRUMENTATION AND CONTROL ENGINEERING
Course Code : 1042
Subject Code : 24267
Semester   : VI
Subject Title: Project Work
.

TEACHING AND SCHEME OF EXAMINATIONS:

No. of Weeks per Semester : 16 Weeks

Subject	Instruction		Examination		
	Hours/ Week	Hours/ Semester	Assessment Marks		
			Internal	Board Exam	Total
PROJECT WORK	5	80	25	75	100

Minimum Marks for Pass is 50 out of which minimum 35 marks should be obtained out of 75 marks in the board Examination alone.

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.
- Understand what entrepreneurship is and how to become an entrepreneur.
- 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.
- Understand the facts and importance of environmental management.

Understand and gain knowledge about disaster management

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 assessment	Max. Marks
First Review	6th week	10
Second Review	14th week	10
Attendance	Entire semester	5
Total		**25**

EVALUATION FOR BOARD EXAMINATION:

Details of Mark allocation	Max Marks
Marks for Report Preparation, Demo, Viva-voce	45
Marks for answers of 15 questions which is to be set by the external examiner from the given question bank consisting of questions in the following three topics Entrepreneurship, Disaster Management and Environmental Management. Out of fifteen questions five questions to appear from each of the above topics i.e. 5 questions x 3 topics = 15 questions 15 questions x 2marks = 30 Marks	30
Total	**75**

DETAILED SYLLABUS

ENTREPRENEURSHIP, ENVIRONMENTAL & DISASTER MANAGEMENT

1. ENTREPRENEURSHIP

1.1 Introduction – Entrepreneur - characteristics of Entrepreneur - contributions of an Entrepreneur - functions of entrepreneur - Barriers to entrepreneurship - Roll of government in Entrepreneurial development.

1.2 Small scale industries (SSI) - SSI role in country's economic growth – importance of SSI - starting of an SSI - Government organization and Non-governmental organizations supporting SSI - DIC,NSIC,SIDO,KVIC, Development banks and their objectives - role of commercial banks in assisting SSI - Women entrepreneurs and opportunities – Subsidy and concessions to Small Scale Industries.

2. ENVIRONMENTAL MANAGEMENT

2.1 Introduction – Environmental Ethics – Assessment of Socio Economic Impact – Environmental Audit – Mitigation of adverse impact on Environment – Importance of Pollution Control – Types of Industries and Industrial Pollution.

2.2 Solid waste management – Characteristics of Industrial wastes – Methods of Collection, transfer and disposal of solid wastes – Converting waste to energy – Hazardous waste management Treatment technologies.

2.3 Waste water management – Characteristics of Industrial effluents – Treatment and disposal methods – Pollution of water sources and effects on human health.

2.4 Air pollution management – Sources and effects – Dispersion of air pollutants – Air pollution control methods – Air quality management.

2.5 Noise pollution management – Effects of noise on people – Noise control methods.

3. DISASTER MANAGEMENT

3.1 Introduction – Disasters due to natural calamities such as Earthquake, Rain, Flood, Hurricane, Cyclones etc – Man made Disasters – Crisis due to fires, accidents, strikes etc – Loss of property and life..

3.2 Disaster Mitigation measures – Causes for major disasters – Risk Identification – Hazard Zones – Selection of sites for Industries and residential buildings – Minimum distances from Sea – Orientation of Buildings – Stability of Structures – Fire escapes in buildings - Cyclone shelters – Warning systems.

3.3 Disaster Management – Preparedness, Response, Recovery – Arrangements to be made in the industries / factories and buildings – Mobilization of Emergency Services - Search and Rescue operations – First Aids – Transportation of affected people – Hospital facilities – Fire fighting arrangements – Communication systems – Restoration of Power supply – Getting assistance of neighbors / Other organizations in Recovery and Rebuilding works – Financial commitments – Compensations to be paid – Insurances – Rehabilitation.

LIST OF QUESTIONS

1. ENTREPRENEURSHIP

1. Define the term Entrepreneur.
2. What is Entrepreneurship? Explain.
3. List the various stages of decisions an entrepreneur has to make before reaching the goal of his project.
4. What is innovation?
5. State briefly the role of an entrepreneur in the economic growth of a country.
6. List the characteristics of an Entrepreneur.
7. What are the critical elements of an Entrepreneur?
8. State the major functions of an Entrepreneur.
9. What are barriers to Entrepreneurship?
10. Define Small Scale Industry.
11. What are the qualities of Entrepreneur?
12. What are the benefits of Entrepreneur?
13. What are the various SSI that can flourish in your district?
14. Identify the infrastructural needs for an industry.
15. What are the various agencies involved in the establishment and development of various SSI?
16. Name some of the agencies funding SSI.
17. Explain the roles played by Government in Entrepreneural development.
18. What are the various concessions and incentives available for a SSI.

19. Name some consumer products with wide demand that can be manufactured by a SSI?

20. What is feasibility study?

21. What is the importance of SSI?

22. What is DIC? State its functions.

23. What is NSIC? State its functions.

24. What is SIDO? State its functions.

25. Name the Development Banks in India working towards Entrepreneurial development.

26. State the role of commercial bank in assisting SSI sector.

27. What are the different phases of Entrepreneurial Development programme?

28. What is an Industrial Estate?

29. What are the facilities available in an Industrial Estate?

30. Identify the various training agencies associated with SSI.

31. List the governmental agencies from whom you shall get financial assistance for a SSI.

32. What is KVIC? State its objectives.

33. Name some state finance corporations.

34. What are the steps involved in preparing a feasibility report?

35. What are the factors to be considered regarding raw materials for a SSI?

36. What are the features of a SSI?

37. What are the advantages of becoming an Entrepreneur?

38. Name the Organizations offering assistance for the development of Women entrepreneurs.

39. State the business opportunities for Women entrepreneurs.

40. State the different subsidies given to SSI's.

2. ENVIRONMENTRAL MANAGEMENT

1. What is the responsibility of an Engineer-in-charge of an Industry with respect to Public Health?

2. Define Environmental Ethic.

3. How Industries play their role in polluting the environment?

4. What is the necessity of pollution control? What are all the different organizations you know, which deal with pollution control?

5. List out the different types of pollutions caused by a Chemical / Textile / Leather / Automobile / Cement factory.

6. What is meant by Hazardous waste?

7. Define Industrial waste management.

8. Differentiate between garbage, rubbish, refuse and trash based on their composition and source.

9. Explain briefly how the quantity of solid waste generated in an industry could be reduced.

10. What are the objectives of treatments of solid wastes before disposal?

11. What are the different methods of disposal of solid wastes?

12. Explain how the principle of recycling could be applied in the process of waste minimization.

13. Define the term 'Environmental Waste Audit'.

14. List and discuss the factors pertinent to the selection of landfill site.

15. Explain the purpose of daily cover in a sanitary landfill and state the minimum desirable depth of daily cover.

16. Describe any two methods of converting waste into energy.

17. What actions, a local body such as a municipality could take when the agency appointed for collecting and disposing the solid wastes fails to do the work continuously for number of days?

18. Write a note on Characteristics of hazardous waste.

19. What is the difference between municipal and industrial effluent ?

20. List few of the undesirable parameters / pollutants anticipated in the effluents from oil refinery industry / thermal power plants / textile industries / woolen mills / dye industries / electroplating industries / cement plants / leather industries   (any two may be asked)

21. Explain briefly the process of Equalization and Neutralization of waste water of varying characteristics discharged from an Industry.

22. Explain briefly the Physical treatments "Sedimentation" and "Floatation" processes in the waste water treatment.

23. Explain briefly when and how chemical / biological treatments are given to the waste water.

24. List the four common advanced waste water treatment processes and the pollutants they remove.

25. Describe refractory organics and the method used to remove them from the effluent.

26. Explain biological nitrification and de-nitrification.

27. Describe the basic approaches to land treatment of Industrial Effluent.

28. Describe the locations for the ultimate disposal of sludge and the treatment steps needed prior to ultimate disposal.

29. List any five Industries, which act as the major sources for Hazardous Air Pollutants.

30. List out the names of any three hazardous air pollutants and their effects on human health.

31. Explain the influence of moisture, temperature and sunlight on the severity of air pollution effects on materials.

32. Differentiate between acute and chronic health effects from Air pollution.

33. Define the term Acid rain and explain how it occurs.

34. Discuss briefly the causes for global warming and its consequences

35. Suggest suitable Air pollution control devices for a few pollutants and sources.

36. Explain how evaporative emissions and exhaust emissions are commonly controlled.

37. What are the harmful elements present in the automobile smokes? How their presence could be controlled?

38. What is the Advantage of Ozone layer in the atmosphere? State few reasons for its destruction.

39. Explain the mechanism by which hearing damage occurs.

40. List any five effects of noise other than hearing damage.

41. Explain why impulsive noise is more dangerous than steady state noise.

42. Explain briefly the Source – Path – Receiver concept of Noise control.

43. Where silencers or mufflers are used ? Explain how they reduce the noise.

44. Describe two techniques to protect the receiver from hearing loss when design / redress for noise control fail.

45. What are the problems faced by the people residing along the side of a railway track and near to an Airport? What provisions could be made in their houses to reduce the problem?

3. DISASTER MANAGEMENT

1. What is meant by Disaster Management? What are the different stages of Disaster management?

2. Differentiate Natural Disasters and Man made Disasters with examples.

3. Describe the necessity of Risk identification and Assessment Surveys while planning a project.

4. What is Disasters recovery and what does it mean to an Industry?

5. What are the factors to be considered while planning the rebuilding works after a major disaster due to flood / cyclone / earthquake? (Any one may be asked)

6. List out the public emergency services available in the state, which could be approached for help during a natural disaster.

7. Specify the role played by an Engineer in the process of Disaster management.

8. What is the cause for Earthquakes? How they are measured? Which parts of India are more vulnerable for frequent earthquakes?

9. What was the cause for the Tsunami 2004 which inflicted heavy loss to life and property along the coast of Tamilnadu ? Specify its epicenter and magnitude.

10. Specify the Earthquake Hazard Zones in which the following towns of Tamilnadu lie: (a) Chennai (b) Nagapattinam (c) Coimbatore (d) Madurai (e) Salem.

11. Which parts of India are experiencing frequent natural calamities such as (a) heavy rain fall (b) huge losses due to floods (c) severe cyclones

12. Define basic wind speed. What will be the peak wind speed in (a) Very high damage risk zone – A, (b) High damage risk zone, (c) Low damage risk zone.

13. Specify the minimum distance from the Sea shore and minimum height above the mean sea level, desirable for the location of buildings.

14. Explain how the topography of the site plays a role in the disasters caused by floods and cyclones.

15. Explain how the shape and orientation of buildings could reduce the damages due to cyclones.

16. What is a cyclone shelter ? When and where it is provided ? What are its requirements ?

17. What Precautionary measures have to be taken by the authorities before opening a dam for discharging the excess water into a canal/river ?

18. What are the causes for fire accidents ? Specify the remedial measures to be taken in buildings to avoid fire accidents.

19. What is a fire escape in multistoried buildings ? What are its requirements ?

20. How the imamates of a multistory building are to be evacuated in the event of a fire/Chemical spill/Toxic Air Situation/ Terrorist attack, (any one may be asked).

21. Describe different fire fighting arrangements to be provided in an Industry.

22. Explain the necessity of disaster warning systems in Industries.

23. Explain how rescue operations have to be carried out in the case of collapse of buildings due to earthquake / blast / Cyclone / flood.

24. What are the necessary steps to be taken to avoid dangerous epidemics after a flood disaster?

25. What relief works that have to be carried out to save the lives of workers when the factory area is suddenly affected by a dangerous gas leak / sudden flooding ?

26. What are the difficulties faced by an Industry when there is a sudden power failure? How such a situation could be managed?

27. What are the difficulties faced by the Management when there is a group clash between the workers? How such a situation could be managed?

28. What will be the problems faced by the management of an Industry when a worker dies because of the failure of a mechanical device due to poor maintenance? How to manage such a situation ?

29. What precautionary measures have to be taken to avoid accidents to labourers in the Industry in a workshop / during handling of dangerous Chemicals / during construction of buildings / during the building maintenance works.

30. Explain the necessity of medical care facilities in an Industry / Project site.

31. Explain the necessity of proper training to the employees of Industries dealing with hazardous products, to act during disasters.

32. What type of disaster is expected in coal mines, cotton mills, Oil refineries, ship yards and gas plants?

33. What is meant by Emergency Plan Rehearsal? What are the advantages of such Rehearsals?

34. What action you will take when your employees could not reach the factory site because of continuous strike by Public Transport workers?

35. What immediate actions you will initiate when the quarters of your factory workers are suddenly flooded due to the breach in a nearly lake / dam, during heavy rain?

36. What steps you will take to avoid a break down when the workers union of your Industry have given a strike notice?

37. List out few possible crisis in an organization caused by its workers? What could be the part of the middle level officials in managing such crisis?

38. What types of warning systems are available to alert the people in the case of predicted disasters, such as floods, cyclone etc.

39. Explain the necessity of Team work in the crisis management in an Industry / Local body.

40. What factors are to be considered while fixing compensation to the workers in the case of severe accidents causing disability / death to them?

41. Explain the legal / financial problems the management has to face if safely measures taken by them are found to be in adequate.

42. Describe the importance of insurance to men and machinery of an Industry dealing with dangerous jobs.

43. What precautions have to be taken while storing explosives in a match/ fire crackers factory?

44. What are the arrangements required for emergency rescue works in the case of Atomic Power Plants?

45. Why residential quarters are not constructed nearer to Atomic Power Plants?

L SCHEME ALTERNATE PAPERS

III SEMESTER

K SCHEME		L SCHEME	
Subject code	Subject Name	Subject code	Subject Name
14231	Basics of Instrumentation	24233	Basics of Instrumentation
14031	Electronic devices & Circuits	24031	Electronic devices & Circuits
14233	Electrical Circuits & Machines	24232	Electrical Circuits & Machines
14234	Basics of Instrumentation Lab	24235	Basics of Instrumentation Practical
14235	Electrical & Electronic Circuits Lab	24235	Electrical & Electronic Circuits Practical
14036	'C' Programming Lab	25236	'C' Programming Practical

IV SEMESTER

K SCHEME		L SCHEME	
Subject code	Subject Name	Subject code	Subject Name
14241	Measurement of Process Variables	24243	Measurement of Process Variables
14041	Analog & Digital Electronics	24241	Analog & Digital Electronics
14243	Measurements & Instruments	24242	Measurements and Instruments
14244	Measurement of Process Variables Lab	24246	Measurement of Process Variables Practical
14044	Analog & Digital Electronics Lab	24245	Analog and Digital Electronics Practical
11011	English Communication Practical	20002	Communication and Life Skill Practice

V SEMESTER

K SCHEME		L SCHEME	
Subject code	Subject Name	Subject code	Subject Name
14251	Control Engineering	24253	Control Engineering
14252	Process Control Instrumentation	24251	Process Control Instrumentation
14051 14042	Elective – 1 Microprocessor & Microcontroller Industrial Electronics	24052 24273	Microcontroller Industrial Power Electronics
14254	LabVIEW * PLC Lab	24255	No Alternate Paper
14255	Process Control Instrumentation Lab	24254	Process Control Instrumentation Practical
14054 14256	Elective - 1 Lab Microprocessor & Microcontroller Lab Industrial Electronics Lab	24256	Microcontroller Practical No Alternate Paper

VI SEMESTER

K SCHEME		L SCHEME	
Subject code	Subject Name	Subject code	Subject Name
14261	Industrial Instrumentation	24244	Industrial Instrumentation
14262	Industrial Automation	24262	Industrial Automation and Drives
14083 14281	Elective – II Bio-Medical Instrumentation☐ Computer Networks	24281	Elective – II Bio-Medical Instrumentation☐ No Alternate Paper
14264	Industrial Instrumentation Lab		Industrial Instrumentation Lab
14265	Industrial Automation Lab	24263	Industrial Automation Practical
14266	Project Work & Entrepreneurship	24266	Project Work

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