

TEACHING AND EXAMINATION SCHEME														
	Course Code	Course Name	Teaching Scheme					Examination Scheme						
			Instruction periods per week			Total Periods per semester	Credits	Continuous internal evaluation			Semester end examination			
1	18EI-501F	Industrial Management & Entrepreneur Ship	3	1	0	60	3	20	20	20	40	14	100	35
2	18EI-502C	Instrumentation in Process Industries	3	1	0	60	3	20	20	20	40	14	100	35
3	18EI-503C	Industrial Automation	3	1	0	60	3	20	20	20	40	14	100	35
4	18EI-504E	Elective - 1	3	1	0	60	3	20	20	20	40	14	100	35
5	18EI-505E	Elective - 2	3	1	0	60	3	20	20	20	40	14	100	35
6	18EI-506P	MATLAB and Virtual Instrumentation lab Practice	1	0	2	45	1.5	20	20	20	40	20	100	50
7	18EI-507P	Industrial Automation Lab practice	1	0	2	45	1.5	20	20	20	40	20	100	50
8	18EI-508P	Analytical & Bio Medical Instrumentation lab Practice	1	0	2	45	1.5	20	20	20	40	20	100	50
9	18EI-509P	Programming in ‘C’ Lab practice	1	0	2	45	1.5	20	20	20	40	20	100	50
10	18EI-510P	Project Work	1	0	2	45	1.5	20	20	20	40	20	100	
		Skill Up gradation	0	0	7	105	2.5	0	0	Rubrics			--	-
		TOTAL	20	5	17	630	25	200	200	200	400	190	1000	440

S No.		COURSE CODE	COURSE NAME
1	ELECTIVE - 1	18EI504E (A)	Electronic Measuring Instruments
		18EI504E (B)	Digital Circuit Design using Verilog
2	ELECTIVE - 2	18EI505E (A)	Analytical & Biomedical instrumentation
		18EI505E (B)	Communication Engineering

INDUSTRIAL MANAGEMENT & ENTREPRENEURSHIP

Course Title	: Industrial Management & Entrepreneurship	Course Code	: 18EI-501F
		Course Group	: Foundation
Semester	: V	Credits	: 3
Teaching Scheme in Periods (L:T:P)	: 45:15:0	Total Contact Periods	: 60 Periods
Methodology	: Lecture + Tutorial	SEE	: 40 Marks
CIE (Continuous Internal Evaluation)	: 60 Marks	(Semester End Examination)	

This course is common for DCME, DEEE, DECE & DFWT

Pre requisites

This course requires the basic knowledge of management and Entrepreneur skills.

Course Outcomes

CO1	To become aware of business and management concepts.
CO2	Analyze the various rules and regulations required for the planning of factory and its staff.
CO3	Analyse balance sheet and various budget issues.
CO4	Analyse the material required and its management economically.
CO5	Analyze the quality management and know the analysis procedure for quality.
CO6	Able to establish a small scale industry by knowing the entrepreneur skills.

Blue Print of Marks for SEE

Unit No	Unit Name	Periods	Questions to be set for SEE				
			R		U	A	
1	Overview of Business, Management Process and Organization Management	8	Q4	Q1	Q9(a)	Q13(a)	
2	Human resource Management	10					
3	Finance Management	10		Q2	Q10(a)	Q14(a)	
4	Material Management	10					
5	Project Management	10		Q3	Q5,Q6	Q9(b), Q11(a), Q11(b)	Q13(b), Q15(a), Q15(b)
6	Entrepreneurship and Supporting Institutions	12			Q7,Q8	Q10(b), Q12(a), Q12(b)	Q14(b), Q16(a), Q16(b)
Total		60	8		8	8	

Course Content

Upon completion of the course the student should be able to

UNIT 1 - Overview of Business, Management Process and Organization Management

Duration 8 (L: 6 T:2)

Business - types of business in various sectors- service, manufacturing & trade- Industrial sectors – Engineering, process, Textile, Chemical, Agro industries – Globalization and effect of globalization – advantages and Disadvantages- Intellectual Property Rights (I.P.R.)- Concept of management – levels of management – Scientific management – by FW Taylor – Principles of management- functions of management – Administration – management, Organization – types of organization(line, line & staff, staff & project) – Departmentation – Classification (centralized, decentralized, Authority, Responsibility, and span of control – Forms of Ownership – Proprietorship – Partnership – Joint stock – Co-operative society and Government sectors.

UNIT 2 - Human resource Management

Duration 10 (L: 7.5 T: 2.5)

Personal Management – Staffing – Introduction to HR planning – Recruitment procedures – Types of Trainings –Personal training – skill development training – Leaderships – types – Motivation – Maslow’s theory – Causes of accidents – safety precautions – Indian Factory Act – Workmen’s compensation Act – Industrial disputes Act- ESI Act.

UNIT 3 - Finance Management

Duration 10 (L: 7.5 T: 2.5)

Introduction – Objectives of Financial Management – Types of capitals – sources of raising capital – Types of budgets – production budgets – labour budgets – Concept of Profit loss Account – Concept of balance sheet – proforma – types of taxes – brief concepts of – Income Tax, GST.

UNIT 4 - Material Management

Duration 10 (L: 7.5 T: 2.5)

Inventory Management – objectives of Inventory Management – ABC Analysis – Economic order Quality – Purchasing – Objectives of purchasing – Functions – Procedures – Material Management.

UNIT 5 - Project Management

Duration 10 (L: 7.5 T: 2.5)

Introduction – CPM & PERT – concept of Break event Analysis – quality system - Definition of Quality , concept of Quality , Quality policy, Quality control, Quality Circle, Quality Assurance, Introduction to TQM- Kaizen 5’s and 6 sigma concepts, ISO 9000 series standards- Merits and drawbacks of ISO series standards.

UNIT 6- Entrepreneurship and Supporting Institutions

Duration 12 (L: 9 T: 3)

Qualities of entrepreneur-Manager- entrepreneur and technical entrepreneur-Advantages of being an entrepreneur-Functions of entrepreneur-Types of entrepreneur and their meaning- Role of entrepreneurship in economy development-Barriers to entrepreneurship-Mention different types of industries-Definitions of small scale industry-Features of SSI-Mention the objectives of developing SSIs- Scope of SSI in terms of various activities- Merits of SSIs-Explain the important steps involved in starting an SSI-Definition of startup company-start up development basis-state level and national level sources of information-various central Government institutions and their functions(like NSIC,SIDO,SISI and SSIB)- Telangana State industry policy-Demographic merits of Telangana state to set up SSIs-Names of state level institutions and their functions(Like SSIDC,DIC,APIITCO)-Banks that support SSIs like SIDBI,APSFC-Thrust areas and core sector as per Telangana state industry policy-Classification of the projects as per TSIP-Special assistance schemes for women and SC/ST entrepreneur -Features of TS-IPASS.

Recommended Books

1. Industrial Engg &Management by Dr. O.P. Khanna - Dhanpath Rai & sons New Delhi
2. Business Administration &Management Dr. S.C. Saxena & W.H. Newman &E.Kirby Warren-Sahitya Bhavan Agra
3. The process of Management by Andrew R. McGill - Prentice Hall
4. Industrial Management by Rustom S. Davar - Khanna Publication
5. Total Quality Management, S Raja Ram, M Shivashankar
6. Industrial management and organizational behaviour, K.K.Ahuja

Suggested E-Learning references

1. <http://jiem.org/index.php/jiem>
2. <https://dipp.gov.in>
3. www.worldwidelearn.com/online-education-guide/business/industrial-management-major.html

Suggested Learning Outcomes

- 1.1 Define Business
- 1.2 State the Types of Business (Service, Manufacturing, Trade)
- 1.3 Explain about the various industrial sectors like engineering, process, textile, Agro based industries.
- 1.4 State the need for Globalization.
- 1.5 List the Advantages & Disadvantages of globalization w.r.t. India.
- 1.6 Explain the importance of Intellectual Property Rights (I.P.R.)
- 1.6 Define Management.
- 1.7 Explain the concept of management
- 1.8 Explain the Different Levels of management
- 1.9 Explain Administration & management
- 1.10 State the principles of scientific management by F.W.Taylor
- 1.11 State the principles of Management by Henry Fayol (14 principles)
- 1.12 List the Functions of Management
 - i) Planning ii) Organizing iii) Directing iv) Controlling
- 1.13 Define Organization
- 1.14 List the Types of organization: a) Line b) Line & staff c) Functional d) Project
- 1.15 Explain the four types of organization.
- 1.16 Define departmentalization.
- 1.17 Explain the following types of departmentalizations
 - i) Centralized & Decentralized ii) Authority & Responsibility iii) span of Control
- 1.18 Explain the Forms of ownership
 - i) Proprietorship ii) Partnership iii) Joint stock iv) Co-operative Society v) Govt. Sector

- 2.1 Define Personal Management.
- 2.2 Explain the functions of Personal Management
- 2.3 Define Staffing.
- 2.4 State the importance of HR Planning.
- 2.5 Explain the various Recruitment Procedures.
- 2.6 Explain the need for Training & Development.
- 2.7 State the various types of training procedures (Induction, Skill Enhancement etc)
- 2.8 State the different types of Leaderships.

- 2.9 Explain the Maslow's Theory of Motivation.
- 2.10 Explain the Causes of accident and the Safety precautions to be followed.
- 2.11 Explain the importance of various Acts – Indian Factory Act, ESI Act, Workmen Compensation Act, Industrial Dispute Act etc.

- 3.1 State the Objectives of Financial Management.
- 3.2 State the Functions of Financial Management.
- 3.3. State the necessity of Capital Generation & Management.
- 3.4 List the types of Capitals.
- 3.5 List the Sources of raising Capital.
- 3.6 Explain the Types of Budgets
 - i) Production Budget (including Variance Report) ii) Labour Budget.
- 3.7 Explain Profit & Loss Account (only concepts) .
- 3.8 Explain the proforma of Balance Sheet.
- 3.9 Explain GST and Income Tax.

- 4.1. Define Inventory Management (No Numerical).
- 4.2 State the objectives of Inventory Management.
- 4.3 Explain ABC Analysis.
- 4.4 State Economic Order Quantity.
- 4.5 Explain the Graphical Representation of Economic Order Quantity.
- 4.6 State the objectives of Purchasing.
- 4.7 State the functions of Purchase Department.
- 4.8 Explain the steps involved in Purchasing.
- 4.9 State the Modern Techniques of Material Management.

- 5.1 State the meaning of Project Management.
- 5.2 Explain the CPM & PERT Techniques of Project Management.
- 5.3 Distinguish between CPM & PERT techniques.
- 5.4 Identify the critical path and find the project duration using CPM & PERT techniques (solve problems on CPM and PERT).
- 5.5 Explain the concept of Break Even Analysis.
- 5.6 Define Quality.
- 5.7 State the concept of Quality.
- 5.8 Explain the various Quality Management systems.
- 5.9 Explain the importance of Quality policy, Quality control, Quality Circle.
- 5.10 State the principles of Quality Assurance.
- 5.10 State the concepts of TQM, Kaizen 5's and 6 sigma.

- 5.12 State the constituents of ISO 9000 series standards.
- 5.13 Merits and draw backs of ISO 9000 series standards.

- 6.1 Explain the concept of entrepreneurship.
- 6.2 Mention the qualities of entrepreneur.
- 6.3 Distinguish between manager-entrepreneur and technical entrepreneur.
- 6.4 Mention the advantages of being an entrepreneur.
- 6.5 List the functions of entrepreneur.
- 6.6 Mention the important types of entrepreneur and their meaning.
- 6.7 Explain the role of entrepreneurship in economic development.
- 6.8 Mention the barriers to entrepreneurship.
- 6.9 Mention different types of Industries.
- 6.10 Define Small scale industry.
- 6.11 List the features of SSI.
- 6.12 Mention the objectives of developing SSIs.
- 6.13 Explain the scope of SSI in terms of various activities.
- 6.14 List the merits of SSIs.
- 6.15 Explain the important steps involved in starting an SSI.
- 6.16 Define a startup company.
- 6.17 Explain various start up development phases
- 6.18 Name the state level and National level sources of information
- 6.19 Mention the various Central government institutions and their functions
(Like NSIC, SIDO, SISI_SSIB)
- 6.20 Explain Telangana state industry policy.
- 6.21 Mention the demographic merits of Telangana state to set up SSIs.
- 6.22 Mention the names of State level institutions and their functions (like SSIDC, DIC, APITCO)
- 6.23 List the banks that support SSIs like SIDBI, APSFC.
- 6.24 List the thrust areas and Core sectors as per Telangana state industry policy.
- 6.25 Classify the projects as per TSIP.
- 6.26 Mention Special assistance schemes for women and SC/ST entrepreneurs.
- 6.27 Mention the features of TS-iPASS.

Suggested Student Activities

1. Student visits Library to refer to Management courses.
2. Student observes the solo and partnership business establishments nearby and prepare a report about the activities.
3. Identify any one product, being manufactured in local industry; study the process they are following for Manufacturing the product, submit handwritten report.
4. Visit a nearby industry, make a report on Plant layout, type of production, quality system is put in Practice and quality tools they are using in work place.
5. Motivate student to take case study on plant maintenance of nearby industry, observe type of Maintenance they undertake in their industry.
6. Each student should prepare a detailed project report on selected product.
7. Visit a local industry and list the safety precautions carried out there.
8. Meet a local Entrepreneur and prepare a report on his success story.
9. Quiz.
10. Group discussion.
11. Surprise test.

Execution Mode:

1. Maximum of 5 students in each batch should do any one of the following type activity or similar activity related to the course and before take up, get it approved from concerned Teacher.
2. Each batch should conduct different activity and no repeating should occur.
3. Submit a brief report on the activity done on 4-6 pages, A4 size hand written paper. Papers should be simple stapled or tagged. Avoid plastic based files for submitting of reports.
4. Activities can be carried off-class.
5. Assessment shall be made based on quality of activity/presentation/demonstration and report.

CO-PO Mapping Matrix

	Basic knowledge	Discipline Knowledge	Experiments and practice	Engineering Tools	Engineer and society	Environment & sustainability	Ethics	Individual and Team work	Communication	Lifelong learning	Linked PO
CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	
CO1	2	2								3	1,2
CO2	2	2			2	3	3			2	1,2,5,6,7
CO3	2	2							3	3	1,2,9
CO4	2	2			2		3			2	1,2,5,7
CO5	2	3			2					2	1,2,5,10

CO6	2	2	2				3			3	1,2,3,7,10
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Internal Evaluation

Test	Units	Marks
Mid Sem 1	1 and 2	20
Mid Sem 2	3 and 4	20
Slip Test 1	1 and 2	5
Slip Test 2	3 and 4	5
Assignments	-	5
Seminars	-	5
	Total	60

QUESTION PAPER PATTERN FOR MID SEMESTER EXAMS

Sl.No	Description	Level	No of Questions	Marks for each question	Choice	Total Marks
01	Part-A	Remembering(R)	4	1	Nil	4 Marks
02	Part-B	Understanding(U)	4	3	2	6 Marks
03	Part-C	Application(A)	4	5	2	10 Marks
Total Marks						20 Marks

MID SEM-I EXAM

S.No	Unit No	R	U	A
1	Unit-I	1,2	5(a)	7(a)
			5(b)	7(b)
2	Unit-II	3,4	6(a)	8(a)
			6(b)	8(b)
Total Questions		4	4	4

MID SEM-II EXAM

S.No	Unit No	R	U	A
1	Unit-III	1,2	5(a)	7(a)
			5(b)	7(b)
2	Unit-IV	3,4	6(a)	8(a)
			6(b)	8(b)
Total Questions		4	4	4

The length of answer for each question framed in respect of Part-A, B&C shall not exceed $\frac{1}{4}$ of a page side, 1 page side and 2page sides respectively

QUESTION PAPER PATTERN FOR SEMESTER END EXAM

Sl.No	Description	Level	No of Questions	Marks for each question	Choice	Total Marks
01	Part-A	Remembering(R)	8	1	Nil	8 Marks
02	Part-B	Understanding(U)	8	3	4	12 Marks
03	Part-C	Application(A)	8	5	4	20 Marks
Total Marks						40 Marks

Unit No	Questions to be set for SEE				
	R			U	A
I	Q4	Q1		Q9(a)	Q13(a)
II					
III		Q2		Q10(a)	Q14(a)
IV					
V		Q3	Q5,Q6	Q9(b), Q11(a), Q11(b)	Q13(b), Q15(a), Q15(b)
VI			Q7,Q8	Q10(b), Q12(a), Q12(b)	Q14(b), Q16(a), Q16(b)
Total Questions	8			8	8

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DIPLOMA IN ELECTRONICS & INSTRUMENTATION ENGG.
SUB CODE: 18EI-501F
INDUSTRIAL MANAGEMENT & ENTREPRENEURSHIP

MID SEM -I EXAM MODEL PAPER

TIME: 1 HR

TOTAL MARKS: 20

Important Note: Wherever any question has choice, marks will be allotted only to first attempted question. **No marks will be allotted for extra questions answered**

PART – A

Marks: 4Q X 1= 04

Instructions: (1) Answer all questions
(2) Each question carries **one** marks.

1. Define business.
2. Define organization.
3. What are the different types of Leaderships?
4. Define personnel management.

PART - B

Marks: 2Q x 3 = 06

Instructions: (1) Answer all questions
(2) Each question carries **three** marks.

5. (a) State the need for Globalization.

OR

5. (b) Briefly explain Proprietor form of business ownership.
6. (a) Briefly explain the need for Training & Development.

OR

6. (b) What are the Causes of accident in an industry.

PART - C

Marks: 2Q x 5= 10

Instructions: (1) Answer all questions
(2) Each question carries **five** marks.

7. (a) State the principles of Scientific management by F.W.Taylor.

OR

7. (b) Explain the line and staff type of organisation.
8. (a) Explain the Maslow's Theory of Motivation.

OR

7. (b) Explain various features of Indian Factory Act.

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MID SEM -II EXAM MODEL PAPER

TIME: 1 HR

TOTAL MARKS: 20

Important Note: Wherever any question has choice, marks will be allotted only to first attempted question. **No marks will be allotted for extra questions answered**

PART – A

Marks: 4Q X 1= 04

Instructions: (1) Answer all questions
(2) Each question carries **One** marks.

1. List the types of Capitals.
2. Mention any two objectives of financial management.
3. Define inventory management.
4. List any two objectives of purchasing.

PART - B

Marks: 2Q x 3 = 06

Instructions: (1) Answer all questions
(2) Each question carries **three** marks.

5. (a) What is the necessity of Capital Generation?

OR

5. (b) Briefly explain Profit & Loss Account.

6. (a) State the Modern Techniques of Material Management.

OR

6. (b) What are the steps involved in Purchasing?

PART - C

Marks: 2Q x 5= 10

Instructions: (1) Answer all questions
(2) Each question carries **five** marks.

7. (a) Explain about production budget.

OR

7. (b) Explain the proforma of balance sheet.

8. (a) Explain ABC analysis.

OR

8. (b) Explain the Graphical Representation of Economic Order Quantity.

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SEMESTER END EXAM MODEL PAPER

TIME: 2 HOURS

TOTAL MARKS: 40

PART – A

Marks: 8Q X 1= 8

- Instructions:** (1) Answer all questions
(2) Each question carries **one** mark.
1. Define Staffing.
 2. List the types of Capitals.
 3. State the concept of Quality.
 4. List the functions of entrepreneur.
 5. What is meant by Project Management?
 6. What is meant by Quality Assurance?
 7. Define Small scale industry.
 8. Define a startup company.

PART - B

Marks: 4Qx3=12

- Instructions:** (1) Answer any Four Questions
(2) Each question carries **three** marks.

9. (a) Write salient features of partnership type of business ownership.

OR

9. (b) Explain briefly the importance of Quality policy.

10. (a) What is meant by GST?

OR

10. (b). Mention the barriers to entrepreneurship.

11. (a) What are the concepts of TQM?

OR

11. (b) Explain the importance of Quality control.

12. (a) Explain briefly the role of entrepreneurship in economic development.

OR

12. (b) Mention the features of TS-iPASS.

PART - C

Marks: 4Qx5=20

Instructions:

- (1) Answer any Four Questions
(2) Each question carries **five** marks

13. (a) Explain the principles of Management by Henry Fayol.

OR

13. (b) Explain the concept of Break Even Analysis.

14. (a) Explain the labour budget.

OR

14. (b) Explain the important steps involved in starting an SSI .

15. (a) Draw a network diagram and find out project duration for the following activities.

Activity	1-2	1-3	1-4	2-6	3-5	4-5	5-6	6-7
Duration in days	4	2	3	5	1	2	2	7

OR

15. (b) Explain the importance of quality circle.

16. (a) Explain briefly Telangana state industry policy.

OR

16. (b) What are the special assistance schemes provided for women entrepreneurs.

INSTRUMENTATION IN PROCESS INDUSTRIES

Course Title :	INSTRUMENTATION IN PROCESS INDUSTRIES	Course Code	18EI-502C
Semester	V	Course Group	CORE
Teaching Scheme in periods(L:T:P)	45:15:0	Credits	3
Methodology	Lecture + Assignments	Total Periods	60
CIE	60 Marks	SEE	40 Marks

Prerequisites

This course requires the basic knowledge of process instrumentation and industrial instrumentation.

Course outcomes

Upon completion of the course, the student shall be able to

CO1 :	Determine Analyze and Observe the parameters related to power plant industries.
CO2 :	Acquire knowledge to measure various parameters related to petro chemical industries.
CO3 :	Determine, Analyze and Observe the measure various parameters related to iron and steel plant.
CO4 :	Acquire knowledge to measure various parameters related to paper industry
CO5 :	Determine ,Analyze and Observe the measure various parameters related to cement industry
CO6 :	Determine, Analyze and Observe the measure various parameters related to textile industry.

Unit No	Unit Name	Periods	Questions to be set for SEE			
			R		U	A
1	Power Plant Instrumentation	12	Q4	Q1	Q9A	Q13A
2	Petro Chemical plant Instrumentation	10				
3	Iron and Steel Plant Instrumentation	8		Q2	Q10A	Q14A
4	Pulp and Paper Plant Instrumentation	10				
5	Cement plant Instrumentation	10		Q5, Q6	Q9B, Q11A, Q11B	Q13B, Q15A, Q15B
6	Textile industry Instrumentation.	10		Q7, Q8	Q10B, Q12A, Q12B	Q14B, Q16A, Q16B
	Total	60	8		8	8

Course Contents
UNIT1.Power Plant Instrumentation:
Duration: 12 Periods (L: 10 –T: 2)

Power generation method-Thermal power plant layout-generation process-Boiler process, P&I diagram-Measurement of feed water, level, pressure, temperature of boiler-Turbine unit-condenser.

UNIT2.Petro-chemical Plant instrumentation:
Duration: 10 Periods (L: 8 –T: 2)

Petro chemical etc.-Crude oil-Distillation column-PI diagram. Plant layout-Process-Units in plant-Thermal cracking, Fluid catalytic cracking, polymerization. Measurement of pressure, density, flow of centrifugal pump.

UNIT3.Iron and Steel Plant Instrumentation:
Duration: 8 Periods (L: 6 –T: 2)

Manufacturing process-Units in ISP-Raw materials-Furnace types-Measurement of molten metal level, pressure, density of steel.

UNIT4.Pulp and Paper Plant Instrumentation:
Duration: 10 Periods (L: 8 –T: 2)

Plant layout-Process of making paper-Raw materials-pulp production-Physical properties of paper-Grades of paper-Measurement of weight, specific gravity, density, temperature-Control system units.

UNIT5. Cement Plant Instrumentation:**Duration: 10 Periods (L: 8 –T: 2)**

Plant layout-manufacturing process-types of cements- raw materials-working of crushers-level measurement-lime formation-kiln temperature measurement-working of ESP-clinker kiln process-hardening of cement.

UNIT6.Textile industry instrumentation:**Duration: 10 Periods (L: 8 –T: 2)**

Plant layout-manufacturing process-types of fibers-raw materials used-properties of fibers. Measurement of moisture, fiber length, fineness. Yarn strength testing, fiber quality index.

Reference Books

1. Bela G.Liptak: Instrumentation in Process Industries
2. D.M. Consodine: Hand book of applied Instrumentation
3. Austine G.T. Shreeves: Chemical Process Industries.
4. Gill A.B.Power Plant performance
5. Jervis M.J: Power Station Instrumentation
6. J.E.BOOOTH-Principles of textile testing -3 edition..

Suggested e-learning References

1. www.nptel.ac.in
2. www.egr.msu.edu
3. www.bme.rutgers.edu
4. www.BMES.org
5. www.Biospace.com
6. www.chromacademy.com
7. www.agilent.com

Suggested Learning Outcomes**Chapter 1: Power Plant Instrumentation (PPI)**

- 1.1 Importance of measurements and instrumentation in power plant.
- 1.2 List various power generation methods.
- 1.3 Give the principle of power generation in thermal power plant
- 1.4 Draw the general layout of thermal power plant.
- 1.5 Explain the process of generation of power based on the layout of thermal power Plant.
- 1.6 Give the building blocks of boiler process in thermal power plant.
- 1.7 Draw the PI diagram of boiler process.
- 1.8 Explain a method of measurement of feed water flow.
- 1.9 Explain the measurement of level, pressure and temperature of the boiler

- 1.10 List the safety measures in boiler control.
- 1.11 Give the interlocks for boiler operation.
- 1.12 List the turbine trip conditions.
- 1.13 Explain the working of turbine unit.
- 1.14 Explain the measurement of speed and Vibration of turbine.
- 1.15 Explain the working of condenser.

Chapter 2: Petro Chemical plant Instrumentation.(PCPI)

- 2.1. Draw the general layout of a Petro chemical plant.
- 2.2. Explain the process based on the layout of petro chemical plant.
- 2.3. .List any ten important petrochemicals and give their uses.
- 2.4. .List various units in petro chemical plant.
- 2.5. .Define the following unit operations
 - a) Thermal cracking
 - b) Catalytic cracking
 - c) Polymerization
 - d) Alkalization
 - e) Isomerisation
- 2.6. Explain the process of thermal cracking.
- 2.7. Explain the process of fluid catalytic cracking.
- 2.8 .List the bi products of crude oil.
- 2.9 .Explain the working of distillation column.
- 2.10. Draw the PI diagram of distillation column.
- 2.11. List various physical parameters to be measured in PCP
- 2.12. Explain the measurement of flow and pressure of petro chemical.
- 2.13. Explain the measurement of density of petrochemicals.
- 2.14. Explain the working of centrifugal pump used in PCP.
- 2.15. List safety measures in handling petrochemicals.

Chapter 3: Iron and Steel Plant Instrumentation (ISPI)

- 3.1. Draw general layout of iron and steel plant.
- 3.2. Explain the manufacturing process of iron and steel based on the layout.
- 3.3. Classify types of steel.
- 3.4. List various units in ISP
- 3.5. Explain the preparation of raw materials in ISP
- 3.6 .List different types of furnaces used in ISP

- 3.7. Explain the working of blast furnace with a diagram
- 3.8. Explain the process of making raw steel.
- 3.9. Explain the working of oxygen furnace with a diagram
- 3.10. Explain the working of electric arc furnace with a diagram
- 3.11. Explain the measurement of molten metal level using eddy current transducer.
- 3.12. Explain the measurement of density of steel using radiation methods.
- 3.13. Explain the measurement of temperature of furnace using pyrometer.
- 3.14. Explain the measurement of flow of molten metal.
- 3.15. Explain the measurement of weight and thickness of iron and steel products.

Chapter 4: Pulp and Paper Plant instrumentation (PPPI)

- 4.1. Draw the general layout of pulp and paper plant.
- 4.2. Explain the basic process of making the paper based on the layout.
- 4.3. List the raw materials for making paper.
- 4.4. List various steps in pulp production
- 4.5. Explain pulp bleaching.
- 4.6 .Explain wet end and dry end operations in making paper.
4. 7. List the various grades of paper.
- 4.8. List the physical properties of paper.
- 4.9. Explain the measurement of basis weight and specific gravity.
- 4.10. Explain the measurement of density of paper.
- 4.11. Explain the working of moisture analyzer.
- 4.12. Explain the measurement of paper thickness.
- 4.13 .Explain graphic displays used in PPP
- 4.14. List the types of alarms used in PPP
- 4.15. List various control systems units in PPP

Chapter 5.Cement plant instrumentation (CPI)

- 5.1. Draw the general layout of cement industry.
- 5.2. Explain the manufacturing process of cement based on Layout.
- 5.3. List the types of cement.
- 5.4. Give criteria for selection of site for locating cement plant.
- 5.5. List the various raw materials used in cement manufacturing.
- 5.6. List the types of crushers used in cement industry.
- 5.7. Explain the working of crusher.
- 5.8. Explain the process of Level measurement in cement industry.
- 5.9. Explain point level detection in rock crushers.
- 5.10. Explain how lime is formed from lime stone.
- 5.11. Explain the measurement of temperature in kiln process.

- 5.12. Explain the working principle of ESP.
- 5.13. Explain the Clinker Kilning process.
- 5.14. Explain the hardening of cement.
- 5.15. List safety measures to be taken in cement plant.

Chapter 6: TEXTILE INDUSTRY INSTRUMENTATION.

- 6.1. Draw the general layout of textile industry.
- 6.2. Explain the working of textile industry based on layout.
- 6.3. Classify various textile fibers.
- 6.4. List the raw materials used in textile industry.
- 6.5. Give various units in textile industry.
- 6.7. Explain measurement of humidity by wet and dry bulb hygrometer..
- 6.8. Give the effect of moisture regain on fiber properties.
- 6.9. Define fiber quality index.
- 6.10. Explain measurement of fiber length by digital fibro graph.
- 6.11. Explain measurement of fiber fineness using micronaire.
- 6.12. Explain yarn strength testing.
- 6.13. List the physical properties of fiber.
- 6.14. Give the importance of fiber maturity measurements.
- 6.15. List the objectives of fiber bleaching process.

Suggested Student Activities

1. Student visits Library to refer to Manual /books to search relevant material related to industries.
2. Students should collect all process industries data, district wise in telangana and other states
3. Prepare table with names of industries, required raw materials and available raw materials in that area
4. Visit nearby Industry to familiarize with manufacturing process.
5. Familiarize with power plant industry by visiting and understand different processes with machinery.
6. Familiarize with petrochemical industry by visiting and understand different processes with machinery
7. Familiarize with Iron and Steel industry by visiting and understand different processes with machinery
9. Familiarize with Pulp and Paper industry by visiting and understand different processes with machinery
10. Familiarize with Cement industry by visiting and understand different processes with machinery
11. Familiarize with Textile industry by visiting and understand different processes with machinery
12. Quiz/debates/seminars on industries near to your native place & native district by each student.

C0-PO Mapping Matrix

	Basic knowledge	Discipline Knowledge	Experiments and practice	Engineering Tools	Engineer and society	Environment & sustainability	Ethics	Individual and Team work	Communication	Lifelong learning	Linked PO
CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	
CO1	2	2				2	2	2		2	1,2,6,7,8,10
CO2	2	2				2	2	2		2	1,2,6,7,8,10
CO3	2	2				2	2	2		2	1,2,6,7,8,10
CO4	2	2		2	2				2		1,2,4,5,9
CO5	2	2		2	2				2		1,2,4,5,9
CO6	2	2		2	2			2	2	2	1,2,4,5,8,9,10

Internal Evaluation

Test	Units	Marks	Pattern
Mid Sem 1	1 and 2	20	Part A 4 Short answer questions Part B 2 Questions out of 4 Questions Part C 2 Essay questions out of 4 Questions
Mid Sem 2	3 and 4	20	Part A 4 Short answer questions Part B 2 Questions out of 4 Questions Part C 2 Essay questions out of 4 Questions
Slip Test 1	1 and 2	5	2 Essay Questions out of 3 Questions
Slip Test 2	3 and 4	5	2 Essay Questions out of 3 Questions
Assignment	1	5	Different group assignments of Higher order Questions that develop problem solving skills and critical thinking should be given

Seminars	1	5	
	Total	60	

QUESTION PAPER PATTERN FOR MID SEMESTER EXAMS

Sl.No	Description	Level	No of Questions	Marks for each question	Choice	Total Marks
01	Part-A	Remembering(R)	4	1	Nil	4 Marks
02	Part-B	Understanding(U)	4	3	2	6 Marks
03	Part-C	Application(A)	4	5	2	10 Marks
Total Marks						20 Marks

MID SEM-I EXAM

S.No	Unit No	R	U	A	Remarks
1	Unit-I	1,2	5(a)	7(a)	
			5(b)	7(b)	
2	Unit-II	3,4	6(a)	8(a)	
			6(b)	8(b)	
Total Questions		4	4	4	

MID SEM-II EXAM

S.No	Unit No	R	U	A	Remarks
1	Unit-III	1,2	5(a)	7(a)	
			5(b)	7(b)	
2	Unit-IV	3,4	6(a)	8(a)	
			6(b)	8(b)	
Total Questions		4	4	4	

The length of answer for each question framed in respect of Part-A, B&C shall not exceed $\frac{1}{4}$ of a page, 1 page and 2 pages respectively

QUESTION PAPER PATTERN FOR SEMESTER END EXAM

Sl.No	Description	Level	No of Questions	Marks for each question	Choice	Total Marks
01	Part-A	Remembering(R)	8	1	Nil	8 Marks

02	Part-B	Understanding(U)	8	3	4	12 Marks
03	Part-C	Application(A)	8	5	4	20 Marks
Total Marks						40 Marks

Unit No	Questions to be set for SEE				
	R		U		A
I	Q4	Q1		Q9(a)	Q9(a)
II					
III		Q2		Q10(a)	Q10(a)
IV					
V		Q3	Q5,Q6	Q9(b), Q11(a), Q11(b)	Q9(b), Q11(a), Q11(b)
VI			Q7,Q8	Q10(b), Q12(a), Q12(b)	Q10(b), Q12(a), Q12(b)
Total Questions	8		8		8

MODEL QUESTION PAPER
BOARD DIPLOMA MID-SEMESTER-I EXAMINATION (C-18)
DEIE- V SEMESTER EXAMINATION
INSTRUMENTATION IN PROCESS INDUSTRIES (18EI-502C)

Time: 1hr.

Max Marks: 20

PART –A

MARKS: 4X1 =4

Instructions: Answer all the questions. Each question carries ONE mark.

1. List the various power generation methods
2. List the turbine trip conditions
3. List the bi products of crude oil
4. List various physical parameters to be measured in petro chemical plant

PART –B

2X3=6

Instructions: Answer TWO questions. Each question carries THREE marks.

5. (a) Draw the PI diagram of boiler process

(OR)

5. (b) List the safety measures in boiler control

6. (a) Explain the measurement of density of petro chemicals

(OR)

6. (b) List the various units in petrochemical plant

PART –C

2X5=10

Instructions: Answer TWO questions. Each question carries FIVE marks.

7. (a) Explain the process of generation of power based on thermal power plant.

(OR)

7. (b) Explain the working of condenser

8. (a) Explain the process of fluid catalytic cracking

(OR)

8. (b) Explain the working of centrifugal pump used in petro chemical plant.

MODEL QUESTION PAPER
BOARD DIPLOMA MID-SEMESTER-II EXAMINATION (C-18)
DEIE- V SEMESTER EXAMINATION
INSTRUMENTATION IN PROCESS INDUSTRIES (18EI-502C)

Time: 1Hr

Max Marks: 20

PART –A

MARKS: 4X1 =4

Instructions: Answer all the questions. Each question carries ONE mark.

1. List the raw materials used in iron and steel plant
2. List the types of furnaces used in iron and steel plant
3. List the raw materials for making paper
4. List any four grades of paper

PART –B

2X3=6

Instructions: Answer TWO questions. Each question carries THREE marks.

5. (a) List the various units in iron and steel plant.
(OR)
5. (b) classify the types of steel
6. (a). List various steps in pulp production
(OR)
6. (b). List the physical properties of paper

PART –C

2X5=10

Instructions: Answer TWO questions. Each question carries FIVE marks.

7. (a) Explain the working of Electric arc furnace with diagram
(OR)
7. (b). Explain the process of making steel based on the layout of iron and steel plant
8. (a). Explain wet end and dry end operations in making paper
(OR)
8. (b) Explain the working of moisture analyser.

MODEL QUESTION PAPER
BOARD DIPLOMA SEMESTER END EXAMINATION (C-18)
DEIE- V SEMESTER EXAMINATION
INSTRUMENTATION IN PROCESS INDUSTRIES (18EI502C)

Time: 2Hrs

Max Marks: 40

PART –A

MARKS: 8X1 =8

Instructions: Answer all the questions. Each question carries ONE mark.

1. List the bi products of crude oil
2. List the types of furnaces used in iron and steel plant
3. List the types of cement
4. List any four grades of paper
5. List the types of crushers used in cement industries
6. List the raw materials used in cement manufacturing
7. List the raw materials used in textile industry
8. Define fibre quality index.

PART –B

Marks: 4X3=12

Instructions: Answer FOUR questions. Each question carries THREE marks.

9(a) Draw the PI diagram of boiler process

(OR)

9(b) Mention the criteria for selection of site for locating cement plant

10(a) List various steps in pulp production

(OR)

10(b) Give the effect of moisture regain on fibre properties

11(a) List the safety measures to be taken in cement plant

(OR)

11(b) Explain how lime is formed from lime stone

12(a) List the various units in textile industry

(OR)

12(b) List the objectives of fibre bleaching process

Instructions: Answer *FOUR* questions. Each question carries *FIVE* marks.

13(a) Explain the process of generation of power based on thermal power plant

(OR)

13(b) Explain the manufacturing process of cement based on the layout

14(a) Explain the process of making steel based on the layout of iron and steel plant

(OR)

14(b) Explain the working of textile industry with help of layout

15(a) Explain the measurement of temperature in kiln process

(OR)

15(b) Explain the point level detection in rock crusher

16(a) Describe the measurement of humidity by dry bulb hygrometer

(OR)

16(b) Explain the measurement of fibre fineness using micronaire

INDUSTRIAL AUTOMATION

Course Title :	INDUSTRIAL AUTOMATION	Course Code	18EI-503C
Semester	V	Course Group	Core
Teaching Scheme in periods(L:T:P)	45:15:0	Credits	3
Methodology	Lecture + Assignments	Total Periods	60
CIE	60 Marks	SEE	40 Marks

Pre requisites

Student requires the basic knowledge of computer architecture and basic programming concepts.

Course Outcomes

Upon completion of the course, the student shall be able to

CO1 :	Be familiar with the architecture, hardware and applications of PLC
CO2 :	Understand the working of different instructions for programming the PLC
CO3 :	Understand the various PLC programs
CO4 :	Understand the various Computer Controlled Systems architecture and system elements
CO5 :	Understand the major elements and application areas of SCADA
CO6 :	Understand the architecture, systems elements and applications of Robotics and CNC machine

Course Content and Blue Print of Marks for SEE

Unit No	Unit Name	Periods	Questions to be set for SEE			
			R		U	A
1	Introduction to PLC	6	Q 4	Q1	Q9A	Q13A
2	Basics of PLC programming	10				
3	Advanced PLC programming	12		Q2	Q10A	Q14A
4	Computer Controlled Systems	8				
5	Basics of SCADA & HMI in Automation	12		Q 3	Q5, Q6	Q9B, Q11A, Q11B
6	Robotics and CNC machine	12		Q7,	Q10B, Q1	Q14B

					Q8	2A, Q12B	, Q16A , Q16B
	Total	60	8			8	8

Course Contents

UNIT 1 - Introduction to PLC

Duration: 06 Periods (L: 5 –T: 1)

Definition of Automation-need for the industrial automation-relay based and PLC based control panel- PLC definition -block diagram-explanation - PLC components - I/O - PLC operation cycle - Advantages and Disadvantages of PLC - PLC applications. –Different types of PLC manufacturers – interfacing of PLC and PC

UNIT 2 - Basics of PLC programming

Duration: 10 Periods (L: 8 –T: 2)

Types of PLC programming methods – describe the methods - ladder diagram, Functional Block Diagram, Sequential Function Chart, Structured Text, Instruction List - rules for programming - PLC basic Instruction set:- Bit or Relay instruction, OSR Instruction, Output latching instructions, - Ladder diagram for basic logic gates--universal logic gates-XOR and XNOR - Modes of PLC operation - Program mode - Run mode - Remote mode- Interfacing start/stop push button switch and motor to PLC

UNIT 3 - Advanced PLC programming

Duration: 12 Periods (L: 8 –T: 4)

Special programming Instructions - Timer and Counter Instructions - On delay and off delay and retentive timer instructions - PLC counters up and down instructions - Program Control and Data manipulation Instructions - Data handling instructions - Sequencer instructions - Programming sequence output instructions - Ladder programs-based on counters-DOL starter- Star-Delta Starter- Stair case lighting - Traffic light control - sequential control of induction motor-level control-conveyor belt

Unit-4 - Computer Controlled Systems

Duration: 08 Periods (L: 6 –T: 2)

Introduction –Role of computers in process control-Data logger – definition - explanation – application –Data Acquisition system (DAS)– definition - explanation –application – Distributed control systems (DCS) – definition - explanation – applications

Unit-5 - Basics of SCADA& HMI in Automation Duration: 12 Periods (L: 10 –T:2)

Definition of SCADA, need of SCADA-architecture of SCADA- Major elements of SCADA - communication infrastructure of SCADA- Advantages and Disadvantages of SCADA- graphical symbols used in SCADA – tags creation in SCADA-Interfacing of SCADA with PLC- Application areas of SCADA - Comparison of SCADA, DCS, PLC and Smart Instrumentation - Basics of HMI- Applications of HMI - Comparison of HMI with SCADA.

UNIT 6: Robotics and CNC machine Duration: 12 Periods (L: 10 –T: 2)

Definition of robotics - Asimov's principles -types of robot—structure of a robot -operation of simple robot-Block diagram of robot - advantages and disadvantages of robot-application of robot- Introduction to Intelligent Robots-definition of CNC machine-Block diagram-advantages - working -applications of CNC machine

Reference Books

1. PLC principles and applications by John webb & Ronald Reis
2. PLC principles and applications by NIIT, PHI
3. Introduction to Programmable Logic Controllers by Garry Dunning, Thomson, 2nd edition, Thomson, ISBN: 981-240-625-5
4. Practical SCADA for Industry, David Bailey and Edwin Wright, Newness An imprint of Elsevier, 2003, ISBN 07506 58053
5. Programmable Logic Controllers, JR Hackworth, Frederick , Pearson Education
6. Programmable Logic Controllers, W Bolton, Elsevier
7. Learning Programmable Logic Controllers with Applications, PK Srivstava, BPB Publications.

Suggested e-Learning References

1. www.plcs.net
2. www.PLC circuits-tutorials.ws

Suggested Learning Outcomes

1.0 Be familiar with the architecture, hardware and applications of PLC

- 1.1 Define automation
- 1.2 State the need for Industrial Automation
- 1.3 Give the concept of Relay based Control panel.

- 1.4 List the components of Relay based Control panel
- 1.5 Define Programmable Logic Controller(PLC)
- 1.6 List the components of PLC based Control panel
- 1.7 Compare Relay based and PLC based Control panel
- 1.8 Explain the block diagram of PLC
- 1.9 Explain the operation cycle of a PLC
- 1.10 List the different types of PLCs
- 1.11 List different types PLC manufacturers
- 1.12 Explain the interfacing of PLC with PC

2.0 Understand the working of different instructions for programming the PLC

- 2.1 List the Types of PLC programming methods.
- 2.2 Describe the ladder diagram method
- 2.3 Describe the Function Block Diagram method
- 2.4 Describe the Sequential Function Chart method
- 2.5 Describe the Structured Text method
- 2.6 Describe the Instruction List method
- 2.7 Mention the Rules to follow in drawing the Ladder diagram
- 2.8 Explain Bit or Relay instruction OSR Instruction, Output latching instructions
- 2.9 List the PLC instruction set
- 2.10 Draw the Ladder diagram for basic logic gates, universal logic gates-XOR and XNOR
- 2.11 States the Modes of PLC operation , Program mode , Run mode , Remote mode
- 2.12 Explain the Interfacing of start/stop push button switch and motor to PLC

3.0 Understand the various PLC programs

- 3.1 State the Special programming Instructions
- 3.2 Explain Timer Instructions - On delay and off delay and retentive timer instructions
- 3.3 Explain and Counter Instructions - counters up and down instructions
- 3.4 Draw the ladder diagram using On delay and off delay and retentive timer instructions
- 3.5 Draw the ladder diagram using CTU and CTD instruction
- 3.6 Describe Program Control and Data manipulation Instructions
- 3.7 Describe Data handling instructions
- 3.8 Describe Sequencer instructions
- 3.9 Describe Programming sequence output instructions
- 3.10 Draw the ladder diagram for DOL starter
- 3.11 Draw the ladder diagram for Star-Delta starter
- 3.12 Draw the ladder diagram for stair case lighting
- 3.13 Draw the ladder diagram for traffic light control
- 3.14 Draw the ladder diagram for sequential control of induction motor
- 3.15 Draw the ladder diagram for level control
- 3.16 Draw the ladder diagram for conveyor belt

4.0 Knowing the major elements Understand the various Computer Controlled Systems architecture and system elements

- 4.1 Explain the role of computers in process control
- 4.2 Define Data logger
- 4.3 Explain the block diagram of Data logger
- 4.4 List the application of Data logger
- 4.5 Define Data Acquisition System
- 4.6 Explain the block diagram of Data Acquisition System
- 4.7 List the applications of Data Acquisition System

- 4.8 Define Distributed Digital Control system
- 4.9 Explain the block diagram of Distributed Digital Control system
- 4.10 List the applications of Distributed Digital Control system

5.0 Understand the major elements and application areas in SCADA

- 5.1 Define SCADA
- 5.2 State the need of SCADA in industry
- 5.3 Draw the hardware architecture of SCADA
- 5.4 Explain the hardware architecture of SCADA
- 5.5 Explain the software architecture of SCADA
- 5.6 List the three components of a SCADA
- 5.7 Explain Remote Terminal Unit(RTU) of SCADA
- 5.8 Explain Master Station of SCADA
- 5.9 Explain communication infrastructure of SCADA
- 5.10 Explain the Creation of graphical symbols using Graphic Display Builder
- 5.11 Explain the creation of tags using SCADA
- 5.12 State the need of SCADA with PLC
- 5.13 Explain the interfacing of SCADA with PLC
- 5.14 List the applications of SCADA
- 5.15 Compare of SCADA, DCS, PLC and Smart Instrumentation
- 5.16 Define HMI
- 5.17 Applications of HMI
- 5.18 Compare of HMI with SCADA.

6.0 Understand the architecture, systems elements and applications of Robotics and CNC machine

- 6.1 Define a Robot
- 6.2 State the Asimov's principles in robotics
- 6.3 State the types of robot
- 6.4 Explain the operation of simple robot with block diagram
- 6.5 List the advantages and disadvantages of robot
- 6.6 List the applications of a Robot
- 6.7 Explain material handling applications of robot
- 6.8 Explain machine loading and unloading applications of robot
- 6.9 Explain arc welding and spot welding applications of robot
- 6.10 Explain assembly operation applications of robot
- 6.11 Define the Intelligent Robots
- 6.12 State the importance of Robots in manufacturing automation
- 6.13 Define CNC machine
- 6.14 State the advantages of CNC machine
- 6.15 Explain the working of CNC Machine
- 6.16 List the applications of CNC Machine

Suggested Student Activities

- 1. Use free simulator PLC , available PLC and construct any one of the Industrial applications
- 2. Interface PLC with automatic water level / Temperature control / conveyor belt control / Elevator system (any one)
- 3. Compare makes of different PLCs and submit a handwritten report
- 4. Visit on your own a nearby industry and submit a handwritten report on PLC/SCADA
- 5. Power point presentation or YouTube lecture on PLC, HMI, DCS, SCADA

C0-PO Mapping Matrix

	Basic knowledge	Discipline Knowledge	Experiments and practice	Engineering Tools	Engineer and society	Environment & sustainability	Ethics	Individual and Team work	Communication	Lifelong learning	Linked PO
CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	
CO1	2	2	2								1,2,3
CO2	2	2			2	2					1,2,5,6
CO3	2	2		2	2						1,2,4,5
CO4	2	2			2						1,2,5
CO5	2	2		2	2						1,2,4,5
CO6	2	2	2								1,2,3

Internal Evaluation

Test	Units	Marks	Pattern
Mid Sem 1	1 and 2	20	Part A 4 Short answer questions Part B 2 Questions out of 4 Questions Part C 2 Essay questions out of 4 Questions
Mid Sem 2	3 and 4	20	Part A 4 Short answer questions Part B 2 Questions out of 4 Questions Part C 2 Essay questions out of 4 Questions
Slip Test 1	1 and 2	5	2 Essay Questions out of 3 Questions
Slip Test 2	3 and 4	5	2 Essay Questions out of 3 Questions
Assignment	1	5	Different group assignments of Higher order Questions that develop problem solving skills and critical thinking should be given
Seminars	1	5	
	Total	60	

QUESTION PAPER PATTERN FOR MID SEMESTER EXAMS

Sl.No	Description	Level	No of Questions	Marks for each question	Choice	Total Marks
01	Part-A	Remembering(R)	4	1	Nil	4 Marks
02	Part-B	Understanding(U)	4	3	2	6 Marks
03	Part-C	Application(A)	4	5	2	10 Marks
Total Marks						20 Marks

MID SEM-I EXAM

S.No	Unit No	R	U	A	Remarks
1	Unit-I	1,2	5(a)	7(a)	
			5(b)	7(b)	
2	Unit-II	3,4	6(a)	8(a)	
			6(b)	8(b)	
Total Questions		4	4	4	

MID SEM-II EXAM

S.No	Unit No	R	U	A	Remarks
1	Unit-III	1,2	5(a)	7(a)	
			5(b)	7(b)	
2	Unit-IV	3,4	6(a)	8(a)	
			6(b)	8(b)	
Total Questions		4	4	4	

The length of answer for each question framed in respect of Part-A, B&C shall not exceed ¼ of a page, 1 page and 2 pages respectively

QUESTION PAPER PATTERN FOR SEMESTER END EXAM

Sl.No	Description	Level	No of Questions	Marks for each question	Choice	Total Marks
01	Part-A	Remembering(R)	8	1	Nil	8 Marks
02	Part-B	Understanding(U)	8	3	4	12 Marks
03	Part-C	Application(A)	8	5	4	20 Marks
Total Marks						40 Marks

Unit No	Questions to be set for SEE				
	R		U	A	
I	Q4	Q1		Q9(a)	Q9(a)
II					
III		Q2		Q10(a)	Q10(a)
IV					
V		Q3	Q5,Q6	Q9(b), Q11(a), Q11(b)	Q9(b), Q11(a), Q11(b)
VI					
Total Questions	8		8	8	

MODEL QUESTION PAPER

BOARD DIPLOMA MID-SEMESTER-I EXAMINATION (C-18)

DEIE- V SEMESTER EXAMINATION

INDUSTRIAL AUTOMATION 18EI-503C

Time: 1hr.

Max Marks: 20

PART –A

MARKS: 4X1 =4

Instructions: Answer all the questions. Each question carries ONE mark.

5. State the need for industrial automation
6. Define PLC
7. List the types of PLC programming methods.
8. State the PLC operation Modes.

PART –B

2X3=6

Instructions: Answer TWO questions. Each question carries THREE marks.

5. (a) Compare Relay based and PLC based control Panel
(OR)
5. (b) Explain the operation cycle of a PLC
6. (a) Explain about Bit instructions.
(OR)
- 6.(b) List the PLC instruction set.

PART –C

2X5=10

Instructions: Answer TWO questions. Each question carries FIVE marks.

7. (a) Explain the block diagram of PLC.
(OR)
7. (b) Explain the interfacing of PLC with PC
8. (a) Describe the ladder diagram programming of PLC
(OR)
- 8(b) Explain the interfacing of start stop button switch to a PLC

MODEL QUESTION PAPER
BOARD DIPLOMA MID-SEMESTER-II EXAMINATION (C-18)
DEIE- V SEMESTER EXAMINATION
INDUSTRIAL AUTOMATION 18EI-503C

Time: 1Hrs

Max Marks: 20

PART –A

MARKS: 4X1 =4

Instructions: Answer all the questions. Each question carries ONE mark.

1. Draw the ladder diagram for DOL Starter.
2. List the timer instructions.
3. List the applications of Data acquisition systems
4. Define Distributed Digital Control system.

PART –B

2X3=6

Instructions: Answer TWO questions. Each question carries THREE marks.

5. (a) Draw the ladder diagram for level control.
(OR)
5. (b) Describe Sequential instructions
6. (a) Draw the block diagram of data logger.
(OR)
6. (b) List the applications of distributed digital control systems

PART –C

2X5=10

Instructions: Answer TWO questions. Each question carries FIVE marks.

7. (a) Draw the ladder diagram for conveyor belt.
(OR)
7. (b). Draw the ladder diagram for Traffic light control
8. (a). Explain the block diagram of Data Acquisition system
(OR)
9. (b) Explain the block diagram of Distributed digital control system.

MODEL QUESTION PAPER

BOARD DIPLOMA SEMESTER END EXAMINATION (C-18)

DEIE- V SEMESTER EXAMINATION

INDUSTRIAL AUTOMATION 18EI-503C

Time: 2Hrs

Max Marks: 40

PART –A

MARKS: 8X1 =8

Instructions: Answer all the questions. Each question carries ONE mark.

1. Define PLC
2. List the Timer instructions
3. Define SCADA
4. State the PLC operation modes
5. Define HMI
6. List the applications of SCADA
7. Define a Robot
8. Define CNC Machine

PART –B

Marks: 4X3=12

Instructions: Answer FOUR questions. Each question carries THREE marks.

9(a) Compare Relay based and PLC based control panel

(OR)

9(b) State the need for interfacing SCADA with PLC

10(a) Draw the Ladder diagram for level control

(OR)

10(b) State the types of Robot

11(a) Draw the Hardware architecture of SCADA

(OR)

11(b) Compare HMI with SCADA

12(a) List the advantages and Disadvantages of Robot

(OR)

12(b) List the applications of CNC Machine

PART –C

4X5=20

Instructions: Answer FOUR questions. Each question carries FIVE marks.

13(a) Describe the block diagram of PLC

(OR)

13(b) Explain the software architecture of SCADA

14(a) Explain the block diagram of Data Acquisition System

(OR)

14(b) Explain the operation of simple robot with block diagram

15(a) Explain the Master station of SCADA

(OR)

15(b) Explain the creation of Tags using SCADA

16(a) State the Asimov's principles of Robotics

(OR)

16(b) Explain the working of CNC Machine

ELECTRONIC MEASURING INSTRUMENTS

Course Title :	ELECTRONIC MEASURING INSTRUMENTS	Course Code	18EI-504E(A)
Semester	V	Course Group	ELECTIVE
Teaching Scheme in Periods(L:T:P)	45:15:0	Credits	3
Methodology	Lecture + Assignments	Total Contact Periods :	60
CIE	60 Marks	SEE	40 Marks

Common with 18EC-504E(A)

Pre requisites

This course requires the basic knowledge of Analog and digital circuits

Course Outcomes

Upon completion of the course, the student should be able to

Course Outcome	
CO1	Use Analog instruments for measuring Basic Electrical Quantities
CO2	Use ac and dc bridges for determining unknown parameters
CO3	Use digital instruments for measuring the given electrical quantities
CO4	Understand the working of AF, RF signal generators and power meters
CO5	Understand the working principles of CRO and its applications
CO6	Use the Test instruments in Laboratory applications

Course Contents

1.0 Analog instruments

Characteristics of ideal Voltmeter and ideal Ammeter- Construction and principle of operation of PMMC instrument- Principle of extending the range of DC ammeter- Principle of extending the range of DC voltmeter- Principle and working rectifier type voltmeter and ammeter- Construction and principle of series and shunt type ohmmeters- Use of Megger for measuring the insulation resistance- loading effect with an example- Need for high input impedance for Voltmeters- working of FET input voltmeter with a circuit diagram- Drift problem in FET Voltmeters- Working of differential voltmeters-

2.0 DC & AC bridges

Use of high voltage probe and clamp-on current probe- Construction of AC Bridge- Conditions for bridge balance- Types of DC bridges and AC bridges- Use of above bridges- Resistance measurement using Wheat Stone Bridge- Inductance measurement using Maxwell's Bridge- capacitance measurement using Schering Bridge- important errors and their prevention in bridge measurements- Limitations of AC bridge method for measurement of small inductances and capacitances

3.0 Digital instruments

Advantages of digital instruments over Analogue instruments- Working of Ramp type digital voltmeter with block diagram- Successive approximation type digital voltmeters with block diagram- Specifications of digital voltmeters- Working of digital frequency meter with block diagram- Important specifications of digital frequency meter- Accuracy and Resolution of a meter- Factors effecting the accuracy and Resolution of a frequency meter- Working of digital LCR meter with block diagram- specifications of digital LCR meter.

4.0 working principle of AF, RF signal generators and power meters

Working of AF Oscillator (sine & square) - Block diagram- Front panel controls and specifications of AF Oscillator- Working of function generator with block diagram- Applications of AF oscillators and function generators- Working of RF signal generator- Specifications of RF signal generator- Important Applications of RF signal generators- Importance of shielding in RF generators- Working of AF power meter- Applications of power meters.

5.0 Working principle and use of CRO

Block diagram of general purpose CRO - Function of each block- Necessity of time base and deflection amplifiers- Deflection sensitivity of CRO- Conditions for stationary waveforms- Conditions for flicker free waveforms- Triggered sweep with necessary circuit- Advantages of triggered sweep- Function of various controls on front panel of CRO- Procedure for measurement of - Voltage (DC & AC) b) frequency - Phase angle - Time interval - Depth of modulation-Define a pulse - Waveform of a pulse- Define the pulse parameters - Pulse width - Rise time - Fall time - Duty cycle-delay time- procedure for measuring above pulse parameters with CRO- Different types of probes and connectors used in oscilloscopes.

6.0 Test instruments

- Stray inductance and stray capacitance of a coil- Q meter with a block diagram- Parameters that can be measured using Q meter- Distortion factor- Distortion Factor Meter with block diagram- Digital IC tester with block diagram- Working of logic analyser with block diagram- Working principle of spectrum analyser and uses- Plotters and Recorders- XY recorders- plotter- logic probe.

REFERENCE BOOKS:

1. Modern Electronic Instrumentation and Measurement techniques - Albert D. Helfrick William David Cooper-PHI Publications
2. Electrical and Electronics Measurements and Instrumentation - A.K. Sawhney , Puneet SawhneyDhanpatRai& Company, 2010

Electronic Instrumentation - HS Kalsi ,-Tata McGraw Hill

Specific Learning Outcomes:

After completing this course the student will be able to

1.0. Understand the working of analog instruments.

- 1.1. List the characteristics of ideal volt meter and ideal ammeter.
- 1.2. Explain the construction and principle of operation of PMMC instrument.
- 1.3. Explain the principle of extending range of DC ammeter.
- 1.4. Explain the principle of extending range of DC voltmeter.
- 1.5. Explain the principle & working of rectifier type voltmeter.
- 1.6. Explain the principle of series & shunt type ohmmeters.
- 1.7. Explain the use of Megger for measuring the insulation resistance.
- 1.8. Explain loading effect of voltmeter with an example circuit
- 1.9. Explain the need for high input impedance for voltmeters.
- 1.10. Explain the working of FET input voltmeter with a circuit diagram.
- 1.11. Explain the drift problems in FET voltmeters.
- 1.12. Explain the working of differential voltmeters.
- 1.13. Explain the use of high voltage probe & clamp-on current probe.

2.0 DC bridges and AC Bridges

- 2.1 Explain the construction of AC bridge.
- 2.2 State the conditions for AC bridge balance.
- 2.3 List 4 types of AC bridges.
- 2.4 Mention the use of above bridges.

- 2.5 Explain the resistance measurement using Wheatstone bridge.
- 2.6 Explain the inductance measurement using Maxwell's Bridge.
- 2.7 Explain the capacitance measurement using Schering Bridge.
- 2.8 List 4 important errors and their prevention in bridge measurements.
- 2.9 Mention the limitations of AC bridge method for measurement of small Inductances and capacitances.

3.0 Understand the working of Digital Instruments.

- 3.1 List 4 advantages of digital instruments over analog instruments.
- 3.2 Explain the working of RAMP type digital voltmeter with block diagram.
- 3.3 Explain the working of Successive approximation type digital voltmeter with block diagram.
- 3.4 List 4 important specifications of digital voltmeter.
- 3.5 Explain the working of digital frequency meter with block diagram.
- 3.6 List 4 important specifications of digital frequency meter.
- 3.7 Define accuracy and resolution of a meter.
- 3.8 Explain factors effecting the accuracy and resolution of a frequency meter.
- 3.9 Explain the working of digital LCR meter with block diagram.
- 3.10 List 4 specifications of digital LCR meter.

4.0 Understand the construction and working of signal generators & power meters.

- 4.1 Explain the working of AF oscillator with block diagram.
- 4.2 List the front panel controls and specifications of AF oscillator.
- 4.3 Explain the working of function generator with block diagram.
- 4.4 List the applications of AF oscillators and function generators.
- 4.5 Explain the working of RF signal generator with block diagram.
- 4.6 List the specifications of RF signal generator.
- 4.7 Mention 3 important applications of RF signal generator.
- 4.8 Explain the importance of shielding in RF generators.
- 4.9 Explain the working of AF power meter.
- 4.10 List the applications of power meter

5.0 Understand construction and working of CRO.

- 5.1 Draw the block diagram of general purpose CRO and describe the function of each block.
- 5.2 Explain the necessity of time base and deflection amplifiers.
- 5.3 Define deflection sensitivity of CRO.
- 5.4 List the conditions for stationary waveforms.
- 5.5 Mention the conditions for flicker free waveforms.
- 5.6 Explain the triggered sweep with necessary circuit.
- 5.7 Mention the advantages of triggered sweep.
- 5.8 Explain the function of various controls on front panel of CRO.
- 5.9 Explain the procedure for measurement of a) voltage (DC & AC) b) frequency c) phase angle d) time interval e) depth of modulation.
- 5.10 Define a pulse.
- 5.11 Draw the waveform of a pulse.
- 5.12 Define the pulse parameters a) pulse width b) rise time c) fall time d) duty cycle e) delay time.
- 5.13 Explain the procedure for measuring above pulse parameters with CRO.
- 5.14 List different types of probes and connectors used in CRO's.

6.0 Understand the construction and working of test instruments.

- 6.1 Define stray inductance and stray capacitance of a coil.
- 6.2 Explain the working of Q-meter with a block diagram.
- 6.3 List various parameters that can be measured using Q-meter.
- 6.4 Define distortion factor.
- 6.5 Explain the working of distortion factor meter with block diagram.
- 6.6 Explain the working of distortion factor meter with block diagram.
- 6.7 Explain the basic working principle of spectrum analyser and mention its use.
- 6.8 State the need for plotters and recorders.
- 6.9 Explain the working of XY recorders.
- 6.10 Explain the working of plotters.
- 6.11 Explain the working of logic probe

Suggested Student Activities

- 1. Student visits Library to refer to Manuals and related books of electronic instruments
- 2. Student inspects the available equipment in the Lab
- 3. Visit nearby Industry to familiarize with working of various electronic instruments
- 4. Participate in the Quiz & discussion

Model of rubrics for assessing student activity

Dimension	Scale				
	1 Unsatisfactory	2 Developing	3 Satisfactory	4 Good	5 Exemplary
1.Information search and documentation	Does not collect information relate to topic	Collects very limited information, some relate to topic	Collects basic information, most refer to the topic	Collects more information, most refer to the topic	Collects a great deals of information, all refer to the topic
2. Full-fills team roles and duties	Does not perform any duties assigned to the team role	Performs very little duties	Performs nearly all duties	Performs almost all duties	Performs all duties of assigned team roles
3. Shares work equality	Always relies on others to do the work	Rarely does the assigned work, often needs reminding	Usually does the assigned work, rarely needs reminding	Always does the assigned work, rarely needs reminding.	Always does the assigned work, without needing reminding
4. Listening skills	Is always talking, never allows anyone to else to speak	Usually does most of the talking, rarely allows others to speak	Listens, but sometimes talk too much,	Listens and talks a little more than needed.	Listens and talks a fare amount

Suggested E-Learning references

1. www.electronics-tutorials.ws
2. www.nptel.ac.in
3. www.Techopedia.com
4. www.circuitdigest.com

CO-PO MAPPING MATRIX

Course Outcome		Linked PO
CO1	Use Analog instruments for measuring Basic Electrical Quantities	1,2
CO2	Use ac and dc bridges for determining unknown parameters	1,2,3,5,
CO3	Use digital instruments for measuring the given electrical quantities	1,2,5,9
CO4	Explain the working of AF, RF signal generators and power meters	1,2,5,7
CO5	Understand the working principles of CRO and its applications	1,2,5,7
CO6	Use the Test instruments in Laboratory applications	1,2,3,7,10

MID SEM-I EXAM

S.No	Unit Name	R	U	A	Remarks
1	Unit-I	1, 2	5(a) 5(b)	7(a) 7(b)	
2	Unit-II	3, 4	6(a) 6(b)	8(a) 8(b)	
Total Questions		4	4	4	

MID SEM –II EXAM

S.No	Unit Name	R	U	A	Remarks
1	Unit-III	1, 2	5(a) 5(b)	7(a) 7(b)	
2	Unit-IV	3, 4	6(a) 6(b)	8(a) 8(b)	
Total Questions		4	4	4	

Semester End Examination

S No	Unit No.	Questions to be set for SEE				Remarks
		R		U	A	
1	I	4	1	9(a)	13(a)	
2	II					
3	III		2	10(a)	14(a)	
4	IV					
5	V		3	9(b)	13(b)	
				5, 6 11(a) 11(b)	15(a) 15(b)	
6	VI		7,8	10(b)	14(b)	
				12(a)	16(a)	

					12(b)	16(b)	
Total Questions		8			8	8	

Legend:	Remembering (R)	1 Mark
	Understanding (U)	3 Marks
	Application (A)	5 Marks

STATE BOARD OF TECHNICAL EDUCATION & TRAINING: TS: HYDERABAD

C18EI-504E (A), V SEMESTER, ELECTRONIC MEASURING INSTRUMENTS

MID EXAM - I MODEL QUESTION PAPER

Time: 1 hour

Max. Marks: 20

PART-A

Answer All questions. Each carries 1 mark.

4X1=4 Marks

1. List the characteristics of ideal ammeter
2. State the importance of high input impedance of voltmeter
3. State the conditions for AC bridge balance
4. List the limitations of AC bridge for measuring of small inductance.

PART-B

Note: Answer any TWO questions. Each carries 3marks.

2X3=6 Marks

5. (a) Explain loading effect of volt meter

(or)

5. (b) Explain the principle of extending range of DC voltmeter

6. (a) Explain the resistance measurement using Wheatstone Bridge

(or)

6. (b).Explain the capacitance measurement using Schering bridge

PART-C

Note: Answer any TWO questions. Each carries 5 marks.

2X5=10 Marks

7. (a) Explain the construction and principle of operation of PMMC instrument

(or)

7. (b) Explain the principle & working of rectifier type voltmeter

8. (a) Explain the inductance measurement using Maxwell's Bridge

(or)

8. (b).State the conditions for AC bridge balance and Explain the construction of AC bridge

STATE BOARD OF TECHNICAL EDUCATION & TRAINING: TS: HYDERABAD

C18EI-504E (A), V SEMESTER, ELECTRONIC MEASURING INSTRUMENTS

MID EXAM - II MODEL QUESTION PAPER

Time: 1 hour

Max. Marks: 20

PART-A

Answer All questions. Each carries 1 mark.

4X1=4 Marks

1. List two advantages of digital instruments over analog instruments
2. Define accuracy of a meter
3. List the front panel controls of AF oscillator.
4. Mention 3 important applications of RF signal generator.

PART-B

Note: Answer any TWO questions. Each carries 3marks.

2X3=6 Marks

5. (a) Explain factors effecting the accuracy and resolution of a frequency meter

(or)

5. (b) Explain the working of RAMP type digital voltmeter with block diagram.

6. (a) Explain the importance of shielding in RF generators

(or)

6. (b). Explain the importance of shielding in RF generators

PART-C

Note: Answer any TWO questions. Each carries 5 marks.

2X5=10 Marks

7. (a) Explain the working of Successive approximation type digital voltmeter with block diagram

(or)

7. (b) Explain the working of digital frequency meter with block diagram.

8. (a) Explain the working of function generator with block diagram.

(or)

8. (b).Explain the working of AF power meter.

STATE BOARD OF TECHNICAL EDUCATION & TRAINING: TS: HYDERABAD

C18EI-504E (A), V SEMESTER, ELECTRONIC MEASURING INSTRUMENTS

SEMESTER END EXAMINATION MODEL QUESTION PAPER

Time: 2 hours

Max. Marks: 40

PART-A

Answer All questions. Each carries 1 mark.

8X1=8 Marks

1. List the characteristics of ideal volt meter.
2. Define resolution of a digital instrument.
3. List any two applications of a power meter.
4. Define pulse parameters like rise time and duty cycle.
5. Define deflection sensitivity of CRO.
6. State the conditions for stationary wave forms.
7. Define distortion factor.
8. State the need for plotters.

PART-B

Answer any four questions. Each carries three marks.

4X3=12Marks

9. (a) Explain loading effect of voltmeter

(or)

9. (b) Explain the procedure for measurement of voltage (AC) and Frequency using CRO.

10. (a) Explain factors effecting the accuracy and resolution of a frequency meter

(or)

10. (b) Draw the block diagram of Q-meter.

11. (a) Mention the function of various controls on front panel of CRO.

(or)

11. (b) Explain the triggered sweep with necessary circuit.

12. (a) Draw the block diagram of distortion factor meter.

(or)

12. (b) State the basic working principle of spectrum analyzer and mention its use.

PART-C

Answer any four questions. Each carries 5 marks

4X5=20Marks

13. (a) Explain the capacitance measurement using Schering Bridge.

(or)

13. (b) Draw the block diagram of general purpose CRO and describe the function of each block.

14. (a) Explain the working of function generator with block diagram.

(or)

14. (b) Explain the working of XY recorders

15. (a) Explain the necessity of time base and deflection amplifiers.

(or)

15. (b) Explain the procedure for measuring pulse parameters like parameters a) pulse width b)

rise time c) fall time d) duty cycle e) delay time with CRO

16. (a) Explain the working of logic probe

(or)

16. (b) Explain the working of plotters.

18EC-504E (B)- Digital circuit design using Verilog

Course Title :	Digital circuit design using Verilog	Course Code	18EI-504E (B)
Semester	V	Course Group	Elective
Teaching Scheme in Periods(L:T:P)	30:15:0	Credits	3
Methodology	Lecture + Assignments	Total Contact Periods :	60Pds
CIE	60 Marks	SEE	40 Marks

Course Content and Blue Print of Marks for SEE

Pre requisites							
NO						weightage	
			R	U	A		
1.	Basic Concepts of VLSI Circuits	12	1	1	1	17	15.5
2	Introduction to Verilog HDL	8	1	1	0	12	11
3	Language constructs and conventions	12	1	3	0	19	17
4.	Gate level, Data Flow and Behavioral modeling	8	1	0	1	7	6.5
5.	Modeling of combinational and Sequential Logic circuits	13	1	3	3	36	33
6.	System design concepts	7	2	1	1	19	17
	Total	60	7	9	6	110	100

Course Outcomes

- 1) Concepts of switching theory and logic design.
- 2) Familiarity with a programming language like C or C++.

Upon completion of the course the student should be able to

CO1 :	Use Layout design rules; Draw stick diagrams; Interpret fabrication process, timing simulation.
CO2 :	Apply the basics of Hardware Description Languages and use Verilog modules, instantiation process.
CO3 :	Use Verilog HDL constructs and conventions.
CO4 :	Develop Simple logic circuits using various levels of Abstraction in Verilog HDL.
CO5 :	Design and Simulate Combinational and sequential circuits using Verilog HDL.
CO6 :	Apply Verilog HDL principles to develop various real time applications using FSM and FPGA.

Course Content

Unit 1: Basic Concepts of VLSI Circuits:

Duration: 12 Periods

MOS Transistor fabrication-Merits of CMOS technology-CMOS fabrication process-Layout design rules-Stick diagrams-VLSI design flow-VLSI design specification and design entry-Functional simulation-Planning Placement and Routing (PPR)-Timing simulation-Fusing/Fabrication into the chip-Use of Verilog HDL in VLSI simulation.

Unit 2: Introduction to Verilog HDL:

Duration: 8 Periods

Steps involved in the design flow for the VLSI IC design-Importance of Hardware Description Languages in VLSI design-Compare VHDL and Verilog HDL-Features of Verilog HDL-Difference between an instantiation and inference of a component-Differences between modules and module instances in Verilog-Levels of abstraction to represent the internals of a module-Identify the components of a Verilog module definition-Port connection rules in module instantiation.

Unit 3: Language constructs and conventions:

Duration: 12 Periods

Lexical conventions like number specification, Identifiers, Keywords, etc-Different data types like value set, nets, registers, vectors, integer, real and time register data types, arrays, memories and strings-Defparam and localparam keywords-System tasks and compiler directives-Expressions, operators and operands-Types of operators used in the Verilog HDL

Unit 4: Gate level, Data Flow and Behavioural modelling:**Duration: 8 Periods**

Logic gates primitives provided in Verilog-Instantiation of gates, gate symbols, and truth tables for and/or and buf/not types gates-Rise, fall and turn off delays in gate level design-Initial and Always statements-Assignment statements in data flow modelling-Different types of delays used in the data flow level modelling-Blocking and Non blocking procedural assignments with examples-Timing controls like delay based timing control and event based timing control-Conditional statements-Multiway branching-Use of case, casex and casez statements-Difference between conditional if statement and case statements-Looping statements such as while, for, repeat and forever-Sequential and parallel blocks- User Defined Primitives (UDP)-Hierarchical modelling-Advantages of hierarchical modeling-Modeling techniques in Verilog HDL-Design simple logic circuits like adders, subtractors using Behavioural, Dataflow and Structural modelling.

Unit 5: Modelling of combinational and Sequential Logic circuits:**Duration: 13 Periods**

Modelling of combinational and sequential circuits-Design combinational circuits like multiplexers, decoders, encoders, comparators and ALU-Design RS, JK, T and D flip flops with asynchronous and synchronous clock and reset- Explain implementation of shift registers like SISO, SIPO, PISO, PIPO, etc-Design synchronous and asynchronous counters-Design a divide by 3 counter-Design shift register counters like ring counter, etc-Design memories like RAM and ROM-Compare RTL level and structural level modelling. Test Bench module-Need of a stimulus module-Structure of stimulus module-stimulus modules for combinational and sequential circuits of Verilog designs.

Unit 6: System Design Concepts:**Duration: 7 Periods**

Concept of Finite State Machines-Mealy and Moore types of state machines-Problems on Mealy and Moore state machines-Design of Mealy state machine using Verilog HDL. Various design tools which are useful in different stages of design-Important programmable logic devices- Architecture of PLAs - Architecture of CPLD-Architecture of FPGAs-Comparison-Applications-Design of UART using FPGA board-Design of Traffic Light controller using FPGA board.

Recommended Books

Digital systems design by Morris Mano

1. Verilog HDL: A guide to digital design and synthesis by S. Palnitkar
2. Advanced Digital Design with the VERILOG HDL by Michael D. Ciletti
3. Switching and finite automation theory by Zvi Kohavi
4. Digital state machine design by David J. Comes
5. Digital Systems by Ronald Tocci
6. Digital design principles and practice- John F Wakerly, PHI / Pearson education Asia 3rd Edn,2005

7. Design through Verilog HDL – T.R. Padmanabhan and B. Bala Tripura Sundari, WSE, IEEE Press, 2004.
8. A Verilog Premier – J. Bhasker, BSP, 2003.
9. Fundamentals of Logic Design with Verilog – Stephen. Brown and Zvonko Vranesic, TMH, 2005.
10. Advanced Digital Design with Verilog HDL – Michael D. Ciletti, PHI, 2005.

Specific Learning Outcomes

1.0 Basic Concepts of VLSI Circuits

- 1.1 Explain the processes of MOS Transistor fabrication
- 1.2 List the merits of CMOS technology
- 1.3 Explain CMOS fabrication process
- 1.4 List Layout design rules
- 1.5 Explain layout design rules
- 1.6 Explain stick diagrams
- 1.7 Explain VLSI design flow
- 1.8 Explain VLSI design specification and design entry
- 1.9 Explain functional simulation
- 1.10 Explain Planning placement and Routing (PPR)
- 1.11 Explain timing simulation
- 1.12 Explain Fusing/Fabrication into the chip
- 1.13 Explain the use of Verilog HDL in VLSI simulation

2.0 Introduction to Verilog HDL

- 2.1 Explain the steps involved in the design flow for the VLSI IC design
- 2.2 Explain the importance of Hardware Description Languages in VLSI design
- 2.3 Compare VHDL and Verilog HDL
- 2.4 List the features of Verilog HDL
- 2.5 Explain the difference between an instantiation and inference of a component.

- 2.6 Explain differences between modules and module instances in Verilog.
- 2.7 Explain four levels of abstraction to represent the internals of a module
- 2.8 Identify the components of a Verilog module definition
- 2.9 Explain the port connection rules in a module instantiation
- 3.0 **Language constructs and conventions**
- 3.1 Explain the lexical conventions like number specification, Identifiers keywords, etc
- 3.2 Explain different data types like value set, nets, registers, vectors, integer, real and time register data types, arrays, memories and strings.
- 3.3 Explain defparam and localparam keywords
- 3.4 Explain about system tasks and compiler directives
- 3.5 Define expressions, operators and operands.
- 3.6 Explain all types of operators used in the Verilog HDL
- 4.0 **Understand concepts of Gate level, Data flow and behavioral modeling**
- 4.1 Identify the logic gate primitives provided in Verilog
- 4.2 Explain the instantiation of gates, gate symbols, and truth tables for and/or and buff/not type gates.
- 4.3 Explain Rise, fall and turn-off delays in the gate level design
- 4.4 Explain about the initial and always statements.
- 4.5 Explain the assignment statements in data flow modeling
- 4.6 Explain different types of delays used in the data flow level modeling
- 4.7 Explain blocking and non blocking procedural assignments with examples
- 4.8 Explain timing controls like delay based timing control and event based timing control
- 4.9 Explain conditional statements.
- 4.10 Explain multiway branching – use case, casex, and casez statements.
- 4.11 Explain the difference between conditional if statement and case statements.
- 4.12 Explain looping statements such as while, for, repeat, and forever.
- 4.13 Explain sequential and parallel blocks.
- 4.14 Explain about user defined primitives (UDP).

- 4.15 Explain about the hierarchical modeling.
- 4.16 List the advantages of hierarchical modeling.
- 4.17 Explain about modeling techniques in Verilog HDL.
- 4.18 Design simple logic circuits like Half Adder, Full Adder, Half Subtractor, and Full Subtractor using Behavioral, Data Flow and Structural Modeling.

5.0 Understand modeling of combinational and sequential logic circuits

- 5.1 Design combinational circuits like multiplexers, decoders, encoders, Comparators and ALU
- 5.2 Design RS, JK, T and D flip flops with Asynchronous and Synchronous Clock and reset
- 5.3 Explain implementation of shift registers like SISO, SIPO, PISO, PIPO, etc.
- 5.4 Design synchronous and asynchronous counters
- 5.5 Design a divide by 3 counter
- 5.6 Design shift register counters like ring counter, etc.
- 5.7 Design memories like RAM and ROM.
- 5.8 Compare RTL level and structural level modelings.
- 5.9 Define test bench module.
- 5.10 Explain the need of a stimulus module.
- 5.11 Explain the structure of stimulus module.
- 5.12 Apply the stimulus modules for combinational and sequential circuits of Verilog designs

6.0 Understand the system design concepts

- 6.1 List different Finite State Machines.
- 6.2 Explain the Mealy and Moore types of State Machines.
- 6.3 Explain the design of Mealy state machine using Verilog HDL
- 6.4 Explain the design of Moore state machine using Verilog HDL
- 6.5 Explain various design tools which are useful in different stages of design.
- 6.6 List 4 important programmable logic devices.
- 6.7 Explain the architecture of PLAs.
- 6.8 Explain the architecture of PALs
- 6.9 Explain the architecture of CPLD.

6.10 Explain the architecture of FPGA.

6.11 Compare the programmable logic devices.

6.12 List any 3 applications of programmable logic devices.

6.13 Explain the design of UART using FPGA.

6.14 Explain the design of Traffic Light Controller using FPGA board.

Internal Evaluation

Test	Units	Marks	Pattern
Mid Sem 1	1 and 2	20	Part A 5 Short answer questions Part B 2 Essay questions out of 3 Questions Part C 2 Essay questions out of 3 Questions
Mid Sem 2	3 and 4	20	Part A 5 Short answer questions Part B 2 Essay questions out of 3 Questions Part C 2 Essay questions out of 3 Questions
Slip Test 1	1 and 2	5	2 Essay Questions out of 3 Questions
Slip Test 2	3 and 4	5	2 Essay Questions out of 3 Questions
Assignment	1	5	Different group assignments of Higher order Questions that develop problem solving skills and critical thinking should be given
Seminars	1	5	
	Total	60	

Suggested Student Activities

1. Quiz
2. Group discussion
3. Surprise test

Suggested E-Learning references

1. <http://electrical4u.com>
2. www.electronics-tutorials.ws
3. www.nptel.ac.in
4. www.allaboutcircuits.com

CO PO Mapping Matrix

On Successful completion of the course, the student will be able to attain the following Course Outcomes (COs):

Course Outcome		CL	Linked PO	Teaching Periods
CO1	Use Layout design rules; Draw stick diagrams; Interpret fabrication process, timing simulation.	R/U/A	1,2,10	12
CO2	Apply the basics of Hardware Description Languages and use Verilog modules, instantiation process.	R/U	1,2,5,6,7	8
CO3	Use Verilog HDL constructs and conventions.	R/U	1,2,9	12
CO4	Develop Simple logic circuits using various levels of Abstraction in Verilog HDL.	R/U/A	1,2,5,7	8
CO5	Design and Simulate Combinational and sequential circuits using Verilog HDL.	R/U/A	1,2,5	13
CO6	Apply Verilog HDL principles to develop various real time applications using FSM and FPGA.	R/U/A	1,2,3,7	7

Model Paper for Mid-I,
BOARD DIPLOMA EXAMINATION, (C-18)
V SEMESTER, 18EI-504E (B)
DIGITAL CIRCUIT DESIGN USING VERILOG

Time: 1 Hr

Total Marks: 20Marks

PART-A

Answer all questions. Each carries one mark

4 X 1 = 04

1. List the merits of CMOS technology
2. Explain the need for stick diagrams
3. List types of design entry methods in VLSI.
4. Write the difference between module and instance.
5. Explain the importance of HDLs in VLSI design.

PART-B

Answer any two questions. Each carries five marks

2 X 3 = 6

6. Explain Layout Design rules.
7. Mention the differences between Verilog HDL and VHDL.
8. Explain about connecting ports by ordered list and ports by name in module instantiation.

PART-C

Answer any two questions. Each carries ten marks

2 X 10 = 20

9. Draw the stick diagram of CMOS transistor
10. Explain VLSI design flow.
11. Explain about the four levels of abstraction Supported by Verilog HDL

Model Paper for Mid-II,
BOARD DIPLOMA EXAMINATION, (C-18)
V SEMESTER, 18EI-504E (B)
DIGITAL CIRCUIT DESIGN USING VERILOG

Time :1 Hrs

Total Marks:20Marks

PART-A

Answer all questions, each carries two marks

5 X 2 = 10

1. Explain about concatenation operator.
2. Mention the difference between \$display and \$monitor.
3. Explain about “= =” and “= = =” operators.
4. Define Rise time delay and fall time delay in gate level design.
5. Explain about initial statement

PART-B

Answer any two questions, each carries five marks

2 X 5 = 10

6. Explain about defparam and localparam keywords.
7. Explain about System tasks in Verilog HDL.
8. Design 1-bit half subtractor using gate level modelling.

PART-C

Answer any two questions, each carries ten marks

2 X 10 = 20

9. Explain about the following operators
 - a) Logical operators
 - b) Bit wise operators
 - c) Binary arithmetic operators
 - d) Unary reduction operators
10. Design 1-bit full adder logic circuit using Gate level and Dataflow level modeling.
11. Explain about casex, casez and case statements.

Model Paper for SEE
BOARD DIPLOMA EXAMINATION, (C-18)
V SEMESTER, 18EI-504E (B)
DIGITAL CIRCUIT DESIGN USING VERILOG

Time: 2Hrs

Total Marks : 40Marks

PART-A

Answer all questions, each carries two marks

10 X 2 =20

1. List the Layout design rules.
2. List the features of Verilog HDL.
3. List any three system tasks in Verilog HDL.
4. Explain about always statement.
5. List the advantages of hierarchical modelling.
6. Write the need for stimulus module.
7. Write the test bench module for 2 X 1 Mux.
8. Define test bench module.
9. List programmable logic devices.
10. Write any three applications of PLD's.

PART-B

GROUP-1 Answer any TWO questions

2 x 5 = 10

11. Draw the stick diagram of two inputs NMOS NAND gate.
12. Explain about compiler directives.
13. Design 1 bit half adder using behavioural modelling.

GROUP-2 Answer any TWO questions

2 x 5 = 10

14.Design 3 X 8 decoder using behavioural modelling.

15.Design 4 X 1 Mux using data flow level modelling.

16.Explain the architecture of FPGA.

PART-C

GROUP-1 Answer any TWO questions

2x10=20

17. Explain the process of NMOS transistor fabrication.

18. Explain about the various components of a verilog module with an example.

19. Explain about casex, casez and case statements.

GROUP-2 Answer any TWO questions

2 x 10= 20

20. Design up/down counter using Verilog HDL.

21. Design a D flip-flop with asynchronous reset and its Test bench using verilog HDL.

22. Explain the architecture of PLA's.

Analytical & Biomedical Instrumentation

Course Title :	Analytical & Biomedical Instrumentation	Course Code	18EI-505E(A)
Semester	V	Course Group	:Elective
Teaching Scheme in Periods(L:T:P)	45:15:0	Credits	: 3
Methodology	Lecture + Assignments	Total Periods :	: 60
CIE	60 Marks	SEE	40 Marks

Pre requisites

This course requires the basic knowledge of Instrumentation.

Course Outcomes

CO1 :	Study of Analytical Instrumentation using radiation properties
CO2 :	Use various analyzers.
CO3 :	Interpret the terminologies in Biomedical Instrumentation and ECG wave forms.
CO4 :	Use the principles of life assisting and therapeutic devices
CO5 :	Analyze using Mass Spectroscopy and Chromatography techniques.
CO6 :	Use the basic principles of imaging techniques

Course Content and Blue Print of Marks for SEE

Unit No	Unit Name	Periods	Questions to be set for SEE				
			R		U	A	
1.	Introduction to Analytical Instrumentation & Spectrophotometers	8	Q4	Q1		Q9A	Q13A
2	Analyzers	10					
3	Introduction to Bio-medical Instrumentation	12		Q2		Q10A	Q14A
4.	Blood Pressure and Blood Flow Measurement and Therapeutic Instruments	10					
5.	Mass spectrometry and Chromatography	8		Q3	Q5, Q6	Q9B, Q11A, Q11B	Q13B, Q15A, Q15B
6.	Modern Imaging Systems	12					
	TOTAL	60	8		8	8	

Legend: R: Remembering, U: Understanding, A: Applying

Course Contents

UNIT 1- Introduction to Analytical Instrumentation & Spectrophotometers:

Duration: 8Periods (L: 6– T: 2)

Block diagram of Analytical Instrumentation, Electromagnetic spectrum, Beer lamberts law, monochromators, light sources and detectors - UV, IR, and Visible Spectro photometers.

UNIT 2- Analyzers:

Duration: 10Periods (L: 8– T:2)

Analyzer-Flame Photometer, Spectro fluorimeter, Refractometer, Interferometer, Polarimeter, Paramagnetic, Zirconia type and Thermal conductivity gas analyzers, Auto analyzer.

UNIT 3- Introduction to Bio-medical Instrumentation:

Duration: 12Periods (L: 9– T: 3)

Bio electricity – Resting and action potential - transmission of impulses - Electrodes used for Bio potential measurement-Electrical activity of the heart-ECG waveform-EEG-Electrical Activity of Brain-EMG-Electrical activity of Muscles.

UNIT 4- Blood Pressure and Blood Flow Measurement and Therapeutic Instruments: **Duration: 10Periods (L: 7– T:3)**

Direct Blood pressure measurement - Indirect Blood pressure measurement a)
Electromagnetic Blood flow meters b) Ultrasonic Blood flow meters.-Therapeutic
Instruments (Basic Principles only) – Cardiac Pacemakers - Defibrillators -Dialysis
machine.

UNIT 5- Mass spectrometry and Chromatography:

Duration: 8Periods (L: 6– T: 2)

Mass Spectroscopy: Principle of operation, advantages and applications - Absorption and Adsorption, Chromatography- Principle of operation, advantages and applications of Gas and Liquid chromatography.

UNIT 6: Modern Imaging Systems: Duration: 12 Periods(L:9– T:3)

X-Ray Imaging - properties, interaction, production, and significance of grid,
Applications, Limitations, Construction and operation of an X-Ray machine, C.A.T.
Scanner-MRI Scanner- Telemedicine-Introduction-working-applications.

Recommended Books

1. Instrumental Methods of Chemical Analysis by Willard, Merritt, Dean, Settle (CBS Publications & Distributors Pvt. Ltd.)

- | | |
|---|---|
| 2. Instrumental Methods of Chemical Analysis by | Chatwal & Anand (Himalaya Publishing house) |
| 3. Hand Book of Analytical Instrumentation by | R.S. Khandpur |
| 4. Industrial Instrumentation by Donald | P.Eckman. |
| 5. Industrial Instruments and Control by | S.K.Singh. |
| 6. Instrument Engineer Hand Book by | Liptak. |
| 7. Handbook on Bio-medical Instrumentation | RS Khandpur |
| 8. Introduction to Medical Electronics | SK Guha |
| 9. Bio-medical Instruments and measurements | Cromwell, Weisel |
| 10. Bio-medical Instrumentation | Armugam |

Suggested E-Learning references

www.egr.msu.edu

www.bme.rutgers.edu

www.BMES.org

www.Biospace.com

www.chromacademy.com

www.agilent.com

Suggested Learning Outcomes

1.0 Introduction to Analytical instrumentation and Spectrophotometer

- 1.1 Draw and explain the block diagram of Analytical instrumentation.
- 1.2 Define the term spectroscopy.
- 1.3 Define the terms atomic spectroscopy and molecular spectroscopy.
- 1.4 Draw and explain Electromagnetic spectrum.
- 1.5 State the Beer Lamberts law.
- 1.6 List the components of a Monochromators.
- 1.7 List types of Monochromators (Prism and Grating).
- 1.8 Explain
 - a) Prism
 - b) Grating Monochromators.
- 1.9 List different types of light sources for
 - a) Visible
 - b) UV

c) IR

1.10 List different types of light detectors for

a) Visible

b) UV

c) IR

1.11 Explain the operation of U.V Spectrophotometer

1.12 List the applications of U.V Spectrophotometer

1.13 Explain the operation of Visible Spectrophotometer

1.14 List the applications of Visible Spectrophotometer

1.15 Explain the operation of IR Spectrophotometer

1.16 List the applications of IR Spectrophotometer

2.0 Introduction to Analysers

2.1 Define Analyser.

2.2 State the necessity of analysers.

2.3 Explain the operation of Flame Photometer

2.4 List the applications of Flame Photometer

2.5 Explain the operation of Spectro fluorometer

2.6 List the applications of Spectro fluorometer

2.7 Explain the operation of Refractometer

2.8 List the applications of Refractometer

2.9 Explain the operation of Interferometer

2.10 List the applications of Interferometer

2.10 Explain the operation of Polarimeter

2.11 List the applications of Polarimeter

2.12 Explain the operation of Paramagnetic gas analyzer.

2.13 List the applications of Paramagnetic gas analyzer.

2.14 Explain the operation of Zirconia gas analyzer.

2.15 List the applications of Zirconia gas analyzer.

2.16 Explain the operation of Thermal conductivity type gas analyzer.

2.17 List the applications of Thermal conductivity type gas analyzer.

2.18 Explain the operation of Auto analyzer.

2.19 List the applications of Auto analyzer.

3.0 Introduction to Bio-Medical Instrumentation

- 3.1 Introduction to human body system.
- 3.2 Describe human Cell and their structure.
- 3.3 Components of bio medical instrumentation.
- 3.4 Explain resting and action potentials. Sodium pump and transmission of impulses.

Describe the wave forms.

- 3.5 State the need of bio potential electrodes.
- 3.6 Give the equivalent circuit of electrodes.
- 3.7 Explain the following types of electrodes.

- a) Surface electrodes
- b) Cup type electrodes
- c) Disposable electrodes
- d) Microelectrodes

- 3.8 List the Diagnostic Medical Equipment.

- 3.9 Draw the diagram and explain electrical activity of heart.

- 3.10 Explain the significance of ECG wave form.
- 3.11 Draw the electrocardiogram and indicate its amplitude and duration and state their importance.
- 3.12 Draw the building Blocks of an electro cardio graph (ECG)
- 3.13 Explain ECG leads Configuration.
- 3.14 Compare the bipolar and unipolar leads.
- 3.15 List the applications of ECG.
- 3.16 Explain electrical activity of Brain. Indicate frequency regions.
- 3.17 Explain the bio potential electrodes associated with muscle activity (EMG).

4.0 Blood Pressure and Blood flow Measurement and Therapeutic Instruments.

- 4.1 State the necessity of blood pressure measurement.
- 4.2 List the various methods of blood pressure measurement.
- 4.3 Describe indirect blood pressure measurement (sphygmomanometer) with a diagram.
- 4.4 List the advantages and disadvantages of indirect blood pressure measurement.
- 4.5 Describe direct blood pressure measurement.
- 4.6 List the advantages and disadvantages of direct blood pressure measurement.
- 4.7 Explain the working principle of electromagnetic blood flow meter with diagram.

- 4.8 Explain the working principle of ultrasonic blood flow meter with diagram.
- 4.9 State the need of pacemakers.
- 4.10 Classify different types of pacemakers.
- 4.11 Compare the advantages of implantable pacemakers over external pacemakers.
- 4.12 Draw the block diagram of a ventricular synchronous demand pacemaker and explain its operation.
- 4.13 State the need of defibrillators.
- 4.14 List the types of defibrillators.
- 4.15 Draw and explain the circuit diagram of capacitive discharge DC defibrillators.
- 4.16 Compare AC defibrillators and DC defibrillators.
- 4.17 Explain the importance of dialysis.
- 4.18 Explain the function of Haemodialysis machine.

5.0 Mass spectrometry and Chromatography

- 5.1. State the principle of Mass spectrometry.
- 5.2. List the advantages of mass spectrometer.
- 5.3. Derive the expression for mass charge ratio (m/e).
- 5.4. Draw and explain the block diagram of mass spectrometer.
- 5.5. List the applications of mass spectrometer.
- 5.6. Define the terms absorption and adsorption.
- 5.7. Differentiate between the terms absorption and adsorption.
- 5.8. Define chromatography.
- 5.9. Classify chromatography.
- 5.10. List the components of a Gas Chromatography.
- 5.11. Explain the principle of operation of the Gas Chromatography.
- 5.12. List the applications of Gas Chromatography.
- 5.13. List the advantages of the Gas Chromatography
- 5.14. Explain the principle of operation of the Liquid Chromatography.
- 5.15. List the applications of Liquid Chromatography.
- 5.16. List the advantages of Liquid Chromatography

6.0 Modern Imaging Systems.

6.1 X-Ray imaging

- a) Explain the properties of X-Rays

- b) Explain about the interaction of X-Rays with matter, explain Compton effect.
- c) Explain the Production of X-Rays
- d) Grids and their significance
- e) Applications of X-Ray imaging
- f) Limitations of X-Ray imaging

6.2 Describe the construction and operation of an X-ray machine with a block diagram.

6.3 State the need for computer axial tomography (CAT).

6.4 Describe the working principle of C.A.T Scanner.

6.5 List the applications of the C.A.T Scanner.

6.6 Define magneto resonance image (MRI).

6.7 Describe the working principles of MRI.

6.8 List the advantages of MRI.

6.9 State the importance of Telemedicine.

6.10 Explain the working principle of telemedicine.

6.11 List the applications of telemedicine.

Suggested Student Activities

- 1) The student has to Study the different types of Analytical and Biomedical Instruments by doing a survey and then submit a handwritten report. Documents have to be maintained as a record.
- 2) Take Quiz tests / assignments in topics based on Analytical and Biomedical Instrumentation .Documents have to be maintained as a record.
- 3) Do a power point presentation on any type of Analytical instrument and biomedical instrument. Documents have to be maintained as a record.
- 4) Visit YouTube sites relevant to topics on Analytical Instrumentation. Listen to the lectures and submit a handwritten report.
- 5) Submit a report on where Gas Chromatography / Refractrometry can be used.
- 6) Visit a nearby hospital / diagnostic centre & submit a report on the various Biomedical instruments used.

CO-PO Mapping Matrix

	Basic knowledge	Discipline Knowledge	Experiments and practice	Engineering Tools	Engineer and society	Environment & sustainability	Ethics	Individual and Team work	Communication	Lifelong learning	Linked PO
CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	
CO1	2	2		2							1,2,4
CO2	2	2		2		2					1,2,4,6
CO3	2	2	2		2						1,2,3,5
CO4	2	2	2	2	2						1,2,3,4,5
CO5	2	2	2	2							1,2,3,4
CO6	2	2	2	2							1,2,3,4

Internal evaluation

Test	Units	Marks
Mid Sem 1	1 and 2	20
Mid Sem 2	3 and 4	20
Slip Test 1	1 and 2	5
Slip Test 2	3 and 4	5
Assignment	1	5
Seminars	1	5
	Total	60

QUESTION PAPER PATTERN FOR MID SEMESTER EXAMS

Sl.No	Description	Level	No of Questions	Marks for each question	Choice	Total Marks
01	Part-A	Remembering(R)	4	1	Nil	4 Marks
02	Part-B	Understanding(U)	4	3	2	6 Marks
03	Part-C	Application(A)	4	5	2	10 Marks
Total Marks						20 Marks

MID SEM-I EXAM

S.No	Unit No	R	U	A	Remarks
1	Unit-I	1,2	5(a)	7(a)	
			5(b)	7(b)	
2	Unit-II	3,4	6(a)	8(a)	
			6(b)	8(b)	
Total Questions		4	4	4	

MID SEM-II EXAM

S.No	Unit No	R	U	A	Remarks
1	Unit-III	1,2	5(a)	7(a)	
			5(b)	7(b)	
2	Unit-IV	3,4	6(a)	8(a)	
			6(b)	8(b)	
Total Questions		4	4	4	

The length of answer for each question framed in respect of Part-A, B&C shall not exceed $\frac{1}{4}$ of a page, 1 page and 2 pages respectively

QUESTION PAPER PATTERN FOR SEMESTER END EXAM

Sl.No	Description	Level	No of Questions	Marks for each question	Choice	Total Marks
01	Part-A	Remembering(R)	8	1	Nil	8 Marks
02	Part-B	Understanding(U)	8	3	4	12 Marks
03	Part-C	Application(A)	8	5	4	20 Marks
Total Marks						40 Marks

Unit No	Questions to be set for SEE				
	R		U		A
I	Q4	Q1		Q9(a)	Q13(a)
II					
III		Q2		Q10(a)	Q14(a)
IV					
V		Q3	Q5,Q6	Q9(b), Q11(a), Q11(b)	Q13(b), Q15(a), Q15(b)
VI			Q7,Q8	Q10(b), Q12(a), Q12(b)	Q14(b), Q16(a), Q16(b)
Total Questions	8		8		8

Model Question Paper
BOARD DIPLOMA MID-SEMESTER EXAMINATIONS (C-18)
DEIE - V SEMESTER EXAMINATION
ANALYTICAL AND BIOMEDICAL INSTRUMENTATION (18EI-505E (A))

TIME: 1 Hour

MAXIMUM MARKS: 20

PART –A

Instructions: Answer all the questions. Each question carries one mark. MARKS: 4X1 =4

1. Define Spectroscopy
2. State Beer's Lambert law.
3. Define Analyser.
4. List two applications of refractometer.

PART –B

Instructions: Answer two questions. Each question carries three marks. MARKS: 2X3 =6

5. (a) Draw the block diagram of Analytical Instrumentation.
(or)
5. (b) List the applications of UV Spectrophotometer
6. (a) Draw the diagram of a thermal conductivity gas analyser.
(or)
6. (b) List the components of Flame Photometer.

PART –C

Instructions: Answer two questions. Each question carries five marks MARKS: 2X5 =10

7. (a) Explain the construction and working of visible spectro photometer with a diagram.
(or)
7. (b) Explain the operation of UV Spectrophotometer.
8. (a) Explain the operation of auto analyser.
(or)
8. (b) Draw and explain the principle and operation of Paramagnetic gas analyser.

Model Question Paper
BOARD DIPLOMA MID-SEMESTER EXAMINATIONS (C-18)
DEIE - V SEMESTER EXAMINATION
ANALYTICAL AND BIOMEDICAL INSTRUMENTATION (18EI-505E (A))

TIME: 1 Hour

MAXIMUM MARKS: 20

PART –A

Instructions: Answer all the questions. Each question carries one mark. MARKS: 4X1 =4

1. Define bioelectric potential.
2. List the diagnostic medical equipment.
3. List the methods of blood pressure measurement.
4. Define dialysis.

PART –B

Instructions: Answer two questions. Each question carries three marks. MARKS: 2X3 =6

5. (a) Draw and label the ECG waveform.
(or)
5. (b) Explain the electrical activity of Brain with frequency ranges.
6. (a) Compare AC and DC defibrillators.
(or)
6. (b) Compare the advantage of internal pacemakers over external pacemakers.

PART –C

Instructions: Answer two questions. Each question carries five marks MARKS: 2X5 =10

7. (a) Explain the working of ECG recording setup with a diagram.
(or)
7. (b) Explain about Resting and action potentials with the help of wave forms.
8. (a) Explain the working of ventricular synchronous demand pacemaker with a diagram.
(or)
8. (b) Explain the working of Electromagnetic blood flow meter.

Model Question Paper
BOARD DIPLOMA SEMESTER END EXAMINATIONS (C-18)
DEIE - V SEMESTER EXAMINATION
ANALYTICAL AND BIOMEDICAL INSTRUMENTATION (18EI-505E (A))

TIME: 2Hours

MAXIMUM MARKS: 40

PART –A

Instructions: Answer all the questions. Each question carries one mark.

MARKS: 8X1 =8

1. State Beer Lambert Law.
2. Define resting and action potential.
3. List the applications of Telemedicine.
4. Classify the different types of pacemakers.
5. State the principle of Mass spectroscopy.
6. Define chromatography.
7. Give the frequency range of X-rays.
8. Define MRI.

PART –B

Answer FOUR questions

4 x3 = 12

9. (a) Draw and explain the block diagram of Analytical instrumentation.

(or)

9. (b) Classify chromatography. List the components of a Gas Chromatography.

10. (a) Draw the electrocardiogram and indicate its amplitude and duration and state their importance.

(or)

10. (b) State the need for computer axial tomography (CAT).

11. (a) List the advantages of Mass Spectrometer.

(or)

11. (b) List the applications of Gas Chromatography.

12. (a) State the need of Grids and their significance in X-Ray machine.

(or)

12. (b) List the advantages of MRI.

PART –C

Answer FOUR questions

4 x 5 = 20

13. (a) Draw and explain the principle and operation of Paramagnetic gas analyser.

(or)

13. (b) Draw and explain the block diagram of mass spectrometer.

14. (a) Explain the function of Haemodialysis machine.

(or)

14. (b) Describe the construction and operation of an X-ray machine with a block diagram.

15. (a) Explain the principle of operation of the Gas Chromatography.

(or)

15. (b) Explain the principle of operation of Liquid Chromatography.

16. (a) Explain the working principle of telemedicine.

(or)

16. (b) Draw and explain the block diagram of MRI.

Communication Engineering

Course Title :	Communication Engineering	Course Code	18EI-505E(B)
Semester	V	Course Group	:Elective
Teaching Scheme in Periods(L:T:P)	45:15:0	Credits	: 3
Methodology	Lecture + Assignments	Total Periods :	: 60
CIE	60 Marks	SEE	40 Marks

Pre requisites

This course requires the basic knowledge of Electronics, Circuits and Control Systems.

Course Outcomes

CO1 :	Categorize the modulation using communication system principles
CO2 :	Compare AM and FM detectors, receivers
CO3 :	Develop the basic knowledge on Digital modulation
CO4 :	Determine modern communications techniques
CO5 :	Use the functionalities of Computer Network layers
CO6 :	Analyze the Advanced Wireless communication Techniques

Course Content and Blue Print of Marks for SEE

Unit No	Unit Name	Periods	Questions to be set for SEE				
			R		U	A	
1.	Introduction to Communication System & Noise	6	Q4	Q1	Q9A	Q13A	
2	AM and FM detectors, receivers	10					
3	Digital modulation	9		Q2	Q10A	Q14A	
4.	Modern Communication	9					
5.	Computer Communication	12		Q3	Q5,Q6	Q9B,Q11A, Q11B	Q13B, Q15A, Q15B
6.	Wireless communication	14					
	Total	60	8		8	8	

Legend: R: Remembering, U: Understanding, A: Applying

Course Contents

UNIT 1- Introduction to Communication System & Noise

Duration: 6Periods (L: 4– T: 2)

Communication system- Transmitter, receiver, channel- Different blocks of communication system explanation- Modulation- need for Modulation in communication system- amplitude modulation- waveform of AM wave- frequency modulation- waveform of FM wave- phase modulation- different types of noise- internal and external Noise

UNIT 2- AM and FM Detectors / Receivers**Duration: 10Periods (L: 8– T: 2)**

Demodulation principle of TRF Receiver- need for heterodyning in a Radio Receiver. Block diagram of super heterodyne Receiver. Need of RF & IF amplifier stages. Selectivity-,Sensitivity and fidelity- basic principle of AM and FM detector- explanation of diode detector(envelope detector) circuit- List of FM demodulator circuits- Explanation of Fosters – Seely Demodulator.

UNIT 3- Digital Modulation**Duration: 9Periods (L: 6– T: 3)**

Digital modulation techniques- ASK, FSK and PSK- Multiplexing techniques-FDM and TDM and explain them with neat sketches- principle of pulse modulation- types of pulse modulation methods- Sketch the waveforms of PAM, PPM, PWM and PCM- Compare between PAM, PPM, PWM and PCM- applications of the above four types of modulation.

UNIT-4- Modern Communication Systems**Duration: 9Periods (L: 7– T: 2)**

Principle of Radar with a block diagram- Derivation of the basic Radar range equation- applications of various Radar systems- need for satellite communication- advantages of satellite communication over terrestrial radio communication- applications of satellites-working principle of transmitter and Receivers used in fiber optic communication system-use of fibres in local telephone and cable T.V (FTTH)

UNIT-5: Computer Communication**Duration: 12Periods(L:9– T:3)**

Data communication- need for data communication networking- Distinguish between analog and digital data- Definition of computer network and state its use- ISO: OSI 7 layer architecture and explain the function of each layer- different types of physical transmission media- use of UTP, STP, Coaxial and Fiber optic cable in networking- simplex, half-duplex and full-duplex communication- definition of bandwidth and throughput of a physical medium- three types of switching techniques used in networking - circuit switching

UNIT 6: Demonstrate advancedWireless Communication System**Duration: 14Periods (L: 11– T: 3)**

Limitations of conventional mobile phone system- Evolution of cellular mobile communication system- mobile station and base station- functions of Mobile switching centre (MSC)- channels in mobile communication- voice and control channels in mobile communication- features of various mobile radio systems around the world- simplex- half duplex and full duplex channels-

frequency division duplex (FDD) and time division duplex (TDD)- uplink and downlink channels in mobile communication- block diagram of a basic cellular system.

Recommended Books

1. Mobile Cellular Telecommunications by William C.Y. Lee
2. Satellite Communication by Martin
3. Communication systems by Simon Hwikins
4. Electronic Communication Systems by Blake
5. Wireless communication Systems by William shallings
6. Fiber Optic Communication by Gover

Suggested E-Learning references

1. <http://electrical4u.com/>
2. www.electronics-tutorials.ws
3. www.nptel.ac.in

Suggested Learning Outcomes

1.0 Communication Systems

- 1.1 Define communication system.
- 1.2 Explain Different blocks of communication system.
- 1.3 Define Modulation
- 1.4 State the need for Modulation in communication system.
- 1.5 Define amplitude modulation
- 1.6 Draw the waveform of AM wave
- 1.7 Define frequency modulation
- 1.8 Draw the waveform of FM wave
- 1.9 Define phase modulation
- 1.10 Classify different types of noise
- 1.11 Describe internal and external Noise

2.0 AM and FM Detectors / Receivers.

- 2.1 Define Demodulation
- 2.2 Explain the principle of TRF Receiver
- 2.3 Identify the need for heterodyning in a Radio Receiver.
- 2.4 Draw the block diagram of super heterodyne Receiver.
- 2.5 State the need of RF & IF amplifier stages.
- 2.6 Define Selectivity, Sensitivity and fidelity.
- 2.7 Explain basic principle of AM detector

- 2.8 Explain basic principle of FM detector.
- 2.9 Draw and explain diode detector (Envelope detector) circuit.
- 2.10 List FM demodulator circuits.
- 2.11 Draw and Explain Fosters – Seely Demodulator.

3.0 Digital Modulation

- 3.1 Define ASK
- 3.2 Explain ASK modulator with block diagram.
- 3.3 Define FSK and PSK
- 3.4 Compare ASK, FSK and PSK
- 3.5 List the Multiplexing techniques
- 3.6 Explain FDM and TDM with neat sketches.
- 3.7 Explain the principle of Pulse modulation.
- 3.8 List the different types of pulse modulation methods.
- 3.9 Sketch the waveforms of PAM, PPM, PWM and PCM.
- 3.10 Compare PAM, PPM, PWM and PCM methods
- 3.11 List the applications of the above four types of modulation.

4.0 Modern Communication System

- 4.1 Define Radar.
- 4.2 State the basic principle of Radar with a block diagram.
- 4.3 Derive the basic Radar range equation.
- 4.4 List the applications of various Radar systems.
- 4.5 State the need for satellite communication
- 4.6 List the advantages of satellite communication over terrestrial radio communication.
- 4.7 List the applications of satellites
- 4.8 Explain the working principle of transmitter and Receivers used in fiber optic communication system.
- 4.9 Explain the use of fibres in local telephone and cable TV (FTTH)

5.0 Computer Communication

- 5.1 Define data communication
- 5.2 State the need for data communication networking.
- 5.3 Distinguish between analog and digital data.
- 5.4 Define computer network and state its uses.
- 5.5 Draw the ISO: OSI architecture
- 5.6 Explain the function of each layer.
- 5.7 List the different types of physical transmission media.
- 5.8 Explain the use of UTP, STP, Coaxial and Fiber optic cable in networking.
- 5.9 List the various communication methods
- 5.10 Define simplex, half-duplex and full-duplex communication.
- 5.11 Define bandwidth and throughput of a physical medium.
- 5.12 List the three types of switching techniques used in networking.
- 5.13 Explain about circuit switching

6.0 Demonstrate advanced Wireless Communication System

- 6.1 List the limitations of conventional mobile phone system.
- 6.2 Evolution of cellular mobile communication system.
- 6.3 Define the terms mobile station and base station
- 6.4 State the functions of Mobile Switching Centre (MSC)
- 6.5 List various channels in mobile communication
- 6.6 Define voice and control channels in mobile communication
- 6.7 List the features of various mobile radio systems around the world
- 6.8 Distinguish between Frequency Division Duplex (FDD) and Time Division Duplex (TDD).
- 6.9 Define uplink and downlink channels in mobile communication
- 6.10 Draw the block diagram of a basic cellular system.

Suggested Student Activities

1. Student visits Library to refer to Manual of electronic components to find their specifications
2. Student inspects the available equipment in the Lab to identify the components
3. Visit nearby Industry to familiarize with communication systems like
 - i) TV Station
 - ii) FM Radio Station
 - iii) Telephone exchange office
4. Analyze the connections and channels, cables available in the Institution facility
5. Quiz
6. Group discussion
7. Surprise test

CO-PO Mapping Matrix

	Basic knowledge	Discipline Knowledge	Experiments and practice	Engineering Tools	Engineer and society	Environment & sustainability	Ethics	Individual and Team work	Communication	Lifelong learning	Linked PO
CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	
CO1	2	2								2	1,2,10
CO2	2	2			2	2					1,2,5,6
CO3	2	2		2	2						1,2,4,5

CO4	2	2			2		2				1,2,5,7
CO5	2	2		2	2			2			1,2,4,5,8
CO6	2	2	2					2			1,2,3,8

Internal evaluation

Test	Units	Marks
Mid Sem 1	1 and 2	20
Mid Sem 2	3 and 4	20
Slip Test 1	1 and 2	5
Slip Test 2	3 and 4	5
Assignment	1	5
Seminars	1	5
	Total	60

QUESTION PAPER PATTERN FOR MID SEMESTER EXAMS

Sl.No	Description	Level	No of Questions	Marks for each question	Choice	Total Marks
01	Part-A	Remembering(R)	4	1	Nil	4 Marks
02	Part-B	Understanding(U)	4	3	2	6 Marks
03	Part-C	Application(A)	4	5	2	10 Marks
Total Marks						20 Marks

MID SEM-I EXAM

S.No	Unit No	R	U	A	Remarks
1	Unit-I	1,2	5(a)	7(a)	
			5(b)	7(b)	
2	Unit-II	3,4	6(a)	8(a)	
			6(b)	8(b)	
Total Questions		4	4	4	

MID SEM-II EXAM

S.No	Unit No	R	U	A	Remarks
1	Unit-III	1,2	5(a)	7(a)	
			5(b)	7(b)	
2	Unit-IV	3,4	6(a)	8(a)	
			6(b)	8(b)	
Total Questions		4	4	4	

The length of answer for each question framed in respect of Part-A, B&C shall not exceed $\frac{1}{4}$ of a page, 1 page and 2 pages respectively

QUESTION PAPER PATTERN FOR SEMESTER END EXAM

Sl.No	Description	Level	No of Questions	Marks for each question	Choice	Total Marks
01	Part-A	Remembering(R)	8	1	Nil	8 Marks
02	Part-B	Understanding(U)	8	3	4	12 Marks
03	Part-C	Application(A)	8	5	4	20 Marks
Total Marks						40 Marks

Unit No	Questions to be set for SEE				
	R		U	A	
I	Q4	Q1		Q9(a)	Q13(a)
II					
III		Q2		Q10(a)	Q14(a)
IV					
V		Q3	Q5,Q6	Q9(b), Q11(a), Q11(b)	Q13(b), Q15(a), Q15(b)
VI					
Total Questions	8		8	8	

Model Question Paper
BOARD DIPLOMA MID-SEMESTER EXAMINATIONS (C-18)
DEIE - V SEMESTER EXAMINATION
COMMUNICATION ENGINEERING (18EI-505E (B))

TIME: 1 Hour

MAXIMUM MARKS: 20

PART –A

Instructions: Answer all the questions. Each question carries one mark. MARKS: 4X1 =4

- a. Define Modulation.
- b. Draw the waveform of FM wave.
- c. Define demodulation?
- d. State the need of RF in amplifier stages

PART –B

Instructions: Answer two questions. Each question carries three marks. MARKS: 2X3 =6

- 5. (a) State the need for Modulation in communication system.
(or)
- 5. (b) Classify different types of Noise.
- 6. (a) Draw and explain diode detector (envelope detector) circuit.
(or)
- 6. (b) Draw the block diagram of super heterodyne Receiver.

PART –C

Instructions: Answer two questions. Each question carries five marks MARKS: 2X5 =10

- 7. (a) Describe internal and external Noise.
(or)
- 7. (b) Explain different blocks of communication system.
- 8. (a) Explain basic principle of AM and FM detector.
(or)
- 8. (b) Explain the principle of TRF Receiver.

Model Question Paper
BOARD DIPLOMA MID-SEMESTER EXAMINATIONS (C-18)
DEIE - V SEMESTER EXAMINATION
COMMUNICATION ENGINEERING (18EI-505E (B))

TIME: 1 Hour

MAXIMUM MARKS: 20

PART –A

Instructions: Answer all the questions. Each question carries one mark MARKS: 4X1 =4

1. List the applications of the PPM.
2. List different types of pulse modulation methods.
3. List the applications of various Radar systems.
4. List the advantages of satellite communication.

PART –B

Instructions: Answer two questions. Each question carries three marks. MARKS: 2X3 =6

5. (a) Explain the principle of pulse modulation.
(or)
5. (b) Compare PWM and PCM methods.
6. (a) Explain the working principle of transmitter and Receivers used in fiber optic Communication system.
(or)
6. (b) State the basic principle of Radar with a block diagram.

PART –C

Instructions: Answer two questions. Each question carries five marks MARKS: 2X5 =10

7. (a) Explain FDM with neat sketches.
(or)
7. (b) Explain ASK Modulator with block diagram.
8. (a) Explain the use of fibres in local telephone and cable T.V (FTTH).
(or)
8. (b) Derive the basic Radar range equation.

Model Question Paper
BOARD DIPLOMA END-SEMESTER EXAMINATIONS (C-18)
DEIE - V SEMESTER EXAMINATION
COMMUNICATION ENGINEERING (18EI-505E (B))

TIME: 2Hours

MAXIMUM MARKS: 40

PART –A

Instructions: Answer all the questions. Each question carries one mark. MARKS: 8X1 =8

1. Define communication system.
2. Define demodulation?
3. Define simplex.
4. State the need of RF Amplifier stage.
5. Define data communication.
6. Define computer network and state its use.
7. List the limitations of conventional mobile phone system.
8. List various channels in mobile communication.

PART –B

Answer FOUR questions

4 x3 = 12

9. (a) Explain Different blocks of communication system.
(or)
9. (b) Explain about circuit switch.
10. (a) Compare between PAM, PPM, PWM and PCM.
(or)
10. (b) List the limitations of conventional mobile phone system.
11. (a) Distinguish between analog and digital data.
(or)
11. (b) State the need for Data communication networking.
12. (a) State the functions of Mobile switching centre (MSC).
(or)
12. (b) Define terms Mobile station and Base station.

PART –C

Answer FOUR questions

4 x 5 = 20

13. (a) Draw and Explain Fosters – Seely Demodulator.

(or)

13. (b) Draw the ISO: OSI 7 layer architecture and explain the function of each layer.

14. (a) Explain ASK modulator with block diagram.

(or)

14. (b) Distinguish between frequency division duplex (FDD) and time division duplex (TDD).

15. (a) Explain the use of UTP, STP in networking.

(or)

15. (b) Explain about Half duplex and Full duplex communication.

16. (a) State the functions of Mobile switching centre (MSC).

(or)

16. (b) Write about Evolution of cellular mobile communication system.

MATLAB & Virtual Instrumentation Lab Practice

Course Title :	MATLAB & Virtual Instrumentation Lab Practice	Course Code	18EI-506P
Semester	V	Course Group	Practical
Teaching Scheme in Hrs(L:T:P)	15:0:30	Credits	1.5
Methodology	Lecture + Practicals	Total Contact Hours :	45
CIE	60 Marks	SEE	40 Marks

Pre requisites

This course requires the basic knowledge of Mathematics and Virtual Instrumentation software environment- Lab view basics.

Course Outcomes

CO1 :	Able to get familiarize with MATLAB environment and its programming fundamentals
CO2 :	Ability to write Programs using data types
CO3 :	Able to write Programs using control structures
CO4 :	Able to write Programs using Input-Output functions
CO5 :	Able to write Programs using Vectors and Matrices
CO6 :	Able to use the new concept in measurement and automation.
CO7 :	Able to control an external measuring device by interfacing a computer
CO8 :	Able to use the Components in data acquisition and instrument control.

Course Content and Blue Print

Unit No	Unit name	Periods
1.	Familiarize with Mat lab environment	05
2	Mat lab Data types	05
3	Mat lab Control structures	06
4	Mat lab Input-Output functions	05
5.	Mat lab Vectors and Matrices	06
6	Lab View basics	09
7	Debugging	06
8	VI tool set	03
	Total:	45

Course Contents

1. Familiarize with Mat lab environment : Duration:5Periods(L:2– P:3)

Practicing MATLAB environment with simple exercises to familiarize Command Window, History, workspace, Current Directory, Figure window, Edit window, Shortcuts, Help files.

2. Mat lab Data types : Duration:5Periods(L:2– P:3)

Simple exercises to familiarize Data types, Constants and Variables, Character constants, operators, Assignment statements.

3. Mat lab Control structures : Duration:6Periods(L:2– P:4)

Simple exercises to familiarize Control Structures: For loops, While, If control structures, Switch, Break, Continue statements.

4. Mat lab Input-Output functions : Duration:5Periods(L:2– P:3)

Simple exercises to familiarize Input-Output functions, Reading and Storing Data.

5. Mat lab Vectors and Matrices :

Duration:6Periods(L:2– P:4)

Simple exercises to familiarize Vectors and Matrices, commands to operate on vectors and matrices, matrix Manipulations.

6. Lab View basics

- a) To familiarize with Virtual Instrumentation software Environment –Lab View.
- b) To practice Lab View Editing Techniques.
- c) To implement a VI to convert Degree Celsius to Fahrenheit.
- d) To implement Logic gates using Lab View.
- e) To construct basic ON-OFF control.

7. Debugging

- a) To practice debugging features of Lab View.
- b) To implement VI with two blinking indicator lights with a delay of two seconds.
- c) To create a case structure using Switch.
- d) To create a simple calculator using Lab view.

8. VI tool set

- a) To practice working with VI tool set.
- b) To create a program to plot data stored in an array.
- c) To use a While Loop and a chart for acquiring and displaying data in real time.

Reference books

1. Gary Johnson, Lab VIEW Graphical Programming, 2nd edition, McGraw Hill, Newyork, 1997.
2. Lisa K. wells & Jeffrey Travis, Lab VIEW for everyone, Prentice Hall, New Jersey, 1997.
3. Jerome J., Virtual Instrumentation using Lab VIEW, Prentice Hall India Private Ltd., New Delhi,2010.
4. Kevin James, PC Interfacing and Data Acquisition: Techniques for Measurement, Instrumentation and Control, Newnes, 2000.
5. Sanjay Gupta, Virtual Instrumentation using Lab view, Tata McGraw-Hill Education, 2010.
6. Bansal. R.K, Goel. A.K,Sharma. M.K, “MATLAB and its Applications in Engineering”, Pearson Education, 2012.
7. Amos Gilat, “MATLAB-An Introduction with Applications”, Wiley India, 2009. 3
8. Stephen.J, & Chapman, “Programming in MATLAB for Engineers”, Cengage Learning, 2011.

1. <http://www.ni.com>

Suggested Student Activities

The student should be able to

1. Do Market survey on different Virtual Lab Software available in the market and collect the information and compare. The student should submit a handwritten report. Documents have to be maintained as a record.
2. Take Quiz tests / assignments on lab experiments. Documents have to be maintained as a record.
3. Design a Level measurement VI with simulated sensor input (4 mA to 20 mA) that raises an alarm when the level crosses a fixed (user defined) limit.
4. Use Data Acquisition in LabVIEW - Acquiring analog signal from a function generator through NI-USB-6210 into LabVIEW using DAQ Assistant Express VI.
5. Plot Dynamic Characteristics of a Spring-Mass Damper system using control Design & simulation module.

CO-PO Mapping Matrix

Course Outcome		CL	Linked PO	Teaching periods
CO1	Able to get familiarize with MATLAB environment and its programming fundamentals	R/U	1,3,10	05
CO2	Ability to write Programs using data types	R/U/A	1,2,10	05
CO3	Able to write Programs using control structures	R/U/A	1,2,3,7,10	06
CO4	Able to write Programs using Input-Output functions	R/U/A	1,3,4,8,10	05
CO5	Able to write Programs using Vectors and Matrices	R/U/A	1,2,3,4,7,8,10	06
CO6	Able to use the new concept in measurement and automation.	R/U	1,2,3,4,8,10	12
CO7	Able to control an external measuring device by interfacing a computer.	R/U/A	1,2,3,4,8,10	12
CO8	Able to use the Components in data acquisition and instrument control.	R/U/A	1,2,3,4,8,10	12
Total				45

Internal Evaluation

Test	Units	Marks
Mid Sem 1	1, 2 ,3,4	20
Mid Sem 2	5,6,7,8	20
Internal Evaluation	Attendance (5) Attitude of students towards practicing experiments (10) Prompt submission of records in time (5)	20
	Total	60

MODEL QUESTION PAPER

BOARD DIPLOMA MID-SEMESTER-I EXAMINATION (C-18)

DEIE- V SEMESTER EXAMINATION

18EI-506P – MATLAB and Virtual Instrumentation Lab Practice

Time: 1hr.

Max Marks: 20

Instructions to the Candidate:

(i) Answer any One of the following Questions.

(ii) Record the results on a graph sheet if required, and conclude your observation of the experiment

(iii) Draw the circuit diagram for illustration; choose appropriate values when not mentioned in the question

1. Create a Simple Matlab script file to assign the values of 3 and 4 to the variables x and y, respectively, then calculate the value of z where $z = 2x - 7y$.
2. Create a Simple Matlab script file to Perform the multiple operations $(15 - 4 + 12)/5 - 2*(7^4)/100$.
3. Create a Simple Matlab script file to solve the quadratic equation $x^2 - 7x + 12 = 0$.
4. Create a Simple Matlab script file to Generate the row vector x with integer values ranging from 1 to 9.
5. Create a Simple Matlab script file to compute the factorial of 7.
6. Generate the following rectangular matrix in MATLAB. What is the size of this matrix?

$$A = \begin{bmatrix} 3 & 0 & -2 \\ 1 & 3 & 5 \end{bmatrix}$$

7. Create a Simple Matlab script file to Combine the three vectors [1 3 0 -4], [5 3 1 0], and [2 2 -1 1] to obtain a new matrix of size 3x4.

MODEL QUESTION PAPER

BOARD DIPLOMA MID-SEMESTER-II EXAMINATION (C-18)

DEIE- V SEMESTER EXAMINATION

18EI-506P – MATLAB and Virtual Instrumentation Lab Practice

Time: 1hr.

Max Marks: 20

Instructions to the Candidate:

(i) Answer any One of the following Questions.

(ii) Record the results on a graph sheet if required, and conclude your observation of the experiment

(iii) Draw the circuit diagram for illustration; choose appropriate values when not mentioned in the question

1. Implement a VI to convert Degree Celsius to Fahrenheit.
2. Implement Logic gates using Lab View.
3. Construct basic ON-OFF control.
4. Implement VI with two blinking indicator lights with a delay of two seconds.
5. Create a case structure using Switch.
6. Create a simple calculator using Lab view

MODEL QUESTION PAPER

BOARD DIPLOMA SEMESTER END EXAMINATION (C-18)

DEIE V Semester Practical Examination

18EI-506P – MATLAB and Virtual Instrumentation Lab Practice

Course Code: 18EI-506P

Duration: 2 hours

Course Name: MATLAB and Virtual Instrumentation Lab Practice

Max.Marks:40

Instructions to the Candidate:

(i) Answer any One of the following Questions.

(ii) Record the results on a graph sheet if required, and conclude your observation of the experiment

(iii) Draw the circuit diagram for illustration; choose appropriate values when not mentioned in the question

1. Create a Simple Matlab script file to assign the values of 3 and 4 to the variables x and y, respectively, then calculate the value of z where $z = 2x - 7y$.
2. Create a Simple Matlab script file to Perform the multiple operations $(15 - 4 + 12)/5 - 2*(7^4)/100$.
3. Create a Simple Matlab script file to solve the quadratic equation $x^2 - 7x + 12 = 0$.
4. Create a Simple Matlab script file to Generate the row vector x with integer values ranging from 1 to 9.
5. Create a Simple Matlab script file to compute the factorial of 7.
6. Generate the following rectangular matrix in MATLAB. What is the size of this matrix?

$$A = \begin{bmatrix} 3 & 0 & -2 \\ 1 & 3 & 5 \end{bmatrix}$$

7. Create a Simple Matlab script file to Combine the three vectors [1 3 0 -4], [5 3 1 0], and [2 2 -1 1] to obtain a new matrix of size 3x4.
8. Implement a VI to convert Degree Celsius to Fahrenheit.
9. Implement Logic gates using Lab View.
10. Construct basic ON-OFF control.
11. Implement VI with two blinking indicator lights with a delay of two seconds.
12. Create a case structure using Switch.

INDUSTRIAL AUTOMATION LAB

Course Title :	INDUSTRIAL AUTOMATION LAB	Course Code	18EI-507P
Semester	V	Course Group	:Practical
Teaching Scheme in Periods(L:T:P)	15:0:30	Credits	: 3
Methodology	Lecture + Practicals	Total Periods :	:45 periods
CIE	60 Marks	SEE	40 Marks

Pre requisites

This course requires the basic knowledge of PLC and SCADA.

Course Outcomes

CO1 :	Analyze and test the Logic Gates.
CO2 :	Develop & Test the programs on Timer.
CO3 :	Develop & Test the programs on counters.
CO4 :	Develop and implement the PLC concepts with Applications.
CO5 :	Analyze, apply and observe the interfacing of PLC and SCADA.

Course Content and Blue Print

Unit No	Unit name	Periods
1.	Logic Gates	9
2.	Timer Programs	6
3.	Counter Programs	3
4	Applications	15
5	SCADA	12
	Total:	45

I. Logic Gates

1. Test the basic gates using PLC.
2. Test the universal gates using PLC.
3. Test the EX-OR gate and EX-NOR gates using PLC.

II. Timer Programs

1. Programs on ON-Delay Timer and OFF-Delay Timers.
2. Programs on Retentive and Non-Retentive Timers.

III. Counter programs

1. Programs on up counter.
2. Programs on down counters.

IV Applications

1. Star-Delta starter control using PLC
2. Lift control using PLC
3. Traffic light controller using PLC.
4. Conveyor controller using PLC.
5. Sequential control of Induction motors using PLC
6. Level control using PLC
7. Bottle filling using PLC timer

V. SCADA

1. Using SCADA software create graphic symbols and associate tags with memory tags.
2. Interface SCADA with PLC and associate tags with memory and I/O and operate the LC inputs through the switch symbol from the computer screen and view the status of the outputs using lamp and motor graphics symbols in the screen.

Reference books

1. Introduction to Programmable Logic Controllers by Garry Dunning, Thomson, 2nd edition, Thomson, ISBN: 981-240-625-5
2. Practical SCADA for Industry, David Bailey and Edwin Wright, Newnes An imprint of Elsevier, 2003, ISBN 07506 58053
3. Programmable Logic Controllers, JR Hackworth, Frederick , Pearson Education
4. Programmable Logic Controllers, W Bolton, Elsevier
5. Learning Programmable Logic Controllers with Applications, PK Srivastava, BPB Publications

Suggested e-Learning References

3. www.plcs.net
4. www.PLC.circuits-tutorials.ws

Suggested Student Activities

1. Student inspects the available equipment in the Lab to identify the components.
2. Visit nearby Industry to familiarize with automation using PLC/SCADA ex: Power stations, Cement Paper and Chemical Industries.

CO-PO Mapping Matrix

Course Outcome		CL	Linked PO	Teaching periods
CO1	Analyze and test the Logic Gates.	R/U	1,2,3,4,8,10	9
CO2	Develop & Test the programs on Timer.	R/U/A	1,2,3,4,8,10	6
CO3	Develop & Test the programs on counters.	R/U/A	1,2,3,4,8,10	3
CO4	Develop and implement the PLC concepts with Applications.	R/U/A	1,2,3,4,8,10	15
CO5	Analyze, apply and observe the interfacing of PLC and SCADA.	R/U/A	1,2,3,4,8,10	12
	Total			45

Internal Evaluation

Test	Units	Marks
Mid Sem 1	1, 2 and 3	20
Mid Sem 2	4,5	20
Internal Evaluation	Attendance (5) Attitude of students towards practicing experiments (10) Prompt submission of records in time (5)	20
	Total	60

MODEL QUESTION PAPER

BOARD DIPLOMA MID-SEMESTER-I EXAMINATION (C-18)

DEIE- V SEMESTER EXAMINATION

INDUSTRIAL AUTOMATION LAB (18EI-507P)

Time: 1 hrs.

Max Marks: 20

Instructions to the Candidate:

(i) Answer any One of the following Questions.

(ii) Record the results on a graph sheet if required, and conclude your observation of the experiment

(iii) Draw the circuit diagram for illustration; choose appropriate values when not mentioned in the question

1. Develop the ladder diagram to Test the basic gates using PLC
2. Develop the ladder diagram to Test the universal gates using PLC.
3. Develop the ladder diagram to Test the EX-OR gate and EX-NOR gates using PLC.
4. Develop the ladder diagram on ON-Delay Timer and OFF-Delay Timers
5. Develop the ladder diagram on Up counter counters
6. Develop the ladder diagram on Down counters
7. Develop the ladder diagram with PLC for Star Delta starter.

MODEL QUESTION PAPER

BOARD DIPLOMA MID-SEMESTER-II EXAMINATION (C-18)

DEIE- V SEMESTER EXAMINATION

INDUSTRIAL AUTOMATION LAB (18EI-507P)

Time: 1 hr.

Max Marks: 20

Instructions to the Candidate:

(i) Answer any One of the following Questions.

(ii) Record the results on a graph sheet if required, and conclude your observation of the experiment

(iii) Draw the circuit diagram for illustration; choose appropriate values when not mentioned in the question

1. Develop the ladder diagram with PLC for Lift control.
2. Develop the ladder diagram with PLC for Liquid level control.
3. Develop the ladder diagram with PLC for Bottle filling using timer. .
4. Develop the ladder diagram with PLC for Traffic light controller.
5. Develop the ladder diagram with PLC for Conveyor controller.
6. Develop the ladder diagram with PLC for Sequential control of Induction motors
7. Using SCADA software create graphic symbols and associate tags with memory Tags
8. Interface SCADA with PLC and associate tags with memory and I/O and operate the PLC inputs through the switch symbol from the computer screen and view the status of the outputs using lamp and motor graphics symbols in the screen

MODEL QUESTION PAPER
BOARD DIPLOMA SEMESTER END EXAMINATION (C-18)
DEIE- V SEMESTER EXAMINATION
INDUSTRIAL AUTOMATION LAB (18EI-507P)

Time: 2Hrs

Max Marks: 40

Instructions to the Candidate:

(i) Answer any One of the following Questions.

(ii) Record the results on a graph sheet if required, and conclude your observation of the experiment

(iii) Draw the circuit diagram for illustration; choose appropriate values when not mentioned in the question

1. Develop the ladder diagram to Test the basic gates using PLC
2. Develop the ladder diagram to Test the universal gates using PLC.
3. Develop the ladder diagram to Test the EX-OR gate and EX-NOR gates using PLC.
4. Develop the ladder diagram on ON-Delay Timer and OFF-Delay Timers
5. Develop the ladder diagram on Up counter counters
6. Develop the ladder diagram on Down counters
7. Develop the ladder diagram with PLC for Star Delta starter.
8. Develop the ladder diagram with PLC for Lift control.
9. Develop the ladder diagram with PLC for Liquid level control.
10. Develop the ladder diagram with PLC for Bottle filling using timer. .
11. Develop the ladder diagram with PLC for Traffic light controller.
12. Develop the ladder diagram with PLC for Conveyor controller.
13. Develop the ladder diagram with PLC for Sequential control of Induction motors
14. Using SCADA software create graphic symbols and associate tags with memory Tags
15. Interface SCADA with PLC and associate tags with memory and I/O and operate the PLC inputs through the switch symbol from the computer screen and view the status of the outputs using lamp and motor graphics symbols in the screen

Analytical & Biomedical Instrumentation Lab Practice

Course Title :	Analytical & Biomedical Instrumentation Lab Practice	Course Code	18EI-508P
Semester	V	Course Group	:Practical
Teaching Scheme in Periods(L:T:P)	15:0:30	Credits	: 1.5
Methodology	Lecture + Practicals	Total Periods :	:45
CIE	60 Marks	SEE	40 Marks

Pre requisites

This course requires the basic knowledge of Analytical and Biomedical Instruments.

Course Outcomes

CO1 :	Experiments are carried out for the application and usage of absorption and emission spectroscopy
CO2 :	Experiments are carried out for the application and usage of analyzers.
CO3 :	Experiments are carried out for the application and usage of gas chromatography.
CO4 :	Cardiovascular instrument is connected to the patient and measurements are taken and recorded.
CO5 :	Blood pressure measurement using sphygmomanometer.
CO6:	Experiments are carried out for the equipment for critical care and x-ray imaging.

Course Content and Blue Print

Unit No	Unit name	Periods
1.	Spectrophotometers	6
2.	Analyzers	6
3.	Chromatographic Technique	3
4	Cardiovascular instrument	6
5	Blood Pressure and Blood flow measurement	9
6	Critical care equipment and X-ray imaging	15
		45

Course Contents

6. Spectrophotometers Duration: 6Periods(L:2–P:4)

1. Identification of atoms and its concentration through absorption spectra with VIS Spectrophotometer.
2. Using UV Spectro Photo Meter, analyse the composition of the given sample.

7. Analyzers Duration: 6Periods(L:2–P:4)

3. Determining the refractive index of the given sample using refractometer.
4. Determination of percentage of oxygen using Paramagnetic gas analyzer.

8. Chromatographic technique Duration: 3Periods(L:1–P:2)

5. Separation of different constituents in a mixture of chemical using gas chromatography

9. Cardiovascular Instrument**Duration: 6Periods(L:2–****P:4)**

6. Concept of ECG system and placement of electrodes.

10. Blood Pressure and Blood flow Measurement**Duration: 9Periods(L:2–****P:7)**

7. Use of sphygmomanometer for measurement of blood pressure.
8. Use of Electromagnetic blood flow meter.

11. Critical care equipment and X-ray imaging**Duration:15Periods(L:3–****P:12)**

9. Study of DC Defibrillator.
10. Study of Pacemakers.
11. Study and Demonstration of X-ray-Machine.
12. Study of C.A.T scanner.

Suggested students Activities:

The student should be able to

6. Do Market survey on different Analytical and biomedical instruments available in the market and collect the information and compare. The student should submit a handwritten report. Documents have to be maintained as a record.
7. Take Quiz tests / assignments on lab experiments. Documents have to be maintained as a record.

Recommended Books

1. Handbook of Analytical Instrumentation, R.S. Khandpur, TMH.
2. Instrumental Method of Analysis- by Willard.H.H, Merit L.L,Dean,
3. Hand-book of Biomedical Instrumentation – by R.S. Khandpur, McGraw-Hill, 2003.
4. Medical Instrumentation, Application and Design – by John G. Webster, John Wiley.

CO-PO Mapping Matrix

	Basic knowledge	Discipline Knowledge	Experiments and practice	Engineering Tools	Engineer and society	Environment & sustainability	Ethics	Individual and Team work	Communication	Lifelong learning	Linked PO
CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	
CO1	2	2	2	2				2		2	1,2,3,4,8,10
CO2	2	2	2	2				2		2	1,2,3,4,8,10
CO3	2	2	2	2				2		2	1,2,3,4,8,10
CO4	2	2	2	2				2		2	1,2,3,4,8,10
CO5	2	2	2	2				2		2	1,2,3,4,8,10

Internal Evaluation

Test	Units	Marks
Mid Sem 1	1, 2 and 3	20
Mid Sem 2	4,5 and 6	20
Internal Evaluation	Attendance (5) Attitude of students towards practicing experiments (10) Prompt submission of records in time (5)	20
	Total	60

Course Code: 18EI-508P

Duration: 1 hour

Course Name: Analytical and Biomedical Instrumentation Lab Practice

Max.Marks:20

Instructions to the Candidate:

(i) Answer any One of the following Questions.

(ii) Record the results on a graph sheet if required, and conclude your observation of the experiment

(iii) Draw the circuit diagram for illustration; choose appropriate values when not mentioned in the question

1. Identify the atoms and mention their concentrations using visible spectrophotometer.
2. Using UV Spectro Photo Meter, analyse the composition of the given sample.
3. Determining the refractive index of the given sample using refractometer.
4. Determination of percentage of oxygen using Paramagnetic gas analyser.

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Semester Mid-2 Examination Model Question paper

DEIE V Semester Practical Examination

Course Code: 18EI-508P

Duration: 1 hour

Course Name: Analytical and Biomedical Instrumentation Lab Practice

Max.Marks:20

Instructions to the Candidate:

(i) Answer any One of the following Questions.

(ii) Record the results on a graph sheet if required, and conclude your observation of the experiment

(iii) Draw the circuit diagram for illustration; choose appropriate values when not mentioned in the question

1. Separation of different constituents in a mixture of chemical using gas chromatography
2. Concept of ECG system and placement of electrodes.
3. Use of sphygmomanometer for measurement of blood pressure.
4. Use of Electromagnetic blood flow meter.

State Board of Technical Education and Training, Telangana

Semester End Examination Model Question paper

DEIE V Semester Practical Examination

Course Code: 18EI-508P

Duration: 2 hours

Course Name: Analytical and Biomedical Instrumentation Lab Practice

Max.Marks:40

Instructions to the Candidate:

(i) Answer any One of the following Questions.

(ii) Record the results on a graph sheet if required, and conclude your observation of the experiment

(iii) Draw the circuit diagram for illustration; choose appropriate values when not mentioned in the question

1. Identify the atoms and mention their concentrations using visible spectrophotometer.
2. Using UV Spectro Photo Meter, analyse the composition of the given sample.
3. Determining the refractive index of the given sample using refractometer.
4. Determination of percentage of oxygen using Paramagnetic gas analyser.
5. Separation of different constituents in a mixture of chemical using gas chromatography
6. Concept of ECG system and placement of electrodes.
7. Use of sphygmomanometer for measurement of blood pressure.
8. Use of Electromagnetic blood flow meter.
9. Study of DC Defibrillator.
10. Study of Pacemakers.
11. Study and Demonstration of X-ray-Machine.
12. Study of C.A.T scanner.

PROGRAMMING IN C LAB PRACTICE

Course Title :	Programming in C lab practice	Course Code	18EI-509P
Semester	V	Course Group	Practical
Teaching Scheme in Periods(L:T:P)	15:0:30	Credits	1.5
Methodology	Lecture + Practical	Total Contact Hours :	45 Periods
CIE	60 Marks	SEE	40 Marks

Pre requisites

Basic knowledge of Computer Operation.

Course outcomes

Course Outcome	
CO1	Write programs using input/output statements, variables and operators
CO2	Work on Constants, Variables, Data Types, Operators and Expressions in C
CO3	Construct programs on Decision making and Looping statements.
CO4	Develop programs using arrays, Strings and structures

Course Content

1. Programming Methodology and Introduction to C Language

Duration: 5 Periods

Program - Define High level language and low level language-history of C language - importance of C language – Define & Differentiate Compiler, Assembler - structure of C language - programming style of C language - steps involved in executing the C program

2. Understand Constants, Variables and Data Types in C and Understand Operators and Expressions in C

Duration: 15 Periods

Character set - C Tokens - Keywords and Identifiers- Constants and Variables - data types and classification - declaration of a variable - Assigning values to variables - Define an operator - Define an expression -Classify operators - List and explain various arithmetic operators with examples -Illustrate the concept of relational operators - List logical operators - various assignment operators - Increment and decrement operators - Conditional operator - List bitwise operators -List various special operators- Arithmetic expressions- precedence and associativity of operators- Evaluation of expressions - formatted input and output.

3. Decision making and Looping statements

Duration: 10 Periods

Simple if statement with sample program – if else statement – else if statement – switch statement
- Classification of various loop statements- while statement – do-while statement - for loop statement - break and continue statements.

4. Arrays and Structures Periods

Duration: 15

Arrays - declaration and initialization of One Dimensional - Accessing elements in the Array - Declaration and initialization of two Dimensional Arrays - sample programs on matrix addition and matrix multiplication –Strings – String handling functions - Declaration of a Structure – Structure members – Array of structures.

Course Outcome		CL	Linked PO	Teaching Hours
CO1	Write programs using input/output statements, variables and operators	R, U, A	1,2,3,4,8,9,10	5
CO2	Work on Constants, Variables, Data Types, Operators and Expressions in C	R, U, A	1,2,3,4,8,9,10	15
CO3	Construct programs on Decision making and Looping statements.	R,U, A	1,2,3,4,8,9,10	10
CO4	Develop programs using arrays, Strings and structures	U, A	1,2,3,4,8,9,10	15
			Total Sessions	45

REFERENCE BOOKS

1. Let Us C -- Yeshwanth Kanetkar BPB Publications
2. Programming in ANSI C -- E. Balaguruswamy Tata McGrawHill
3. Programming with C -- Gottfried Schaum's outline
4. C The complete Reference -- Schildt Tata McGraw Hill

List of Experiments

1. Exercise on structure of C program
2. Exercise on Keywords and identifiers
3. Exercise on constants and variables
4. Execution of simple C program
5. Exercise on operators and expressions
6. Exercise on special operators
7. Exercise on input and output of characters
8. Exercise on formatted input and output
9. Exercise on simple if statement
10. Exercise on if else statement

11. Exercise on else if ladder statement
12. Exercise on switch statement
13. Exercise on conditional operator
14. Exercise on while statement
15. Exercise on for statement
16. Exercise on do...while statement
17. Exercise on one dimensional arrays
18. Exercise on two dimensional arrays
19. Exercise on string handling functions.
20. Exercise on structure
21. Exercise on array of structures

PROJECT WORK

Course Title :	Project Work	Course Code	18EI-510P
Semester	V	Course Group	:Practical
Teaching Scheme in Periods(L:T:P)	15:0:30	Credits	: 1.5
Methodology	Lecture + Practical	Total Periods :	:45
CIE	60 Marks	SEE	40 Marks

S. No	Subject	Items	Max Marks
1	PROJECT WORK	1. project work I spell (Abstract submission)	20
		2. project work II spell (Final submission)	20
		3.a) Maintenance of Log Book	10
		b) Record work	10
		4.a) Seminar	20
		b) Viva Voce	20
TOTAL			100

The Project work carries 100 marks and pass marks is 50% of the Total marks.If a candidate failing to secure the minimum marks should repeat the Project work.

STUDENT ACTIVITY SHEET FOR SKILL UP GRADATION

The activity should be graded as

Excellent: 5 Marks, Good: 4 Marks, Satisfactory: 3 Marks, Needs improvement: 2 Marks, Unsatisfactory: 1 Mark

Note:

(1) Along with every activity the rubrics table should be given to the student for his information about the criterion of assessment.

(2) As a record of the activity at least Rubric sheet for each student For every activity at least Rubric sheet for each student as be preserved as a document.

RUBRICS MODEL – Group activity like Mini Project

RUBRICS FOR ACTIVITY(5 Marks)						
Dimension	Unsatisfactory	Developing	Satisfactory	Good	Excellent	Student Score
	<u>1</u>	<u>2</u>	<u>3</u>	<u>4</u>	<u>5</u>	
Collection of data	Does not collect any information relating to the topic	Collects very limited information; some relate to the topic	Collect much information; but very limited relate to the topic	Collects some basic information; most refer to the topic	Collects a great deal of information; all refer to the topic	Ex: 4
Fulfill team's roles & duties	Does not perform any duties assigned to the team role	Performs very little duties but unreliable.	Performs very little duties	Performs nearly all duties	Performs all duties of assigned team roles	<u>5</u>
Shares work equally	Always relies on others to do the work	Rarely does the assigned work; often needs reminding	Usually does the assigned work; rarely needs reminding	Normally does the assigned work	Always does the assigned work without having to be reminded	<u>3</u>
Listen to other Team mates	Is always talking; never allows anyone else to speak	Usually does most of the talking; rarely allows others to speak	Talks good; but never show interest in listening others	Listens, but sometimes talk too much	Listens and speaks a fair amount	<u>2</u>
Average / Total marks=(4+5+3+2)/4=14/4=3.5=4						

Rubrics assessment for Power point presentations

ELEMENT	Exemplary	Proficient	Partially Proficient	Unsatisfactory	POINTS
Research and Note Taking	3 points	2 points	1 point	0 points	___/3
	Accurately researched a variety of information sources recorded and interpreted significant facts, meaningful graphics, and evaluated alternative points of view.	Recorded relevant information from multiple sources of information evaluated and synthesized relevant information.	Misinterpreted statements, graphics and questions and failed to identify relevant arguments.	Recorded information from four or less resources did not find graphics and ignored alternative points of view.	
Presentation planning	3 points	2 points	1 point	0 points	___/3
	the slide presentation structure with thumbnail sketches of each slide including: title of slide, text, background color, placement & size of graphic, fonts - color, size, type for text and headings. All slides are numbered, and there is a logical sequence to the presentation.	The thumbnail sketches on the topic include titles and text for each slide and are in sequential order.	The thumbnail sketches on the topic are not in a logical sequence and have incomplete information.	There a very few thumbnail sketches on the topic and do not provide an overview of the presentation.	
Introduction	3 points	2 points	1 point	0 points	___/3
	The introduction presents the overall topic and draws the audience into the presentation with compelling questions or by relating to the audience's	The introduction is clear and coherent and relates to the topic.	The introduction shows some structure but does not create a strong sense of what is to follow. May be overly detailed or	The introduction does not orient the audience to what will follow. The sequencing is unclear and does not	

	interests or goals.		incomplete and is somewhat appealing to the audience.	appear interesting or relevant to the audience.	
Content	3 points	2 points	1 point	0 points	___/3
	<p>The content is written clearly and concisely with a logical progression of ideas and supporting information.</p> <p>The project includes motivating questions and advanced organizers. The project gives the audience a clear sense of the main idea.</p> <p>Information is accurate, current and comes mainly from * primary sources.</p>	<p>The content is written with a logical progression of ideas and supporting information.</p> <p>Includes persuasive information from reliable sources.</p>	<p>The content is vague in conveying a point of view and does not create a strong sense of purpose.</p> <p>Includes some persuasive information with few facts.</p> <p>Some of the information may not seem to fit.</p> <p>Sources used appear unreliable.</p>	<p>The content lacks a clear point of view and logical sequence of information.</p> <p>Includes little persuasive information and only one or two facts about the topic.</p> <p>Information is incomplete, out of date and/or incorrect.</p> <p>Sequencing of ideas is unclear.</p>	
Text	3 points	2 points	1 point	0 points	___/3
	<p>The fonts are easy to read and point size varies appropriately for headings and text.</p> <p>Use of italics, bold, and indentations enhances readability.</p> <p>Text is appropriate in length for the target audience and to the point.</p>	<p>Sometimes the fonts are easy to read, but in a few places the use of fonts, italics, bold, long paragraphs, color or busy background detracts and does not enhance readability.</p>	<p>Overall readability is difficult with lengthy paragraphs, too many different fonts, dark or busy background, overuse of bold or lack of appropriate indentations of text.</p>	<p>The text is extremely difficult to read with long blocks of text and small point size of fonts, inappropriate contrasting colors, poor use of headings, subheadings, indentations, or bold formatting.</p>	

	The background and colors enhance the readability of text.				
Layout	3 points	2 points	1 point	0 points	___/3
	The layout is visually pleasing and contributes to the overall message with appropriate use of headings, subheadings and white space.	The layout uses horizontal and vertical white space appropriately.	The layout shows some structure, but appears cluttered and busy or distracting with large gaps of white space or uses a distracting background.	The layout is cluttered, confusing, and does not use spacing, headings and subheadings to enhance the readability.	
Graphics, and/or Animation	3 points	2 points	1 point	0 points	___/3
	<p>The graphics, and/or animation assist in presenting an overall theme and enhance understanding of concept, ideas and relationships.</p> <p>Original images are created using proper size and resolution, and all images enhance the content.</p> <p>There is a consistent visual theme.</p>	<p>The graphics, /and or animation visually depict material and assist the audience in understanding the flow of information or content.</p> <p>Original images are used.</p> <p>Images are proper size, resolution.</p>	<p>Some of the graphics, and/or animations seem unrelated to the topic/theme and do not enhance the overall concepts.</p> <p>Most images are clip art or recycled from the internet.</p> <p>Images are too large/small in size.</p> <p>Images are poorly cropped or the color/resolution is fuzzy.</p>	<p>The graphics, and/or animations are unrelated to the content.</p> <p>Graphics do not enhance understanding of the content, or are distracting decorations that create a busy feeling and detract from the content.</p>	
Writing Skills	3 points	2 points	1 point	0 points	___/3
	The text is written with no	The text is clearly written	Spelling, punctuation,	Errors in spelling,	

	errors in grammar, capitalization, punctuation, and spelling.	with little or no editing required for grammar, punctuation, and spelling.	and grammar errors distract or impair readability. (three or more errors)	capitalization, punctuation, usage and grammar repeatedly distract the reader, and major editing and revision is required. (more than five errors)	
TOTAL POINTS					___ /24