

# CHATTISGARH SWAMI VIVEKANAND TECHNICAL UNIVERSITY, BHILAI

## COURSE OF STUDY AND SCHEME OF EXAMINATION OF DIPLOMA PROGRAM IN ELECTRICAL ENGINEERING

### SEMESTER – IV

S No.	Board of Study	Subject Code	Subject	Period per week			Scheme of Examination					Total Marks	Credit L+(T+P)/2
							Theory			Practical			
				L	T	P	ESE	CT	TA	ESE	TA		
1	Electrical	224411 (24)	Electrical Measurements and Measuring Instruments	4	1	-	100	20	10	-	-	130	5
2	Electrical	224412 (24)	Electrical Machines -I	4	1	-	100	20	10	-	-	130	5
3	Electrical	224413 (24)	Generation Transmission & Distribution	4	1	-	100	20	10	-	-	130	5
4	Mechanical	200415 (37)	Industrial Management	4	-	-	100	20	10	-	-	130	4
5	Electronics	224415 (28)	Digital Electronics	4	1	-	100	20	10	-	-	130	5
6	Electrical	224421 (24)	Electrical Measurements and Measuring Instruments Lab	-	-	3	-	-	-	50	20	70	2
7	Electrical	224422 (24)	Electrical Machines -I Lab	-	-	3	-	-	-	50	20	70	2
8	Electrical	224423 (24)	Generation Transmission & Distribution Lab	-	-	2	-	-	-	50	20	70	1
9	Electronics	224424 (28)	Digital Electronics Lab	-	-	2	-	-	-	50	20	70	1
10	Electrical	224425 (24)	Mini Project	-	-	2	-	-	-	50	20	70	1
<b>Total</b>				<b>20</b>	<b>4</b>	<b>12</b>	<b>500</b>	<b>100</b>	<b>50</b>	<b>250</b>	<b>100</b>	<b>1000</b>	<b>31</b>

L-Lecture

ESE-End Semester Exam

T-Tutorial

CT-Class Test

P- Practical

TA-Teachers Assessment

**Note :** Industrial Training of 4 weeks will be carried out in summer vacation, after the completion of 4<sup>th</sup> semester, and evaluation will be done in fifth semester

**CHHATTISGARH SWAMI VIVEKANAND TECHNICAL UNIVERSITY,  
BHILAI**

**SEMESTER** : **IV**  
**SUBJECT TITLE** : **ELECTRICAL MEASUREMENT AND  
MEASURING INSTRUMENTS**  
**CODE** : **224411 (24)**  
**BRANCH DISCIPLINE** : **ELECTRICAL ENGINEERING**  
**TEACHING AND EXAMINATION SCHEME**

Course code	Teaching scheme (Hrs./week)				Scheme of Examination						Credit L + $\frac{(T+P)}{2}$
	L	T	P	Total Hours	Theory			Practical		Total Marks	
					ESE	CT	TA	ESE	TA		
224411 (24)	4	1	-	5	100	20	10			130	5
224421 (24)	-	-	3	3	-	-	-	50	20	70	2

**1. DISTRIBUTION OF MARKS AND HOURS:**

SL NO.	Chapter No.	Chapter Name	Hours	Marks
1	1	Introduction to Measurement	4	5
2	2	Basic Concepts of Electrical Measuring Instruments	10	13
3	3	Current Measurement and Voltage Measurement	10	12
4	4	Power Measurement and Energy Measurements	12	15
5	5	Measurement of other Electrical Quantities	12	15
6	6	A.C. Bridges	12	12
7	7	Magnetic Measurement	6	10
8	8	Dielectric Measurement	6	10
9	9	Cathode Ray Oscilloscope	8	10
		<b>TOTAL</b>	<b>80</b>	<b>100</b>

**RATIONALE**

This course is under basic technology group is intended to enable the student understand the facts, concepts, principles and test procedure of the measurement of electrical quantities and circuit parameters and also the circuits analysis. This course will also help to build in the student the analytical skills that will enable him/her in doing and guiding, estimating investigation which in turn will help him/her to discharge the role as a supervisor or as a entrepreneur.

## 2. DETAILED COURSE CONTENTS

### Chapter – 1 Introduction to Measurement

- ?? Measuring systems
- ?? Requirements
- ?? Classification of measuring instruments (Indicating, recording & Integrating types)
- ?? Accuracy, sensitivity ammeter Types of errors

### Chapter – 2 Basic Concepts of Electrical Measuring Instruments

- ?? Necessity of different torques and arrangement of torque producing system
- ?? General description of PMMC, moving iron, induction type, dynamometers type instruments

### Chapter – 3 Current & Voltage Measurement

- ?? Principle of current and voltage measurement
- ?? Galvanometer
- ?? Ammeter, Voltmeter
- ?? Extension of current range, voltage range
- ?? Calibration of ammeter and voltmeter

### Chapter – 4 Power Measurement and Energy Measurement

- ?? Principle of power measurement and energy measurement
- ?? Types of Wattmeters and energy meters
- ?? Extension of wattmeter range
- ?? Power measurement in three phase
- ?? Effect of P.F. on the wattmeter measurement

### Chapter – 5 Measurement of Other Electrical Quantities

- ?? Dynamometer , P.F. meter
- ?? Weston Frequency meter
- ?? Rotating type Phase sequence and maximum demand indicator
- ?? Synchroscope
- ?? Earth tester
- ?? Megger

### Chapter – 6 A.C. Bridges

- ?? Measurement of different types of resistances by bridge methods
- ?? Measurement of frequency by Weins bridge
- ?? Measurement of inductance by Anderson & Maxwell bridge circuit
- ?? Measurement of unknown capacitance by Schering bridge

### Chapter – 7 Magnetic measurement

- ?? Measurement of flux by BG Gressort fluxmeter
- ?? Determination of Hyteresis loop for ring and bar specimen
- ?? Measurement o f iron loss by Lloyd fisher square

### Chapter – 8 Dielectric Measurement

- ?? By Wattmeter
- ?? By CRO
- ?? By Schering bridge

### Chapter – 9 Cathode Ray Oscilloscope

- ?? CRT
- ?? Electrostatic and Magnetic deflection
- ?? X & Y Amplifiers
- ?? Control on CRO

### SUGGESTED IMPLEMENTATION STRATEGIES

The implementation strategy to teach this course should be a good mix of the various teaching methods like lecture, question-answer, assignment and lab. work. More drill and practice of numerical will be useful. Home and classroom assignments would prove more useful to develop the analytical skills.

### SUGGESTED LEARNING RESOURCES

- A) Textbooks mentioned in the references.
- B) Instruction manuals and brochures from instrument suppliers
- C) Periodicals like magazines, journals etc.
- D) OHP transparencies.

### SUGGESTED REFERENCES

S. No.	Title	Ed./ Year	Author/ Publisher
1	Instrumentation for Engineering Measurements	5 <sup>th</sup> , 1986	Cerni & Foster; Tata McGraw Hill, New Delhi
2	Electronic instrumentation & measurement techniques	3 <sup>rd</sup> , 1989	Cooper, W.D. & Helfrick, A.D., New Delhi: Prentice Hall of India
3	Instrumentation for Engineering Measurements	1 <sup>st</sup> , 1984	Dally, J.W. et al; John Wiley & Sons, New York
4	Instrumentation, Measurement & Feedback	1 <sup>st</sup> , 1994	Jones; McGraw Hill, New York
5	Electronic Instrumentation	2 <sup>nd</sup> , 1987	Malvino; Tata McGraw Hill, New Delhi
6	Electrical & electronic measurement & instruments	1 <sup>st</sup> , 1994	Rambhadran, S.; Delhi: Khanna Publishers
7	Electronic Measurements & Instrumentation	2 <sup>nd</sup> , 1988	Rao & Sutrave; Nirali Prakashan, Pune
8	A course in electrical & electronic measurements and instrumentation	4 <sup>th</sup> , 1987	Sawhney, A.K., Delhi: Dhanpatrai & sons
9	A course in Electrical & Electronic Measurements & Instruments	11 <sup>th</sup> , 2000	Sawhney; Dhanpatrai & Sons, Delhi
10	Electrical measurements & measuring instruments	1 <sup>st</sup> , 1994	Suryanarayana, New Delhi, Tata McGraw Hill

**SUBJECT TITLE – ELECTRICAL MEASUREMENT AND MEASURING  
INSTRUMENTS LAB**

**Practical Code : 224421 (24)  
Total Hours: 48**

**PRACTICAL EXPERIENCES**

- a) Study of different meters, such as: Ammeter, voltmeter, wattmeter & energy meter.
- b) .Measurement of electrical quantities by low range meter along with
  - i. Shunt & multiplier
  - ii. C.T. & P.T.
- c) Measurement of active & reactive power in 3-phase balance load circuit by one wattmeter method.
- d) Measurement of active & reactive power in 3-phase unbalance load circuit by two-wattmeter method. Effect of load PF.
- e) Calibration of energy meter at various P.F. by
  - (1) Standard energy meter
  - (2) Meter test bench
- f) Performance of
  - iii. Phase sequence meter
  - iv. P.F. & frequency meter
  - v. Maximum demand indicator KVA, KWH & KVAR meter.
- g) Measurement of low & medium resistance by Wheastone bridge.
- h) Measurement of low resistance by Kelvin double bridge.
- i) Measurement of earth resistance by Earth Tester.
- j) Measurement of insulation resistance by Megger.
- k) Use of potentiometer for the measurement of Resistance and emf
- m) Calibration of DC voltmeter and ammeter by potentiometer
- n) Use of Multimeter.

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**CHHATTISGARH SWAMI VIVEKANAND TECHNICAL UNIVERSITY,  
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**SEMESTER** : **IV**  
**SUBJECT TITLE** : **ELECTRICAL MACHINES - I**  
**CODE** : **224412 (24)**  
**BRANCH DISCIPLINE** : **ELECTRICAL ENGINEERING**  
**TEACHING AND EXAMINATION SCHEME**

Course code	Teaching scheme (Hrs./week)				Scheme of Examination						Credit [L+(T+P)] 2
	L	T	P	Total Hours	Theory			Practical		Total Marks	
					ESE	CT	TA	ESE	TA		
224412 (24)	4	1	-	5	100	20	10	-	-	130	5
224422 (24)	-	-	3	3	-	-	-	50	20	70	2

**DISTRIBUTION OF MARKS AND HOURS:**

SL NO.	Chapter No.	Chapter Name	Hours	Marks
1	1	Single Phase Transformer	25	30
2	2	Three Phase Transformers	10	10
3	3	Basic Concepts of D.C. Machines	06	10
4	4	D.C. Generators	14	20
5	5	D.C. Motors	25	30
		<b>TOTAL</b>	<b>80</b>	<b>100</b>

**RATIONALE**

This course is classified under basic technology group is intended to enable the student understand the facts, concepts, principles, procedures for the operations, testing and maintenance of electric machines such as D.C. motors and transformers. The transformers are used in power systems for transmission and distribution of electric power. DC machines are used in various applications like certain electric locomotives, paper mills etc. This course will help the student to function confidently when he enters the world of work.

## **DETAILED COURSE CONTENTS**

### **Chapter – 1 Single Phase Transformers**

- ?? Construction of a single phase transformer
- ?? Types of single phase transformers
- ?? Principle of working, emf equations
- ?? Voltage & current ratios
- ?? Ratings of transformer
- ?? No load & on load operation,
- ?? Open circuit test
- ?? Short circuit test
- ?? Equivalent circuit diagram
- ?? Regulation of a transformer
- ?? Losses and efficiency
- ?? All day efficiency and numerical problem
- ?? Auto transformer

### **Chapter – 2 Three Phase Transformers**

- ?? Construction of a three phase transformer
- ?? Classification of three phase transformers: - (Distribution of Power transformer)
- ?? Ratings of three phase transformer
- ?? Different types of transformer terminal connection
- ?? Transformer Accessories

### **Chapter – 3 Basic Concepts of D.C. Machines**

- ?? Need
- ?? Construction of D.C. machines
- ?? Materials used for constructional parts

### **Chapter – 4 D.C. Generators**

- ?? Types of D.C. generators
- ?? Principle of working, emf equation
- ?? Condition for building up emf in self excited generator
- ?? Critical resistance, internal & external characteristics
- ?? Armature reaction
- ?? Commutation

### **Chapter – 5 D.C. Motors**

- ?? Types of D.C. motors
- ?? Principle of working, back emf equations, Torque equations.
- ?? Speed torque characteristics
- ?? Speed control of shunt & series motors
- ?? Reversing of D.C. motors
- ?? Necessity of starters (3 & 4 point)
- ?? Power stages of D.C. motors
- ?? Losses & efficiency
- ?? Condition for maximum efficiency

## SUGGESTED IMPLEMENTATION STRATEGIES

The implementation strategy to teach this course should be a good mix of the various teaching methods like lecture, question-answer, assignment and lab. work. More drill and practice of numericals will be useful. Home and classroom assignments would prove more useful to develop the analytical skills.

## SUGGESTED LEARNING RESOURCES

1. Textbooks mentioned in the references.
2. Laboratory manuals
3. Laboratory sheet, workbook etc.

## SUGGESTED REFERENCES

S. No.	Title	Ed./ Year	Author/ Publisher
11	Electrical Machines	1997	Bhattacharya, S.K.; Tata McGraw-Hill, New Delhi
12	Transformers	1991	BHEL Bhopal; Tata McGraw-Hill, New Delhi
13	Transformers Design & Manufacture	1995	Dasgupta, Indrajit; Tata McGraw-Hill, New Delhi
14	Electric Machinery	5 <sup>th</sup> , 1992	Fitzgerald, A.E., Charles Kingsley, Jr., Stephen D. Umans; McGraw-Hill, New York
15	Electric Machinery and Transformers	2 <sup>nd</sup> , 1992	Irving L. Kosovo; Prentice Hall of India, New Delhi
16	Electrical Machines	1996	Nagrath & Kothari; Tata McGraw-Hill, New Delhi
17	Transformers and motors	1 <sup>st</sup> , 1989	Shultz; George patrick Howard W. Sams & Co. New York

## PRACTICAL EXPERIENCES

- a) Voltage & current ratio of 1- $\phi$  & 3- $\phi$  transformer
- b) Performance of a single phase transformer by direct loading
- c) Performance of a single phase transformer by OC & SC test and its regulation
- d) Performance of an auto transformer
- e) Performance of D.C. generator
- f) Performance of D.C. shunt Motor
- g) Performance of D.C. series Motor
- h) Performance of D.C. shunt/series/compound generator
- i) Load test on separately excited generator.
- j) Speed torque characteristics of D.C. shunt & series motors
- k) Starting of shunt & series D.C. motors

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**CHHATTISGARH SWAMI VIVEKANAND TECHNICAL UNIVERSITY,  
BHILAI**

**SEMESTER** : **IV**  
**SUBJECT TITLE** : **GENERATION TRANSMISSION AND DISTRIBUTION**  
**CODE** : **224413 (24)**  
**BRANCH DISCIPLINE** : **ELECTRICAL ENGINEERING**  
**TEACHING AND EXAMINATION SCHEME**

Course code	Teaching scheme (Hrs./week)				Scheme of Examination						Credit [L+(T+P)] 2
	L	T	P	Total Hours	Theory			Practical		Total Marks	
					ESE	CT	TA	ESE	TA		
224413 (24)	4	1	-	5	100	20	10	-	-	130	5
224423 (24)	-	-	2	2	-	-	-	50	20	70	1

**DISTRIBUTION OF MARKS AND HOURS:**

SL NO.	Chapter No.	Chapter Name	Hours	Marks
1	1	Generation o Electrical Power	15	20
2	2	Variable Load on Power Plants	4	5
3	3	Economics of Power Generation	6	10
4	4	Tariff	8	10
5	5	HVAC and HVDC Transmission System	10	10
6	6	Transmission Line Parameters	15	20
7	7	Distribution System	6	8
8	8	Conductor Selection for a Distribution System	8	7
9	9	Cables	8	10
		<b>TOTAL</b>	<b>80</b>	<b>100</b>

**RATIONALE**

This course is under applied technology group is intended to enable the student understand the facts, concepts, principles and procedure related to the electric power generation,transmission and distribution so that he can acquire supervisory skills, which will help him to discharge his role as a supervisor when he starts working in the industry.

## DETAILED COURSE CONTENTS

### Chapter – 1      **Generation of Electrical Power**

- ?? Introduction an overview of a generalised power system
- ?? Single line diagram of power generation systems
- ?? Thermal , Hydro, Nuclear, Diesel, MHD Power Plants
- ?? Line and block diagram of all power plants
- ?? Choice of site
- ?? Equipment and their functions
- ?? Operation and control of the power plants
- ?? Strengths and limitations
- ?? Comparison of different power plants

### Chapter – 2      **Variable Load on Power Plants**

- ?? Variable load on power plants.
- ?? Load curves
- ?? Selection of size and number of units.
- ?? Base load and peak load.

### Chapter – 3      **Economics of Power Generation**

- ?? Interest and depreciation.
- ?? Cost of electrical energy.
- ?? Method of determining depreciation.
- ?? Importance of high load factor.

### Chapter – 4      **Tariff**

- ?? Introduction of tariff
- ?? Types of tariff – simple, flat rate, block rate, two part, maximum demand, power factor, three part.

### Chapter – 5      **Transmission Line Parameters**

- ?? Line Resistance and Inductance
- ?? Capacitance
- ?? Skin effect and effect of proximity
- ?? Stranding and transposition of conductors
- ?? Classification of transmission lines
- ?? Performance of transmission lines, voltage regulation and efficiency, equivalent circuits
- ?? Ferranti effect, line losses on open circuits

### Chapter – 6      **HVAC and HVDC Transmission System**

- ?? Economics of power transmission.
- ?? Operation and control of A.C. transmission system.
- ?? Concept of HVDC transmission
- ?? Types of HVDC transmission system
- ?? Layout and components of a typical HVDC transmission system
- ?? Advantages and disadvantages of HVAC and HVDC transmission

### Chapter – 7      **Distribution System**

- ?? Introduction

- ?? Feeders, distributors and service mains.
- ?? Feeders (or primary distribution lines).
- ?? Distributors (or secondary distribution lines)

### **Chapter – 8 Conductor Selection for a Distribution System**

- ?? Considerations for selection of conductor size for distribution systems
- ?? Voltage drops in D.C. distributors
- ?? Voltage drop in A.C. distributors

### **Chapter -9 Power Cables**

- ?? Types of Underground cables
- ?? Construction of cables
- ?? Low-tension cables
- ?? High tension (HT) cables
- ?? Laying of underground cables
- ?? Faults in Power cables

### **SUGGESTED IMPLEMENTATION STRATEGIES**

When teaching this course, field visits to some electric power transmission and distribution substations, switchyards etc. will develop a proper understanding in the students. Some photographs and video programmes and CDs related to this subject area will render this class quite interesting. Bring some of the real things like different types of insulators, cables, conductors in the classroom for demonstration of their use.

### **SUGGESTED LEARNING RESOURCES**

- 1 Textbooks mentioned in the references.
- 2 Code of practice published by B.I.S
3. S.O.R. by PWD etc.

### **SUGGESTED REFERENCES**

<b>S.No.</b>	<b>Title</b>	<b>Ed./ Year</b>	<b>Author/ Publisher</b>
1	Power system engineering	1 <sup>st</sup> , 1994	Nagrath; Tata McGraw-Hill, New Delhi
2	High Voltage Engineering	2 <sup>nd</sup>	Naidu; Tata McGraw-Hill, New Delhi
3	Transmission and Distribution	1994	Raina, K.B. et al; Tata McGraw Hill, New Delhi
4	A course in electrical power	5 <sup>th</sup> , 1989	Soni M.L., Gupta J.L.; Dhanpat Rai & Sons, New Delhi
5	A text book of electrical power	1996	Uppal S. L.; Khanna publisher, New Delhi
6	Generation, Distribution & Utilisation of Electrical Energy	6 <sup>th</sup> , 1991	Wadhwa, C.L.; Wiley Eastern Ltd., New Delhi

## TUTORIALS/PRACTICALS

- Field visits to explain various electrical and mechanical details of transmission & distribution system
- Reports of field visits
- Market survey to find out the availability of the various transmission and distribution components (like different types of pin insulators, shackle insulators, etc.) and comparison of their specification and prices.

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## CHHATTISGARH SWAMI VIVEKANAND TECHNICAL UNIVERSITY, BHILAI

**SEMESTER** : **IV**  
**SUBJECT TITLE** : **INDUSTRIAL MANAGEMENT**  
**CODE** : **200415 (37)**  
**BRANCH/DISCIPLINE** : **MECHANICAL ENGINEERING**  
**TEACHING AND EXAMINATION SCHEME**

Course code	Teaching scheme (Hrs./week)				Scheme of Examination						Credit [L+(T+P)]
	L	T	P	Total Hours	Theory			Practical		Total Marks	
					ESE	CT	TA	ESE	TA		
200415 (37)	4	-	-	4	100	20	10	-	-	130	4

## RATIONALE :

Student has been earmarked for this course since the shop floor provides majority of the opportunity available for employment & many diploma pass outs are engaged in shop floor supervisory work. Hence it has been found necessary to impart information related to the concepts, principles, procedures and 'understanding' of management techniques so that the student is brought to fairly high level of competency in 'supervisor ship'.

The course is introduced through a chapter on 'Systems Thinking'. It is felt that considerable time is spent in identification and alternative solution selection when a young engineer encounters problematic situations on the shop floor. A systematic frame of thinking and a proper problem-solving attitude is required to with these situations. The course comprises of two major parts, one is of 'Behavioural Science' where the students are exposed to the principles of Group behaviour, which will help them to deal with worker's psychology, their motivation level, and finally an idea of how communication transfer is effected form the highest to lowest level. The second face deals with the 'Mathematical Approach towards Management', which comprises of Modern management concepts like CPM and PERT value Analysis, Inventory control, economic batch size determination and operation-research. It is hoped that this course will evoke considerable interest in the diploma students and will help to get jobs earlier.

## DISTRIBUTION OF MARKS AND HOURS:

S. No.	Chapter No.	Chapter Name	Hours	Marks
1.	1	Management & System Thinking Concepts	06	10
2.	2	Materials Management	10	10
3.	3	Production Planning and Control.	06	10
4.	4	Project Planning Using Network Techniques	06	10
5.	5	Industrial Relations	06	10
6.	6	Supervision and Leadership	06	10
7.	7	Organizational Dynamics	07	10
8.	8	Operation Research	06	10
9.	9	Planning & Preparing a Project Report	06	10
10.	10	Value Analysis & Computers in Management	05	10
		<b>TOTAL</b>	<b>64</b>	<b>100</b>

## DETAILED COURSE CONTENTS:

### Chapter- 1: MANAGEMENT & SYSTEM THINKING CONCEPTS:

- ?? Management- definition, activities.
- ?? Theories-Decision, Quantitative, Mathematical, Behavioral Sciences.
- ?? System definition and parameters,
- ?? Production system, Non-production system and objectives,
- ?? System design, procedure, system variables,
- ?? Different types of model under system thinking.

### Chapter- 2: MATERIALS MANAGEMENT:

- ?? Introduction & function of purchase system,
- ?? Inventory, need & advantages of Inventory control
- ?? Different techniques of Inventory control -A.B.C. analysis, simple treatment only.
- ?? Correlation, stock turn over, order quantity, Lead time purchase cycle,
- ?? Economic order Quantity, simple numerical problems ,Safety stock
- ?? **Stores Management**-Definition and importance, Storing Procedure and store records.

### Chapter- 3: PRODUCTION PLANNING AND CONTROL:

- ?? Production system, concept of planning, meaning of PPC,
- ?? Classification & characteristics of each type,
- ?? Function of & place of PPC in a organization,
- ?? Production and consumption rate,
- ?? Job, Batch and Mass production,
- ?? Batch size, Buffer stock, Production cost components,
- ?? Concept of production scheduling. Difference between Loading & Scheduling,
- ?? Gantt chart scheduling, advantages and preparation of GANTT chart,
- ?? Interpretation updating, critical ratio scheduling.
- ?? Gap phasing and Lap phasing

#### **Chapter- 4: PROJECT PLANNING USING NETWORK TECHNIQUES:**

- ?? Network –meaning & objectives,
- ?? Network formation, representation of activities and event on network, rules for drawing network diagram, Fulkerson's rule,
- ?? Different techniques-PERT & CPM.,
- ?? Dependency of activities, Dummy activities,
- ?? Different Time estimates- Optimistic, Pessimistic & Most likely Time, ET, LT, EST, LST, LCT, ECT, Floats & Slacks and Network analysis on tabular form,
- ?? Updating of Network, control through updating.
- ?? Main power loading and calculation on load smoothing.

#### **Chapter- 5: INDUSTRIAL RELATIONS:**

- ?? Scope, definition, need, objective and function of personnel management.
- ?? Job analysis, Job description and its constituents,
- ?? Man power as resources, recruitment, selection, training and terminal behavior in an organization,
- ?? Communication in Industry its need and importance,
- ?? Classification, technique and barriers in communication and their effects
- ?? Grievances, its meaning, factors responsible for grievances, process and condition for handling of grievances,
- ?? Strikes and lockouts, conditions, conciliation and adjudication machinery
- ?? Motivation, meaning and its benefits, factors responsible for lack of motivation, techniques to boost the motivation in workers,
- ?? Job satisfaction, social and economic values, factors influencing job satisfaction.

#### **Chapter- 6: SUPERVISION AND LEADERSHIP:**

- ?? Meaning and Role of supervisor in an industry,
- ?? Need of supervision, older workers and their supervision,
- ?? Concept of leadership, Qualities of a good leader
- ?? Effectiveness of leadership system
- ?? Industrial acts-Introduction, Factory acts, Industrial disputes act, Boiler act, Workman's compensation act, Indian electricity act, Pollution control act, ESI act.

#### **Chapter- 7: ORGANISATIONAL DYNAMICS:**

- ?? Organization structure, characteristic and principle of organization
- ?? Modern organization approach,
- ?? Types of organization, meaning and signification of various types,
- ?? Organization change, resistance to change, employee's attitude, factors for reducing the resistance to change.

#### **Chapter- 8: OPERATION RESEARCH:**

- ?? Definition and concept & methods of Operation Research.,
- ?? Linear programming-problem formulation and Graphical methods
- ?? Simplex method of linear programming.

#### **Chapter- 9: PLANNING AND PREPARING A PROJECT REPORT:**

- ?? Selection of project, Scheduling of activities Involved, Model format,
- ?? Project planning, preparation of action plan for implementation, preparation of project,
- ?? Cases: - illustrate some real cases, the students are advised to
  1. Visit few small-scale industries situated in the city, near by industrial area.
  2. Discuss the problem related to S.S.I. with entrepreneurs.
  3. Collect information about the market rates, quality & quantity of goods of their choice.
  4. Develop logical & analytical approach to purchase the raw material, finished good.
  5. Prepare project report for the industry, they are willing to start.

## **Chapter- 10: VALUE ANALYSIS & COMPUTERS IN MANAGEMENT**

- ?? Concept of Cost and Concept of value,
- ?? Objectives, components and types of value,
- ?? V.A. procedure and V.A. Test. DARA SIRI method, value improvement procedures.
- ?? Role of computers in management, introduction to computer system, Personal computer and its uses-introduction to management information system (MIS).

### **ISUGGESTED INSTRUCTIONAL STRATEGIES.**

#### ?? **Lecture Method:**

- Teaching through chalk board
- H.P, LCD Projector.
- Interaction with students through seminar.
- As far as possible concepts are to visualized by extensive use of charts models

#### ?? **Industrial Visits:**

Visits to nearby industries to expose them to industrial environment, their working, ways of written & verbal communications, their team working & decision-making styles, , problem solving strategies, computer usage in different aspects of industrial work, Industrial relations and material management methods.

#### ?? **Expert Lecturer:**

- Expert lecturer as to be arranged on above subject through guest faculty.

#### ?? **Demonstration:**

## SUGGESTED LEARNING RESOURCES:

### (a) Reference Books

S.No.	Title	Author/Publisher
1.	Learning package on Industrial Management.	T.T.T.I., Bhopal.
2.	CPM and PERT - Principles and Application.	L.S. Srinath.
3.	Modern Production Management.	Buffa.
4.	Essentials of Management	Kuntz , Mcgraw Hill.
5.	Industrial Engineering and Management	O.P. Khanna.
6.	Industrial organization and management	Ahuja.
7.	Value Analysis	Miles.
8.	Manpower Management.	R.S. Diwedi.
9.	Personnel Management and Industrial Relations	R.S. Davar.
10.	Production and operations Management	Ray Wild.
11	Management of operations	Jack R. Meredith.
12	Production and Operations Management- Contemporary policy for managing Operating.	Tata McGraw Hill.
13.	Project Engineering and Management	A.K.Sinha & Rama Sinha

### (b) Others

- ?? VCD's
- ?? Learning Packages through CD
- ?? Charts.

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**CHHATTISGARH SWAMI VIVEKANAND TECHNICAL UNIVERSITY,  
BHILAI**

**SEMESTER** : **IV**  
**SUBJECT TITLE** : **DIGITAL ELECTRONICS**  
**CODE** : **224415 (28)**  
**BRANCH DISCIPLINE** : **ELECTRICAL ENGINEERING**  
**TEACHING AND EXAMINATION SCHEME**

Course code	Teaching scheme (Hrs./week)				Scheme of Examination						Credit [L+(T+P)] 2
	L	T	P	Total Hours	Theory			Practical		Total Marks	
					ESE	CT	TA	ESE	TA		
224415 (28)	4	1	-	5	100	20	10	-	-	130	5
224424 (28)	-	-	2	-	-	-	-	50	20	70	1

**DISTRIBUTION OF MARKS AND HOURS:**

SL NO.	Chapter No.	Chapter Name	Hours	Marks
1	1	Introduction to Digital Techniques	6	8
2	2	Digital Codes	9	8
3	3	Logic Gates	9	12
4	4	Digital Systems	9	12
5	5	Encoders / Multiplexers	7	10
6	6	Decoders / Demultiplexers	7	10
7	7	Code Converters	8	10
8	8	Data Converters	8	10
9	9	Memories	8	10
10	10	Arithmetic Logic Unit	9	10
		<b>TOTAL</b>	<b>80</b>	<b>100</b>

**RATIONALE**

This course is classified under basic technology group is intended to enable the student understand the facts, concepts, principles and procedures of digital techniques and their application used in digital circuits & systems. This understanding will help in prototype testing and thereby the investigation skills, which in turn, will help him/her in performing the role of a supervisor in all technology areas and also assist those working under him.

## DETAILED COURSE CONTENTS

- Chapter – 1 Introduction to Digital Techniques**
- ?? Numerical representations
  - ?? Comparison of digital and analog systems
  - ?? Merits of operation in the digital mode
- Chapter – 2 Digital Codes**
- ?? Number systems: Binary, Decimal, Octal & Hexa-decimal
  - ?? Conversion of one number system to others, Binary addition, subtraction, multiplication and division
  - ?? Use of 1's and 2's compliments in binary arithmetic.
  - ?? Binary codes: BCD numbers, weighted and non-weighted binary codes, 8421 BCD code, Excess-3 codes and Gray code, BCD addition and subtraction
  - ?? Use of 9's and 10's complement in decimal arithmetic, alphanumeric codes ASCII and EBC DIC.
- Chapter – 3 Logic Gates**
- ?? Basic logic gates: NOT, AND, OR gates using semiconductor diodes & BJTs symbol, Truth table, logic equation applications.
  - ?? Universal logic gates: NOR, NAND gates using semiconductor diodes and BJTs symbol, truth table, logic equation, Basic logic gates using universal logic gates. Ex-OR and Ex-NOR gates.
  - ?? Boolean algebra: Fundamental concepts & their basic laws-AND, OR, complementation, cumulative, Associative and distribution laws. De'Morgan's theorems and numerical examples.
  - ?? Verin diagram: Standard forms for Boolean function, SOP and POS and their conversion to standard forms, Karnaugh (k) map reduction techniques for 2 and 4 variables only.
- Chapter – 4 Digital Systems**
- ?? Introduction: types of digital systems and their block diagram, operating principles.
  - ?? Combination Logic system: R-S flip-flop using BJTs, NOR and NAND gates clocked R-S flip-flop, propagation delay and Race-around condition, Master-Slave (M-S) J.K. flip-flop with preset and clear, T and D type flip-flops, field of application of flip-flop.
- Chapter – 5 Encoders / Multiplexers**
- ?? Necessity of Multiplexers.
  - ?? Principles of Multiplexers and their types 2 to 1, 4 to 1, 8 to 1 and 16 to 1 lines, Block diagrams, operating principles and applications.
  - ?? Study of ICs – 74150, 74151, 74152, 74153 and 74157.
  - ?? Multiplexer tree 32 to 1 and 64 to 1 line multiplexer 16 to 1 line multiplexer.
- Chapter – 6 Decoders / Demultiplexers**
- ?? Necessity of demultiplexer.
  - ?? Principles of demultiplexer and their types 2 to 1, 4 to 1, 8 to 1 and 16 to 1 lines, Block diagrams, operating principles and applications.
  - ?? Study of ICs – 74139, 74154 and 74155.
- Chapter – 7 Code Converters**
- ?? BCD to binary converter using IC 74184.
  - ?? Binary to BCD converter using IC 74185.

## **Chapter – 8      Data Converters**

- ?? Introduction: Necessity of data converters and their types.
- ?? Analog to digital converters: Necessity, different methods, staircase ramp, single slope, dual slope and successive approximation method. performance criteria. A/D converter ICs field of applications.
- ?? Digital to analog converters: Necessity, different methods, weighted register, ladder & binary ladder methods. Performance criteria, study of D/A converters ICs, field of applications

## **Chapter – 9      Memories**

- ?? Introduction: Characteristics of memory classification – Random access and sequential access memories, Read-Write and Read-Only memories, Volatile and Non-Volatile memories, Static and dynamic memory, magnetic core and semiconductor memory.
- ?? Magnetic memory.
- ?? Semiconductor memory- Requirements and their types ROMs & RAMs, semiconductor RAMs storage cells, bipolar cells, static bipolar RAM and Static CMOS RAMs, MOS dynamic RAMs, Three state RAMs semiconductor RAMs –Mask programmable and erasable RAMs, EPROMs, EEPROM, Dot – matrix ROM.
- ?? Memory system reliability MTBF and Error detection using parity, charge coupled device & Magnetic bubbles study of 2716, 7481 and 701141 ICs

## **Chapter – 10    Arithmetic Logic Unit**

- ?? Introduction.
- ?? Adders – Half and full adders, series and parallel binary adders.
- ?? Subtractors – Half and full subtractor.
- ?? Full adders / Full subtractor 1's and 2's complement adders, subtractor, shift operations, multiplication and division.
- ?? Full adders, BCD adders and BCD subtractors using 7483 IC.
- ?? Study of ALU ICs – 74181, 74381, 74481 and 4057.

## **SUGGESTED IMPLEMENTATION STRATEGIES**

The implementation strategy to teach this course should be a good mix of the various teaching methods like lecture, question answer, assignment and lab. work. More drill and practice of numericals will be useful. Home and classroom assignments would prove more useful to develop the analytical skills.

## SUGGESTED LEARNING RESOURCES

1. Textbooks mentioned in the references
2. Laboratory manuals

## 9. SUGGESTED REFERENCES

S. No.	Title	Ed./ Year	Author/ Publisher
1	Digital computer fundamentals	6 <sup>th</sup> , 1995	Barli, Tata McGraw-Hill; New Delhi
2	Digital Electronics	1 <sup>st</sup> , 2000	Bignell, James & Donovan Robert; Delmar, Thomson Learning, Singapore, www.delmar.com
3	Modern Digital Electronics	2 <sup>nd</sup> , 2000	Jain, R.P.; Tata McGraw-Hill, New Delhi
4	Digital Electronics Practical	1 <sup>st</sup> , 1999	Jain, R.P.; Tata McGraw-Hill, New Delhi
5	Digital Principles and Application	4 <sup>th</sup> , 1996	Malvino & Leach, Tata McGraw-Hill; New Delhi
6	Digital Principles	2 <sup>nd</sup> , 1980	Malvino, Tata McGraw-Hill; New Delhi
7	Digital Circuits	1 <sup>st</sup> , 1990	Nowicki, J.R.; Edward Arnold, London
18	Laboratory Manual and Teacher Guide in Digital Electronics	1 <sup>st</sup> , 2001	TTTI, Bhopal and DTE, Goa

## SUBJECT TITLE – DIGITAL ELECTRONICS LAB

Practical Code: 224424 (28)

Total Hours: 32

## PRACTICAL EXPERIENCES

Depending upon the time available, of the following list, two or three experiences could be undertaken in one laboratory session.

- a) Assemble Basic logic gates using Diodes and BJT's and verify truth table.
- b) Assemble universal logic gates using BJTs and verify truth table.
- c) Performance of NOR and NAND gates as universal.
- d) Verify De'Morgan's theorems.
- e) Performance of IC logic gates - pin.
- f) Use Data books for diagram specification & ratings.
- g) Performance of R-S flip-flop.
- h) Performance of IC J-K M-S flip-flop.
- i) Performance J-K M-S flip-flop using NAND gates.
- j) Performance of 4-bit ripple counter using IC 7476.
- k) Performance of IC 7490.
- l) Performance of Ring counter.
- m) Performance of multiplexer ICs.
- n) Performance of demultiplexer ICs.
- o) Performance of BCD to seven segment drivers ICs.

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# CHHATTISGARH SWAMI VIVEKANAND TECHNICAL UNIVERSITY, BHILAI

**SEMESTER** : **IV**  
**SUBJECT TITLE** : **MINI PROJECT**  
**CODE** : **224425 (24)**  
**BRANCH DISCIPLINE –** : **ELECTRICAL ENGINEERING**

## TEACHING AND EXAMINATION SCHEME

Course code	Teaching scheme (Hrs./week)				Scheme of Examination						Credit [L+(T+P)] 2
	L	T	P	Total Hours	Theory			Practical		Total Marks	
					ESE	CT	TA	ESE	TA		
224425 (24)	-	-	2	2	-	-	-	50	20	70	1

## RATIONALE

The curriculum has been design to develop the following objective :-

1. Develop habit of enquiry
2. Collect information from various sources
3. Create awareness of recent developments.
4. Create curiosity in new problems.
5. Arrange information in logical order.
6. Develop and demonstrate confidence and ability to tackle new problems
7. Integrate and reinforce the knowledge and skill.
8. Understand the follow standard test procedures
9. Observe safety precautions
10. Interpreter events and results

## DETAILED COURSE CONTENTS

### Chapter – 1 Power Project or Electronics / Electrical Project

- ?? Electrification of Village / Colony
- ?? Modification of sub station
- ?? Solving live problems

### Chapter – 2 Report on small scale industries

- ?? Collection of information and writing report on small scale industry

## IMPLEMENTATION STRATEGIES

1. Project could be performed by a group of two to five students.
2. Project should integrate all problems which could consist of practical skills, market survey skills etc.

## SUGGESTED LEARNING RESOURCES

1. Textbooks mentioned in the references
2. Laboratory manuals
3. Periodicals like news magazines, journals etc.

## SUGGESTED REFERENCES

<b>S. No.</b>	<b>Title</b>	<b>Ed./ Year</b>	<b>Author/ Publisher</b>
1	<i>Design Suitable Learning Experiences for Laboratory Work and Direct Laboratory Experiences to Achieve Specified Aims - Competency-based Self-learning Module.No.4; REC-British Council India Project</i>	1999	Earnest, Joshua; Mathew, Susan S.; Shrivastava, M.K.; Banthiya, N.K.; TTTI, Bhopal