

# CHHATTISGARH SWAMI VIVEKANAND TECHNICAL UNIVERSITY, BHILAI

## DIPLOMA IN INSTRUMENTATION ENGINEERING SEMESTER – III COURSE OF STUDY AND SCHEME OF EXAMINATION

S.No.	Board of Studies	Subject Code	Subject	Period per week			Scheme of Examination					Total Marks	Credit L+[(T+P)/2]
				L	T	P	Theory			Practical			
							ESE	CT	TA	ESE	TA		
1	Electronics & Telcomm Engg	234311 (28)	Basic Electronics & Devices	4	1	-	100	20	20	-	-	140	5
2	Electronics & Telcomm Engg	200313 (28)	Electrical & Electronic Measurements	3	1	-	100	20	20	-	-	140	4
3	Computer Engg.	200315 (22)	Computer Hardware Installation & Maintenance	3	1	-	100	20	20	-	-	140	4
4	Electrical Engg	234314 (24)	Fundamental of Electrical Engg.	4	1	-	100	20	20	-	-	140	5
5	Electronics & Telcomm Engg	200312 (28)	Digital Electronics	3	1	-	100	20	20	-	-	140	4
6	Electronics & Telcomm Engg	234321 (28)	Basic Electronics & Devices, Lab	-	-	2	-	-	-	50	10	60	1
7	Electronics & Telcomm Engg	200323 (28)	Electrical & Electronic Measurement, Lab	-	-	2	-	-	-	50	10	60	1
8	Computer Engg.	200325 (22)	Computer Hardware Installation & Maintenance	-	-	4	-	-	-	50	10	60	2
9	Electrical Engg	234324 (24)	Fundamental Of Electrical Engg. Lab	-	-	3	-	-	-	50	10	60	2
10	Electronics & Telcomm Engg	200322 (28)	Digital Electronics Lab	-	-	3	-	-	-	50	10	60	2
<b>Total</b>				<b>17</b>	<b>5</b>	<b>14</b>	<b>500</b>	<b>100</b>	<b>100</b>	<b>250</b>	<b>50</b>	<b>1000</b>	<b>30</b>

## CHHATTISGARH SWAMI VIVEKANAND TECHNICAL UNIVERSITY, BHILAI

- (A) SEMESTER : III  
 (B) SUBJECT TITLE : BASIC ELECTRONICS & DEVICES  
 (C) SUBJECT CODE : 234311 (28)  
 (D) BRANCH / DISCIPLINE : INSTRUMENTATION ENGINEERING  
 (E) RATIONALE :

Any electronic trade has its basis on a certain number of component and sum basic standard circuit's. These common circuit's are applied in all section of electronic technology.

Emphasis has been given on character static's and applications of semi-conductor devices/ components. The focus has been made on interaction of active and passive components and over all performance according to stated requirements.

The laboratory course fundamentally aims to familiarize the student's with various devices and components and their applications.

### (F) TEACHING & EXAMINATION SCHEME

Sub. Code	Period per week			Scheme of Examination					Total Marks	Credit L+ (T+P) 2
	L	T	P	Theory			Practical			
				ESE	CT	TA	ESE	TA		
234311 (28)	4	1	-	100	20	20	-	-	140	5
234321 (28)	-	-	2	-	-	-	50	10	60	1

### SCHEME OF STUDY ( HRS. DISTRIBUTION )

S.No.	Topic	Hrs. Distribution	
		Theory	Marks
1	Semiconductors	06	18
2	Pn-JUNCTION	14	18
3	Rectifier & Dc Power Supplies	16	16
4	Bipolar Junction Transistor	20	16
5	Feedback Amplifier & Oscillator	14	16
6	Multivibrator	10	16
	Total	80	100

### COURSE CONTENTS

#### 1. SEMICONDUCTORS

- ?? Energy Band Theory  
Classification as Insulators, Conductors & Semiconductors
- ?? Types Of Semiconductors

Intrinsic & Extrinsic Semiconductors  
Concept of Hole & Electron  
Mobility of Hole & Electron  
P-Type & N-Type Semiconductor  
Majority Carrier in P-Type & N-Type Semiconductor  
Drift Current, Diffusion & Recombination  
?? Properties Of Ge, Si  
Group-III & Group-V Alloys and their properties

## 2. pn - JUNCTION

- ?? Construction of p-n Junction
  - Depletion layer
  - Junction or Barrier Voltage
  - Forward & Reverse Biased PN Junction
  - Barrier Width & Diffusion
  - V-I Characteristic of PN Junction
- ?? pn Junction Diode
  - Working
  - VI Characteristics
  - Parameters of pn-Junction Diode
  - Static & Dynamic Resistance, Bulk Resistance,
  - Cut In Potential
  - Reverse Saturation Current,
  - Reverse Breakdown
- ?? Zener Diode
- ?? VARACTOR Diode
- ?? Light Emitting Diode ( LED ),
- ?? Photo-Diode
- ?? Applications of Various Types of Diodes.

## 3. RECTIFIER & DC POWER SUPPLIES

- ?? SINGLE PHASE
  - Half Wave Rectifier
  - Full Wave Rectifier
  - Bridge Rectifier
  - Centre-Tapped FW-Rectifier
  - Calculation of Instantaneous, Average & rms values
  - Efficiency, Ripple factor
  - PIV & TUF.
  - Filters
  - L,C & LC
- ?? Voltage Regulation
  - Zener & Shunt Regulator

### 3-Pin IC-Regulator 78xx / 79xx

#### 4. BIPOLAR JUNCTION TRANSISTOR

- ?? Construction of BJT
- ?? NPN & PNP transistor
  - Current components
  - alpha & Beta  $\alpha$  of Transistor
- ?? Transistor Biasing
  - Fixed Bias
  - Self Bias
  - Collector-Base biasing circuit configuration
  
- ?? Static characteristic of CB, CE & CC configuration
- ?? Significance & utility of h-parameter
- ?? Thermal Runaway, Heat dissipation, Heat Sink
- ?? Transistor as an Amplifiers
- ?? Classification of Amplifiers
  - Class A, B, C & AB
  - Frequency response of
  - CB, CE & CC Amplifier
  - Performance & Comparisons of CB, CE & CC
- ?? Amplifier Parameters
  - $A_i$ ,  $A_v$ ,  $R_{in}$ ,  $R_o$ ,  $A_p$
  - Distortion In Amplifier - Nonlinear, Frequency & Phase.
  
- ?? Multistage Amplifier
  - Coupling & Cascading

#### 5. FEEDBACK AMPLIFIER & OSCILLATOR.

- ?? General Concept Of Feedback
- ?? Positive & Negative Feed Back
  - Voltage Shunt & Voltage Series Feedback
  - Current Shunt & Current Series Feedback
- ?? Effect Of Negative Feedback,
- ?? Barkhausen Criterion For Oscillation
- ?? Type Of Oscillator
  - Weinbridge Oscillator
  - Hartley Oscillator
  - Colpits Oscillator
  - Clapp's Oscillator
  - Crystal Controlled Oscillator.

#### 6. MULTIVIBRATOR

- ?? BJT as Switch
- ?? Inverter
- ?? Concept of Multivibrator
  - Bistable
  - Monostable
  - Astable Multivibrator
  - Schmitt Trigger

## **Course: Basic Electronics & Devices, Lab**

**CODE : 234321 (28)**

**Hours: 32**

### LIST OF EXPERIMENTS

- 1 Plot Forward & Reverse Characteristic of PN Junction Diode.
- 2 Plot  $V_i$  Characteristic Of Zener Diode.
- 3 Plotting Input & Output Characteristic Of p-n-p Transistor CE & CB Configuration.
- 4 Plotting Input & Output Wave Form Of Half Wave With & Without Filter Circuit & verify the plot, using CRO Display.
- 5 Plotting Input & Output Wave Form Full Wave Rectifier With & Without Filter Circuit & verify the plot, using CRO Display.
- 6 Assemble Hartley & Colpitts Oscillator & Measure Output Frequency.
- 7 Study Astable, Monostable & Bistable Multivibrator and plot the Output waveform.

### RECOMMENDED BOOK

1. Eletronoc Principle -- by Malvino
2. Solid State Device -- by B.L. Thereja.
3. Basic Electronics -- by Grob.
4. Basic Electronics -- by G. M. Mottershed ( PHI )

## CHHATTISGARH SWAMI VIVEKANAND TECHNICAL UNIVERSITY, BHILAI

- (A) SEMESTER : III  
 (B) SUBJECT TITLE : ELECTRICAL & ELECTRONIC MEASUREMENTS  
 (C) CODE : 200313 (28)  
 (D) BRANCH / DISCIPLINE : INSTRUMENTATION ENGINEERING

**E) RATIONALE :** This measurement subject enables the student to understand the very basic facts, Concepts and principles of measurement and will be able to apply the same for solving simple test procedures. This subject also enables the student to understand various skills in measuring devices and in display and recording systems.

**F) TEACHING AND EXMINATION SCHEME:**

Course Code	Periods/Week (In Hours) (Teaching Scheme)			Scheme of Examination						Credit [L+(T+P)] 2
	L	T	P	Theory			Practical		Total Marks	
				ESE	CT	TA	ESE	TA		
200313 (28)	3	1	-	100	20	20	-	-	140	4
200323 (28)	-	-	2	-	-	-	50	10	60	1

L : Lecture hours : T : Tutorial hours, P : Practical hours

ESE – End of Semester Exam.; CT – Class Test; TA- Teacher’s Assessment

**G) DISTRIBUTION OF MARKS AND HOURS:**

Sl. No.	Chapter No.	Chapter Name	Hours	Marks
<b>1</b>	<b>1</b>	Measurement Systems	10	10
2	2	Measurement of Circuit Component (R, L&C)	15	20
3	3	Instrument Transformer	10	20
4	4	Cathode Ray Oscilloscope	15	25
5	5	Displays and Recorders	14	25
		<b>Total</b>	<b>64</b>	100

## H) DETAILED COURSE CONTENTS:

### Chapter – 1 : Measurement Systems

~~✍~~ Basic arrangements of Measurement System;

- Sensing Element.
- Signal conditioning element.
- Output element.

~~✍~~ Basic parameters of Measuring Devices.

- Accuracy and Precision.
- Error (Gross, Systematic and Random).
- Linearity, Hysteresis, Resolution, Threshold.
- Repeatability, Reliability and Maintainability.
- Span.
- Calibration.

~~✍~~ Standards and Units of Measurement;

- Primary Standards, Secondary Standards, International Standards, Working Standards.

~~✍~~ Electrical Standards.

- Current Standard (Absolute Ampere), Capacitance Standard, Inductance Standard, Voltage Standard, IEEE Standards.

### Chapter – 2 : Measurement of Circuit Components (R,L and C)

~~✍~~ Inductance Measurement.

~~✍~~ Self-Inductance Measurement.

- Ammeter and Voltmeter method.
- Three Voltmeter Methods.
- Three Ammeter Method.
- General Four arms bridge network method.
- Maxwells' bridge method, and other bridges used for Self-Inductance measurement & their application.

~~✍~~ Mutual Inductance Measurement.

- Felici's Method.

~~✍~~ Capacitance Measurement –

- Wein bridge method, and other bridges used for capacitance measurement and their specific applications.

~~✍~~ Resistance Measurement :

- Ammeter voltmeter method, Potentiometer method, Kelvin's double bridge method, Wheatstone bridge method, Loss of charge method.

### Chapter – 3 : Instrument Transformer

~~✍~~ Need of Instrument Transformer.

~~✍~~ Range Extension of Ammeter.

~~✍~~ Range Extension of Voltmeter.

~~✍~~ Advantages of Instrument Transformer.

~~✍~~ Current Transformer and Potential Transformer, phase error, ratio error and burden.

~~Use~~ Use of Current Transformer and potential transformer for range extension in high voltage and current circuits.

#### **Chapter – 4 : Cathode Ray Oscilloscope**

- Need of C.R.O. in electronic measurements.
- Block diagram of a general-purpose cathode ray oscilloscope.
- Cathode Ray Tube – Internal Structure, Electron Gun, Electrostatic Focusing, Electrostatic deflection, CRT screen, CRT gratitude.
- Time base generator – necessity of time base signal.
- ~~Basic~~ Basic C.R.O. Circuits:
  - Vertical (y) deflection system, Horizontal (x) deflection system, synchronization, Blanking Circuit, Intensity Modulation, Positioning Control, Focus Control, Intensity control, Calibration Circuit Astigmatism.
  - ~~Application~~ Application of CRO: Measurement of Voltage, Current, Frequency, Phase difference.
  - ~~Special Purpose~~ Special Purpose C.R.O.
- Multiple beam oscilloscopes.
- Multiple trace Oscilloscope.
- Storage type oscilloscope.

#### **Chapter – 5 : Displays and Recorders**

~~Displays:~~ Displays:

- Analog indicators/displays
- Digital indicators/displays
  - i. Cold cathode displays
  - ii. Fluorescent displays
  - iii. Light emitting diodes
  - iv. Liquid crystal diodes
  - v. Alpha-numeric display
  - vi. Dot matrix display
  - vii. Seven segment display

~~Recorders :~~ Recorders :

- Analog Recorder, Graphic Recorder, Optical oscillograph, Strip Chart Recorder (Null & Galvanometer).
- X-Y Recorder, Ultraviolet Recorder, Magnetic Tap Recorder.

#### **I) SUGGESTED INSTRUCTIONAL STRATEGIES:**

A good practice and exercise is required to enable students to have complete knowledge on the subject and various measurement techniques.

#### **J) SUGGESTED LEARNING RESOURCES.**

**(a) Reference Books :**



Sl. No.	Title	Author, Publisher, Edition & Year
1	Electronic Instrumentation & Measurement Techniques	Cooper W.D. & Helfride A.D., Prentice Hall of India, New Delhi.
2	Electronic instruments and instrumentation technology	Anand, Prentice Hall of India, New Delhi, 2004.
3	Electronic Instrumentation & Measurement	Bell, Prentice Hall of India, New Delhi, 2004.
4	Instrumentation Measurement Devices & Systems	Rangan C.S., TMH Publications, New Delhi.
5	Electrical Measurement & Measuring Instruments	Golding & Widdis.
6	A Course in Electrical and Electronics & Instrumentation	Rambhadran S., Khanna Publishers, Delhi.
7	Electrical & electronic measurement and instrumentation	A.K. Shawney, 11 <sup>th</sup> edition, 2000
8	Electrical Measurements & Measuring Instruments	Sauryanarayana, Tata McGrawHill Publications, New Delhi.

**(b) Others:**

- ~~///~~ VCDs.
- ~~///~~ Learning Packages.
- ~~///~~ Lab Manuals.
- ~~///~~ Charts.

**Course: Electrical & Electronic Measurements, Lab**

**CODE : 200323 (28)**

**Hours: 32**

**LIST OF PRACTICALS / TUTORIALS:**

1. Self-inductance measurements:
  - Ammeter and Voltmeter method.
  - Voltmeter method.
  - Ammeter method.
2. Self-Inductance Measurement by General four-arms's bridge network method.
3. Self-inductance Measurement by – Maxwell's Bridges method.
4. Mutual Inductance Measurement by Felicia method.

5. Capacitance Measurement by Wein-bridge method.
6. Low-resistance Measurement by –
  - Ammeter Voltmeter method.
  - Potentiometer method.
  - Kelvin's double bridge method.
7. Medium Resistance Measurement by –Wheat Stone bridge method.
8. Ammeter range extension using shunts.
9. Voltmeter range extension using voltage multiplier circuit.
10. Study and use of C.T. & P.T.
11. Study of C.R.O.
12. Voltage measurement on C.R.O.
13. Current measurement on C.R.O.
14. Frequency measurement on C.R.O.
15. Phase difference measurement on C.R.O.
16. Study of Displays –Cold cathode displays, Fluorescent displays, Light emitting diodes, Liquid crystal diodes, Alpha-numeric display  
Recorders –  
Analog Recorder, Graphic Recorder, Strip Chart Recorder, X-Y Recorder.
17. Digital Instruments –  
Digital Voltmeter, Digital Frequency Meter, Digital Panel Meter, Digital Storage Oscilloscope.

## CHHATTISGARH SWAMI VIVEKANAND TECHNICAL UNIVERSITY, BHILAI

- (A) SEMESTER : III  
 (B) SUBJECT TITLE : COMPUTER HARDWARE, INSTALLATION & MAINTENANCE  
 (C) CODE : 200315 (22)  
 (D) BRANCH / DISCIPLINE : INSTRUMENTATION ENGINEERING

**E) RATIONALE :** The aim of this course is to develop some level of specialization in students of electronics & telecommunication engineering. It is often expected from the passouts of *electronics and telecommunication* engineering diploma programme to troubleshoot the common faults in computers that usually occur. Today large numbers of computers are being procured for different purposes. However, there are only few trained personnel in the market who are capable of maintaining computer systems similar to the way TV sets are repaired. Keeping this scenario in mind, if the size of the industry where the polytechnic passouts get employed is small or if he/she is a self entrepreneur who has just started a business, then there is a high potential of using the training in this course for employment as well as for supporting his/her own business.

This course is intended to make the student to be aware of the different parts of computer system, their functions, common faults in computers and develop troubleshooting skills of a typical computer systems.

**F) TEACHING AND EXMINATION SCHEME:**

Course Code	Periods/Week (In Hours) (Teaching Scheme)			Scheme of Examination						Credit $L + \frac{(T+P)}{2}$
	L	T	P	Theory			Practical		Total Marks	
				ESE	CT	TA	ESE	TA		
200315 (22)	3	1	-	100	20	20	-	-	140	4
200325 (22)	-	-	4	-	-	-	50	10	60	2

L : Lecture hours; T : Tutorial hours; P : Practical hours;  
 ESE – End of Semester Exam; CT – Class Test; TA – Teacher’s Assessment

**G) DISTRIBUTION OF MARKS AND HOURS:**

<b>Sl. No.</b>	<b>Chapter No.</b>	<b>Chapter Name</b>	<b>Hours</b>	<b>Marks</b>
1	1	Basic Concept of Computer Hardware	4	6
2	2	Motherboard & Processor	7	10
3	3	Input Devices	4	10
4	4	Output Devices	4	10
5	5	Display Devices	6	10
6	6	Storage Devices	8	12
7	7	Installation	8	10
8	8	Virus – Antivirus & Fireballs	7	10
9	9	Maintenance & Trouble-Shooting	8	12
10	10	Other Peripherals & Interface Devices	8	10
		<b>Total</b>	<b>64</b>	<b>100</b>

**H) DETAILED COURSE CONTENTS:**

**Chapter – 1 : Basic Concept of Computer Hardware**

- ~~///~~ System Blocks of a Computer
- ~~///~~ Basic Architecture
- ~~///~~ Detailed Specification of a Computer

**Chapter – 2 : Motherboard & Processor**

~~///~~ MOTHER-BOARD

- Specification of Mother-Board
- Commercially Available Various Type of Motherboards
- Chipset & its importance
- Mother-Board Jumpers / Jumper Setting and its utility
- Panel Connections and indications

~~///~~ PROCESSOR

- Popular Processors
- Features of a processor
- Processor Sockets
- Cooling of Processor
- Socket Compatibility
- Precautions for handling a Processor

~~///~~ ADD ON CARDS

- AGP / XGP
- Sound-Blaster
- TV-Tuner
- FAX-MODEM

- Special Purpose Cards

#### ~~///~~ INSERTION SLOTS & PORTS

- ISA / EISA Slot
- PCI / PCIMCA Slot
- AGP / XGP Slot
- IDE Slot
- RAM & External Cache Slot
- Serial / Parallel Ports
- Game / Joystick Port
- Display / VGA Connecting Port
- USB Port
- IR Port (Infra Red)

### **Chapter – 3 : Input Devices**

#### ~~///~~ BASICS OF INPUT DEVICES

#### ~~///~~ TYPES OF INPUT DEVICES

- Key-Board
- Mouse
- Scanner (Flat Bed / Vertical Roller etc.)
- Light Pen
- Card Reader
- Camera (Web / Still / Video)

### **Chapter – 4 : Output Devices**

#### ~~///~~ BASICS OF OUTPUT DEVICES

#### ~~///~~ TYPES OF OUTPUT DEVICES

#### ~~///~~ PRINTERS

- Dot Matrix Printer (DMP)
- Heavy Duty Printer (HDP)
- Line Printer (LP)
- LASER Printer
- Inkjet / Desk-jet Printer
- Thermal Printer

#### ~~///~~ MULTIFUNCTION PRINTERS

- 3-in-1 Printer
- 5-in-1 Printer

#### ~~///~~ PLOTTERS

- Flat-Bed & Vertical Roller Plotter
- Inkjet Plotter
- Pen Plotter
- Laser Plotter

### **Chapter – 5 : Display Devices**

#### ~~///~~ ADAPTERS

- Type of Display Adapter
- CGA / VGA / SVGA / XGA / WXGA

## ~~✍~~ TYPES OF DISPLAYS

- Display active Area
- CRT Display
- Active Matrix
- LCD / TFT Display

## **Chapter – 6 : Storage Devices**

### ~~✍~~ TYPE OF STORAGE

- Primary Storage Devices
- Secondary Storage System
- Standard Features of Storage Devices

### ~~✍~~ HARD DISK DRIVE

- Features & Construction of HDD
- Parallel IDE / ATA Drive & specifications
- Serial IDE / ATA Drive & Specifications
- SCSI Drive
- Hard Disk Stacks

### ~~✍~~ FLOPPY DISK DRIVE

- Features & Construction of FDD
- Types Floppy & Floppy Drives

### ~~✍~~ CD / DVD - DRIVE

- Basic Features of CD
- Basic Features of DVD
- CD-Drive
- Read / Read-Write CD
- CD / DVD Burning Process
- Read / Read-Write CD-Drive
- Concept of Combo Drive
- Read / Read-Write DVD
- Read / Read-Write DVD-Drive

### ~~✍~~ RAM / CACHE MEMORY

- Fundamental of RAM
- Various types of RAM
- RAM Organization & its functioning
- SIMM / DIMM
- SRAM / DRAM
- SDRAM / DDRAM
- Cache Memory
- Various types of Cache Memory
- Working Concept & Need of Cache

## **Chapter – 7 : Installation**

### ~~✍~~ INSTALLATION OF A SYSTEM

- Basic idea about any type of Installation
- BIOS Setup / POST

- Manual Configuration of BIOS
- Setting up USER / SUPERVISOR Password
- Disabling Password
- APCM
- ~~///~~ HDD PREPARATION
  - SCANDISK
  - FDISK & Partitioning of HDD
  - FORMATTING of HDD
- ~~///~~ OPERATING SYSTEMS
  - Selection Criteria of O/S
  - O/S Installation
  - Booting Process of the system
  - Hard-Boot / Soft-Boot
- ~~///~~ APPLICATION S/W INSTALLATION
- ~~///~~ NETWORK (NIC) CONFIGURATION
- ~~///~~ MULTIMEDIA CONFIGURATION
  - Sound-Blaster Card & Software Installation
  - AGP / XGP Card & Software Installation
  - TV-Tuner Card & Software Installation
- ~~///~~ FAX-MODEM ( CARD ) & SOFTWARE INSTALLATION

#### **Chapter – 8 : Virus – Antivirus & Fireballs**

- Concept and Various features of Viruses
- Types of Virus
- Antidote or Antivirus S/W
- Quarantine (For Infected File/s)
- Scanning & Virus Removal (From Infected Files)
- ~~///~~ FIREBALL PROTECTION
  - Concept and features
  - Security Features
  - Security Level
  - Need of Activation & Deactivation

#### **Chapter – 9 : Maintenance & Trouble-Shooting**

- ~~///~~ Common Faults In A Computer System & Symptoms
- ~~///~~ Normal Precautions & Preventive Maintenance
- ~~///~~ Diagnostic S/W & Tools
- ~~///~~ Routine Check-Up & Minor Maintenance.

#### **Chapter – 10 : Other Peripherals & Interface Devices**

- ~~///~~ DIGITAL PAD / INTERACTIVE BOARD
- ~~///~~ Mass Storage Devices
- ~~///~~ Raid Controllers & Utility
- ~~///~~ Usb Devices & Its Utility
- ~~///~~ Wireless Lan Card & Network
- ~~///~~ Bnluetooth / Buffelo Devices

~~///~~ Flash-Drive / Thumb Drive / Usb Hdd

~~///~~ Serial Port Printers

~~///~~ Universal Card Reader Etc.

## I) SUGGESTED INSTRUCTIONAL STRATEGIES:

- The students should be demonstrated the possible faults that are encountered and he/she should be explained the process of rectification.
- More troubleshooting exercises should be given.
- Lecture session could be conducted directly in the computer laboratory for enhanced understanding.
- The course should be taught by taking help of various audio visual aids.
- Moreover, when teaching this course, the actual devices need to be brought to the class and demonstrated to the students.

## J) SUGGESTED LEARNING RESOURCES:

### (c) Reference Books :

Sl. No.	Title	Author, Publisher, Edition & Year
1	Troubleshooting, Maintaining & repairing PCs	Bigelow, Stephen J.; Tata McGraw-Hill, Ltd. New Delhi, 2 <sup>nd</sup> , 1999
2	How multimedia computer works	BPB Publication; New Delhi 7 <sup>th</sup> , 1998
3	IBM PC and C.K. Jones	B. Govindrajalu; Tata McGraw-Hill, Ltd. New Delhi 7 <sup>th</sup> , 2000
4	Assemble Your Own Computer	G.K. Gupta; G.T. Publication, Jaipur, 1 <sup>st</sup> , 1996
5	The Complete PC upgrade & Maintenance guide	Jain, Manish; BPB; New Delhi, 7 <sup>th</sup> , 1997
6	Modern -All About Monitors	Lotia, Nair; BPB Publication; New Delhi 2 <sup>nd</sup> , 1999
7	All about Keyboard and mouse	Lotia; BPB Publication; New Delhi. 2 <sup>nd</sup> , 1992
8	Complete PC upgrade & Maintenance guide	Minasi Mark; BPB Publication; New Delhi, 7 <sup>th</sup> , 1997
9	Upgrading and repairing PCs	Mueller, Scott; Prentice-Hall of India, New Delhi 8 <sup>th</sup> , 1998
10	A Complete Guide to SMPS for PC	Upadhyay; BPB Publication; New Delhi, 1 <sup>st</sup> , 1996

### (d) Others:

~~///~~ VCDs

~~///~~ Learning Packages

~~///~~ Lab Manuals

~~///~~ Charts



**Course: Computer Hardware, Installation & Maintenance Lab**

**CODE : 200325 (22)**

**Hours: 64**

**LIST OF PRACTICALS / TUTORIALS:**

- a) Identify different elements of computer system.
- b) Identify different beep codes and error codes.
- c) Identification of different motherboards & CPU's .
- d) Configuration of slot 1 motherboard for setting up of a Pentium III processor.
- e) Troubleshooting symptom failures in motherboard.
- f) Troubleshooting symptom failures in FDD.
- g) Installation of memory modules (SIMMs, DIMMs); CMOS battery and-on cards.
- h) Installation & configuration of a display card (PCI –SVGA).
- i) Installation & configuration of Video Accelerator card (2D ; 3D) in AGP slot.
- j) Installation & configuration of a sound blaster card, sound and video mixing.
- k) Installation of Input devices.
- l) Installation of Deskjet., laser printer & printer consumables.
- m) Installation of Video Display Unit (VDU).
- n) Installation of Scanners.
- o) Portioning and formatting a hard disk using FDISK ; Disk manager.
- p) Installation and configuration of a IDE: SCSI CD-ROM drive.
- q) Installation and configuration of a DVD drive.
- r) Installation and configuration of a CD-writer, creating an audio CD using CD-writer and download MP-III songs from the Internet.
- s) Importing & exporting from different video formats like GIF, JPEG, TIF, PGA, CDR, PHV etc.
- t) Assembly, installation and configuration and troubleshooting of complete computer system along with input output devices and UPS.
- u) Installation of operating system.
- v) Installation of application softwares like MS-Office 2000 and Star Office.
- w) Installation of Diagnostic softwares.
- x) Installation of antivirus softwares.
- y) Preventive maintenance of computer system.
- z) Debugging computer system.

## CHHATTISGARH SWAMI VIVEKANAND TECHNICAL UNIVERSITY, BHILAI

- (A) SEMESTER : III  
 (B) SUBJECT TITLE : FUNDAMENTALS OF ELECTRICAL ENGINEERING  
 (C) CODE : 234314 (24)  
 (D) BRANCH / DISCIPLINE : INSTRUMENTATION ENGINEERING  
 (E) RATIONALE

Electricity plays a very important role in day-to-day life of every one. It also forms the very first basis for any Electronics technician course, since the fundamentals of Electrical Engg. are used in the Electronics circuits, T.V., Instrumentation-Circuit and control-Circuits.

As a technician, one is expected to know the fundamentals and utilization aspects of electrical engineering, practice the safety rules and prevent the mishaps and hazards.

The course of fundamentals of Electrical Engg. aims to impart the knowledge and practice in DC and AC circuits, machines, measuring instruments and electrical safety, which is essential in developing a solid foundation for any Electronics Engg student to become a competent technician.

The course is designed so that more emphasis on practice through laboratory work is given to reinforce fundamental concepts and develop basic skills of handling of instruments and machines.

### (F) TEACHING & EXAMINATION SCHEME

Subject	Period per week			Scheme of Examination					Total Marks	Credit L+[(T+P)/2]
	L	T	P	Theory			Practical			
				ESE	CT	TA	ESE	TA		
234314 (24)	4	1	-	100	20	20	-	-	140	5
234324 (24)	-	-	3	-	-	-	50	10	60	2

### Distribution of Marks and Hours:

S. No.	Topic	Hours	Marks
1	Basic concepts	05	10
2	Electromagnetism	06	10
3	A.C. Circuit	08	12
4	Polyphase Circuits	06	08
5	Transformers	08	10
6	D.C. Machines	08	10
7	A.C. Motors	12	12
8	Single Phase Induction Motor	10	10
9	Electrical & Electronic Measurement	12	12

10	Electrical Safety	05	06
	<b>Total</b>	<b>80</b>	<b>100</b>

### Detailed Course Contents:

#### 1. BASIC CONCEPTS

- ~~///~~ Concept of unit of Electric Current and Voltage
- ~~///~~ Ohm's Law
- ~~///~~ Concept of Resistance, Inductance
- ~~///~~ Resistivity and Conductivity, units and dependence on temperature.
- ~~///~~ Power & energy heating effect of electric current and conversion of units (Mechanical to Electrical).
- ~~///~~ Kirchoff's Voltage and Current Laws & their application in simple
- ~~///~~ D.C. Circuits.
  - Series and parallel combination of resistance and wattage considerations. Simple numerical problems.

#### 2. ELECTROMAGNETISM

- ~~///~~ Concept of magnetic field production by flow of current
- ~~///~~ Concept of e.m.f.
  - Magnetic Flux
  - Reluctance
  - permeability
- ~~///~~ Analogy between electric & magnetic circuit.
- ~~///~~ Faraday's Laws of electromagnetic Induction
  - Self and mutually induced e.m.f.,
  - Simple numerical problems.

#### 3. A.C. CIRCUIT

- ~~///~~ Concept of alternating voltage and current, difference between A.C. and D.C.
- ~~///~~ Concept of Cycle, Frequency, Period, Amplitude
  - Instantaneous Value,
  - Average Value,
  - r.m.s. value
  - Peak value
  - Form factor (definitions only).
- ~~///~~ Concept of impedance & phase angle,
- ~~///~~ RL, RC & RLC Series & parallel circuits & Numerical problems

#### 4. POLY PHASE CIRCUITS

- ~~///~~ Three phase A.C. waveform

- ~~/~~ Phase displacement, equations of each phase,
- ~~/~~ Values in each phase at any instant of time, Numerical problems.
- ~~/~~ Three phase A.C. circuit with balanced load.

## 5. TRANSFORMERS

- ~~/~~ Principle of Transformer
- ~~/~~ E.M.F. equation
- ~~/~~ Transformation ratio
- ~~/~~ Losses in Transformers
  - Copper loss, Core loss,
  - Efficiency, Numerical problems
- ~~/~~ Auto Transformer
- ~~/~~ Applications of Transformer and Auto Transformer.

## 6 D.C. MACHINES

- ~~/~~ Working principle of D.C. Machines
- ~~/~~ Constructional Features
- ~~/~~ Classification and applications, numerical problems.

## 7 A.C. MOTORS

- ~~/~~ Introduction of A.C. Motor
- ~~/~~ Classification of A.C. Motors
- ~~/~~ Construction of 3- $\phi$  Induction motors
- ~~/~~ Working principle of 3- $\phi$  Induction Motors
- ~~/~~ Application of 3- $\phi$  Induction Motors.
- ~~/~~ Introduction of Synchronous Motor

## 8 SINGLE PHASE INDUCTION MOTOR

- ~~/~~ Working principle of Single Phase Induction Motor.
- ~~/~~ Types of Single Phase Induction Motor
- ~~/~~ Capacitor start
- ~~/~~ Capacitor start and Capacitor run
- ~~/~~ Shaded Pole type, Universal Motor.

## 9 ELECTRICAL & ELECTRONIC MEASUREMENT

- ~~/~~ General description of PMMC
  - Moving iron type instruments.
  - Dynamometers type instruments.
- ~~/~~ Working principle and construction of Ammeters and Voltmeters, extension of range and simple numerical problems.
- ~~/~~ Principle and working of Wattmeter (dynamometer type) and Energy meter (Induction type).
- ~~/~~ Digital measuring instruments

- ~~/~~ Seven-segment display and its applications.
- ~~/~~ Basic concepts of CRO.

## 10 ELECTRICAL SAFETY

- ~~/~~ Safety Precaution.
  - ~~/~~ Effect of Electric Current on Human Body.
  - ~~/~~ Artificial Respiration.
  - ~~/~~ Circuit Protection: Fuses, Switches, Relays of circuit, MCB, MCCB.
  - ~~/~~ Earthing.
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### **Course: Fundamental Of Electrical Engg. Lab**

**CODE : 234324 (24)**  
**Hours: 48**

#### **LIST OF PRACTICAL:**

1. Verify Ohm's Law.
2. Verify KCL & KVL.
3. Measure voltage & current in RLC series circuit, Calculate impedance, inductance, capacitance, & power factor, Draw vector diagram.
4. Measure voltage & current in RLC parallel circuit. Also calculate impedance, power factor, and Draw vector diagram.
5. Use rheostat as Regulator and Potential divider.
6. Identify the different parts of a dismantled motor.
7. Identify the different parts of 3-point starter and use it for starting single-phase induction motor.
8. Perform open circuit test on single-phase transformer.
9. Perform short circuit test on single-phase transformer.
10. Calculate transformation ratio of single phase transformer.
11. Identify various types of induction motor looking at the constructional details.
12. Measure current & voltage in balanced star connection. Also verify the relation of phase and line value of voltage and current.
13. Measure current & voltage in balanced Delta connection. Also verify the relation of phase and line value of voltage and current.
14. Measure the electrical power and energy in a given circuit.
15. Measure active & reactive power in 3-phase balance load circuit by one wattmeter method.
16. Use analog and digital multimeter for testing voltage, current and resistance.
17. Measure circuit parameters by L.C.R. meter.
18. Calculate fusing current of a fuse wire.
19. Observe different waveform on C.R.O. to calculate time period, maximum value, cycle, frequency etc. of A.C. waveform.
20. Calibrate given voltmeter/ammeter.

21. Calibrate energy meter at various P.F. by Standard energy meter

**SUGGESTED INSTRUCTIONAL 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 to solve numerical problems, home and classroom assignments would prove more useful to develop the analytical skills. As this will be the first exposure to an electrical laboratory, the procedure of lab practices should be in more detail including the safe practices to be followed.

**SUGGESTED LEARNING RESOURCES.**

**REFERENCE BOOKS :**

<b>Sl. No.</b>	<b>Title</b>	<b>Author, Publisher, Edition &amp; Year</b>
1.	Principles of Electrical Engineering	Bhattacharya, Tata -McGraw-Hill, New Delhi, 1997
2.	Electrical Technology	Cotton, H., ELBS, London, 6 <sup>th</sup> , 1987
3.	Electrical Application Servicing	Crouse, William H., McGraw Hill, New York, 1 <sup>st</sup> . 1980
4.	Preventing Electrical Fires & Failures	Hattangadi, A.A., Tata -McGraw-Hill, New Delhi, 2001
5.	Electrical Technology	Hughes, Edward, Longman, 1 <sup>st</sup> , 1990
6.	Basic Electrical Engineering	Mittle, V.N. Tata McGraw-Hill, New Delhi 1990
7.	Electrical Technology Vol.I	Thareja B.L., Thareja A.K. S. Chand & Company Ltd., New Delhi, 23 <sup>rd</sup> Edition.
8.	Electrical Technology Vol.II	Thareja B.L., Thareja A.K. S. Chand & Company Ltd., New Delhi, 23 <sup>rd</sup> Edition.
9.	Electric Machinery and Transformers	Kosow, Prentice-hall, New- Delhi, 2 <sup>nd</sup> edition
10.	Electrical Engineering Fundamentals	Del Toro, Prentice-hall, New- Delhi, 2 <sup>nd</sup> Edition
11.	Electrical Engineering- Principles and Applications	Hambley, Prentice-hall, New- Delhi, 2 <sup>nd</sup> Edition
12.	Electromagnetism: Theory and Applications	Pramanik, Prentice-hall, New- Delhi,
13.	Basic Electrical Engineering	R.K. Rajput
14.	Basic Electrical Engineering	Jain & Jain
15.	Basic Electrical Engineering	Anjali Chakraborty

**OTHERS**

VCDs.

Learning Packages.

Lab Manuals.

Charts.

## CHHATTISGARH SWAMI VIVEKANAND TECHNICAL UNIVERSITY, BHILAI

- (A) SEMESTER : III  
 (B) SUBJECT TITLE : DIGITAL ELECTRONICS  
 (C) CODE : 200312(28)  
 (D) BRANCH / DISCIPLINE : INSTRUMENTATION ENGINEERING  
 (E) **RATIONALE** : This course is classified under basic technology group is intended to enable the students to understand the facts, concepts, principles & procedures of digital techniques and their application used in digital circuits & systems. This subject concept will help in developing skills regarding small circuit implementation. It will also help students acquire investigation skill required for prototype testing.

**F) TEACHING AND EXMINATION SCHEME:**

Course Code	Periods/Week (In Hours) (Teaching Scheme)			Scheme of Examination						Credit $L + \frac{(T+P)}{2}$
	L	T	P	Theory			Practical		Total Marks	
				ESE	CT	TA	ESE	TA		
200312 (28)	3	1	-	100	20	20	-	-	140	4
200322 (28)	-	-	3	-	-	-	50	10	60	2

L : Lecture hours, : T : Tutorial hours, P : Practical hours;  
 ESE – End of Semester Exam.; CT – Class Test; TA – Teacher’s Assessment

**G) DISTRIBUTION OF MARKS AND HOURS:**

Sl. No.	Chapter No.	Chapter Name	Hours	Marks
1	1	Number System & Codes	10	15
2	2	Boolean Algebra & Logic Gates	12	25
3	3	Combinational Circuits	09	15
4	4	Sequential Circuits	10	13
5	5	D/A and A/D Converters	08	12
6	6	Logic Families	07	10
7	7	Memories	08	10
		<b>Total</b>	<b>64</b>	<b>100</b>

## H) DETAILED COURSE CONTENTS:

### Chapter – 1 : Number system & Codes

- Number systems, Conversion between different number systems, complement of numbers i.e.1's, 2's, 9's, 10's
- Binary Codes: Weighted & Unweighted codes, Excess-3 Code, Gray Code, Ring code, Error Detection & Correction Codes, BCD Code
- .Binary Operations - Addition, Subtraction, Multiplication, Division

### Chapter – 2 : Logic Gates & Boolean Algebra

- Logic Gates-AND, OR, NOT, EX-OR, EX-NOR, Universal Gates, Switching circuits
- Basic Boolean Functions, Boolean theorems, De Morgan's Theorems, function of duality, , Max-term, Min-term, SOP& POS,
- Simplification of Boolean Functions with Boolean algebra. Simplification with K-map up to 5 variables.

### Chapter – 3 : Combinational Circuits

- Half Adder, Full Adder, Half Subtractor. Full Subtractor, 3 bit binary adder, 3 bit binary Subtractor. BCD adder, Magnitude comparator.
- Encoder, Decoder, Multiplexer, Demultiplexer.
- BCD to binary & binary to BCD decoder, BCD to Seven Segment decoder.

### Chapter – 4 : Sequential Circuits

- Flip-Flop – Introduction to Flip Flop- RS F/F, JK F/F, D F/F, T F/F, Clock , Set, and Reset input of F/F
- clock triggering-positive & negative clock, Edge triggering, level triggering.
- Race around condition, Master Slave F/F (unclocked & clocked input), Counters – Introduction, Synchronous & Asynchronous counter, Ripple Counter, Up-down binary counter, Decade counter, BCD counter, Ring counter, Johnson counter. Designing of counters .
- Register – Introduction, Series in –parallel out, Series in-series out,. Parallel in-parallel out register, shift register, Designing of register

### Chapter – 5 : D/A and A/D Converters

- Binary – weighted digital to analog converters
- Counter ramp analog to digital converter
- Successive approximation analog to digital converter.

### Chapter – 6 : Logic Families

- Introduction to Logic IC Families- like 74 Series IC, 54 Series IC, 40 Series .
- Concept of TTL, RTL, DTL, ETL, C-MOS and comparison.

### Chapter – 7 : Memories

- Introduction to Memories: Magnetic memory, Semi conductor memory, Static/Dynamic memories, RAM/ROM. Programmable ROM/EPROM/ EE ROM/EAROM.
- Storage devices-Magnetic disk : Floppy disk & Hard disk, Magnetic Drum, Magnetic Tape.



**I) INSTRUCTIONAL 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.

**J) LEARNING RESOURCES.**

**(e) Reference Books :**

Sl. No.	Title	Author, Publisher, Edition & Year
1	Digital circuits and logic design	Lee, Prentice-Hall, 2004
2	Digital Electronics: An Introduction to theory and practice	Gothmann, Prentice-Hall, 2004
3	Digital Electronics	Morris Mano
4	Digital Fundamentals	T.L. Floyd
5	Digital Electronics	Malvino
6	Digital Electronics	R.P.Jain
7	Digital Principles and Applications	Malvino, Leach
8	Digital electronics	R.K.Gaur
9	Digital Electronics (A practical approach)	William Kletzt
10	Pulse & Digital Circuits And Applications	R. Venkatraman, Dhanpatrai & sons

**(f) Others:**

- ~~///~~ VCDs.
- ~~///~~ Learning Packages.
- ~~///~~ Lab Manuals.
- ~~///~~ Charts.

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## **Course: DIGITAL ELECTRONICS**

**CODE : 200322 (28)**

**Hours: 48**

### **LIST OF PRACTICALS / TUTORIALS:**

1. Verify Truth Table of Logic Gates (AND, OR ,NOT ,NAND & NOR Gates ).
2. Design Basic Gates Using NAND gates
3. Design Basic Gates Using NOR gates.
4. Verify Demorgan's theorem.
5. Design Half Adder. (a) Using AND/OR/NOT Gates. (b) Using NAND/NOR Gates.
6. Design full Adder.
7. Design Half subtractor.
8. Design full subtractor.
9. Verify the operation of magnitude comparator ( 7485 IC) .
10. Verify the Truth Table of RS Flipflop, JK F/F, D F/F & T type F/F.
11. Design 3/4 bit Counter & verify truth table.
12. Design Ripple 3/4 bit Counter & verify truth table.
13. Design a counter for given event counting.
14. Design Decade Counter & verify truth table.
15. Design shift Register & verify truth table.
16. Design a register such that it can be used as a serial/parallel shift register.

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