RAJIV GANDHI PROUDYOGIKI VISHWAVIDYALAYA, BHOPAL

DIPLOMA IN ELECTRONICS AND TELECOMMUNICATION ENGINEERING

SEMESTER: **FIFTH**   SCHEME: **Jul.08**
COURSE CODE: **501**   COMMON WITH PROGRAM (S):
NAME OF COURSE: **INSTRUMENTATION AND** PAPER CODE:
                         CONTROL

RATIONALE

Transducers are the first and the most essential element of the control system, as it provides the electrical signal corresponding to the physical process variable whose parameter are to be controlled. The subject covers all the types, constructions and principles of these transducers. These transducers are most important element of instruments which are used for measurement and control process.

This course is designed for acquiring knowledge in the field of feedback control system and automated process control system. The subject further covers the basic principles and provide introduction to functions which are means of control process analysis.

Upon completion of this course, the student will be able to:
− define the behavioral elements of a control system
− understand the stability and design criteria of Process control system
− understand the function of a transducer or sensor
− understand the working principle of transducers of different kinds
− Analyze time and frequency domain response.

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DIPLOMA IN ELECTRONICS AND TELECOMMUNICATION ENGINEERING

SEMESTER: **FIFTH** SCHEME: **Jul.08**
COURSE CODE: **501** COMMON WITH PROGRAM (S):
NAME OF COURSE: **INSTRUMENTATION AND** PAPER CODE:
 CONTROL

Lectures: **4** Hrs. per week
Practical: **2** Hrs. per week

SCHEME OF STUDIES

S.No.	TOPICS	THEORY (HRS.)	PRACTICAL (HRS.)	TOTAL (HRS)
1.	ELECTRONIC INSTRUMENTATION SYSTEM	10	05	15
2.	DATA TRANSMISSION AND TELEMETRY	10	05	15
3.	DISPLAYS AND RECORDERS	10	05	15
4.	CONTROL SYSTEM	10	05	15
5.	TIME DOMAIN ANALYSIS	10	05	15
6.	ROOT LOCUS TECHNIQUES	05	-	05
7.	FREQUENCY DOMAIN ANALYSIS	05	05	10
	TOTAL	60	30	90

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DIPLOMA IN ELECTRONICS AND TELECOMMUNICATION ENGINEERING

SEMESTER: **FIFTH**
COURSE CODE: **501**
NAME OF COURSE: **INSTRUMENTATION AND CONTROL**

SCHEME: **Jul.08**
COMMON WITH PROGRAM (S):
PAPER CODE:

Lectures: **4** Hrs. per week

CONTENT DETAILS

S.No.	Course Contents	Hrs of Study

01.	**Electronic Instrumentation System**
	– Block diagram
	– Review of primary sensing elements and Transducers.
	– Signal conditioning: Block diagram of
	  – DC system
	  – AC system
	– Data acquisition system (block Diagram)
		10

02.	**Data transmission and Telemetry** - Introduction - Method of Data Transmission - General Telemetry System - Type of Telemetry System - Brief Description of land line and R.F. telemetry system. - Signal conditioning and data acquisition system	10
03	**Displays and Recorders** Displays: - Analog Indicator /Displays - Digital indicator/Display - Light Emitting Diodes - Liquid Crystal Displays Recorders: - Graphic Recorders - Strip chart recorders - X-Y Recorders - Ultra-Violet Recorders	10

S.No.	Course Contents	Hrs of Study
04.	**Control System** - Basic concept of open loop and closed loop control system and their comparison - Transfer function definition - Simple Mathematical problems on block diagram and signal flow graphs. - Simple Mathematical model of physical systems - Analogy between different systems- Mechanical, Electrical, Thermal	10
05.	**Time Domain Analysis** - First and Second order control System (Without mathematical treatment) - Definition of different performance indices as delay time, rise time, peak time, percentage peak overshoot, Settling time, steady state error. - Type-0, Type -1, type-2, system definition - Concept of stability: absolute stability, relative stability - Routh and Hurwitz Criteria for stability.	10
06.	**Root Locus Techniques** - Introduction - Root Locus concept - Construction of Root Loci	05
07.	**Frequency Domain Analysis** - Introduction - Nyquist Stability Criteria - Bode plots of simple control system	05

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COURSE CODE: **501** COMMON WITH PROGRAM (S):
NAME OF COURSE: **INSTRUMENTATION AND** PAPER CODE:
CONTROL

Practical: **2** Hrs. per week

LIST OF EXPERIMENTS

S.No.	Name of Experiment	HRS OF PRACTICAL
1.	To design practical circuits from the theoretical class room learning of - a. Photo electric system for – - 1. measurement of speed - 2 liquid level measurement - Linear speed measurement - Tracking luminous object - Any other application b. Water level indication and control systems c Temperature control systems d .Pressure measurement system e density measurement	**30**
2.	To design basic automatic system	
3.	To measure the resistance of LDR with the source of light at defferent distances	
4.	To measure the resistance of LDR with different color light.	
5.	To observe the effect of temperature on the resistance of thermister.	
6.	Visit to Industrial units where instrumentation and control system is utilized.	
7.	To draw the block diagram of sequential control system	
8.	To study a microprocessor controlled industrial control system.	
9.	**Visit of automatic bottling plant.**	

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SEMESTER: **FIFTH** SCHEME: **Jul.08**
COURSE CODE: **501** COMMON WITH PROGRAM (S):
NAME OF COURSE: **INSTRUMENTATION AND** PAPER CODE:
CONTROL

LIST OF EQUIPMENT

1. Digital/ Analog Multimeter
2. Function Generator/ Pulse Generator
3. Dual Power Supply
4. Cathode Ray Oscilloscope (C.R.O.)
5. Control System Lab Module
6. PLC Trainer
7. Water Level Control by PLC
8. Elevator control by PLC
9. Temperature control by PLC
10. Traffic Light Control by PLC
11. Optical Transducer Trainer
12. Temperature Transducer Trainer
13. LVDT Trainer
14. Strain Gauge Trainer
15. Relay Control Trainer
16. PID Controller Trainer
17. Digital Control Training System
18. Analog Control Training System

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SEMESTER: **FIFTH** SCHEME: **Jul.08**
COURSE CODE: **501** COMMON WITH PROGRAM (S):
NAME OF COURSE: **INSTRUMENTATION AND** PAPER CODE:
                 CONTROL

REFERENCES

1. Modern Electronic Instrumentation and Measurement Technique by Cooper
2. Electrical Measurements & Measuring Instruments by H. W. Golding
3. Electrical and Electronic Measurements and Instrumentation by S.Ramabhadran
4. Instrumentation Devices & Systems by Rangan
5. A course in Electrical & electronic measurement & instrumentation by A.K. Sawhney.
6. Automated Process Control Systems by Ronald & Hunter
7. Control System Engineering by Nagrath & M. Gopal
8. Linear Control System by Manke
9. Process Control Instrumentation Technology by Curtis D. Johnson
10. Control System Technology by C.J. Chesmond
11. Feedback Control Systems by Charles L.Philips & Royce D. Harber
12. Control system: Scheum Series

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DIPLOMA IN ELECTRONICS AND TELECOMMUNICATION ENGINEERING

SEMESTER: **FIFTH**   SCHEME: **Jul.08**
COURSE CODE: **502**   COMMON WITH PROGRAM (S):
NAME OF COURSE: **DATA COMMUNICATION**   PAPER CODE:
                  AND NETWORKS

RATIONALE

This course is designed to give students an adequate exposure on data communication systems and networks. The course covers both essential and fundamental topics in data communication and, at the same time, many of news and important areas of growing technical need.

Upon successful completion of this course, the student will be able to:
− explain the difference between digital and data communications;
− discuss the basic concepts of information theory;
− recognize and utilize the various date communication codes;
− explain how various error control techniques work;
− identify the important parameters and functions of serial interfaces modems;
− get acquainted with all network issues like Topology, Protocols, Products etc;
− understand the technical characteristics of Ethernet LAN;
− know the applications of ISDN
− recognize data transfer on Internet

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DIPLOMA IN ELECTRONICS AND TELECOMMUNICATION ENGINEERING

SEMESTER: **FIFTH**   SCHEME: **Jul.08**
COURSE CODE: **502**   COMMON WITH PROGRAM (S):
NAME OF COURSE: **DATA COMMUNICATION**   PAPER CODE:
                         AND NETWORKS

Lectures: **4** Hrs. per week
Practical: **4** Hrs. per week

SCHEME OF STUDIES

S.No.	TOPICS	THEORY (HRS.)	PRACTICAL (HRS.)	TOTAL (HRS)
1.	INTRODUCTION TO DATA COMMUNICATION	10	10	20
2.	HARDWARE AND INTERFACE	10	10	20
3.	INTRODUCTION TO NETWORKS	10	10	20
4.	LOCAL AREA NETWORK	20	20	40
5.	INTERNETWORKING	10	10	20
	TOTAL	60	60	120

SEMESTER: **FIFTH**   SCHEME: **Jul.08**
COURSE CODE: **502**   COMMON WITH PROGRAM (S):
NAME OF COURSE: **DATA COMMUNICATION**   PAPER CODE:
              AND NETWORKS

Lectures: **4** Hrs. per week

CONTENT DETAILS

S.No.	Course Contents	Hrs of Study
01.	**Introduction to Data Communication** - Introduction - Data Transmission mode: simplex, half duplex, full duplex - Difference between Digital and Data Communication - Serial and parallel data transmission - Character codes: - Baudot code - ASCII code - Error Detection techniques: - VRC - LRC - CRC - Error Correction techniques: - symbol substitution - Retransmission - Forward Error Correction (Hamming Code) - Serial Transmission: Asynchronous and Synchronous data transmission	10
02.	**Hardware and Interface** - Data communication Hardware: basics and applications of: - DCE - DTE - UART - USRT - Data communication interfaces: specifications and applications of: - RS 232C - USB - Data MODEMS: - Need of a Modem - Bandwidth, Data rate and Baud rate - Baseband and Broadband systems - Types of Modems	10

S.No.	Course Contents	Hrs of Study
03.	**Introduction to Networks** - Definition of Computer Network - Applications of Computer Networks - Categories Networks: LAN, MAN and WAN - Concept of Protocol - Open System Interconnection (OSI) Model: Layer Architecture, brief function of layers - Switching: Circuit switching, Packet switching and Message switching techniques - Introduction to Integrated Service Digital Network (ISDN) and its Applications	10
04.	**Local Area Network** - advantages of LAN - Network topologies: Mesh, Star, Tree, Bus and Ring, comparison - Component of Computer Networks: Understand working and application of: - Server & Workstation - NIC - Hub (Active/Passive) - Repeater - Switch - Bridge - Router - Gateway - Cabling: structure and specifications of: - UTP, STP, Co-axial and Optical Fiber - Access Methods: CSMA/CD and Token Passing - Types of LAN: Ethernet, Token Ring and FDDI; comparison - Knowledge of LAN Software: WIN NT, WIN2000, LINUX	20
05.	**Inter Networking** -Structure of Internet - Goals of Internet - TCP/IP Protocol suite - Comparison between OSI and TCP/IP - IP addressing concept - address classification- class A, class B, class C addresses - domain Name System (DNS) and Uniform Resource Locator (URL) - Internet services: E-mail, FTP and Telnet	10

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SEMESTER: **FIFTH**   SCHEME: **Jul.08**
COURSE CODE: **502**   COMMON WITH PROGRAM (S):
NAME OF COURSE: **DATA COMMUNICATION**   PAPER CODE:
　　　　　　　　　AND NETWORKS

Practical: **4** Hrs. per week

LIST OF EXPERIMENTS

S.No.	Name of Experiment	HRS OF PRACTICAL
1.	Study of various data transmission cables like coaxial, UTP and optical fiber and their connectors	**60**
2.	study of RS 232C interface	
3.	study of different type of Modem	
4.	Study of Network Operating Systems available in the Lab	
5.	Installation and Configure Server and Workstation software	
6.	Study of Various Interconnecting devices like NIC, Hub, Switch etc.	
7.	**study of Internet for data transfer and its various applications**	

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NAME OF COURSE: **DATA COMMUNICATION** PAPER CODE:
AND NETWORKS

LIST OF EQUIPMENT

1. Computers for Server and Workstations
2. Data Communication Trainer
3. Local Area Network Trainer
4. Multimedia Computer Trainer
5. Baseband Transmitter Training System
6. ISDN Trainer
7. Network Cables with RJ Connectors
8. Modem

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COURSE CODE: **502**　　　　　　　　　　COMMON WITH PROGRAM (S):
NAME OF COURSE: **DATA COMMUNICATION**　PAPER CODE:
　　　　　　　　　　AND NETWORKS

REFERENCES

1. Data communication and Networking by Behrouz A. Forouzan
2. Data communication by William Schweber
3. Computer Networks by Tenenbaum
4. Introduction to Digital & Data communication by Michael A. Miller
5. IBM PC and Clones by Govindrajalu
6. Electronic Communication Systems by Wayne Tomasi
7. Welcome to Internet by Tom Badgett and Corey Sandler
8. Web Based Learning Material on Computer Networking by IIT, Mumbai

SEMESTER: **FIFTH**
COURSE CODE: **503**
NAME OF COURSE: **INDUSTRIAL ELECTRONICS**

SCHEME: **Jul.08**
COMMON WITH PROGRAM (S):
PAPER CODE:

RATIONALE

Thyristors are the basic building blocks in industrial and power system application now all over the technical world. Their ability of being controlled, their compactness, fast response, high accuracy and low cost of manufacture are the advantages of thyristors due to advance in the field of semiconductor abreaction. These advancements have given the thyristors a colorful reception in every field. The thyristors are used in control of AC/DC motors, improvement of power factor switching devices IIVDC transmission. The subject covers principles of construction, operation and applications of these thyristors in different applications in industries.

Upon completion of this course, the student will be able to:
- Understand the principal of operation of current driven and voltage driven invertors
- Draw the configuration of Choppers and learn its application.
- Understand the load characteristics of basic variable – speed drives
- Control the speed of AC/DC motors, using power semiconductor circuits
- Understand various applications of Power Electronics.

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DIPLOMA IN ELECTRONICS AND TELECOMMUNICATION ENGINEERING

SEMESTER: **FIFTH**
COURSE CODE: **503**
NAME OF COURSE: **INDUSTRIAL ELECTRONICS**

SCHEME: **Jul.08**
COMMON WITH PROGRAM (S):
PAPER CODE:

Lectures: **4** Hrs. per week
Practical: **2** Hrs. per week

SCHEME OF STUDIES

S.No.	TOPICS	THEORY (HRS.)	PRACTICAL (HRS.)	TOTAL (HRS)
1.	POWER ELECTRONIC DEVICES	10	06	16
2.	SINGLE PHASE AND THREE PHASE RECTIFIER	10	06	16
3.	TRIGGERING CIRCUITS	05	02	07
4.	INVERTER AND CHOPPER	10	06	16
5.	SPEED CONTROL OF DC/AC MOTOR	10	04	14
6.	MISCELLANEOUS APPLICATIONS OF POWER ELECTRONICS	15	06	21
	TOTAL	60	30	90

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DIPLOMA IN ELECTRONICS AND TELECOMMUNICATION ENGINEERING

SEMESTER: **FIFTH**
COURSE CODE: **503**
NAME OF COURSE: **INDUSTRIAL ELECTRONICS**

SCHEME: **Jul.08**
COMMON WITH PROGRAM (S):
PAPER CODE:

Lectures: **4** Hrs. per week

CONTENT DETAILS

S.No.	Course Contents	Hrs of Study
01.	**Review of the characteristics of power electronics devices power diode, SCR, TRIAC, DIAC, UJT & Power Transistors:** - Static & Dynamic Characteristics - Turn On & Turn off methods(communication) - Selection & technical Specification (data-Sheet) - Protection against over voltage & over current	10
02.	**Single phase and three phase rectifier** **Diode & SCR:** - Uncontrolled with R load under continuous current mode function - Controlled with R load under continuous current mode function - Input & output wave form - Quantitative description and comparison of technical parameters such as V_{dc}, $V_{rms,}$ efficiency, RF etc. - Merits & Demerits	10
03.	**Triggering Circuits** - Principle features of firing circuits - UJT pulse triggering circuits - Phase Shift Triggering	05
04.	**Inverter and Chopper** - Principle - Types and classification - Transistorized inverter and chopper - 3 Phase operation of inverter - Practical Applications of each	10

S.No.	Course Contents	Hrs of Study
05.	**Simple speed control methods of DC and AC motors** - Speed torque characteristics of DC & AC motor. - Methods of Speed control (AC&DC) - Basic Elements /Components of Speed Control (AC&DC) - Open loop & closed loop methods (AC&DC), Block Diagram - Armature & Field Control, Block Diagram(DC) - Frequency & Slip Control block Diagram (AC description) - Choice between AC & DC Drive	10

06.	**Miscellaneous applications of power electronics**
	• Introduction
	• Principle & working
	• Different types
	• Block Diagram
	• Practical Applications
	    of the followings:
	        - UPS
	        - Resistance Welding
	        - RF Heating
	        - Diathermy
	        - Ultra Sonic
	        - Electronic Ignition
		15

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DIPLOMA IN ELECTRONICS AND TELECOMMUNICATION ENGINEERING

SEMESTER: **FIFTH**

COURSE CODE: **503**

NAME OF COURSE: **INDUSTRIAL ELECTRONICS**

SCHEME: **Jul.08**

COMMON WITH PROGRAM (S):

PAPER CODE:

Practical: **2** Hrs. per week

LIST OF EXPERIMENTS

S.No.	Name of Experiment	HRS OF PRACTICAL
	Study of wave forms and characteristics of	**30**
1.	3 phase H/W diode rectifier	
2.	3 phase H/W SCR rectifier	
3.	3 phase Bridge rectifier	
4.	3 phase bridge SCR rectifier	
5.	1 phase transistorized inverter (low power)	
6.	1 phase shift inverter	
7.	phase shift trigger circuit	
8.	UJT as a relaxation oscillator	
9.	transistorized chopper circuit	
10.	DC Motor speed control – a. open loop b. closed loop	
11.	AC Motor speed control – open loop only	
12.	Study of UPS	
13.	Study electronic ignition for two wheelers and four wheelers using service manual	
14.	Visit a ultrasonic diagnostic centre	
15.	**Visit a Repairing centre for microwave only**	

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SEMESTER: **FIFTH**
COURSE CODE: **503**
NAME OF COURSE: **INDUSTRIAL ELECTRONICS**

SCHEME: **Jul.08**
COMMON WITH PROGRAM (S):
PAPER CODE:

LIST OF EQUIPMENT

1. Power Electronics Trainer Kit
2. SCR Triggering Circuit Trainer
3. IGBT Characteristic Trainer
4. Series Inverter
5. Three Phase Rectifier Module
6. Single Phase Converter Firing trainer
7. Single Phase Controlled Rectifier
8. Single Phase Converter
9. UPS Trainer
10. Dual Power Supply
11. Function Generator
12. C.R.O (Cathode Ray Oscilloscope)
13. Power Scope for 3 Phase Measurement
14. Multimeter

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COURSE CODE: **503**
NAME OF COURSE: **INDUSTRIAL ELECTRONICS**

SCHEME: **Jul.08**
COMMON WITH PROGRAM (S):
PAPER CODE:

REFERENCES

1. Thyristorized Power Controller by Dube- Dorodla-Joshi- Sinha
2. Power Electronics by M.H.Rashid
3. Electrical Machinery by P.S. Bimbhra
4. Power Electronics by P.C.Sen
5. Thyristor Engineering by M.S.Berde
6. Thyristorized Power Controller by Sugandhi & Sugandhi
7. Industrial Electronics by G.K.Mithal

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DIPLOMA IN ELECTRONICS AND TELECOMMUNICATION ENGINEERING

SEMESTER: **FIFTH**   SCHEME: **Jul.08**
COURSE CODE: **504**   COMMON WITH PROGRAM (S):
NAME OF COURSE: **ANTENNA AND**   PAPER CODE:
                MICROWAVE ENGINEERING

RATIONALE

Antennas are our electronic eyes and ears on the world. They are our links with space. They are an essential and integral part of our civilization. This course designed to provide up-to-date knowledge and skill in communication since antenna is a prominent transducer to couple EM waves in the space.

The course covers wave propagation techniques, basic antenna parameters and some common types of antennas that are used in prominent communication systems. The course aim is to provide knowledge and skill in microwave communication since it is prominent medium of communication at higher frequencies. The emphasis has been given on operation and control of Microwave devices, So that the student may acquire the skill to operate and control the microwave setups. The basic concept of transmission lines has also been highlighted.

Upon completion of this course, the student will be able to:
− describe the propagation of radio waves;
− explain and calculate the basic transmission line characteristics;
− Measure and calculate some fundamental characteristics of antennas;
− Understand microwave systems;
− Operate and control the microwave setups;
− Use various Antennas for communication purpose.

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DIPLOMA IN ELECTRONICS AND TELECOMMUNICATION ENGINEERING

SEMESTER: **FIFTH**
COURSE CODE: **504**
NAME OF COURSE: **ANTENNA AND MICROWAVE ENGINEERING**

SCHEME: **Jul.08**
COMMON WITH PROGRAM (S):
PAPER CODE:

Lectures: **4** Hrs. per week
Practical: **4** Hrs. per week

SCHEME OF STUDIES

S.No.	TOPICS	THEORY (HRS.)	PRACTICAL (HRS.)	TOTAL (HRS)
1.	WAVE PROPAGATION	10	-	10
2.	TRANSMISSION LINES & THEIR CHARACTERISTICS	10	10	20
3.	WAVEGUIDES AND COMPONENTS	05	15	20
4.	MICROWAVE DEVICES	15	15	30
5.	ANTENNA FUNDAMENTALS & THEIR CHARACTERISTICS	10	10	20
6.	TYPES OF ANTENNA AND THEIR USES	10	10	20
	TOTAL	60	60	120

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SEMESTER: **FIFTH**   SCHEME: **Jul.08**

COURSE CODE: **504**   COMMON WITH PROGRAM (S):

NAME OF COURSE: **ANTENNA AND**   PAPER CODE:

                            MICROWAVE ENGINEERING

Lectures: **4** Hrs. per week

CONTENT DETAILS

S.No.	Course Contents	Hrs of Study
01.	**Wave Propagation:** - Ranges of Electromagnetic waves for Communication - frequency-wavelength relation - attenuation of EM waves in air - review of Reflection, refraction, interference, diffraction and Polarization of EM waves - Ground wave propagation - Space wave propagation: radio horizon, fading - Sky wave propagation: - Ionosphere layers - day and night effect - reflection & refraction of radio waves in ionosphere - critical frequency and Maximum usable frequency - Optimum working frequency - Skip distance and single hop/multi hop transmission. - Frequency ranges, advantages & disadvantages, applications of above modes of EM wave propagation. - Trophospheric scattering and Duct propagation	10
02.	**Transmission lines & their characteristics:** – Parallel wire and co -axial cables – Primary and secondary constants of transmission line, equivalent circuit – Propagation constant, attenuation constants – Transmission line losses – Characteristics impedance of parallel wire and co-axial cable – Incident wave, reflected wave and standing wave – Standing wave ratio (SWR) and Reflection co- efficient – Open circuit and short circuit lines, Voltage and current distribution	10

S.No.	Course Contents	Hrs of Study

	− Impedance matching:
	   − Need
	   − quarter wave transformer matching
	   − stub matching	

03.	**Waveguides and components:** - Waveguides concept - Comparison with transmission lines - Rectangular and circular waveguide comparison - Cutoff wavelength and frequency in Rectangular waveguide - Dominant TE_{10} Mode: field pattern & its excitation in rectangular waveguide - Waveguide passive components: List and their uses	05

04.	**Microwave devices:**
	 A. Microwave Solid State devices:
	 - Limitations of transistors at microwave frequency, microwave transistors
	 - Concept of negative resistance devices
	 - Parametric amplifier (PARAMP) and frequency converters
	 - Gunn effect and Gunn diode oscillators
	 B. Microwave Tubes:
	 - Limitation of conventional tubes,
	 - Theory, performance characteristics and Applications of:
	   - Klystron amplifier
	   - Reflex Klystron
	   - Traveling Wave Tube (TWT)
	   - Magnetron
		15

05.	**Antenna Fundamental & their characteristics:** - Introduction: antenna as a radiator - Reciprocity - Radiation resistance - Efficiency - Radiated field strength at a point - Isotropic radiator - Gain & Directivity - Radiation pattern and Beam width - Bandwidth of an antenna - Antenna Polarization - Effective height and effective aperture	10

S.No.	Course Contents	Hrs of Study
06.	**Type of Antenna and their uses:** - Dipole antenna, half wave antenna and folded dipole, distribution of voltage & current for half wave dipole - Antenna arrays: need of array, parasitic and driven elements, broad side & end fire array - Physical Structure and applications of the following Antennas: - Marconi antenna - Yagi-Uda Antenna - Parabolic reflector antenna - Horn antenna - Loop & helical antenna - Log periodic antenna - Turnstile antenna	10

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SEMESTER: **FIFTH**   SCHEME: **Jul.08**
COURSE CODE: **504**   COMMON WITH PROGRAM (S):
NAME OF COURSE: **ANTENNA AND**   PAPER CODE:
                        MICROWAVE ENGINEERING

Practical: **4** Hrs. per week

LIST OF EXPERIMENTS

S.No.	Name of Experiment	HRS OF PRACTICAL
1.	Demonstration of microwave component	60
2.	Study of VSWR meter.	
3.	Measurement of frequency of microwaves	
4.	Measurement of standing wave ratio (VSWR) and reflection coefficient.	
5.	Measurement of cutoff wavelength (TE $_{10}$ mode) Using $c = 2/(m/a) + (n/b) = 2a$	
6.	Measurement of guided power in waveguide and Transmission lines.	
7.	Measurement of attenuation in dB for a given component.	
8.	Measurement of characteristics of klystron tube.	
9.	Measurement of V-I characteristics of Gunn Diode.	
10.	Performance of Gunn Oscillator	
11.	Measurement of attenuation in dB for a given component.	
12.	Measurement of radiation pattern for different antenna.	
13.	Power Measurement in Transmission lines and Waveguide	

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COURSE CODE: **504**   COMMON WITH PROGRAM (S):
NAME OF COURSE: **ANTENNA AND**   PAPER CODE:
                        MICROWAVE ENGINEERING

LIST OF EQUIPMENT

1. Antenna Trainer
2. Microwave Test Benches
3. Wave and Propagation Trainer
4. Microwave Integrated Circuit Trainer
5. Microwave Power Meter
6. Dual Power Supply
7. Function Generator
8. C.R.O. (Cathod Ray Oscilloscope)
9. Multimeter

RAJIV GANDHI PROUDYOGIKI VISHWAVIDYALAYA, BHOPAL

DIPLOMA IN ELECTRONICS AND TELECOMMUNICATION ENGINEERING

SEMESTER: **FIFTH**   SCHEME: **Jul.08**
COURSE CODE: **504**   COMMON WITH PROGRAM (S):
NAME OF COURSE: **ANTENNA AND**   PAPER CODE:
             MICROWAVE ENGINEERING

REFERENCES

1. Electronic Communication System by Kennedy
2. Microwave devices & circuits by Liao
3. Microwaves by Gupta K.C.
4. Antennas by Kraus
5. Electronic Communication System by Tomasi
6. Electronic Communication System by William Schweber
7. Electronic Communication by Terman
8. Microwave Engineering and Application by Om P. Gandhi (Maxwell Macmillan Edition.

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DIPLOMA IN ELECTRONICS AND TELECOMMUNICATION ENGINEERING

SEMESTER: **FIFTH**

COURSE CODE: **505**

NAME OF COURSE: **ELECTRONIC WORKSHOP PRACTICE**

SCHEME: **Jul.08**

COMMON WITH PROGRAM (S): **E03, O01**

RATIONALE

As the student enter in the third year of their studies, they have sufficient basic knowledge of electronics and basic skills of soldering and handling of measuring instruments. The subject project workshop will give them practice of doing work by their own imagination which will develop confidence of doing work and handling all types of electronics equipment and components.

This course envisages to develop basic modular circuits their functional testing and to form a firm & confident basis for advanced and complex electronic circuit projects in their final year studies.

Each student is required to complete a small scale project. The projects involve bread-boarding, testing & fabrication. The circuit design for this projects, are to be given by the concerned project guide. The course covers the actual construction of a project as well as technical description of the project. The student will require submitting project report for assessment. The project report should contain background information, circuits schematics, Block diagrams, graphs, measured results, conclusion and scope for further improvement.

Upon completion of this course, the student will be able to:
− Use electronic component and pin out them
− Translate theoretical knowledge in to practice
− Develop Printed Circuit Board
− Design and fabricate electronic projects
− Develop detailed project report

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SEMESTER: **FIFTH**

COURSE CODE: **505**

NAME OF COURSE: **ELECTRONIC WORKSHOP PRACTICE**

SCHEME: **Jul.08**

COMMON WITH PROGRAM (S):**E03, O01**

Practical: **6** Hrs. per week

SCHEME OF STUDIES

S.No.	TOPICS	THEORY HRS.	PRACTICAL (HRS.)	TOTAL HRS.
1.	ELECTRICAL &ELECTRONIC MAINTENENCE	-	05	05
2.	REVIEW OF TOOLS AND ELECTRICAL ACCESSORIES	-	15	15
3.	ELECTRONICS WORKSHOP	-	15	15
4.	P.C.B. FABRICATION	-	25	25
5.	DESIGING AND FABRICATION OF SMALL ELECTRONIC PROJECT	-	30	30
	TOTAL	-	90	90

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SEMESTER: **FIFTH**

COURSE CODE: **505**

NAME OF COURSE: **ELECTRONIC WORKSHOP PRACTICE**

SCHEME: **Jul.08**

COMMON WITH PROGRAM (S):**E03, O01**

Practical: **6** Hrs. per week

CONTENT DETAILS

S.No.	Course Contents	Hrs of Practical
01.	**Electrical & Electronics Maintenance** Awareness of cleaning of dust & corrosion, Oiling & greasing for lubricating of moving parts of tools and equipment, Protection of tools & equipment from dust and temperature.	05
02.	**Review of Tools and Electrical Accessories** − Identification and selection of tools like Pliers, screw drivers, Poker, Hammer, Hacksaw, Firmer, Hand drill, Phase tester − Study of different types of wires and their specifications. − Study of Switches, resistors, capacitors and transformers.	15
03.	**Electronic Work Shop** − Material required in electronic work shop like tag points, terminal soldering metal flux etc. − Identification & testing of electronic components including ICs and SMDs. − Soldering: selection of soldering iron, Soldering metal flux, soldering technique, de soldering technique, − AC & Dc voltage & current measurement with multimeter, continuity test, measurement of resistance.	15
04.	**P.W.B. Fabrication** − Specify the need of PWB in electronic circuits. − Merits and Demerits of PWB − Describe the methods of PWB making: photo printing and screen printing. − Describe features of different types of copper clad and laminates. − State properties and applications of various types of PWB's like single layer, double layer and multiplayer. − PWB Fabrication for SMD components − PWB Designing using software like Circuit Maker etc.	25

S.No.	Course Contents	Hrs of Practical
05.	**Designing and Fabrication of Small Electronic Project** – Use data book to get the relevant information of components. – Check digital and Linear IC's on bread board with the help of data book – Make Art work for a small project – Prepare the PWB for the project. – Check and test the PCB – Fabricate cabinet. – Prepare project report – Demonstrate the function / working of the prepared project.	30

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DIPLOMA IN ELECTRONICS AND TELECOMMUNICATION ENGINEERING

SEMESTER: **FIFTH**
COURSE CODE: **505**
NAME OF COURSE: **ELECTRONIC WORKSHOP PRACTICE**

SCHEME: **Jul.08**
COMMON WITH PROGRAM (S):**E03, O01**

LIST OF EQUIPMENT

1. UV Exposure
2. Dip Coating Machine
3. Curing Oven
4. Electronic Tool Kit
5. Mechanical Tool Kit
6. Crimping Tools
7. Clamping/ Tong Tester
8. Etching Machine
9. Temperature Controlled Soldering Iron unit
10. Shearing Machine
11. Bench Drill Machine
12. Coil Winding Machine
13. Compressor/Blower
14. Bench vise
15. Hand Drills
16. Chemicals for PCB Making
17. Multimeter
18. Art Work Table
19. Screen Printing Table
20. Multimeter
21. Panel Meters
22. Art Work Material
23. Computer with PCB Design Software
24. Printer and Scanner

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DIPLOMA IN ELECTRONICS AND TELECOMMUNICATION ENGINEERING

SEMESTER: **FIFTH**

SCHEME: **Jul.08**

COURSE CODE: **505**

COMMON WITH PROGRAM (S):**E03, O01**

NAME OF COURSE: **ELECTRONIC WORKSHOP PRACTICE**

REFERENCES

(i)   The Design and drafting of Printed Circuits
                    By – Mr. Darryl Lindsey
(ii)   Printed Circuit Boards Design and Technology
                    By – Walter and Bosshart.

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DIPLOMA IN ELECTRONICS AND TELECOMMUNICATION ENGINEERING

SEMESTER: **FIFTH**   SCHEME: **Jul.08**
COURSE CODE: **506**   COMMON WITH PROGRAM (S):
NAME OF COURSE: **PROFESSIONAL ACTIVITIES**

Practical: **2** Hrs. per week

RATIONALE

Professional Activities is not a descriptive course, as per conventional norms; therefore specific content for this course cannot be prescribed. It is a group of open-ended activities; where in variety of tasks are to be performed, to achieve objectives. However general guidelines for achieving the target and procedure for its assessment are given under the course content.

As the student has to practice this course in all the six semesters, the guidelines given therein are common and applicable to each semester.

OBJECTIVES:
➢ To allow for professional development of students as per the demand of engineering profession.
➢ To provide time for organization of student chapter activities of professional bodies) i.e. Institute of engineers, ISTE or Computer Society of India etc.)
➢ TO allow for development of abilities in students for leadership and public speaking through organization of student's seminar etc.
➢ To provide time for organization of guest lectures by expert engineers/eminent professionals of industry.
➢ To provide time for organization of technical quiz or group discussion or any other group activity.
➢ To provide time for visiting library or using Internet.
➢ To provide time for group discussion or solving case studies.
➢ To provide time for personality development of students.
➢ To provide time for working for social cause like awareness for environmental and ecology etc.

DETAILED INSTRUCTIONS TO CONDUCT PROFESSIONAL ACTIVITIES:

A. Study hours, if possible should be given greater time slot with a minimum of two hrs/week to a maximum of four hrs/week.

B. This course should be evaluated on the basis of grades and marksheet of students, should have a separate mention of the grade awarded. There will be no pass/fail in professional activities(PA).

C. Following grade scale of evaluation of performance in PA has been established.

Grades	Level of performance
A	Excellent
B	Good
C	Fair
D	Average
E	Below Expectations

D. Grades once obtained in a particular examination shall become final and no chance of improvement in grades will be given to the students.

E. Assessment of performance in PA is to be done internally by the Institution, twice in a Semester/Term through a simultaneous evaluation of the candidate by a group of three teachers, of the deptt. Concerned. Group of teachers will jointly award the grade to candidate in the assessment. Best of the grades obtained by the student in these two assessments shall be finally taken on the mark sheet of the respective Semester/Term.

Candidate abstaining from the prescribed course work and/or assessment planned at the Institute shall be marked ABSENT in the mark sheet, instead of any grade.

F. While awarding the grades for performance in PA, examining teacher should reach the final consensus based on the attendance, punctuality, interest, presentation skills in seminar on the topic assigned (collection of relevant data, observations, analysis, findings/conclusion) and its written report, awareness of latest developments in the chosen programme of study.

G. Institution shall maintain the record of grades awarded to all the students in PA for a period of 1 year.

H. It shall be mandatory for students to submit a compendium for his PA in the form of a Journal.

I. Compendium shall contain following:
1. Record of written quiz.
2. Report/write up of seminar presented
3. Abstract of the guest lectures arranged in the Institution.
4. Topic and outcome of the group discussion held.
5. Report on the problems solved through case studies.

6. Report on social awareness camps(organized for social and environmental prevention).
7. Report on student chapter activities of professional bodies like ISTE, IE (India), CSI etc.

J. PA is not a descriptive course to be taught in the classroom by a particular teacher. Various activities involved in the achievement of objectives of this course should be distributed to a number of teachers so that the talent and creativity of group of teacher's benefit the treatment of the course content.

These activities should preferably be conducted in English language to maintain continuity and provide reinforcement to skill development.

Small groups shall be formed like in tutorials, group discussion, case studies, seminar, project methods, roll play and simulation to make the development of personality affective.

Treatment of PA demands special efforts, attention, close co-operation and creative instinct on the part of teachers of department concerned. Since this course is totally learner centered, many of the activities planned under this course shall come out from the useful interaction of student, among themselves and with the teachers. The guide teacher/s shall best act as a facilitator of these creative hunts/ exercises, which unfold many of the hidden talents of the students or bring out greater amount of confidence in them, to execute certain activity.