Certificate Programme : Fundamentals of Computer and Networking				**Certificate Programme : Advance Instruments , Gadgets and Appliances**			
General	**Credit**	**Skill Based**	**Credits**	**General**	**Credit**	**Skill Based**	**Credit**
Paper I: Fundamentals of IT	5	Paper I: Basic Electricals& Electronics.	3	Paper I: Fundamental of IT	5	Paper I: Basic Electricals& Electronics.	3
Paper II: Fundamentals of IT Lab.	4	Paper II: Basic Electricals & Electronics Lab.	4	Paper II: Fundamental of IT Lab.	4	Paper II:Basic Electricals & Electronics Lab.	4
		Optional - Paper III: Computer Maintenance & Troubleshooting	3			**Optional -** Paper III:Repair and maintenance of domestic appliances	3
		Optional - Paper IV: Computer Maintenance & Troubleshooting Lab.	4			**Optional -** Paper IV:Repair and maintenance of domestic appliances	4
		Optional - Paper V: Computer Networking	3			**Optional -** Paper V: Air Conditioning and Refrigeration	**3**

		Optional - Paper VI: Computer Networking Lab.	4			**Optional -** Paper VI: Air Conditioning and Refrigeration Lab.	**4**
		Optional - Paper VII: Digital Electronics	3			**Optional -**Paper VII: Repair and maintenance of Industrial Equipment's	3
		Optional -Paper VIII: Digital Electronics Lab.	4			**Optional -**Paper VIII: Repair and maintenance of Industrial Equipments Lab.	**4**
	9		**21**		**12**		21
Diploma Programme :Fundamentals of Computer and Networking				**Diploma Programme : Advance Instruments, Gadgets and Appliances**			
General	**Credit**	**Skill Based**	**Credits**	**General**	**Credit**	**Skill Based**	**Credits**
Paper I : Entrepreneur Development And Small Business Management	3	Paper I:Renewable Energy and Battery Technology	**5**	Paper I : Entrepreneur Development and Small Business Management	3	Paper I: Renewable Energy and Battery Technology	5

Paper II : Entrepreneur Related Laws and Insurance	4	Paper II:Renewable Energy and Battery Technology Lab.	5	Paper II : Entrepreneur Related Laws and Insurance	4	Paper II: Renewable Energy and Battery Technology Lab.	5
Paper III: Waste Management and E-Waste Recycling	3	**Optional -** Paper III: Web Technologies & Networking	5	Paper III: Waste Management and E-Waste Recycling	3	**Optional -** Paper III: Electronic /Electrical Laboratory Equipments	5
		Optional - Paper IV: Web Technologies & Networking Lab.	5			**Optional -** Paper IV: Electronic/Electrical Laboratory Equipments Lab.	5
		Optional - Paper V: Microprocessor and Microcontroller	5			**Optional -**Paper V:: Microprocessor, Microcontrollers	**5**
		Optional - Paper VI: Microprocessor and Microcontroller Lab.	5			**Optional -**Paper VI:: Microprocessor, Microcontrollers Lab.	**5**
		Optional -Paper VII:Programming with C	5			**Optional -**Paper VII: Programming with C	5
		Optional -Paper VIII:Programming with C Lab.	5			**Optional -**Paper VIII: Programming with C Lab.	5
	10		20	**10**			20

Appendix I

SYLLABUS

CERTIFICATE PROGRAMME: ADVANCE INSTRUMENTS, GADGETS AND APPLIANCES							
Semester		**Course Opted**	**Course Code**	**Course Name**	**Credit**	**Marks**	**Hours (@ 14H/ Credit for Theory& 28H/Credit per Lab.)**
I	General Component (Credit – 09)	Generic skills-I	GEC 1	Fundamentals of IT	05	125	70
		Generic skills-II	GEC 2	Fundamentals of IT Lab.	04	100	112
	Skill Component (Credit – 21)	Skill Education Component Course-I	DSC 1	Basic Electrical & Electronics.	03	75	42
		Skill Education Component Course-I Practical/Workshop /Field Trip/Internship	DSC 2	Basic Electrical & Electronic Lab.	04	100	112
		Skill Education Component Course-II	Optional-DSC 3	Repair and Maintenance of Domestic Appliances	03	75	42
		Skill Education Component Course-II Practical/Workshop	Optional-DSC 4	Repair and Maintenance of Domestic Appliances Lab	04	100	112

		/Field Trip/Internship	Optional-DSC 5	Air Conditioning and Refrigeration	03	75	42
			Optional-DSC 6	Air Conditioning and Refrigeration Lab	04	100	112
			Optional-DSC 7	Repair and maintenance of Industrial Equipments	03	75	70
			Optional-DSC 8	Repair and maintenance of Industrial Equipments Lab	04	100	112
					30	750	588

GEC 1: Fundamentals of IT (Theory) 70 hrs

Introduction to Computers **09**

Introduction, Definition, .Characteristics of computer, Evolution of Computer, Block Diagram Of a computer, Generations of Computer, Classification Of Computers, Applications of Computer, Capabilities and limitations of computer.

Basic Computer Organization **08**

Role of I/O devices in a computer system. Input Units: Keyboard, Terminals and its types. Pointing Devices, Scanners and its types, Voice Recognition Systems, Vision Input System, Touch Screen, Output Units: Monitors and its types. Printers: Impact Printers and its types. Non Impact Printers and its types, Plotters, types of plotters, Sound cards, Speakers.

Storage Fundamentals **08**

Primary Vs Secondary Storage, Data storage & retrieval methods. Primary Storage: RAMROM, PROM, EPROM, EEPROM. Secondary Storage: Magnetic Tapes, Magnetic Disks. Cartridge tape, hard disks, Floppy disks Optical Disks, Compact Disks, Zip Drive, Flash Drives.

Software **10**

Software and its needs, Types of S/W. System Software: Operating System, Utility Programs

Programming Language: Machine Language, Assembly Language, High Level Language their advantages & disadvantages. Application S/Wand its types: Word Processing, Spread Sheets Presentation, Graphics, DBMS s/w.

Operating System **10**

Functions, Measuring System Performance, Assemblers, Compilers and Interpreters. Batch Processing, Multiprogramming, Multi Tasking, Multiprocessing, Time Sharing, DOS, Windows, Unix/Linux.

Data Communication **10**

Communication Process, Data Transmission speed, Communication Types(modes), Data Transmission Medias, Modem and its working, characteristics, Types of Networks, LAN Topologies, Computer Protocols, Concepts relating to networking.

Business Data Processing **06**

Introduction, data storage hierarchy, Method of organizing data, File Types, File Organization, File Utilities.

Computer Arithmetic **08**

Binary, Binary Arithmetic, Number System: Positional & Non Positional, Binary, Octal, Decimal, Hexadecimal, Converting from one number system to another , Converting from one number system to another , Converting from one number system to another.

GEC 2 - Fundamentals of IT Lab 112 Hrs

DOS and Windows 18Hrs

Introduction to DOS Commands, Execute DOS commands using example. Introduction to Windows, introduction to Microsoft Office.

MS Word 2010 20Hrs

Introduction to MSWord, Menus, Shortcuts, Document types , Working with Documents a. Opening Files –New & Existing, Saving Files , Formatting page and Setting Margins , Converting files to different formats : Importing, Exporting , Sending files to others Editing text documents : Inserting , Deleting ,Cut, Copy, paste , Undo, Redo , Find, Search, Replace. Using Toolbars, Ruler, Icons and help, Formatting Documents, Setting Font Styles Font selection –style, size, color etc., Type face –Bold Italic, underline, Case settings, iv. Highlighting, Special symbols, Setting Paragraph style Alignments, Indents, Line space, Margins and Bullets and Numbering , Setting Page Style Formatting, Border & Shading, Columns, Header & footer, Setting Footnotes, Inserting manual Page break, Column break and line break, Creating sections and frames, Inserting Clip arts, inserting pictures and other files, Anchoring & Wrapping. Setting Document Styles Table of Contents, Index, Page Numbering, data &Time, Author etc., Creating Master Documents, Creating Tables Table settings, Borders, Alignments, Insertion, deletion, Merging, Splitting, Sorting,

Formula, Drawing Inserting Pictures/Files etc., Drawing Pictures, Formatting &Editing pictures, Grouping and ordering, Rotating, Tools Word Completion, Spell Checks, Macros, Mail merge, Templates, Using Wizards, Tracking, Changes, Security

MS Power Point 2010 20Hrs

Introduction Opening new Presentation, Different presentation templates, Setting backgrounds, Selecting presentation layouts, Creating a presentation Setting presentation style, Adding Text to the presentation, Formatting a presentation Adding style, Color, gradient fills, Arranging objects, Adding Header & Footer, Slide background, Slide layout, Adding Graphics to the presentation Inserting pictures, movies, tables, etc into the presentation; Drawing Pictures using Draw, Adding effects to the presentation Setting Animation & transition effect, Adding audio and video, Printing Handouts and Generating standalone presentation viewer.

MS Excel 2010 20Hrs

Introduction Spreadsheet & its Applications, Opening spreadsheet, Menus & Toolbars &icons, Shortcuts , Using help . Working with Spreadsheets Opening a File, Saving Files, Setting Margins Converting files to different formats :Importing, Exporting and Sending files to others .Spreadsheet addressing :Rows, Columns & Cells, Referring cells and Selecting cells, Entering and Editing Data: Entering Data, Cut, Copy, paste, Undo, Redo, Find, Search & Replace Filling continuous rows, columns, Inserting -Data, cells, column, rows & sheets, Manual breaks , Computing data : Setting Formula, Finding total in a column or row, Mathematical operations(Addition, Subtraction, Multiplication, Division, Exponentiation), Using other Formula, Formatting Spreadsheets: Formatting –Cell, row, column & Sheet: Alignment, Font, Border & shading, highlighting values Hiding/Locking Cells Worksheet : Sheet Name , Row & Column Headers, Row Height, Column Width, Visibility –Row, Column, Sheet , worksheet Security . Formatting –worksheet: Sheet Formatting & style -background, color, Borders & shading Anchoring objects, Formatting layout for Graphics, Clipart etc., ,Working with sheets :Sorting, Filtering, Validation, Consolidation, Subtotal , Creating Charts, Selecting charts, Formatting charts, label, scaling etc., Using Tools Error Checking, Spell Checks, Macros, Formula Auditing, Creating & using Templates, Tracking changes, customization, printing.

Business Data Processing 18Hrs

Accounting: The Data Processing System can be used to maintain the accounting records and in preparation of final accounts. The general ledger, Accounts Payable, Accounts Receivable, etc. are the examples for the computerized accounting systems followed in most business organizations.
Payroll preparation: In personnel department the data processing system is used to record the operations of the number of employees of different departments in each shifts, leave taken, deductions such as ESI, PF and finally in the preparation of Pay Slips.
Sales Analysis: The Data Processing system is highly useful in sales analysis. The sales manager can prepare the sales forecast on the basis of per month's sales reports and subsequent future actions can be taken.

DIGITAL FUNDAMENTALS 16Hrs

Verification of truth table of Logic gates, Implementation of various Logic gates using NAND gates, Implementation of various Logic gates using only NOR gate. Verification of function of Binary to Grey code conversion, Verification of function of Grey to Binary code conversion,

DSC 1- BASIC ELECTRICAL AND ELECTRONICS 42Hrs

Familiarization with the Institute and Safety: 0**4Hours**

Course duration- scope- methodology and structure of the training program- Safety in moving and shifting heavy and delicate equipment's-

Basic Electrical concepts: 04Hours

Concept of electric charge, potential difference, current and voltage, AC- DC Supply indicating lamps. Measuring circuit voltage and current using voltmeters and ammeters. AC and DC meters- Measuring instruments- MC- MI type- Ammeter- Voltmeter- Multimeter for measuring voltage and current .Construction, characteristics/ features and specification .Digital Multimeter - Meaning of Circuit and basic

Introduction to Resistors: 04Hours

Classification - characteristics and application of different types of resistors. Carbon film- metal film- wire wound- cermets' and surface mounted- Color coding of resistors. Calculating -measuring resistance value and its tolerance value. Wattage of resistors- specific resistance and their importance- Resistors in series and parallel- Ohms- law and Kirchhoff off's Laws, Temperature dependent resistors and their applications. (PTC and NTC)'-Voltage dependent resistors (VDR)- Photoelectric effect- Light Dependent resistors

Introduction to Inductor and Inductance: 03 Hours

Definition of inductance. Properties. Types of inductors and their application- Inductive reactance- measuring inductance and inductive reactance. Meaning of lead- lag. Effect of inductor on power factor. Frequency dependence of inductive reactance- Self and Mutual inductance. Coefficient of coupling, Transformers. Turns ratio .Transformer winding.

Introduction- Capacitor- Capacitance and Resonance circuits : 04 Hours

Working principle of capacitors- Electrostatic action- di-electric constant. Unit of capacitance and capacitive reactance. Types of Capacitors-electrolytic- ceramic- polyester- tantalum- mica- surface mounted. Colour coding- and tolerance - Measuring capacitance and capacitive reactance- Behavior of capacitance at different frequencies- Capacitors in series and parallel- Meaning of Resonance. Application of resonance. Series and parallel resonance circuits.

Electronic Components: Diodes: 05 Hours

Semiconductor, intrinsic and extrinsic semiconductors, P and N type semiconductor. Development of P.N. junction barrier potential. Effect of temperature. Breakdown voltage, Different types of

Diodes. Diode terminals. Diode specifications using data book- Forward and reverse characteristics of diode Testing diodes using Multimeter-Half wave and Full wave rectifiers using diodes. Transformer requirements. Calculating output DC- ripple factor- Bridge rectifier. Calculating output DC- ripple factor- Filters for rectifiers- Calculating output DC- ripple factor- Zener diode-Its characteristics and application for voltage regulation.

Introduction to Transistor and Amplifiers: 03 Hours
Working principle of Transistor, FET.

Introduction to Power Supply: 03 hours
Unregulated- regulated DC power supply specifications. Application of different types of power supply for specific application types- Series regulator using transistor. Short circuit protection. Overload protection - Fixed Voltage regulators using IC's- Variable voltage regulators using IC's- SMPS

Switches 03 HRs
Types of Switches- one-way (single-pole) electrical switch- two-way (double-pole) electrical switch- do not disturb switch- light dimmer / stepless regulator- bell push switch- SPST Electric Switch - SPDT Electric Switch - DPST Electric Switch - DPDT Electric Power Switch - Toggle Switches - Pushbutton Switches - Selector Switches - Joystick Switches - Limit Switches - Proximity Switches, The Different Types of Process Switches - Speed Switches- Pressure Switches- Temperature Switches- Liquid Level Switch- Liquid Flow Switch- Nuclear Level

Circuit Breaker and Its Importance: 02 HRs
Types of circuit breakers- Air Circuit Breaker - Plain Air Circuit Breaker- Air Blast Circuit Breaker- Axial Blast Breaker- Advantages and Disadvantages of Air-Blast Circuit Breaker - Application and Uses of Air Circuit Breaker, SF6 Circuit Breaker - Single interrupter -.

Relays 02 HRs
Design of a Relay, Construction of Relay and its operation, How Relay Works - Relay in normally closed condition - Relay in normally opened condition, types of relays- Pole and Throw combinations- Single pole, single throw (SPST)- Single pole, double throw (SPDT): Double pole, single throw (DPST)- Double pole, double throw (DPDT),

Sensors 05 HRs
Classification of Sensors - Active and Passive Sensors, Types of sensors- Temperature Sensor (Types of temperature Sensors : Thermocouples, Resistor temperature detectors, hermistors, Infrared sensors, Semiconductors, Piezo-electric sensors) -

Reference Books :

1. Electrical Technology IN S.I Units, Volume I- Basic Electrical Engineering
   B.L Theraj, A.k Theraja S.Chand & Company Ltd.,

2. Electronic Devices and Circuits by Jacob Millman & Christos C Halkias McGraw-Hill

DSC 2- BASIC ELECTRICAL AND ELECTRONICS LAB 112 Hrs

Familiarization with the Institute and Safety: 10 Hours
Visits to workshops- labs- office- stores etc. of the institute, Demonstrate safety precaution including anti- static protection - Demonstrate first aid practice. Demonstrate artificial respiration and practice.- Demonstrate electrical safety precautions.

Basics of Electricity: 15 Hours
Identify specification of different types of fuses- switches. Identify of meter types and measuring range. Construct a simple circuit using AC/DC supply- lamp- fuse and switch. Measure circuit voltage and current using voltmeters and ammeters. Also check voltage between earth and neutral. Measure voltage and current using Multi-meter (analog- digital). Use Multimeter to check fuses- lamps and switches. Measure DC and AC power

Resistors: 15 Hours
Identify different types of resistors from physical appearance.- Identify resistor value and tolerance using color code. Measure resistance using Multimeter. Practice of soldering and de soldering techniques- practice using hook-up wires. Practice using surface mount board/ device. Verify of Ohms Law and Kirchhoff's Laws. Practice of soldering resistors on PCB and De-soldering. Experiment using P.T.C and NTC resistors. Experiment to check VDR's. Experiment to check LDR's.- Test Pot- Presets.

Inductance: 15 Hours
Identification of different types of inductors and its specifications. Measure inductance- using LCR meter. Calculate Inductive reactance at different input signal frequencies.- Demonstrate self and mutual induction. Check step down Transformers. Rewind a transformer to given specification using winging machine. Finding losses and efficiency of given transformers. Identifying and testing high frequency transformers used in electronic circuits.

Capacitance and Resonance Circuits: 15 Hours
Identify of different types of capacitors from colour code and typographic code. Test working condition of capacitor. Discharge first then test a charged capacitor Measure capacitance using RLC meter. Measure capacitive reactance at different frequencies. Measure capacitance and, capacitive reactance of capacitors in series and capacitors in parallel.

Electronic Components: 12Hours

Identify terminals of different types of diodes. Record its specifications referring to diode datasheet. Plot forward and reverse characteristics of diode Testing working condition of diodes. Construct and test a half wave and full wave diode rectifiers. Construct and test a Bridge rectifier with and without filter. Draw Zener diode characteristics, Simple voltage regulator using zener diode.

Transistor and Amplifiers: 10 hours

Identify types transistors based on their physical appearance. Identify the leads of the given assorted types of transistors. Practice Quick test given transistors using Multimeter. Identify opens- shorted junctions. Test and measure various electronics components.

Power supply: 10 Hours

Assemble and test a fixed voltage regulator using 3pin IC. Assemble and test a variable voltage regulator using IC. Assemble a simple inverter and converter for use with emergency lamp. identify the parts and controls of a UPS. Practices switch-on and switch-off procedures.

Sensors 10 HRs

Identify and Test Sensors. Measurement with thermocouple element, Design temperature controller using LM35. Design Application of Proximity Sensor (IR Sensor) - Design Application of Pressure Sensor - Design Application of Light Sensor – Testing of Smoke, Gas and Alcohol Sensor - Touch Sensor - Color Sensor - Humidity Sensor - Tilt Sensor - Flow and Level Sensor

DSC -3: Repair and Maintenance of Domestic Appliances 42Hrs

UPS/Inverter 05Hrs

Various types of batteries used in UPS and Inverters and their maintenance. Different types of inverter, UPS, Working principle, specifications, explanation with the help of block diagram.

SMPS 04 Hrs

Block Diagram of Switch mode power supplies and their working principles

Washing Machine 10Hrs

Washing M/c: different types of machines, washing techniques, parts of manual, semi automatic and fully automatic machines, basic working principle of manual, semi automatic and fully automatic machines, study the working of motors, different types of timers, power supply circuits.

Microwave oven 04Hrs

Different types of oven, study the various functions of Oven, Electrical wiring diagram of microwave oven, working of Power supply.

Steam Iron 03Hrs
Principle of electric iron, parts of steam iron, thermostat heat controls.

Electric Rice cooker 02Hrs
Working Principle of Rice cooker, various parts & functions of rice cooker, temperature control and timer unit.

Electric Kettle 04Hrs
Working Principle of electric kettle. Various parts & functions of electric kettle and temperature control unit. water heater

Mixer Grinder 02Hrs
Various parts & functions of Mixer/Grinder, speed control circuit & automatic over load protector.

Induction cooktops 04Hrs
Working Principle of Induction cooktops, eddy current, electrical induction, Advantages of induction cooktops, The limitations of induction,

DISH TV & CCTV 04

References

1. Troubleshooting and Repairing Major Appliances Hardcover – 16 December 2012 by Eric Kleinert (Author)
2. Complete Guide to Home Appliance Repair Hardcover – June 1, 1990
3. Electrical Appliances: The Complete Step-by-step Guide to the Repair and Maintenance of a Wide Range of Domestic Electrical Appliances (Haynes for Home DIY) Paperback – January 1, 1995 by Graham Dixon (Author)
4. Handbook of Repair and Maintenance of Domestic Electronics Appliances Paperback – 1 January 2016 by Shashi Bhushan Sinha (Author)

DSC 4: Repair and Maintenance of Domestic Appliances Lab 112Hrs

UPS/Inverter 20Hrs

- Installation of UPS and Inverters
- Maintenance of batteries
- Dismantle the UPS and identify the major parts
- Testing of major components
- Testing of power modules
- Charging, discharging and testing of batteries.

SMPS 15Hrs

- Dismantle the given SMPS and find major sections/ ICs components.
- Measure voltages at vital points
- Identify various input and output sockets / connectors of the given SMPS.
- Repairing of SMPS, simulating various faults diagnosing and rectifying it.

Washing machine 20Hrs

- Installation of front load washing machine
- Installation of top load washing machine
- Identify the internal and external parts of semi-auto washing machine
- Identify the internal and external parts of fully automatic washing machine
- Operate semi–automatic washing machine
- Operate fully–automatic washing machine
- Rectify the fault leading to not working of control panel switches.
- Rectify the fault leading to not working of pulsator / agitator.
- Rectify the fault leading to spin drier not working.
- Rectify the fault leading to one side rotation of motor.
- Rectify the fault leading to water inlet and outlet valves

Microwave oven 20Hrs

- Identify the internal and external parts of micro wave oven.
- Identify the different touch pad controls their functions
- Testing of high voltage diode.
- Identify the HV capacitor and discharge it.
- Rectify the fault leading to fuse blows off when cooking is initiated.
- Rectify the fault leading to not responding of touch switches (front panel)
- Rectify the fault leading to dead set.
- Rectify the fault leading to long cooking time.
- Precautions – importance of interlocking switch in performing maintenance

Steam Iron 07Hrs

- Dismantle and identification of various parts, wiring, tracing of various controls, Electronic circuits in steam Iron
- Identify the faults in steam iron & rectify

Electric Rice cooker 06Hrs

- Identify various components of Electric rice cooker, controls and trace the circuit and rectify the simulated faults

Electric kettle 06Hrs

- Identify various components of Electric kettle, controls and trace the circuit and rectify the simulated faults.
- Geyzer

Mixer & Grinder 06hrs

- Dismantle and identification of various parts, wiring, tracing of various controls, Electronic circuits in various types of Mixer & Grinder
- Identify the faults in various types of Mixers/grinders & rectify

Induction cook tops 06Hrs

- Dismantle and identification of various parts, wiring, tracing of various controls, Electronic circuits in various types of Induction cook tops**.**
- Check parts that usually get damaged are: Main control board, Filter board, Touch user interface control board, Cook top glass assembly, Elements coil, Terminal box.
- Identify the faults of each part and repair it or replace the part.

DISH TV & CCTV Installation 06 hours

DSC 5: Air Conditioning and Refrigeration 42Hrs

PSYCHROMETRY 08Hrs

Psychrometric Processes – Sensible Cooling, Sensible Heating, Cooling with de-humidification, Cooling with adiabatic Humidification, Chemical dehumidification, heating and humidification, Mixing of air- streams, Air Washers.

HEAT TRANSFER AND AIR-DISTRIBUTION 10Hrs

Principles of heat transfer, Conduction, Convection and Radiation. Properties of insulating materials, Air Distribution, Systems of air distribution, Duct systems, and cooling load and air quantities pressure in ducts, duct layout & construction.

COMPONENTS OF REFRIGERATION SYSTEMS 10Hrs

Condensers, Air cooled and water cooled Evaporative Condensers, Heat Rejected in condensers, construction of condensers, Driers, receivers, Purging, Cleaning of Condensers, Refrigerant Controls, Types of expansion devices and sensible heat factor, construction and operation of Automatic expansion valve, thermostatic expansion valve, and capillary tube, low side float valve, High Side float valve. Solenoid valves, testing and adjusting thermostatic expansion valves, Evaporators, types of evaporators- Dry and flooded, Heat absorbed in evaporators, water chillers, brine coolers, Methods of defrosting..

ELECTRIC CONTROLS 04Hrs

Refrigeration Controls, H.P and L.P cutouts, Oil Pressure failure safety switch., Motor Starters, capacitors, Relays, over load protectors and servicing of motors.

COMMERCIAL APPLICATIONS 04Hrs

Ice-Manufacture, cold-storage, Ice-Cream manufacture, Dairy refrigeration etc.

AIR-CONDITIONING SYSTEMS AND MAINTENANCE 10Hrs

Air-Conditioning systems and equipments, classification of air-conditioning systems-all air systems, all water system types, Fans, Blowers, grills, resistors, filters, compressors, cooling coils, condensers Air-Handling Units, Fan coil Units, Central Air Conditioning plants. Ventilation Systems, Leak Detection, Pressure testing and charging.

DSC 6: Air Conditioning and Refrigeration Lab 112Hrs

1) Testing of Thermostats.
2) Experiment on an Evaporative Cooler.
3) Experiment on a Cooling Tower.
4) Study of expansion-valves, testing and adjusting.
5) Pressure testing and leak detection methods.
6) Charging Procedure and charging correctly a refrigerator.
7) Study of low and high Pressure cut-outs.
8) Study of Capacitors, Relays, Overloads, Chokes, etc.
9) Repairing a Hermetically Sealed Unit.
10) Complete servicing of a Refrigerator.
11) Complete Servicing of an Invertor and non-inverter air-Conditioner.
12) Wiring diagrams of an Air-Conditioner and central Plants.
13) Wiring diagrams of Multi-cylinder Compressor for capacity control.
14) Industrial Visits.

BOOKS AND REFERENCES

1) Refrigeration & Air-conditioning, CP Arora, TMG
2) Refrigeration & Air-conditioning, Manohar Prasad, NAI
3) Refrigeration & Air-conditioning, Stoecker & Jons, MGH
4) Principles of Refrigeration, RC Dosset, LPE
5) ASHRAE Handbook (Fundamentals), ASHRAE

Optional- DSC 7: Repair and Maintenance of Industrial Equipments 42Hrs

Plan and perform routine trade activities 8Hrs

Examine types of trade related personal protective equipment, Head protection- hard hat, Eye protection - goggles and face shield, Hearing protection -Ear plug & Ear muffs, Hand protection - Types of gloves and mitts Clothing - Types of materials suitable to work environment Foot protection - safety boots with suitable soles Personal Breathing Apparatus Maintain safe work environment, Safe housekeeping practices, Appropriate recycling and disposal procedures, Use and maintain hand and power tools, Trade specific hand and power tools, Examine mounting and installation hardware and practices, Manufacturer instructions, Types of mounting hardware (uni-strut, clamps, u-bolts, Location for installation of mounting hardware

Scope of Instrumentation 10Hrs

Scope and necessity of Instrumentation, functional block diagram of measurement system calibration and calibration standards basic, secondary and working standards the metric system base and supplementary units derived units, Multiplying factors (milli, micro, nano, Mega, Giga) Instrument Characteristics Instrument performance terminology, Repeatability and Accuracy Zero, span and Linearity errors Types of errors. Standard Signals Different number bases, Binary Octal Hex.

Explain codes, standards and regulations 08Hrs

Examine work-related safety regulations and publications OHS Regulation General Requirements of OHS Chemical and biological agents, Noise, vibration, radiation and temperature, Tools machinery and equipment safety, Ladders, scaffolds and temporary work platforms, Rigging, cranes and hoists, Mobile equipment, Electrical safety, Oil and gas industries

Installs & Maintains Safety and Process Monitoring Systems 8Hrs

Types of ESD control systems, Levels of Shutdown, Unit Shutdown, Process Shutdown, Emergency Shutdown, Emergency Depressurize Shutdown, Types of ESD, Electric Pneumatic, Hydraulic, Mechanical, Purposes of different types of ESD, Personnel protection, Environmental protection, Equipment protection, ESD testing procedures, Partial Stroke Test, Time test, Valve integrity, Interlock checks (system shut down check)

Service and calibrate personal safety systems 8 Hrs

Personal gas monitors and standard calibration routines, Portable personal gas monitor (Cl, SO2, H2S, O2 , CO), Pull tube (Draeger), Radiation safety devices, Radiation (gamma) survey meter, Personal dosimeter.

References:

1) Industrial Machinery Repair: Best Maintenance Practices Pocket Guide (Plant Engineering) Kindle Edition, by Ricky Smith (Author), R. Keith Mobley (Author)
2) Industrial Machinery Repair: Best Maintenance Practices Pocket Guide (Plant Engineering) Paperback – 18 August 2003, by Ricky Smith (Author), R. Keith Mobley President and CEO of Integrated Systems Inc. (Author)
3) Industrial Machinery Repair, 1st Edition, Best Maintenance Practices Pocket Guide, Authors: Ricky Smith R. Keith Mobley

Optional - DSC 8: Repair and maintenance of Industrial Equipments Lab 112Hrs

Plan and perform routine trade activities 12Hrs

Calibrate and service indicating and recording instruments 24Hrs
Study the types of recording devices, Chart recorders, Electronic Indicating devices, Digital displays, Analog displays Configurable, LCD, Calibrate and service indicating devices, Gauges, Bourdon tube, Helical, Spiral, Bellows, Diaphragm capsule, Accessories, Pigtail siphons, Damping mechanisms, Chemical seals, Measuring element and range, Fill fluid specifications, Differential measuring devices, Device calibration using principles of zero, span and angularity, adjustments as they relate to links and levers, Service recording devices (Electronic), Identification of measuring element and input measurement scale, Power supply, Troubleshooting procedures (instrument specific - according to manuals)

Explain codes, standards and regulations 24Hrs
Practical work-related safety, Chemical and biological agents, Noise, vibration, radiation and temperature, Tools machinery and equipment safety, Ladders, scaffolds and temporary work platforms, Rigging, cranes and hoists, Mobile equipment, Electrical safety.

Installs & Maintains Safety and Process Monitoring Systems 24**Hrs**
Visit to industries to learn how to Install of ESD control systems, Levels of Shutdown, Unit Shutdown, Process Shutdown, Emergency Shutdown, Emergency Depressurize Shutdown, Installation of ESD, Electric Pneumatic, Hydraulic, Mechanical, Purposes of different types of ESD, Personnel protection, Environmental protection, Equipment protection, ESD testing procedures, Partial Stroke Test, Time test, Valve integrity, Interlock checks (system shut down check).

Digital Data Acquisition systems & control 16Hrs
Practical on signal conditioners, scanners, signal converters, recorders, display devices, A/D & D/A circuits in digital data acquisition. Instrumentation systems. Field visit to show different Types of Instrumentation systems. Components of an analog Instrumentation Data – Acquisition system. Multiplexing systems. Uses of Data Acquisition systems. Modern Digital Data Acquisition system. Analog Multiplexed operation.

Appendix II

Syllabus
Diploma Programme: Advance Instruments, Gadgets and Appliances

SEMESTER-WISE SCHEDULE FOR **Diploma Programme : Advance Instruments, Gadgets and Appliances**							
Semester		**Course Opted**	**Course Code**	**Course Name**	**Credit**	**Marks**	**Hours** (@ 14H/ Credit for Theory& 28H/Credit per Lab.)
II	General Component (Credit – 10)	General Education Component Course-I	GEC 3	Entrepreneur Development and Small Business Management	03	75	42
		General Education Component Course-I	GEC 4	Entrepreneur Related Laws and Insurance	**04**	**100**	**56**
		General Education Component Course-I	GEC 5	Waste Management and E-waste Recycling	**03**	**75**	**42**

	Skill Component (Credit – 20)	Skill Education Component Course-II	DSC 9	Renewable Energy and Battery Technology	**05**	**125**	**70**
		Skill Education Component Course-II Practical/Workshop/Field Trip/Internship	DSC 10	Renewable Energy and Battery Technology Lab.	**05**	**125**	**140**
		Skill Education Component Course-II	Optional-DSC 11	Electronic/Electrical Laboratory Equipments	**05**	**125**	**70**
		Skill Education Component Course-II Practical/Workshop/Field Trip/Internship	Optional-DSC 12	Electronic/Electrical Laboratory Equipments Lab.	**05**	**125**	**140**
		Skill Education Component Course-II	Optional-DSC 13	Microprocessor, Microcontrollers	**05**	**125**	**70**
		Skill Education Component Course-II Practical/Workshop/Field Trip/Internship	Optional-DSC14	Microprocessor, Microcontrollers Lab.	**05**	**125**	**140**
		Skill Education Component Course-II	Optional-DSC15	Programming with C	**05**	**125**	**70**
		Skill Education Component	Optional-DSC16	Programming with C Lab.	**05**	**125**	**140**

		Course-II Practical/Workshop/Field Trip/Internship					
				Total	**20**	**750**	**560**

GEC 3: Entrepreneur Development and Small Business Management 42 Hrs

Introduction 12hrs

Meaning and Importance, Evolution of term 'Entrepreneurship, Factors influencing entrepreneurship, Psychological factors, Social factors, Economic factor, Environmental factors, Characteristics of an entrepreneur, Entrepreneur and Entrepreneur, Types of entrepreneur, According to Type of Business, According to Use of Technology, According to Motivation, According to Growth, According to Stages, New generations of entrepreneurship viz. social entrepreneurship, Entrepreneurship, Health entrepreneurship, Tourism entrepreneurship, Women entrepreneurship etc., Barriers to entrepreneurship.

Creativity 10hrs

Creativity and entrepreneurship, Steps in Creativity, Innovation and inventions, Using left brain skills to harvest right brain ideas, Legal Protection of innovation, Skills of an entrepreneur, Decision making and Problem Solving(steps indecision making).

Organization Assistance 20Hrs

Assistance to an entrepreneur, New Ventures, Industrial Park(Meaning, features, & examples), Special Economic Zone(Meaning, features & examples), Financial assistance by different agencies, MSME Act Small Scale Industries, Carry on Business (COB) license, Environmental Clearance, National Small Industries Corporation (NSIC), Government Stores Purchase scheme(e-tender process), Excise exemptions and concession, Exemption from income tax, Quality Standards with special reference to ISO, Financial assistance to MSME, Modernization assistance to small scale unit, The Small Industries Development Bank of India(SIDBI), The State Small Industries Development Corporation(SSIDC), Export oriented units, 1Incentives and facilities to exports entrepreneurs, Export oriented zone, Registration Categories, Registration Procedure.

Text Books:

1) Entrepreneurship Development and Small Business Enterprises, Poornima M. Charantimath, 2e, Pearson, 2014.

2) Entrepreneurship, A South – Asian Perspective, D. F. Kuratko and T.V.Rao, 3e, Cengage, 2012.

REFERENCES:

1) Entrepreneurship, Arya Kumar, 4 e, Pearson 2015.
2) The Dynamics of Entrepreneurial Development and Management, Vasant Desai, Himalaya Publishing House, 2015.

GEC 4 : Entrepreneur Related Laws and Insurance 56 Hrs

Banking -Deposits & Advances 08Hrs
Lending Schemes / Government Sponsored Schemes, Various Deposit Schemes and other services of banks, General Advances -Security Norms & margin requirement, Term Loan & Working Capital finance, MSME Credit, Mudra Loan, PMEGP Scheme , CGTMSE Scheme.

Book Keeping & accountancy 12Hrs
Cash book, sales & purchases, book keeping methodology, Various types of records to be maintained in small enterprises -Cash Book, General Ledger etc Accounting methodology, Various heads of accounts and how to appropriate expenditure there in, Financial Statements.

Insurance 12Hrs
Importance of securing assets through insurance, Types of insurance cover available , General Insurance (fire, theft, burglary etc), Insurance Schemes of the Government , How to claim insurance.

Business Laws –Taxation & related laws 16Hrs
Legal aspects of weights and measures, IT, VAT Sales Tax, state and central Govt. Rules and regulations in business, Compliance for various statutory requirements VAT, CST, Income Tax etc., Compliance for various statutory requirements(VAT, CST, Income Tax etc.)

IT Factor in managing an enterprise 08Hrs
Impending need., Importance of Computer literacy & basic knowledge of computers, E filing of various tax returns, Online marketing.

Text Books:

1. Entrepreneurship Development and Small Business Enterprises, Poornima M. Charantimath, 2e, Pearson, 2014.

2. Entrepreneurship, A South – Asian Perspective, D. F. Kuratko and T.V.Rao, 3e, Cengage, 2012.

REFERENCES:

1. Entrepreneurship, Arya Kumar, 4 e, Pearson 2015.
2. The Dynamics of Entrepreneurial Development and Management, Vasant Desai, Himalaya Publishing House, 2015.

GEC 5: Waste Management and E-waste Recycling 42Hrs

Solid waste 12hrs

Public health and ecological impacts, Sources and types of solid wastes, material flow and waste generation, Functional elements: Waste generation, storage, collection, Transfer and transport, processing and recovery, disposal. Physical and chemical composition of municipal solid waste, integrated solid waste management, hierarchy of waste management options, different methods for generation rates. Storage: movable bins, fixed bins. Collection: home to home collection, community bin system. Theory and design of hauled container system, stationary container system.

Transportation 08hrs

Handcart, tri-cycle, animal cart, tripper truck, dumper placer, bulk refuse carrier, railroad transport, water transport, conveyors, layout of routes. Engineering system for on-site handling and processing of solid waste: separators, size reduction equipments, screening equipments, densification, baling, cubing, pelleting equipments.

Landfilling 08Hrs

Site selection criteria, landfill layout, landfill sections, Occurrence of gases and leachate in landfills: composition and characteristics, generation factors, initial adjustment phase, transition phase, acid formation phase, methane formation phase, maturation phase of gases and leachate, Introduction to engineered landfills.

E-waste 14Hrs

Definition of Hazardous waste, The magnitude of the problem; Hazardous waste: Risk assessment, Environmental legislation, Characterization and site assessment, Waste minimization and resource recovery, Transportation of hazardous waste, Disposal of hazardous waste.Introduction to Electronic waste and Biomedical waste and their disposal. E-Waste Recycling Technologies for recovery of resources from electronic waste, resource recovery potential of e-waste, steps in recycling and recovery of materials-mechanical processing, technologies for recovery of materials.

References:

1) E-Waste Managing the Digital Dump Yard, Edited by Vishakha Munshi,ICFAI University Press.
2) E-waste: Implications, Regulations and Management in Indiaand Current Global Best Practices, Edited by Rakesh Johri, TheEnergy and Resources Institute, New Delhi
3) Solid Waste Management Paperback – 1 January 2009, by Sasikumar K

DSC 9: Renewable Energy and Battery Technology 70Hrs

Introduction 08Hrs

Causes of Energy Scarcity, Solution to Energy Scarcity, Factors Affecting Energy Resource Development, Energy Resources and Classification, Renewable Energy – Worldwide Renewable Energy Availability, Renewable Energy in India, Sun- earth Geometric Relationship, Layer of the Sun, Earth – Sun Angles and their relationships, Solar Energy Reaching the Earth's Surface, Solar Thermal Energy Applications.

Solar Thermal Energy Collectors 04hrs

Types of Solar Collectors, Configurations of Certain Practical Solar Thermal Collectors, Material Aspects of Solar Collectors, Concentrating Collectors, Parabolic Dish – Stirling Engine System, Working of Stirling or Brayton Heat Engine, Solar Collector Systems into Building Services, Solar Water Heating Systems, Passive Solar Water Heating Systems, Applications of Solar Water Heating Systems, Active Solar Space Cooling, Solar Air Heating, Solar Dryers, Crop Drying, Space Cooing, Solar Cookers, Solar pond.

Solar Cells 04hrs

Components of Solar Cell System, Elements of Silicon Solar Cell, Solar Cell materials, Practical Solar Cells, I – V Characteristics of Solar Cells, Efficiency of Solar Cells, Photovoltaic Panels, Applications of Solar Cell Systems.

Hydrogen Energy 04hrs

Benefits of Hydrogen Energy, Hydrogen Production Technologies, Hydrogen Energy Storage, Use of Hydrogen Energy, Advantages and Disadvantages of Hydrogen Energy, Problems Associated with Hydrogen Energy.

Wind Energy 04hrs

Windmills, Wind Turbines, Wind Resources, Wind Turbine Site Selection.

Geothermal Energy 04hrs

Geothermal Systems, Classifications, Geothermal Resource Utilization, Resource Exploration, Geothermal Based Electric Power Generation, Associated Problems, environmental Effects.

Solid waste and Agricultural Refuse 04hrs

Waste is Wealth, Key Issues, Waste Recovery Management Scheme, Advantages and Disadvantages of Waste Recycling, Sources and Types of Waste, Recycling of Plastics.

Biomass Energy 04hrs

Biomass Production, Energy Plantation, Biomass Gasification, Theory of Gasification, Gasifier and Their Classifications, Chemistry of Reaction Process in Gasification, Updraft, Downdraft and Cross-draft Gasifiers, Fluidized Bed Gasification, Use of Biomass Gasifier, Gasifier Biomass Feed Characteristics, Applications of Biomass Gasifier, Cooling and Cleaning of Gasifiers.

Biogas Energy 04hrs

Introduction, Biogas and its Composition, Anaerobic Digestion, Biogas Production, Benefits of Biogas, Factors Affecting the Selection of a Particular Model of a Biogas Plant, Biogas Plant Feeds and their Characteristics.

Tidal Energy 04hrs

Introduction, Tidal Energy Resource, Tidal Energy Availability, Tidal Power Generation in India, Leading Country in Tidal Power Plant Installation, Energy Availability in Tides, Tidal Power Basin, Turbines for Tidal Power, Advantages and Disadvantages of Tidal Power, Problems Faced in Exploiting Tidal Energy.

Sea Wave Energy 04hrs

Introduction, Motion in the sea Waves, Power Associated with Sea Waves, Wave Energy Availability, Devices for Harnessing Wave Energy, Advantages and Disadvantages of Wave Power.

Ocean Thermal Energy 04hrs

Introduction, Principles of Ocean Thermal Energy Conversion (OTEC), Ocean Thermal Energy Conversion plants, Basic Rankine Cycle and its Working, Closed Cycle, Open Cycle and Hybrid Cycle, Carnot Cycle, Application of OTEC in Addition to Produce Electricity, Advantages, Disadvantages and Benefits of OTEC

SOLAR PV SYSTEM 04Hrs

Classification, Stand-Alone Solar PV System, Grid Interactive Solar PV System, Hybrid Solar PV System.

Battery technology 04Hrs

Introduction, Basic Concepts, Components of Battery, Operation of Battery, Battery Characteristics Classification of Batteries, Classical batteries : Lead Acid, Nickel Cadmium, Zinc Manganese dioxide, Inverter- Introduction ,Classification of Inverter, Single Phase Series Inverter, Single Phase Full Bridge Inverter, Single Phase Inverter Output Voltage Control.

SMART GRID TECHNOLOGY 12Hrs

Evolution of Electric Grid, Concept of Smart Grid, Definition of Smart Grid, Need of Smart Grid, Functions Smart Grid, Opportunities and Barriers Smart Grid, Difference between Conventional Grid and Smart Grid, Concept of Resilient Grid and Smart Grid, Role of Smart Meter in Smart Grid,Real Time Pricing, Smart Appliances, Automatic Meter Reading(AMR), Smart Sensors, Smart Grid Life Cycle, Regulatory & Cost Recovery, Strategy & Planning, Technology Integration, Business Process Readiness, Compliance & Risk Management,

References:

1) Goswami DY. Kreith F. Kreider JF. PrinciplesofSolarEngineering, Taylor & Francis, 19992.
2) Tiwari GN. SolarEnergy,Fundamentalsdesign,modelingandApplications. Narosa, 2002
3) Duffie JA. Beckman WA. SolarEngineeringofThermalProcesses, John Wiley, 2006
4) Kishore VVN. RenewableEnergyEngineeringandTechnologies, TERI, 2009
5) Non-Conventional Energy Resources, B. H. Khan, The McGraw Hill Publications.
6) Non-Conventional Energy Sources, G.D. Ray, Khanna Publications.
7) S. P. Sukhatme and J.K. Nayak, Solar Energy – Principles of Thermal Collection and Storage, Tata McGraw-Hill, New Delhi.

DSC 10: Renewable Energy and Battery Technology Lab 140Hrs

Battery Charger **50**

How NiCad Rechargeable Batteries Work, Checking the Battery Voltage, Building the Programmable Battery Charger, Programming the Battery Charger , Discharging the Batteries, Charging the Batteries, Replaying the Charge Cycle, Detecting the End of Charge.

Solar Cells **60**

How Solar Cells Work, study of Solar Cell Sun Tracker, study of Real World Sun-Tracking Solar Arrays, How to Shielding the Solar Panels Centering the Servo , How the Sun Tracker Works Half and Full Wave Rectification ,The Principles of Half Wave Rectification, Assembling the three-phase AC Alternator , Building the Half Wave Rectifier, How the Half Wave Rectifier Program Works, Full Wave Rectifier Operation ,Building the Full Wave Rectifier Circuit , study of Real World Power Supply Design, Understanding Three-Phase Power, simple experiments for Generating Electricity using Wind Power.

SMART GRID TECHNOLOGY **30**

Field Visit: Study smart meters, Visit Solar plus Wind Power generation's station/ hydro power generation/ Thermal power generation/ other power generation station. Visit to Goa Energy power generation for understanding Grid System.

DSC 11Electronics/Electrical Laboratory Equipments 70hrs

Fundamental aspect of electronic equipments 06HRs

Electronics today, Reliability aspect of electronic equipments, Equipment failure, Causes of failure, Reliability predictions, and Maintenance policy.

Troubleshooting procedure 10 HRs

Making of electronic circuits, Making of electronic equipments, Nature of faults, What is troubleshooting?, Fault location, Fault finding aids, Troubleshooting Technique, Troubleshooting procedure, Approaching components for tests, Grounding system in electronic equipments, Systematic troubleshooting check, Temperature intermittent problems, Corrective action, Preventive maintenance, Service and maintenance laboratory, Professional qualities and work habits.

Electronic test equipments 06 HRs

Multi-meters- types of multimeter- How to measure Resistance, AC/DC Voltage, Current, and Continuity test using multimeter. The oscilloscope, Logic analyzer, Signal analyzer, Signal generator,

Tools and Aid for servicing and maintenance 02HRs

Hand tools, Soft tools.

Soldering techniques 05 HRs

What is soldering?, Soldering tools, Soldering materials, Soldering procedure, Soldering technique, Replacement of components, Special consideration for handling of MOS devices, Soldering of leadless capacitors, Good and bad Soldering joints, Desoldering techniques.

Earthing 02 HRs

Types of earthing, Components of Earthing, how to check Earthing using Multimeter and Bulb, Calculate the total leakage.

Testing semiconductor device 03 HRs

Types of semiconductor devices, Causes of failure in semiconductors, Types of failure, testing procedure for semiconductor devices.

Linear integrated circuits 06 HRs

Linear integrated circuits, Operational amplifiers (op-amps), Characteristics of Operational amplifiers, Typical op-amps circuits, How to consult opamps specification data books, Fault diagnosis in op-amps circuits.

Digital circuits 08HRs

Binary number system, Truth table, Logic circuits, Characteristics integrated logic gates, The circuitry of logic gates, CMOS digital integrated circuits, Categories of digital circuits based on packing density, Logic IC series, Packages in digital IC, Identification of ICs, IC pin outs, Handling ICs, Digital troubleshooting methods, The digital IC troubleshooters, Special consideration for fault diagnosis in digital circuits, Handling precautions for electronic devices subject to damage by static electricity, Function and testing of flip-flops, counters and registers, Semiconductor memories, Microprocessors/Microcontrollers, Special method for troubleshooting LSI based system

Batteries 02HRs
Various types of batteries used in UPS and Inverters and their maintenance.

Electric Motors 07 HRs
Inside an Electric Motor, Types of Motors-AC motors –DC motors- others types of motors, Types of AC motor – Synchronous - Induction (Asynchronous), DC Motor - DC Shunt Motor - Separately Excited Motor - DC Series Motor - PMDC Motor - DC Compound Motor, Special Purpose Motors - Stepper Motor - Brushless DC Motors - Hysteresis Motor - Reluctance Motor - Universal Motor. Ratings and Specifications.

Stirrer 02Hrs
different types of Stirrer. Block Diagram of Stirrer, different types of Speed ontrollers, Types of Motors- AC motor, DC motor

Water Bath 02 hrs
Types of Water Bath, Components of Water bath, Heater, Stirrer to circulate water to maintain uniform temp., Temperature sensor to sense the temperature, Thermostat to maintain temperature at constant level.

Rotamantles 02 Hrs
Block Diagram of Rotamentle, Components of Rotamantles

Temperature controlled Oven: **03Hrs**
Types of laboratory Ovens, Working Principle of Oven. Dryers.

Electrical heater 02 Hrs
Types of Electric Heaters, Distribution for Heating Systems, types of electric resistance heating wires, Pro and Cons of Using Electric Heater

DSC 12: Electronic/Electrical Laboratory Equipments Lab. 140hrs

Troubleshooting procedure 20 HRs

Find the fault in the any given Circuits, Draw PCB layout, identify the components, identify the circuit, and Find the fault..

Electronic test equipments 16 HRs

Uses of multimeter, Measure AC/DC Voltage and Current. Check the Component using Multimeter, Calibration of oscilloscope, measure Voltage and frequency. Generate sinusoidal, triangular, square wave using signal Generator. Logic analyzer is used to view multiple digital (binary) waveforms, Timing diagram, logic analyzer for precise hardware troubleshooting, especially for timing issues. Measures the magnitude and phase of the input signal at a single frequency within the IF bandwidth of the instrument using signal analyzer.

Tools and Aid for servicing and maintenance 10hrs

Hand and soft tools: use hand tools include wrenches, pliers, cutters, files, striking tools, struck or hammered tools, screwdrivers, vises, clamps, snips, saws, drills and knives. Outdoor tools such as garden forks, pruning shears, and rakes are additional forms of hand tools.

Soldering techniques 10 HRs

Identify soldering tools, Solder and disolder the different (resistor, capacitor, MOS devices) components on the PCB.

Earthing 04HRs

Check the earthing using multimeter and bulb. Components, Methods & Types of Earthing – Electrical Grounding Installations, install Plate Earthing, Pipe Earthing, Strip or Wire Earthing

Testing semiconductor device and Linear Device 06Hrs

Test Semiconductor devices (Transistor, FET, MOSFET) and linear devices like OPAMP.

Troubleshooting of batteries 06HRs

Test all types of batteries such as Li-ion, Nicd, Ni-MH, Lead –Acid and find fault in the batteries, Checking invertors/UPS batteries.

Troubleshooting of Electric Motors 14Hrs

Test AC/DC motor using continuity test, Checking the Bearings, Checking the Shaft, Checking the winding, Check the rear bell housing of the motor, Check the fan.

Stirrer 12Hrs

Installation of Stirrer, Identify the internal and external parts , Identify the internal and xternal parts of Stirrer, Operate Stirrer, Rectify the fault leading to not working of control panel switches, Rectify the fault leading to not working Speed Controller, heater and Motor, Rectify the fault of Controller, heater and Motor.

Water bath 06 Hrs

Installation of Water bath, Identify the internal and external parts, Identify the internal and external parts of Water bath, Operate Water bath, Rectify the fault leading to not working of control panel switches, Rectify the fault leading to not working Temperature Controller, heater, Shaking Controller and Motor, Rectify the fault of temperature Controller, heater and Motor.

Rotamantles 12 Hrs

Installation of Rotamantles, Identify the internal and external parts, Identify the internal and external parts of Rotamantles, Operate Rotamantles , Rectify the fault leading to not working of control panel switches, Rectify the fault leading to not working Temperature Controller, heater, Stirrer, Shaking Controller and Motor, Rectify the fault of temperature Controller, heater, Stirrer and Motor.

Temperature control Oven 18Hrs

Installation of Oven, Identify the internal and external parts , Identify the internal and external parts of Oven, Operate Rotamantles , Rectify the fault leading to not working of control panel switches, Rectify the fault leading to not working Temperature Controller, heater, Rectify the fault of temperature Controller, heater, Dryer.

Electrical Heater 06hrs

Installation of Electrical Heater, Identify the internal and external parts , Identify the internal and external parts of Electrical Heater , Operate Rotamantles , Rectify the fault leading to not working of control panel switches, Rectify the fault leading to not working Temperature Controller, heater Coil/Wire.

Optional DSC 13: Microprocessor and Microcontrollers 70Hrs

8086 MICROPROCESSOR 10Hrs

Introduction to 8086 – Microprocessor architecture – Addressing modes – Instruction set and assembler directives – Assembly language programming – Modular Programming – Linking and Relocation – Stacks – Procedures – Macros – Interrupts and interrupt service routines – Byte and String Manipulation.

8086 SYSTEM BUS STRUCTURE 16 Hrs

8086 signals – Basic configurations – System bus timing –System design using 8086 – I/O programming – Introduction to Multiprogramming – System Bus Structure – Multiprocessor configurations – Coprocessor.

I/O INTERFACING 12Hrs

Memory Interfacing and I/O interfacing – Parallel communication interface – Serial communication interface – D/A and A/D Interface – Timer – Keyboard /display controller –

Interrupt controller –DMA controller – Programming and applications Case studies: Traffic Light control, LED display , LCD display, Keyboard display interface and Alarm Controller.

MICROCONTROLLER 16Hrs

Architecture of 8051/8951 – Special Function Registers(SFRs) – I/O Pins Ports and Circuits – Instruction set – Addressing modes – Assembly language programming.

INTERFACING MICROCONTROLLER 16Hrs

Programming 8051 Timers – Serial Port Programming – Interrupts Programming – LCD & Keyboard Interfacing – ADC, DAC & Sensor Interfacing – External Memory Interface- Stepper Motor and BreyWaveform generation – Comparison of Microprocessor, Microcontroller, PIC and ARM processors

References:

1) 8086,80286, 80386,80486,Pentium,Pentium II, Pentium III, Pentium IV by Barry
2) 8051 microcontroller by Muhammad Ali Mazidi
3) 8051 microcontroller by Kenneth Ayala

Optional DSC 14: Microprocessor, Microcontrollers Lab. 140Hrs

8086 MICROPROCESSOR 18Hrs

Introduce ALP concepts and features, Write ALP for arithmetic and logical operations in 8086 , Differentiate Serial and Parallel Interface, Interface different I/Os with Microprocessors, Be familiar with MASM,.

8086 Programs using kits and MASM 20Hrs

Basic arithmetic and Logical operations, Move a data block without overlap, Code conversion, string manipulations, sorting and searching, Counters and Time Delay.

808051/8952 Microcontroller 24Hrs

Write ALP for arithmetic and logical operations in 8051/8952, Series problems, Differentiate Serial and Parallel Interface, Interface different I/Os with Microcontrollers,.

8051/8952 Programs using kits and Simulator 30Hrs

Basic arithmetic and Logical operations, Move a data block without overlap, Code conversion, string manipulations, sorting and searching, Print RAM size and system date, Counters and Time Delay, Series solving programs.

Interfacing with I/O devices 48Hrs

Interfacing Traffic Light Controller with 8051/8952, Interfacing Stepper Motor with 8051/8952, Digital Clock in real time, Interfacing 8279 Keyboard / Display Controller with 8051/8952, .Interfacing ADC with 8051/8952, Interfacing DAC with 8051/8952, Parallel Communication Interface, Serial Communication Interface**,** interfacing with Relay module, Interfacing with Stepper motor, interfacing with Temperature sensors LM 35.

Introduction to C Programming 06Hrs
Features of C and its Basic Structure, Simple C programs, Constants, Integer Constants, Real Constants, Character Constants, String Constants, Backslash Character Constants, Concept of an Integer and Variable, Rules for naming Variables and assigning values to variables

Operators and Expressions 06Hrs
Arithmetic Operators, Unary Operators, Relational and Logical Operators, The Conditional Operator, Library Functions, Bitwise Operators, The Increment and Decrement Operators, The Size of Operator, Precedence of operators

Data Types and Input/Output Operators 06Hrs
Floating-point Numbers, Converting Integers to Floating-point and vice-versa, Mixed-mode Expressions, The type cast Operator, The type char, Keywords, Character Input and Output, Formatted input and output, The gets() and puts() functions, Interactive Programming.

Control Statements and Decision Making 10Hrs
The goto statement, The if statement, The if-else statement, Nesting of if statements, The conditional expression, The switch statement, The while loop, The do…while loop, The for loop, The nesting of for loops, The break statement and continue statement.

Functions 10Hrs
Function Basics, Function Prototypes, Recursion, Function Philosophy

Storage Classes 04Hrs
Storage Classes and Visibility, Automatic or local variables, Global variables, Static variables, External variables

Arrays and Strings 06Hrs
One Dimensional Arrays, Passing Arrays to Functions, Multidimensional Arrays, Strings

Pointers 06Hrs
Basics of Pointers, Pointers and One-dimensional Arrays, Pointer Arithmetic, Pointer Subtraction and Comparison, Similarities between Pointers and One-dimensional Arrays, Null pointers, Pointers as Function Arguments, Pointers and Strings, Pointers and two-dimensional arrays, Arrays of Pointers

Structures and Unions 04Hrs
Basics of Structures, Structures and Functions, Arrays of Structures, Pointers to Structures, Self-referential Structures, Unions.

The Pre-processor 04Hrs

File Inclusion, Macro Definition and Substitution, Macros with Arguments, Nesting of Macros, Conditional Compilation

Dynamic Memory Allocation and Linked List 06Hrs

Dynamic Memory Allocation**,** Allocating Memory with malloc**,** Allocating Memory with calloc**,** Freeing Memory**,** Reallocating Memory Blocks**,** Pointer Safety**,** The Concept of linked list**,** Inserting a node by using Recursive Programs**,** Sorting and Reversing a Linked List**,** Deleting the Specified Node in a Singly Linked List.

File Management 04Hrs

Defining and Opening a file, Closing Files, Input/Output Operations on Files, Predefined Streams, Error Handling during I/O Operations, Random Access to Files, Command Line Arguments.

Optional DSC 14: Programming with C Lab 140Hrs

Operators and Expressions

Introduction to C Programming 06Hrs

Write program for understanding the concept of Constants, Integer Constants, Real Constants, Character Constants, String Constants, Backslash Character Constants, Concept of an Integer and Variable, Rules for naming Variables and assigning values to variables.

Operators and Expressions 18Hrs

Write program for Arithmetic Operators, Write program for Unary Operators, Write program for Relational and Logical Operators, Write program for Conditional Operator, Write program using Library Functions, Write program for Bitwise Operators, Write program for Increment and Decrement Operators, The Size of Operator, Precedence of operators.

Data Types and Input/Output Operators 06Hrs

Write program for Converting Integers to Floating-point and vice-versa, Write program for Mixed-mode Expressions, Write program for gets() and puts(), getch(), putch() functions or I/O functions.

Control Statements and Decision Making 18Hrs

Write program for understanding goto statement, Write program for understanding if statement, Write program for understanding if-else statement, Write program for understanding Nesting of if statements, Write program for understanding conditional expression, Write program for understanding switch statement, Write program for understanding while loop, Write program for understanding do…while loop, Write program for understanding for loop, The nesting of for loops, Write program for understanding break statement and continue statement.

Functions 18Hrs

Write program for arithmetic operation using Function, Write program for febonacci series using Recursion Function.

Pointers 18Hrs

Write program for understanding the concept of Pointers, , Write program for addition, subtraction and multiplication using Pointer.

Structures and Unions 04Hrs

Write program for understanding Structuresconcept, Structures and Functions, Arrays of Structures, Pointers to Structures, Self-referential Structures, Unions.

Other Practical 52 Hrs

1) WAP to reverse a number,
2) WAP to compute the sum of the first n terms of the following series S = 1+1/2+1/3+1/4+..... WAP to compute the sum of the first n terms of the following series S =1-2+3-4+5..... Write a function that checks whether a given string is Palindrome or not. Use this function to find whether the string entered by user is Palindrome or not.
3) Write a function to find whether a given no. is prime or not.
4) WAP to compute the factors of a given number.
5) Write a macro that swaps two numbers.

6) WAP to perform following actions on an array entered by the user: i)Print the even-valued elements ii)Print the odd-valued elements iii)Calculate and print the sum and average of the elements of array iv)Print the maximum and minimum element of array v)Remove the duplicates from the array vi)Print the array in reverse order .

7) The program should present a menu to the user and ask for one of the options. The menu should also include options to re-enter array and to quit the program.

8) WAP that prints a table indicating the number of occurrences of each alphabet in the text entered as command line arguments.
9) Write a program that swaps two numbers using pointers.
10) Write a program in which a function is passed address of two variables and then alter its contents.
11) Write a program which takes the radius of a circle as input from the user, passes it to another function that computes the area and the circumference of the circle and displays the value of area and circumference from the main() function.
12) Write a program to find sum of n elements entered by the user. To write this program, allocate memory dynamically using malloc() / calloc() functions or new operator.

13) Write a menu driven program to perform following operations on strings: a)Show address of each character in string b)Concatenate two strings without using strcat function. c)Concatenate two strings using strcat function. d)Compare two strings e)Calculate length of the string (use pointers) f)Convert all lowercase characters to uppercase g)Convert all uppercase characters to lowercase h)Calculate number of vowels i) Reverse the string
14) Given two ordered arrays of integers, write a program to merge the two-arrays to get an ordered array.
15) WAP to display Fibonacci series (i)using recursion, (ii) using iteration.
16) WAP to calculate Factorial of a number (i)using recursion, (ii) using iteration .
17) .WAP to calculate GCD of two numbers (i) with recursion (ii) without recursion.
18) Create Matrix class using templates. Write a menu-driven program to perform following Matrix operations (2-D array implementation): a) Sum b) Difference c) Product d) Transpose
19) Create the Person class. Create some objects of this class (by taking information from the user). Inherit the class Person to create two classes Teacher and Student class. Maintain the respective information in the classes and create, display and delete objects of these two classes (Use Runtime Polymorphism).
20) Create a class Triangle. Include overloaded functions for calculating area. Overload assignment operator and equality operator.
21) Create a class Box containing length, breath and height. Include following methods in it: a)Calculate surface Area b)Calculate Volume c)Increment, Overload ++ operator (both prefix & postfix) d)Decrement, Overload -- operator (both prefix & postfix) e)Overload operator == (to check equality of two boxes), as a friend function f)Overload Assignment operator g)Check if it is a Cube or cuboid Write a program which takes input from the user for length, breath and height to test the above class.
22) Create a structure Student containing fields for Roll No., Name, Class, Year and Total Marks. Create 10 students and store them in a file.
23) Write a program to retrieve the student information from file created in previous question and print it in following format: Roll No. Name Marks
24) Copy the contents of one text file to another file, after removing all whitespaces.
25) Write a function that reverses the elements of an array in place. The function must accept only one pointer value and return void.
26) Write a program that will read 10 integers from user and store them in an array. Implement array using pointers. The program will print the array elements in ascending and descending order.

Appendix III

Syllabus

CERTIFICATE PROGRAMME: FUNDAMENTALS OF COMPUTER AND NETWORKING							
Semester		**Course Opted**	**Course Code**	**Course Name**	**Credit**	**Marks**	**Hours** (@ 14H/ Credit for Theory& 28H/Credit per Lab.)
I	General Component (Credit – 09)	Generic skills-I	GEC 1	Fundamentals of IT	**05**	**125**	**70**
		Generic skills-II	GEC 2	Fundamentals of IT Lab.	**04**	**100**	**112**
	Skill Component (Credit – 21)	Skill Education Component Course-I	DSC 1	Basic Electrical & Electronic.	**03**	**75**	**42**
		Skill Education Component Course-I Practical/Workshop/Field Trip/Internship	DSC 2	Basic Electrical & Electronic Lab.	**04**	**100**	**112**
		Skill Education Component Course-II	Optional-DSC 3	Computer Maintenance & Troubleshooting	**03**	**75**	**42**
		Skill Education Component Course-II Practical/Workshop/Field Trip/Internship	Optional-DSC 4	Computer Maintenance & Troubleshooting Lab.	**04**	**100**	**112**
		Skill Education Component Course-III	Optional-DSC 5	Computer Networking	**03**	**75**	**42**
		Skill Education Component Course-III Practical/Worksh	Optional-DSC 6	Computer Networking Lab.	**04**	**100**	**112**

		op/Field Trip/Internship					
		Skill Education Component Course-II	Optional-DSC 7	Digital Electronics	**03**	**75**	**70**
		Skill Education Component Course-II Practical/Workshop/Field Trip/Internship	Optional-DSC 8	Digital Electronics Lab.	**04**	**100**	**112**
				Total	**30**	**750**	**588**

GEC 1: Fundamentals of IT (Theory) 70 hrs

Introduction to Computers **09**

Introduction, Definition, .Characteristics of computer, Evolution of Computer, Block Diagram Of a computer, Generations of Computer, Classification Of Computers, Applications of Computer, Capabilities and limitations of computer.

Basic Computer Organization **08**

Role of I/O devices in a computer system. Input Units: Keyboard, Terminals and its types. Pointing Devices, Scanners and its types, Voice Recognition Systems, Vision Input System, Touch Screen, Output Units: Monitors and its types. Printers: Impact Printers and its types. Non Impact Printers and its types, Plotters, types of plotters, Sound cards, Speakers.

Storage Fundamentals **08**

Primary Vs Secondary Storage, Data storage & retrieval methods. Primary Storage: RAMROM, PROM, EPROM, EEPROM. Secondary Storage: Magnetic Tapes, Magnetic Disks. Cartridge tape, hard disks, Floppy disks Optical Disks, Compact Disks, Zip Drive, Flash Drives.

Software **10**

Software and its needs, Types of S/W. System Software: Operating System, Utility Programs Programming Language: Machine Language, Assembly Language, High Level Language their advantages & disadvantages. Application S/Wand its types: Word Processing, Spread Sheets Presentation, Graphics, DBMS s/w.

Operating System **10**

Functions, Measuring System Performance, Assemblers, Compilers and Interpreters. Batch

Processing, Multiprogramming, Multi Tasking, Multiprocessing, Time Sharing, DOS, Windows, Unix/Linux.

Data Communication **10**

Communication Process, Data Transmission speed, Communication Types(modes), Data Transmission Medias, Modem and its working, characteristics, Types of Networks, LAN Topologies, Computer Protocols, Concepts relating to networking.

Business Data Processing **06**

Introduction, data storage hierarchy, Method of organizing data, File Types, File Organization, File Utilities.

Computer Arithmetic **08**

Binary, Binary Arithmetic, Number System: Positional & Non Positional, Binary, Octal, Decimal, Hexadecimal, Converting from one number system to another , Converting from one number system to another , Converting from one number system to another.

GEC 2 - Fundamentals of IT Lab 112 Hrs

DOS and Windows 18Hrs

Introduction to DOS Commands, Execute DOS commands using example. Introduction to Windows, introduction to Microsoft Office.

MS Word 2010 20Hrs

Introduction to MSWord, Menus, Shortcuts, Document types , Working with Documents a. Opening Files –New & Existing, Saving Files , Formatting page and Setting Margins , Converting files to different formats : Importing, Exporting , Sending files to others Editing text documents : Inserting , Deleting ,Cut, Copy, paste , Undo, Redo , Find, Search, Replace. Using Toolbars, Ruler, Icons and help, Formatting Documents, Setting Font Styles Font selection –style, size, color etc., Type face –Bold Italic, underline, Case settings, iv. Highlighting, Special symbols, Setting Paragraph style Alignments, Indents, Line space, Margins and Bullets and Numbering , Setting Page Style Formatting, Border & Shading, Columns, Header & footer, Setting Footnotes, Inserting manual Page break, Column break and line break, Creating sections and frames, Inserting Clip arts, inserting pictures and other files, Anchoring & Wrapping. Setting Document Styles Table of Contents, Index, Page Numbering, data &Time, Author etc., Creating Master Documents, Creating Tables Table settings, Borders, Alignments, Insertion, deletion, Merging, Splitting, Sorting, Formula, Drawing Inserting Pictures/Files etc., Drawing Pictures, Formatting &Editing pictures, Grouping and ordering, Rotating, Tools Word Completion, Spell Checks, Macros, Mail merge, Templates, Using Wizards, Tracking, Changes, Security

MS Power Point 2010 20Hrs

Introduction Opening new Presentation, Different presentation templates, Setting backgrounds,

Selecting presentation layouts, Creating a presentation Setting presentation style, Adding Text to the presentation, Formatting a presentation Adding style, Color, gradient fills, Arranging objects, Adding Header & Footer, Slide background, Slide layout, Adding Graphics to the presentation Inserting pictures, movies, tables, etc into the presentation; Drawing Pictures using Draw, Adding effects to the presentation Setting Animation & transition effect, Adding audio and video, Printing Handouts and Generating standalone presentation viewer.

MS Excel 2010 20Hrs

Introduction Spreadsheet & its Applications, Opening spreadsheet, Menus & Toolbars &icons, Shortcuts , Using help . Working with Spreadsheets Opening a File, Saving Files, Setting Margins Converting files to different formats :Importing, Exporting and Sending files to others .Spreadsheet addressing :Rows, Columns & Cells, Referring cells and Selecting cells, Entering and Editing Data: Entering Data, Cut, Copy, paste, Undo, Redo, Find, Search & Replace Filling continuous rows, columns, Inserting -Data, cells, column, rows & sheets, Manual breaks , Computing data : Setting Formula, Finding total in a column or row, Mathematical operations(Addition, Subtraction, Multiplication, Division, Exponentiation), Using other Formula, Formatting Spreadsheets: Formatting –Cell, row, column & Sheet: Alignment, Font, Border & shading, highlighting values Hiding/Locking Cells Worksheet : Sheet Name , Row & Column Headers, Row Height, Column Width, Visibility –Row, Column, Sheet , worksheet Security . Formatting –worksheet: Sheet Formatting & style -background, color, Borders & shading Anchoring objects, Formatting layout for Graphics, Clipart etc., ,Working with sheets :Sorting, Filtering, Validation, Consolidation, Subtotal , Creating Charts, Selecting charts, Formatting charts, label, scaling etc., Using Tools Error Checking, Spell Checks, Macros, Formula Auditing, Creating & using Templates, Tracking changes, customization, printing.

Business Data Processing 18Hrs

Accounting: The Data Processing System can be used to maintain the accounting records and in preparation of final accounts. The general ledger, Accounts Payable, Accounts Receivable, etc. are the examples for the computerized accounting systems followed in most business organizations.

Payroll preparation: In personnel department the data processing system is used to record the operations of the number of employees of different departments in each shifts, leave taken, deductions such as ESI, PF and finally in the preparation of Pay Slips.

Sales Analysis: The Data Processing system is highly useful in sales analysis. The sales manager can prepare the sales forecast on the basis of per month's sales reports and subsequent future actions can be taken.

DIGITAL FUNDAMENTALS 16Hrs

Verification of truth table of Logic gates, Implementation of various Logic gates using NAND gates, Implementation of various Logic gates using only NOR gate. Verification of function of Binary to Grey code conversion, Verification of function of Grey to Binary code conversion,

DSC 1- BASIC ELECTRICAL AND ELECTRONICS 42Hrs

Familiarization with the Institute and Safety: 0**4Hours**
Course duration- scope- methodology and structure of the training program- Safety in moving and shifting heavy and delicate equipment's-

Basic Electrical concepts: 04Hours
Concept of electric charge, potential difference, current and voltage, AC- DC Supply indicating lamps. Measuring circuit voltage and current using voltmeters and ammeters. AC and DC meters- Measuring instruments- MC- MI type- Ammeter- Voltmeter- Multimeter for measuring voltage and current .Construction, characteristics/ features and specification .Digital Multimeter - Meaning of Circuit and basic

Introduction to Resistors: 04Hours
Classification - characteristics and application of different types of resistors. Carbon film- metal film- wire wound- cermets' and surface mounted- Color coding of resistors. Calculating -measuring resistance value and its tolerance value. Wattage of resistors- specific resistance and their importance- Resistors in series and parallel- Ohms- law and Kirchhoff off's Laws, Temperature dependent resistors and their applications. (PTC and NTC)'-Voltage dependent resistors (VDR)- Photoelectric effect- Light Dependent resistors

Introduction to Inductor and Inductance: 03 Hours
Definition of inductance. Properties. Types of inductors and their application- Inductive reactance- measuring inductance and inductive reactance. Meaning of lead- lag. Effect of inductor on power factor. Frequency dependence of inductive reactance- Self and Mutual inductance. Coefficient of coupling, Transformers. Turns ratio .Transformer winding.

Introduction- Capacitor- Capacitance and Resonance circuits : 04 Hours
Working principle of capacitors- Electrostatic action- di-electric constant. Unit of capacitance and capacitive reactance. Types of Capacitors-electrolytic- ceramic- polyester- tantalum- mica- surface mounted. Colour coding- and tolerance - Measuring capacitance and capacitive reactance- Behavior of capacitance at different frequencies- Capacitors in series and parallel- Meaning of Resonance. Application of resonance. Series and parallel resonance circuits.

Electronic Components: Diodes: 05 Hours
Semiconductor, intrinsic and extrinsic semiconductors, P and N type semiconductor. Development of P.N. junction barrier potential. Effect of temperature. Breakdown voltage, Different types of Diodes. Diode terminals. Diode specifications using data book- Forward and reverse characteristics of diode Testing diodes using Multimeter-Half wave and Full wave rectifiers using diodes. Transformer requirements. Calculating output DC- ripple factor- Bridge rectifier. Calculating output DC- ripple factor- Filters for rectifiers- Calculating output DC- ripple factor- Zener diode-Its characteristics and application for voltage regulation.

Introduction to Transistor and Amplifiers: 03 Hours
Working principle of Transistor, FET.

Introduction to Power Supply: 03 hours
Unregulated- regulated DC power supply specifications. Application of different types of power supply for specific application types- Series regulator using transistor. Short circuit protection. Overload protection - Fixed Voltage regulators using IC's- Variable voltage regulators using IC's- SMPS

Switches 03 HRs
Types of Switches- one-way (single-pole) electrical switch- two-way (double-pole) electrical switch- do not disturb switch- light dimmer / stepless regulator- bell push switch- SPST Electric Switch - SPDT Electric Switch - DPST Electric Switch - DPDT Electric Power Switch - Toggle Switches - Pushbutton Switches - Selector Switches - Joystick Switches - Limit Switches - Proximity Switches, The Different Types of Process Switches - Speed Switches- Pressure Switches- Temperature Switches- Liquid Level Switch- Liquid Flow Switch- Nuclear Level

Circuit Breaker and Its Importance: 02 HRs
Types of circuit breakers- Air Circuit Breaker - Plain Air Circuit Breaker- Air Blast Circuit Breaker- Axial Blast Breaker- Advantages and Disadvantages of Air-Blast Circuit Breaker - Application and Uses of Air Circuit Breaker, SF6 Circuit Breaker - Single interrupter -.

Relays 02 HRs
Design of a Relay, Construction of Relay and its operation, How Relay Works - Relay in normally closed condition - Relay in normally opened condition, types of relays- Pole and Throw combinations- Single pole, single throw (SPST)- Single pole, double throw (SPDT): Double pole, single throw (DPST)- Double pole, double throw (DPDT),

Sensors 05 HRs
Classification of Sensors - Active and Passive Sensors, Types of sensors- Temperature Sensor (Types of temperature Sensors : Thermocouples, Resistor temperature detectors, hermistors, Infrared sensors, Semiconductors, Piezo-electric sensors) -

Reference Books :

1. Electrical Technology IN S.I Units, Volume I- Basic Electrical Engineering B.L Theraj, A.k Theraja S.Chand & Company Ltd.,
2. Electronic Devices and Circuits by Jacob Millman & Christos C Halkias McGraw-Hill

DSC 2- BASIC ELECTRICAL AND ELECTRONICS LAB 112 Hrs

Familiarization with the Institute and Safety: 10 Hours

Visits to workshops- labs- office- stores etc. of the institute, Demonstrate safety precaution including anti- static protection - Demonstrate first aid practice. Demonstrate artificial respiration and practice.- Demonstrate electrical safety precautions.

Basics of Electricity: 15 Hours

Identify specification of different types of fuses- switches. Identify of meter types and measuring range. Construct a simple circuit using AC/DC supply- lamp- fuse and switch. Measure circuit voltage and current using voltmeters and ammeters. Also check voltage between earth and neutral. Measure voltage and current using Multi-meter (analog- digital). Use Multimeter to check fuses- lamps and switches. Measure DC and AC power

Resistors: 15 Hours

Identify different types of resistors from physical appearance.- Identify resistor value and tolerance using color code. Measure resistance using Multimeter. Practice of soldering and de soldering techniques- practice using hook-up wires. Practice using surface mount board/ device. Verify of Ohms Law and Kirchhoff's Laws. Practice of soldering resistors on PCB and De-soldering. Experiment using P.T.C and NTC resistors. Experiment to check VDR's. Experiment to check LDR's.- Test Pot- Presets.

Inductance: 15 Hours

Identification of different types of inductors and its specifications. Measure inductance- using LCR meter. Calculate Inductive reactance at different input signal frequencies.- Demonstrate self and mutual induction. Check step down Transformers. Rewind a transformer to given specification using winging machine. Finding losses and efficiency of given transformers. Identifying and testing high frequency transformers used in electronic circuits.

Capacitance and Resonance Circuits: 15 Hours

Identify of different types of capacitors from colour code and typographic code. Test working condition of capacitor. Discharge first then test a charged capacitor Measure capacitance using RLC meter. Measure capacitive reactance at different frequencies. Measure capacitance and, capacitive reactance of capacitors in series and capacitors in parallel.

Electronic Components: 12Hours

Identify terminals of different types of diodes. Record its specifications referring to diode datasheet. Plot forward and reverse characteristics of diode Testing working condition of diodes. Construct and test a half wave and full wave diode rectifiers. Construct and test a Bridge rectifier with and without filter. Draw Zener diode characteristics, Simple voltage regulator using zener diode.

Transistor and Amplifiers: 10 hours

Identify types transistors based on their physical appearance. Identify the leads of the given assorted types of transistors. Practice Quick test given transistors using Multimeter. Identify opens- shorted junctions. Test and measure various electronics components.

Power supply: 10 Hours

Assemble and test a fixed voltage regulator using 3pin IC. Assemble and test a variable voltage regulator using IC. Assemble a simple inverter and converter for use with emergency lamp. identify the parts and controls of a UPS. Practices switch-on and switch-off procedures.

Sensors 10 HRs

Identify and Test Sensors. Measurement with thermocouple element, Design temperature controller using LM35. Design Application of Proximity Sensor (IR Sensor) - Design Application of Pressure Sensor - Design Application of Light Sensor – Testing of Smoke, Gas and Alcohol Sensor - Touch Sensor - Color Sensor - Humidity Sensor - Tilt Sensor - Flow and Level Sensor

DSC 3- COMPUTER MAINTENANCE & TROUBLESHOOTING 42 HRS

Introduction to Computers 02Hrs

Introduction to computers- classification- generations- applications. Basic blocks of a digital computer. Hand Tools Basics and Specifications. Types of cabinets- relation with mother board form factor. Precautions to be taken while opening and closing PC cabinet. Main devices- components- Cards- boards inside a PC (to card or device level only).

Introduction to PC Hardware03 Hrs

Types of I/O devices and ports on a standard PC for connecting I/O devices. Function of keyboard- brief principle, types- interfaces- connectors- cable. Function of Mouse, brief principle- types – interfaces- connectors - cable. Function of monitor- brief principle- resolution- size- types- interfaces- connectors- cable.

Function of SMPS Tester and its use. Function of PCI slot testing tool and its use. Precaution to be taken while connecting /removing connectors from PC ports. Method of ensuring firm.

Assemble Hardware 05Hrs

Specifications of processors (Intel Celeron- P4family- Xeon dual core- quad core- core2 duo- i3- i5- i7 and AMD). Memory devices- types- principle of storing. Data organization 4bit- 8 bit- word. Semiconductor memories- RAM- ROM- PROM- EMPROM- EEPROM- Static and dynamic. Example of memory chips- pin diagram- pin function. Concept of track- sector- cylinder. FD Drive components read write head- head actuator- spindle motor- sensors- PCB. Precaution and care to be taken while dismantling Drives. Drive bay- sizes- types of drives that can be fitted. Precautions to be taken while removing drive bay from PC.. Concept of SATA and SACH.

Precautions to be taken while fitting drives into bays and bay inside PC cabinet- CMOS setting.(restrict to drive setting sonly).Meaning and need for Using Scan disk and defrag- Basic blocks of SMPS- description of sample circuit. Vendor/sources of PC hardware components.

Introduction to Hard disk Partition and formatting and installation 05 hrs

What's Inside a Hard Drive? How Hard Disks Work Inside: Hard Drive Motherboard Desktop Hard Drive Buyer's Guide What is RAID? Using Multiple Hard Drives for Performance and Reliability Partitioning a hard disk (primary and extended partitions). Bad Sectors in Hard disk- Master Boot Record- in-place installation- Registry fixing- performance level check- Shortcut fixing- Fixing Startup process- log- difference between MBR and GPT etc. Types of software. System software-OS- Compiler. Application software-like MS office. High level- low level language- Computer application scientific industrial and business.

OS features, System utilities 05 Hrs

Functions of an operating system. Disk operating system. Concept of GUI- Modes of starting on different occasions. Desktop- Icon- selecting- choosing- drag and drop. My computer (User folder in Desktop)- network places. Recycle bin- task bar- start menu- tool bar- and menus. Windows Explorer. Properties of files and folders. Executing application programs.

Device Driver, OS Update and Firewall Security 05 Hrs

Properties of connected devices. Applications under windows accessories. Windows Help. Finding files- folders- computers. Control panel. Installed devices and properties Updating of OS- Different configurations of Computer system and its peripherals- Compatible with different hardware/software. Pre-installation Prerequisites- Install procedure- Rollback or Un- install procedure- Tests of various device driver software.

User Account in Windows 02 Hrs

Users and user account. Types of user accounts- user access levels- Privileges- types of privileges- various scope- permissions- permission parameters- user and group permission-time based permission- expiration of permission etc.

Junk File 01 Hrs

Junk files deleted files- un deleting files- configuration of internet browser.

Data backup and data recovery software 03 Hrs

Maintenance of Temp folder- internet history- cookies- bookmark- Concepts of SAN- NAS and cloud storage.

Introduction To Mail Client Software (Outlook) 03 Hrs

Add and use contacts- Calendar basics- Recall and replace sent messages- Send automatic replies when you're out of the office- The ins and outs of BCC- Use Instant Search to find Calendar items-

Use Instant Search to find contacts- Use Instant Search to find messages and text- Add holidays to your calendar- Create or delete a search folder- Import and export v Cards to Outlook contacts-

Laptop and its internal structure 02 Hrs

Introduction of laptop and comparison of various Laptops. Block diagram of laptop & description of all its sections. Detail study of laptop parts. Input system: Touchpad, Trackball- Track point- Docking station- Upgrade memory- hard disk- Replacing battery Configuring wireless internet in a laptop-

Linux operating system 03 Hrs

Basic Linux commands. Linux file system- The Shell- Users and fill permissions- vi editor- X window system- Filter Commands- Processes- Shell Scripting- Concept of UNIX.

Printer and Plotters 03 Hrs

Types of printers- Dot Matrix printers- laser printer- Ink jet printer- line printer. Block diagram and function of each unit head assembly- carriage- and paper feed mechanism. Front panel controls and interfaces. Pin details of interface port. Installation of a printer driver and self test. Ribbon types used- refilling of ribbons. Printer cable testing defects-effect and servicing. Printer head- types- cleaning and replacing procedures.

Reference Books :

1. Upgrading and Repairing PCs Tenth Edition by Scott Mueller with Craig Zacker Prentice – Hall of India.
2. PC Hardware by Craig Zack, John Rounker, Tata Mc Grew – Hill Publishing Co. Ltd
3. Troubleshooting Maintenance and Repairing PCs – 5th Edition Stephen J. Bigelow's Tata Mc Grew – Hill Publishing Co. Ltd

DSC 4- COMPUTER MAINTENANCE & TROUBLESHOOTING LAB. 112 HRS.

Desk Top: PC Repair Safety 06 Hrs

Identify Important Safety Basics- specification and application of basic hand tools. How to handle components to ensure their longevity. Know the danger of static electricity. Use of anti static pads- anti static wrist wraps. Steps to protect a PC from lightning strikes and power outages.

Hardware Identification 12 Hrs

Identify the front and rear panel ports and connectors on a PC cabinet. Open the cabinet and identify various motherboards components- connectors- slots- ports (USB- VGA- DVI- and HDMI)- cables and Connectors. Collect data from circuit board. Check Power Supplies and Power Supply Connections. Identify Motherboard Components and connections. CPU (Processor) RAM (Memory) Hard Drive- Connections Mechanical vs. Solid State Drives ROM Drives Graphic Cards- Sound Cards. Use Post Error Debug Card and understand error Code for fault troubleshooting. Use of SMPS Tester for fault troubleshooting. - Use of PCI slot testing tool for fault troubleshooting. - Identify connectors with data and power cables- connector used to

connect external devices. Verify components with the configuration of CMOS BIOS set up. Install & configure add-on cards.

Hardware: Remove-Test- Replace/ Install 12 Hrs

Check various front panel connections on motherboard (power switch- reset switch and HDD Led).Check power and reset switch connection. Replace faulty power switch from cabinet and assemble a new one. - Check DDR3 and DDR4 RAM's FSB. Insert it on memory slot. Test and understand various beep sounds in case of trouble. Find the CMOS/ROM BIOS chip on mother board. Install a Hard Drive. Identify and check data and power cable and SATA and SACH ports in motherboards.

Install internal and external DVD ROM Drive. Troubleshoot defects related to SMPS- its cable-connector and servicing procedure. Removing a Power Supply. Installing a Power Supply. Use SMPS tester. Install a Graphic and sound cards. Remove them safely. Install and Removing cooling Fans on pc cabinet. Removing the Motherboard carefully and Install it again. Removing the Processor- Installing the Processor. Understand and identify various different processor sockets. Installing different type of CPU Cooler. Find the CMOS Battery. Test it with multimeter. Replace it.

OS installation 08 Hrs

Boot the PC through a BOOTABLE DVD of OS. Partition the disk- Format the drive. Install Windows 7and Windows 10 from DVD Disk. Make bootable USB DRIVE (use any open source software) and install both OS again. Make Win-7 AND Win-10 dual boot properly. Practice on recovery partition Make windows Linux dual boot. Understand Boot loader. The Windows boot manager vs. an alternative boot manager. Rectify errors in dual boot. Practice keyboard shortcuts of mouse activities. Understand the difference between UEFI firmware and tradition BIOS. Check various motherboard if it is UEFI supported or not. Install and boot Win-10 in UEFI mode.) Use third party hard disk partitioning applications. Imaging: create a Windows system image. How to Backup/Restore your Windows partition with the bootable image. Practice Windows 7 and1 registry tweaks.

OS features, System utilities 06 Hrs

Open Personalize Setting and find Desktop icon setting, Screen Resolution and various other setting. Open windows explorer and find different drives- files and folders- their size and other properties. Do it through command prompt also. Open control panel and get familiar with different options and their appropriate use (taskbar and start menu- Programs and features- Display- System- Sound- Devices and Printers etc).

Open command prompt in windows 7 and 10.Open disk drives- folders and files. Execute important commands like DIR- ATTRIB- DEL- RD- DISKPART- COPY- MOVE etc. Use Power shell commands

Device Driver, OS Update and Firewall Security 10 Hrs

Open Device Manager- find various devices and install appropriate driver software (audio, video- chipset- LAN- WLAN- printer and monitor). Use & practice WMIC console. Collecting and installing specific/compatible Device driver from internet. Update the driver software from internet. Uninstall and Rollback the driver. Understand process and services and open task manager and practice its use (Process- services- performance). Start and stop and change the priority of a process. Use event viewer- System Monitor and Performance Logs. Boot in SAFE MODE. Disable and enable device driver from there. Understand the significance of Safe Mode. Fix the master boot record. Configure config.sys file. View System Information to check various configuration of the PC (check if the system is 32 bit or 64 bit). Use Disk cleanup and Disk Defragmenter (Check if your hard drive has bad sectors using 3rd party open source software). Go to drive property- click on tool and check the drive for errors. Do this from command prompt through commands. Go to Windows Update in control panel. Check installed update. Change updates Setting. Open firewall option from control panel. Enable and disable firewall. Allow and block application and port Navigate to WINDOWS SYSTEM32 folder and view and understand the importance of various system files and folders found there. Find the hosts file and understand LOCALHOST- open it on notepad and take backup. Use the hosts file to block any URL. View the content and find the difference between Program Files and Program Files (x86). Create a restore point. Practice System restores and try to restore system to a previous restore pint. Try it through command line.

User Account Customization06 Hrs

Create and configure user accounts in Windows 7/8/10. Create Administrator and limited user account. Make Changes to an Account. Reset Limited user account password through Administrative account. Change the storage location of the personal folders. Change the storage location of Installed software. Set Parental Controls in Windows 7- 8- 10. Use Fast User Switching in Windows. View Hidden Files and Folders Lock Down Windows 7/8/10 With User Account Control. Delete User Accounts in Windows.

Antivirus and Application Software installation 08 Hrs

Install any popular antivirus software. Online and offline updating of antivirus. View its various options. On and off Firewall option inside antivirus software. Run a full system scan and booting in Safe Mode. Set up Parental Controls using antivirus software. Fix your browser from redirecting to other websites (browser hijack). Try to manually remove a virus through commands.) Trying to get rid of a nasty virus. Special utilities that work wonders. Install various application software programs in windows. Install Firefox and chrome browser. Run the programs from command prompt. Extract or uncompress a compressed file. How to compressor make files into one file (use program like Winzip /Winrar). Uninstall application software. Unable to remove a program from Windows Add/Remove programs then use registry to delete the program.

Junk File Removal 05 Hrs

Use various free and paid Disks clean up utility to remove junk files from hard disk. Try to find out the folder in root directory where junk files are stored and delete them manually. Find

browser setting and clear history and temporary file.

Data backup and data recovery software 06 Hrs

Use various types of media to backing up your data, and when each method is appropriate. (04hrs) Create automated backups to ensure you always have recent backup. Learn how to manually backup data. How to make an exact copy (clone) of a hard drive. Use Data Recovery software. Recover emails- files- and data from a crashed hard drive or computer.

Outlook Configure & Backup 06 Hrs

Configure outlook and connect with Gmail- use thunderbird IMAP/POP3 along with security features. Configuration of Browsers. Backup and Restore Outlook. How to restore the Outlook default installation- toolbars and settings. Restore Deleted Items from an Outlook PST-file.

Laptop PCs 10 Hrs

Identify and use of tools and gadgets required for repair & servicing laptop. Safety precaution and handling components of laptops. Identify of laptop sections-components and connector. Assemble and disassembling a Laptop. Check of various parts of a laptop. Check of batteries and adaptors. Configuration of energy saving mode. Replace different parts of laptops. Upgrade RAM-HDD and other parts. Test fault finding and troubleshooting techniques. POST codes and their meaning- fixing of problems based on codes. Check and configure CMOS BIOS set up. Enabling support for SATA technology. Installation of OS using SATA technology drivers. Configuration of camera- mic- WLAN and Bluetooth- touchpad- finger print scanner. Latest Tools & Gadgets For Desktop/Laptop Repairs. Connecting external peripherals and their configuration. Use of KVM switch.

Linux operating system 05 Hrs

Install Linux (Ubuntu- Fedora- Debian- Red hat) OS from bootable usb drive and partition the hard disk manually. Use diskpart command. Preparing functional system LINUX. Adding new users- software- material components. Making back-up copies of the index and files. Dealing with the files permissions and indexes. Practice important Linux commands

Printer and Plotters 12 Hrs

Testing front panel controls. Interface pins- cables- measurement of voltages and waveforms. Installing a printer and carrying self- test. Replacing ribbon in a DMP. Testing and Rectifying defective cable. Removing- cleaning and replacing a new printer head. Testing and servicing Printer power supply. Changing rollers and other mechanical parts. Tracing the control board and identifying defective components. Servicing of control board. Replacement of toner cartridge of laser printers. Refilling toner cartridge of laser printers. Drum cleaning and replacement in of laser printers. Testing and servicing Printer power supply of laser printers. Changing mechanical parts of laser printers. Tracing the control board circuit and identifying defective components. Servicing of control board of laser printers. Replacement of ink cartridge of deskjet/inkjet printers, Refilling ink cartridge of deskjet/inkjet printers. Drum cleaning and replacement indesk

jet/inkjet printers. Testing and servicing Printer power supply of deskjet/inkjet printers. Changing mechanical parts of deskjet/inkjet printers. Tracing the control board and identifying defective components. Servicing of control board of deskjet / inkjet printers. Use of diagnostics software for serving printers. Replacement of mechanical parts and sensors of printer. Installing plotter and rectify its common faults.

DSC 4- Computer Networking 42 hours

Components of the Computer Network . (10 hrs)

Identify various Network tools like : (a) Wire crimper, (b) Wire Map Testers, (c) Multifunction Cable Tester, (d) LAN Tester, (e) Tone Generator etc. (10 hrs) 206. Identify various Network device like: (a) Switch (Normal and Managed), (b) Router(Normal and wireless), (c) Rack, Patch Panel, i/o box, (d) Access Point etc. (10 hrs) 207.Understand the Layout of network on your lab and campus.

Crimping & Punching 10 hours

Communication Media and Connectors – Unshielded
twisted-pair (UTP), shielded twisted-pair (STP), Fibre Optic and coaxial cable: RJ-45, RJ-11, BNC. • Understanding colour codes of CAT5 cable. 568A and 568B convention. Network Cabling • Introduction to Data Communication – Analog and Digital Signals, Simplex, Half-Duplex and Full-Duplex transmission mode. Network Model • The functions of different layers in OSI and TCP/IP model. • Concept of wireless networking, wireless survey. (12 hrs)

C**onfiguration of Data communication equipments 10 hours**

• Network Components - Modems, Firewall, Hubs, Bridges, Routers, Gateways, Repeaters, Transceivers, Switches, Access point, etc. • Types, functions, advantages and applications of Network Component. • Layer 2 manage switch configuration and use it on network. • Latest configurations. • Understand the use of Network simulation software and the process of use it.

IP Addressing & TCP/IP (06 hrs)

• Protocols, TCP/IP, FTP, Telnet etc. • Classes of IP Addressing. • Setting IP Address (IP4/IP6) & Subnet Mask.

Other Network Protocols (06 hrs)

• Simple Mail Transfer Protocol (SMTP) • Telnet • File Transfer Protocol (FTP), • Hyper Text Transfer Protocol (HTTP) • Simple Network Management Protocol (SNMP). • LDAP (Lightweight Directory Access Protocol). • Introduction to Network Security. • Concept of Dynamic Host Control Protocol.

DSC 5- Computer Networking Lab 112 hours

Components of the Computer Network 16

Identify various Network tools like : (a) Wire crimper, (b) Wire Map Testers, (c) Multifunction Cable Tester, (d) LAN Tester, (e) Tone Generator etc. (8 hrs)

Identify various Network device like: (a) Switch (Normal and Managed), (b) Router(Normal and wireless), (c) Rack, Patch Panel, i/o box, (d) Access Point etc. (8 hrs)

Crimping, Punching and Network configuration 33

Practice crimping with straight and cross CAT 6 cables. (8hrs)
Punching practice in IO Box and patch panel. (03hrs)
Create cabling using Fibre Optic cable and connectors. (8hrs)
Create cabling in a lab with HUB/Switch and IO Boxes and patch panel. (8hrs)
Install &Configure a Peer to-Peer Network using Windows (03hrs)
Connect computers using Bluetooth, WI-FI, hotspot. (03hrs)

Configuration of Data communication equipments 23

Connect computers with Network with Drop cable and using Wi Fi configuration. (09 hrs)
Configure Basic Programmable switch (layer two) and practice to set up Spanning Tree Protocol (STP) from Command Line Interface (CLI). (13 hrs)
Configure Layer 3 Switch. Verify IP Routing Process. Configure it from CLI in layer three switches. (10 hrs)

IP Addressing & TCP/IP 18

Practice IP Addressing technique (IPv4/IPv6) and Sub netting and Super netting the network. (12 hrs)
Install and Configure TCP/IP Protocol. Practice FTP, Telnet and NS lookup. (03 hrs)
Use popular TCP/IP (windows and Linux) Utilities like PING, IPCONFIG, HOSTNAME, ROUTE, TRACERT etc. (03 hrs)

Other Network Protocols 22

Practice to set up and use SMTP, TELNET, FTP, HTTP, SNMP, LDAP, SSH, NTP, IPP, HTTPS etc. (10 hrs)
Configure a wireless router in the lab and practice port forwarding with security features. (07 hrs)

Practice on configuring DHCP. (05 hrs)

Optional DSC 7- DIGITAL ELECTRONICS 70HRS

DIGITAL FUNDAMENTALS 14Hrs

Number Systems – Decimal, Binary, Octal, Hexadecimal, 1‘s and 2‘s complements, Codes – Binary, BCD, Excess 3, Gray, Alphanumeric codes, Boolean theorems, Logic gates, Universal gates, Sum of products and product of sums, Minterms and Maxterms, Karnaugh map Minimization and Quine-McCluskey method of minimization.

COMBINATIONAL CIRCUIT DESIGN 12Hrs

Design of Half and Full Adders, Half and Full Subtractors, Binary Parallel Adder – Carry look ahead Adder, BCD Adder, Multiplexer, Demultiplexer, Magnitude Comparator, Decoder, Encoder,

Priority Encoder.

SYNCHRONOUS SEQUENTIAL CIRCUITS 12 Hrs

Flip flops – SR, JK, T, D, Master/Slave FF – operation and excitation tables, Triggering of FF, Analysis and design of clocked sequential circuits – Design – Moore/Mealy models, state minimization, state assignment, circuit implementation – Design of Counters- Ripple Counters, Ring Counters, Shift registers, Universal Shift Register.

ASYNCHRONOUS SEQUENTIAL CIRCUITS 08Hrs

Stable and Unstable states, output specifications, cycles and races, state reduction, race free assignments, Hazards, Essential Hazards, Pulse mode sequential circuits, Design of Hazard free circuits.

MEMORY DEVICES AND DIGITAL INTEGRATED CIRCUITS 12

Basic memory structure – ROM -PROM – EPROM – EEPROM –EAPROM, RAM – Static and dynamic RAM – Programmable Logic Devices – Programmable Logic Array (PLA) – Programmable Array Logic (PAL) – Field Programmable Gate Arrays (FPGA) – Implementation of combinational logic circuits using PLA, PAL. Digital integrated circuits: Logic levels, propagation delay, power dissipation, fan-out and fan-in, noise margin, logic families and their characteristics-RTL,
TTL, ECL, CMOS.

D/A and A/D Converters: 12Hrs

Digital to Analog Converters D/A converter Specifications, Types of D/A converters, Mode of Operation, BCD-Input D/A converter, Integrated Circuit D/A Converters, D/A converter Applications, A/D converters, A/D Converter Specifications, A/D Converter Technology, Types of A/D converters, Integrated Circuit A/D Converters, A/D converter Applications

Optional DSC 8- DIGITAL ELECTRONICS Lab 112HRS

DIGITAL FUNDAMENTALS 22Hrs

Verification of truth table of Logic gates, Implementation of various Logic gates using NAND gates, Implementation of various Logic gates using only NOR gate.

COMBINATIONAL CIRCUIT DESIGN 30 Hrs

Design and Verification of function of Half and Full adder circuits, Verification of function of Half/full subtractor circuits, Verification of function of Binary to Grey code conversion, Verification of function of Grey to Binary code conversion, Design and verification of function of 2 line to 4 line decoder, Design and Verification of function of 4 line to 2 line encoder, Design and Verification of function of 4 to 1 multiplexer, Design and Verification of function of 1 to 4 demultiplexer, Study of Parity Generator.

SEQUENTIAL LOGIC CIRCUITS 30Hrs

Verification of function of Latch and flip-flop, Verification of shift left/ right register, Verification of counter circuit like binary up/down counter, decimal counter, ring counter, Johnson counter etc, Verification of Sequential circuits other than counter and shift registers.

D/A and A/D Converters: 30Hrs

Verification of Specification and Performance indices of D/A and A/D converters, to study standard graphics symbols for digital logic, to study the construction, working and application of any one memory IC from datasheet, to study the D/A and A/D converter IC with its specifications.

Appendix IV

Syllabus
Diploma Programme: Fundamentals of Computer and Networking

SEMESTER-WISE SCHEDULE FOR Diploma Programme : Fundamentals of Computer and Networking							
Semester		**Course Opted**	**Course Code**	**Course Name**	**Credit**	**Marks**	**Hours** (@ 14H/ Credit for Theory& 28H/Credit per Lab.)
I	General Component (Credit – 10)	General Education Component Course-I	GEC 3	Entrepreneur Development and Small Business Management	**03**	**75**	**42**
		General Education Component Course-I	GEC 4	Entrepreneur Related Laws and Insurance	**04**	**100**	**56**
		General Education Component Course-I	GEC5	Waste Management and and E-Waste Recycling	**03**	**75**	**42**
	Skill Component (Credit – 20)	Skill Education Component Course-II	DSC 7	Renewable Energy and Battery Technology	**05**	**125**	**70**
		Skill Education Component Course-II Practical/Workshop/Field Trip/Internship	DSC 8	Renewable Energy and Battery Technology lab	**05**	**125**	**140**
		Skill Education Component Course-II	DSC 9	Web Technologies & Networking	**05**	**125**	**70**

		Skill Education Component Course-II Practical/Worksh op/Field Trip/Internship	DSC10	Web Technologies & Networking Lab.	**05**	**125**	**140**
		Skill Education Component Course-II	Optional DSC 11	Microprocessor and Microcontroller	**05**	**125**	**70**
		Skill Education Component Course-II Practical/Worksh op/Field Trip/Internship	Optional DSC 12	Microprocessor and Microcontroller Lab	**05**	**125**	**140**
		Skill Education Component Course-II	Optional-DSC 13	Programming with C	**05**	**125**	**70**
		Skill Education Component Course-II Practical/Worksh op/Field Trip/Internship	Optional-DSC 14	Programming with C Lab.	**05**	**125**	**140**
				Total	**60**	**750**	**588**

GEC 3: Entrepreneur Development and Small Business Management 42 Hrs

Introduction 12hrs

Meaning and Importance, Evolution of term 'Entrepreneurship, Factors influencing entrepreneurship, Psychological factors, Social factors, Economic factor, Environmental factors, Characteristics of an entrepreneur, Entrepreneur and Entrepreneur, Types of entrepreneur, According to Type of Business, According to Use of Technology, According to Motivation,

According to Growth, According to Stages, New generations of entrepreneurship viz. social entrepreneurship, Entrepreneurship, Health entrepreneurship, Tourism entrepreneurship, Women entrepreneurship etc., Barriers to entrepreneurship.

Creativity 10hrs

Creativity and entrepreneurship, Steps in Creativity, Innovation and inventions, Using left brain skills to harvest right brain ideas, Legal Protection of innovation, Skills of an entrepreneur, Decision making and Problem Solving(steps indecision making).

Organization Assistance 20Hrs

Assistance to an entrepreneur, New Ventures, Industrial Park(Meaning, features, & examples), Special Economic Zone(Meaning, features & examples), Financial assistance by different agencies, MSME Act Small Scale Industries, Carry on Business (COB) license, Environmental Clearance, National Small Industries Corporation (NSIC), Government Stores Purchase scheme(e-tender process), Excise exemptions and concession, Exemption from income tax, Quality Standards with special reference to ISO, Financial assistance to MSME, Modernization assistance to small scale unit, The Small Industries Development Bank of India(SIDBI), The State Small Industries Development Corporation(SSIDC), Export oriented units, 1Incentives and facilities to exports entrepreneurs, Export oriented zone, Registration Categories, Registration Procedure.

Text Books:

3) Entrepreneurship Development and Small Business Enterprises, Poornima M. Charantimath, 2e, Pearson, 2014.
4) Entrepreneurship, A South – Asian Perspective, D. F. Kuratko and T.V.Rao, 3e, Cengage, 2012.

REFERENCES:

3) Entrepreneurship, Arya Kumar, 4 e, Pearson 2015.
4) The Dynamics of Entrepreneurial Development and Management, Vasant Desai, Himalaya Publishing House, 2015.

GEC 4 : Entrepreneur Related Laws and Insurance 56 Hrs

Banking -Deposits & Advances 08Hrs

Lending Schemes / Government Sponsored Schemes, Various Deposit Schemes and other services of banks, General Advances -Security Norms & margin requirement, Term Loan & Working Capital finance, MSME Credit, Mudra Loan, PMEGP Scheme , CGTMSE Scheme.

Book Keeping & accountancy 12Hrs

Cash book, sales & purchases, book keeping methodology, Various types of records to be maintained in small enterprises -Cash Book, General Ledger etc Accounting methodology, Various heads of accounts and how to appropriate expenditure there in, Financial Statements.

Insurance 12Hrs

Importance of securing assets through insurance, Types of insurance cover available , General Insurance (fire, theft, burglary etc), Insurance Schemes of the Government , How to claim insurance.

Business Laws –Taxation & related laws 16Hrs

Legal aspects of weights and measures, IT, VAT Sales Tax, state and central Govt. Rules and regulations in business, Compliance for various statutory requirements VAT, CST, Income Tax etc., Compliance for various statutory requirements(VAT, CST, Income Tax etc.)

IT Factor in managing an enterprise 08Hrs

Impending need., Importance of Computer literacy & basic knowledge of computers, E filing of various tax returns, Online marketing.

Text Books:

3. Entrepreneurship Development and Small Business Enterprises, Poornima M. Charantimath, 2e, Pearson, 2014.
4. Entrepreneurship, A South – Asian Perspective, D. F. Kuratko and T.V.Rao, 3e, Cengage, 2012.

REFERENCES:

3. Entrepreneurship, Arya Kumar, 4 e, Pearson 2015.
4. The Dynamics of Entrepreneurial Development and Management, Vasant Desai, Himalaya Publishing House, 2015.

GEC 5: Waste Management and E-waste Recycling 42Hrs

Solid waste 12hrs

Public health and ecological impacts, Sources and types of solid wastes, material flow and waste generation, Functional elements: Waste generation, storage, collection, Transfer and transport, processing and recovery, disposal. Physical and chemical composition of municipal solid waste, integrated solid waste management, hierarchy of waste management options, different methods for generation rates. Storage: movable bins, fixed bins. Collection: home to home collection,

community bin system. Theory and design of hauled container system, stationary container system.

Transportation 08hrs

Handcart, tri-cycle, animal cart, tripper truck, dumper placer, bulk refuse carrier, railroad transport, water transport, conveyors, layout of routes. Engineering system for on-site handling and processing of solid waste: separators, size reduction equipments, screening equipments, densification, baling, cubing, pelleting equipments.

Landfilling 08Hrs

Site selection criteria, landfill layout, landfill sections, Occurrence of gases and leachate in landfills: composition and characteristics, generation factors, initial adjustment phase, transition phase, acid formation phase, methane formation phase, maturation phase of gases and leachate, Introduction to engineered landfills.

E-waste 14Hrs

Definition of Hazardous waste, The magnitude of the problem; Hazardous waste: Risk assessment, Environmental legislation, Characterization and site assessment, Waste minimization and resource recovery, Transportation of hazardous waste, Disposal of hazardous waste.Introduction to Electronic waste and Biomedical waste and their disposal. E-Waste Recycling Technologies for recovery of resources from electronic waste, resource recovery potential of e-waste, steps in recycling and recovery of materials-mechanical processing, technologies for recovery of materials.

References:

4) E-Waste Managing the Digital Dump Yard, Edited by Vishakha Munshi,ICFAI University Press.
5) E-waste: Implications, Regulations and Management in Indiaand Current Global Best Practices, Edited by Rakesh Johri, TheEnergy and Resources Institute, New Delhi
6) Solid Waste Management Paperback – 1 January 2009, by Sasikumar K

DSC 9: Renewable Energy and Battery Technology 70Hrs

Introduction 08Hrs

Causes of Energy Scarcity, Solution to Energy Scarcity, Factors Affecting Energy Resource Development, Energy Resources and Classification, Renewable Energy – Worldwide Renewable Energy Availability, Renewable Energy in India, Sun- earth Geometric Relationship, Layer of the Sun, Earth – Sun Angles and their relationships, Solar Energy Reaching the Earth's Surface, Solar Thermal Energy Applications.

Solar Thermal Energy Collectors 04hrs

Types of Solar Collectors, Configurations of Certain Practical Solar Thermal Collectors, Material Aspects of Solar Collectors, Concentrating Collectors, Parabolic Dish – Stirling Engine System, Working of Stirling or Brayton Heat Engine, Solar Collector Systems into Building Services, Solar Water Heating Systems, Passive Solar Water Heating Systems, Applications of Solar Water Heating Systems, Active Solar Space Cooling, Solar Air Heating, Solar Dryers, Crop Drying, Space Cooing, Solar Cookers, Solar pond.

Solar Cells 04hrs

Components of Solar Cell System, Elements of Silicon Solar Cell, Solar Cell materials, Practical Solar Cells, I – V Characteristics of Solar Cells, Efficiency of Solar Cells, Photovoltaic Panels, Applications of Solar Cell Systems.

Hydrogen Energy 04hrs

Benefits of Hydrogen Energy, Hydrogen Production Technologies, Hydrogen Energy Storage, Use of Hydrogen Energy, Advantages and Disadvantages of Hydrogen Energy, Problems Associated with Hydrogen Energy.

Wind Energy 04hrs

Windmills, Wind Turbines, Wind Resources, Wind Turbine Site Selection.

Geothermal Energy 04hrs

Geothermal Systems, Classifications, Geothermal Resource Utilization, Resource Exploration, Geothermal Based Electric Power Generation, Associated Problems, environmental Effects.

Solid waste and Agricultural Refuse 04hrs

Waste is Wealth, Key Issues, Waste Recovery Management Scheme, Advantages and Disadvantages of Waste Recycling, Sources and Types of Waste, Recycling of Plastics.

Biomass Energy 04hrs

Biomass Production, Energy Plantation, Biomass Gasification, Theory of Gasification, Gasifier and Their Classifications, Chemistry of Reaction Process in Gasification, Updraft, Downdraft and Cross-draft Gasifiers, Fluidized Bed Gasification, Use of Biomass Gasifier, Gasifier Biomass Feed Characteristics, Applications of Biomass Gasifier, Cooling and Cleaning of Gasifiers.

Biogas Energy 04hrs

Introduction, Biogas and its Composition, Anaerobic Digestion, Biogas Production, Benefits of Biogas, Factors Affecting the Selection of a Particular Model of a Biogas Plant, Biogas Plant Feeds and their Characteristics.

Tidal Energy 04hrs

Introduction, Tidal Energy Resource, Tidal Energy Availability, Tidal Power Generation in India, Leading Country in Tidal Power Plant Installation, Energy Availability in Tides, Tidal Power Basin,

Turbines for Tidal Power, Advantages and Disadvantages of Tidal Power, Problems Faced in Exploiting Tidal Energy.

Sea Wave Energy 04hrs
Introduction, Motion in the sea Waves, Power Associated with Sea Waves, Wave Energy Availability, Devices for Harnessing Wave Energy, Advantages and Disadvantages of Wave Power.

Ocean Thermal Energy 04hrs
Introduction, Principles of Ocean Thermal Energy Conversion (OTEC), Ocean Thermal Energy Conversion plants, Basic Rankine Cycle and its Working, Closed Cycle, Open Cycle and Hybrid Cycle, Carnot Cycle, Application of OTEC in Addition to Produce Electricity, Advantages, Disadvantages and Benefits of OTEC

SOLAR PV SYSTEM 04Hrs
Classification, Stand-Alone Solar PV System, Grid Interactive Solar PV System, Hybrid Solar PV System.

Battery technology 04Hrs
Introduction, Basic Concepts, Components of Battery, Operation of Battery, Battery Characteristics Classification of Batteries, Classical batteries : Lead Acid, Nickel Cadmium, Zinc Manganese dioxide, Inverter- Introduction ,Classification of Inverter, Single Phase Series Inverter, Single Phase Full Bridge Inverter, Single Phase Inverter Output Voltage Control.

SMART GRID TECHNOLOGY 12Hrs
Evolution of Electric Grid, Concept of Smart Grid, Definition of Smart Grid, Need of Smart Grid, Functions Smart Grid, Opportunities and Barriers Smart Grid, Difference between Conventional Grid and Smart Grid, Concept of Resilient Grid and Smart Grid, Role of Smart Meter in Smart Grid,Real Time Pricing, Smart Appliances, Automatic Meter Reading(AMR), Smart Sensors, Smart Grid Life Cycle, Regulatory & Cost Recovery, Strategy & Planning, Technology Integration, Business Process Readiness, Compliance & Risk Management,

References:

8) Goswami DY. Kreith F. Kreider JF. PrinciplesofSolarEngineering, Taylor & Francis, 19992.
9) Tiwari GN. SolarEnergy,Fundamentalsdesign,modelingandApplications. Narosa, 2002
10) Duffie JA. Beckman WA. SolarEngineeringofThermalProcesses, John Wiley, 2006
11) Kishore VVN. RenewableEnergyEngineeringandTechnologies, TERI, 2009
12) Non-Conventional Energy Resources, B. H. Khan, The McGraw Hill Publications.
13) Non-Conventional Energy Sources, G.D. Ray, Khanna Publications.
14) S. P. Sukhatme and J.K. Nayak, Solar Energy – Principles of Thermal Collection and Storage, Tata McGraw-Hill, New Delhi.

DSC 10: Renewable Energy and Battery Technology Lab 140Hrs

Battery Charger **50**

How NiCad Rechargeable Batteries Work, Checking the Battery Voltage, Building the Programmable Battery Charger, Programming the Battery Charger , Discharging the Batteries, Charging the Batteries, Replaying the Charge Cycle, Detecting the End of Charge.

Solar Cells **60**

How Solar Cells Work, study of Solar Cell Sun Tracker, study of Real World Sun-Tracking Solar Arrays, How to Shielding the Solar Panels Centering the Servo , How the Sun Tracker Works Half and Full Wave Rectification ,The Principles of Half Wave Rectification, Assembling the three-phase AC Alternator , Building the Half Wave Rectifier, How the Half Wave Rectifier Program Works, Full Wave Rectifier Operation ,Building the Full Wave Rectifier Circuit , study of Real World Power Supply Design, Understanding Three-Phase Power, simple experiments for Generating Electricity using Wind Power.

SMART GRID TECHNOLOGY **30**

Field Visit: Study smart meters, Visit Solar plus Wind Power generation's station/ hydro power generation/ Thermal power generation/ other power generation station. Visit to Goa Energy power generation for understanding Grid System.

DSC 11Electronics/Electrical Laboratory Equipments 70hrs

Fundamental aspect of electronic equipments 06HRs

Electronics today, Reliability aspect of electronic equipments, Equipment failure, Causes of failure, Reliability predictions, and Maintenance policy.

Troubleshooting procedure 10 HRs

Making of electronic circuits, Making of electronic equipments, Nature of faults, What is troubleshooting?, Fault location, Fault finding aids, Troubleshooting Technique, Troubleshooting procedure, Approaching components for tests, Grounding system in electronic equipments, Systematic troubleshooting check, Temperature intermittent problems, Corrective action, Preventive maintenance, Service and maintenance laboratory, Professional qualities and work habits.

Electronic test equipments 06 HRs

Multi-meters- types of multimeter- How to measure Resistance, AC/DC Voltage, Current, and Continuity test using multimeter. The oscilloscope, Logic analyzer, Signal analyzer, Signal generator,

Tools and Aid for servicing and maintenance 02HRs
Hand tools, Soft tools.

Soldering techniques 05 HRs
What is soldering?, Soldering tools, Soldering materials, Soldering procedure, Soldering technique, Replacement of components, Special consideration for handling of MOS devices, Soldering of leadless capacitors, Good and bad Soldering joints, Desoldering techniques.

Earthing 02 HRs
Types of earthing, Components of Earthing, how to check Earthing using Multimeter and Bulb, Calculate the total leakage.

Testing semiconductor device 03 HRs
Types of semiconductor devices, Causes of failure in semiconductors, Types of failure, testing procedure for semiconductor devices.

Linear integrated circuits 06 HRs
Linear integrated circuits, Operational amplifiers (op-amps), Characteristics of Operational amplifiers, Typical op-amps circuits, How to consult opamps specification data books, Fault diagnosis in op-amps circuits.

Digital circuits 08HRs
Binary number system, Truth table, Logic circuits, Characteristics integrated logic gates, The circuitry of logic gates, CMOS digital integrated circuits, Categories of digital circuits based on packing density, Logic IC series, Packages in digital IC, Identification of ICs, IC pin outs, Handling ICs, Digital troubleshooting methods, The digital IC troubleshooters, Special consideration for fault diagnosis in digital circuits, Handling precautions for electronic devices subject to damage by static electricity, Function and testing of flip-flops, counters and registers, Semiconductor memories, Microprocessors/Microcontrollers, Special method for troubleshooting LSI based system

Batteries 02HRs
Various types of batteries used in UPS and Inverters and their maintenance.

Electric Motors 07 HRs
Inside an Electric Motor, Types of Motors-AC motors –DC motors- others types of motors, Types of AC motor – Synchronous - Induction (Asynchronous), DC Motor - DC Shunt Motor - Separately Excited Motor - DC Series Motor - PMDC Motor - DC Compound Motor, Special Purpose Motors - Stepper Motor - Brushless DC Motors - Hysteresis Motor - Reluctance Motor - Universal Motor. Ratings and Specifications.

Stirrer 02Hrs
different types of Stirrer. Block Diagram of Stirrer, different types of Speed ontrollers, Types of Motors- AC motor, DC motor

Water Bath 02 hrs
Types of Water Bath, Components of Water bath, Heater, Stirrer to circulate water to maintain uniform temp., Temperature sensor to sense the temperature, Thermostat to maintain temperature at constant level.

Rotamantles 02 Hrs
Block Diagram of Rotamentle, Components of Rotamantles

Temperature controlled Oven: **03Hrs**
Types of laboratory Ovens, Working Principle of Oven. Dryers.

Electrical heater 02 Hrs
Types of Electric Heaters, Distribution for Heating Systems, types of electric resistance heating wires, Pro and Cons of Using Electric Heater

DSC 12: Electronic/Electrical Laboratory Equipments Lab. 140hrs

Troubleshooting procedure 20 HRs
Find the fault in the any given Circuits, Draw PCB layout, identify the components, identify the circuit, and Find the fault..

Electronic test equipments 16 HRs
Uses of multimeter, Measure AC/DC Voltage and Current. Check the Component using Multimeter, Calibration of oscilloscope, measure Voltage and frequency. Generate sinusoidal, triangular, square wave using signal Generator. Logic analyzer is used to view multiple digital (binary) waveforms, Timing diagram, logic analyzer for precise hardware troubleshooting, especially for timing issues. Measures the magnitude and phase of the input signal at a single frequency within the IF bandwidth of the instrument using signal analyzer.

Tools and Aid for servicing and maintenance 10hrs
Hand and soft tools: use hand tools include wrenches, pliers, cutters, files, striking tools, struck or hammered tools, screwdrivers, vises, clamps, snips, saws, drills and knives. Outdoor tools such as garden forks, pruning shears, and rakes are additional forms of hand tools.

Soldering techniques 10 HRs
Identify soldering tools, Solder and disolder the different (resistor, capacitor, MOS devices) components on the PCB.

Earthing 04HRs
Check the earthing using multimeter and bulb. Components, Methods & Types of Earthing – Electrical Grounding Installations, install Plate Earthing, Pipe Earthing, Strip or Wire Earthing

Testing semiconductor device and Linear Device 06Hrs
Test Semiconductor devices (Transistor, FET, MOSFET) and linear devices like OPAMP.

Troubleshooting of batteries 06HRs
Test all types of batteries such as Li-ion, Nicd, Ni-MH, Lead –Acid and find fault in the batteries, Checking invertors/UPS batteries.

Troubleshooting of Electric Motors 14Hrs
Test AC/DC motor using continuity test, Checking the Bearings, Checking the Shaft, Checking the winding, Check the rear bell housing of the motor, Check the fan.

Stirrer 12Hrs
Installation of Stirrer, Identify the internal and external parts , Identify the internal and xternal parts of Stirrer, Operate Stirrer, Rectify the fault leading to not working of control panel switches, Rectify the fault leading to not working Speed Controller, heater and Motor, Rectify the fault of Controller, heater and Motor.

Water bath 06 Hrs
Installation of Water bath, Identify the internal and external parts, Identify the internal and external parts of Water bath, Operate Water bath, Rectify the fault leading to not working of control panel switches, Rectify the fault leading to not working Temperature Controller, heater, Shaking Controller and Motor, Rectify the fault of temperature Controller, heater and Motor.

Rotamantles 12 Hrs
Installation of Rotamantles, Identify the internal and external parts, Identify the internal and external parts of Rotamantles, Operate Rotamantles , Rectify the fault leading to not working of control panel switches, Rectify the fault leading to not working Temperature Controller, heater, Stirrer, Shaking Controller and Motor, Rectify the fault of temperature Controller, heater, Stirrer and Motor.

Temperature control Oven 18Hrs
Installation of Oven, Identify the internal and external parts , Identify the internal and external parts of Oven, Operate Rotamantles , Rectify the fault leading to not working of control panel switches, Rectify the fault leading to not working Temperature Controller, heater, Rectify the fault of temperature Controller, heater, Dryer.

Electrical Heater 06hrs

Installation of Electrical Heater, Identify the internal and external parts , Identify the internal and external parts of Electrical Heater , Operate Rotamantles , Rectify the fault leading to not working of control panel switches, Rectify the fault leading to not working Temperature Controller, heater Coil/Wire.

DSC 11: Web Technologies & Networking 70Hrs

Introduction 08Hrs

Introduction and Web Development Strategies, History of Web and Internet, Protocols governing Web, Writing Web Projects, Connecting to Internet, Introduction to Internet services and tools, Introduction to client-server computing. Core Java: Introduction, Operator, Data type, Variable, Arrays, Methods & Classes, Inheritance, Package and Interface, Exception Handling, Multithread programming, I/O, Java Applet, String handling, Event handling, Introduction to AWT, AWT controls, Layout managers.

Web Page Designing 12Hrs

HTML: list, table, images, frames, forms, CSS, Document type definition, XML: DTD, XML schemes, Object Models, presenting and using XML, Using XML Processors: DOM and SAX, Dynamic HTML.

Internet & web browser 08Hrs

Web browser, Web search engine, Electronic mail, Cloud computing.

Computer Networking 20Hrs

Introduction to Computer Networks– Advantages of Networking, Peer-to-Peer and Client/Server Network, Network Topologies – Star, Ring, Bus, Tree, Mesh, and Hybrid. Type of Networks–Local Area Networks(LAN), Metropolitan Area Networks(MAN), Wide Area Networks(WAN) and Internet, Ethernet, Wi-Fi, Bluetooth, Mobile Networking ,Wire and wireless Networking, Difference between Intranet and Internet.

Crimping & Punching 12Hrs

Communication Media & Connectors–Unshielded twisted-pair (UTP), shielded twisted-pair (STP), Fiber Optic and coaxial cable: RJ-45, RJ-11, BNC. Understanding color codes of CAT5 cable. 568A and 568B convention. Cabling: Introduction to Data Communication–Analog and Digital Signals, Simplex, Half-Duplex and Full-Duplex, transmission mode.

Install & configure Network 12Hrs

OSI Model - the functions of different layers in OSI model.

Refwrences:

1) Burdman, Jessica, “Collaborative Web Development” Addison Wesley
2) Xavier, C, “ Web Technology and Design” , New Age International
3) Ivan Bayross,” HTML, DHTML, Java Script, Perl & CGI”, BPB Publication

4) Bhave, “Programming with Java”, Pearson Education
5) Herbert Schieldt, “The Complete Reference:Java”, TMH.
6) Hans Bergsten, “Java Server Pages”, SPD O’Reilly
7) Tanveer Alam, Internet and Java Programming, Khanna Publishing House
8) Margaret Levine Young, “The Complete Reference Internet”, TMH
9) Naughton, Schildt, “The Complete Reference JAVA2”, TMH
10) Balagurusamy E, “Programming in JAVA”, TMH
11) Greenlaw R and Hepp E “Fundamentals of Internet and www” 2nd EL, Tata McGrawHill, 2007.
12) Ivan Bayross, “HTML, DHTML, JavaScript, Perl CGI”, 3rd Edition, BPB Publications.
13) D. Comer, “The Internet Book”, Pearson Education, 2009. SUPPLEMENTARY READING
14) M. L. Young,”The Complete reference to Internet”, Tata McGraw Hill, 2007
15) Godbole AS & Kahate A, “Web Technologies”, Tata McGrawHill,2008
16) B. Patel & Lal B. Barik, ” Internet & Web Technology “, Acme Learning Publishers

DSC 12: Web Technologies & Networking Lab. 140Hrs

Web Technologies 70Hrs

1) Create a basic HTML file
2) Create a static webpage using table tags of HTML
3) Create a static web page which defines all text formatting tags of HTML in tabular format
4) Create webpage using list tags of HTML
5) Create webpage to include image using HTML tag.
6) Create employee registration webpage using HTML form objects
7) Apply style sheet in Web page. [inline, embedded and linked].
8) Introduction to IIS. Installation of IIS server in windows 7.
9) Create a simple xml file and also create dynamic web page in which XML tags used.
10) Create a dynamic web page which displays a message “Welcome to ASP” using VBScript.
11) Create a dynamic web page which generates student grade sheet using VBScript.
12) Create a dynamic web page which prints Fibonacci series from 1 to 10 in VBScript.
13) Create a dynamic web page which displays factorial of a number in VBScript.
14) Create a dynamic web page which displays arithmetic operations [addition, subtraction, division, multiplication and modulus]using HTML Frame.
15) INTERNET TECHNOLOGY27PRACTICAL 15Write a script which differentiates Request Query string and Request Form.
16) Write suitable scripts which show properties of Response object [Buffer, Expires and Expires Absolute].
17) Write a suitable scripts which show methods of Server object [HTML Encode, URL Encode, Map path, Execute and Transfer].
18) Write a script which creates and retrieves Cookies information.
19) Create a dynamic web page which displays Ads using AdRotator Component.

20) Introduction to DSN. Create System DSN Connection for web application.
21) Write a suitable script which displays records from the database.

Computer Networking Practical 70Hrs

1) Familiarization of Internetworking elements like Hubs, switches, routers
2) Network Cable Crimping-Straight through and Cross over Crimping using UTP cables and testing
3) Installation of NIC in PCs and trouble shooting4.Client configuration for networking, advanced client configuration for connecting multiple networks
4) Setting up of a simple LAN ,Checking the connectivity using DOS commands
5) Sharing files, Printers, CD drives
6) Sharing desktops, Remote desktop, Using Applications like Team Viewer for accessing a remote computer
7) Configuration of client PCs for connecting multiple networks etc
8) Installation of Windows server, Configuration of server for Web Server and FTP server, Verification from a client
9) Basic router configuration, Connecting through Hyper terminal, Configuring router connecting different networks
10) Broadband Lab-Type 1 and Type 2 Modems, Modem configuration for internet connection. Wireless modem configuration for Wi-Fi connectivity, Internet connection sharing to multiple clients

Optional DSC 13: Microprocessor and Microcontrollers 70Hrs

8086 MICROPROCESSOR 10Hrs

Introduction to 8086 – Microprocessor architecture – Addressing modes – Instruction set and assembler directives – Assembly language programming – Modular Programming – Linking and Relocation – Stacks – Procedures – Macros – Interrupts and interrupt service routines – Byte and String Manipulation.

8086 SYSTEM BUS STRUCTURE 16 Hrs

8086 signals – Basic configurations – System bus timing –System design using 8086 – I/O programming – Introduction to Multiprogramming – System Bus Structure – Multiprocessor configurations – Coprocessor.

I/O INTERFACING 12Hrs

Memory Interfacing and I/O interfacing – Parallel communication interface – Serial communication interface – D/A and A/D Interface – Timer – Keyboard /display controller –

Interrupt controller –DMA controller – Programming and applications Case studies: Traffic Light control, LED display , LCD display, Keyboard display interface and Alarm Controller.

MICROCONTROLLER 16Hrs

Architecture of 8051/8951 – Special Function Registers(SFRs) – I/O Pins Ports and Circuits – Instruction set – Addressing modes – Assembly language programming.

INTERFACING MICROCONTROLLER 16Hrs

Programming 8051 Timers – Serial Port Programming – Interrupts Programming – LCD & Keyboard Interfacing – ADC, DAC & Sensor Interfacing – External Memory Interface- Stepper Motor and BreyWaveform generation – Comparison of Microprocessor, Microcontroller, PIC and ARM processors

References:

4) 8086,80286, 80386,80486,Pentium,Pentium II, Pentium III, Pentium IV by Barry
5) 8051 microcontroller by Muhammad Ali Mazidi
6) 8051 microcontroller by Kenneth Ayala

Optional DSC 14: Microprocessor, Microcontrollers Lab. 140Hrs

8086 MICROPROCESSOR 18Hrs

Introduce ALP concepts and features, Write ALP for arithmetic and logical operations in 8086 , Differentiate Serial and Parallel Interface, Interface different I/Os with Microprocessors, Be familiar with MASM,.

8086 Programs using kits and MASM 20Hrs

Basic arithmetic and Logical operations, Move a data block without overlap, Code conversion, string manipulations, sorting and searching, Counters and Time Delay.

808051/8952 Microcontroller 24Hrs

Write ALP for arithmetic and logical operations in 8051/8952, Series problems, Differentiate Serial and Parallel Interface, Interface different I/Os with Microcontrollers,.

8051/8952 Programs using kits and Simulator 30Hrs

Basic arithmetic and Logical operations, Move a data block without overlap, Code conversion, string manipulations, sorting and searching, Print RAM size and system date, Counters and Time Delay, Series solving programs.

Interfacing with I/O devices 48Hrs

Interfacing Traffic Light Controller with 8051/8952, Interfacing Stepper Motor with 8051/8952, Digital Clock in real time, Interfacing 8279 Keyboard / Display Controller with 8051/8952, .Interfacing ADC with 8051/8952, Interfacing DAC with 8051/8952, Parallel Communication Interface, Serial Communication Interface**,** interfacing with Relay module, Interfacing with Stepper motor, interfacing with Temperature sensors LM 35.

Introduction to C Programming 06Hrs

Features of C and its Basic Structure, Simple C programs, Constants, Integer Constants, Real Constants, Character Constants, String Constants, Backslash Character Constants, Concept of an Integer and Variable, Rules for naming Variables and assigning values to variables

Operators and Expressions 06Hrs

Arithmetic Operators, Unary Operators, Relational and Logical Operators, The Conditional Operator, Library Functions, Bitwise Operators, The Increment and Decrement Operators, The Size of Operator, Precedence of operators

Data Types and Input/Output Operators 06Hrs

Floating-point Numbers, Converting Integers to Floating-point and vice-versa, Mixed-mode Expressions, The type cast Operator, The type char, Keywords, Character Input and Output, Formatted input and output, The gets() and puts() functions, Interactive Programming.

Control Statements and Decision Making 10Hrs

The goto statement, The if statement, The if-else statement, Nesting of if statements, The conditional expression, The switch statement, The while loop, The do…while loop, The for loop, The nesting of for loops, The break statement and continue statement.

Functions 10Hrs

Function Basics, Function Prototypes, Recursion, Function Philosophy

Storage Classes 04Hrs

Storage Classes and Visibility, Automatic or local variables, Global variables, Static variables, External variables

Arrays and Strings 06Hrs

One Dimensional Arrays, Passing Arrays to Functions, Multidimensional Arrays, Strings

Pointers 06Hrs

Basics of Pointers, Pointers and One-dimensional Arrays, Pointer Arithmetic, Pointer Subtraction and Comparison, Similarities between Pointers and One-dimensional Arrays, Null pointers, Pointers as Function Arguments, Pointers and Strings, Pointers and two-dimensional arrays, Arrays of Pointers

Structures and Unions 04Hrs

Basics of Structures, Structures and Functions, Arrays of Structures, Pointers to Structures, Self-referential Structures, Unions.

The Pre-processor 04Hrs

File Inclusion, Macro Definition and Substitution, Macros with Arguments, Nesting of Macros, Conditional Compilation

Dynamic Memory Allocation and Linked List 06Hrs

Dynamic Memory Allocation**,** Allocating Memory with malloc**,** Allocating Memory with calloc**,** Freeing Memory**,** Reallocating Memory Blocks**,** Pointer Safety**,** The Concept of linked list**,** Inserting a node by using Recursive Programs**,** Sorting and Reversing a Linked List**,** Deleting the Specified Node in a Singly Linked List.

File Management 04Hrs

Defining and Opening a file, Closing Files, Input/Output Operations on Files, Predefined Streams, Error Handling during I/O Operations, Random Access to Files, Command Line Arguments.

Optional DSC 14: Programming with C Lab 140Hrs

Operators and Expressions

Introduction to C Programming 06Hrs

Write program for understanding the concept of Constants, Integer Constants, Real Constants, Character Constants, String Constants, Backslash Character Constants, Concept of an Integer and Variable, Rules for naming Variables and assigning values to variables.

Operators and Expressions 18Hrs

Write program for Arithmetic Operators, Write program for Unary Operators, Write program for Relational and Logical Operators, Write program for Conditional Operator, Write program using Library Functions, Write program for Bitwise Operators, Write program for Increment and Decrement Operators, The Size of Operator, Precedence of operators.

Data Types and Input/Output Operators 06Hrs

Write program for Converting Integers to Floating-point and vice-versa, Write program for Mixed-mode Expressions, Write program for gets() and puts(), getch(), putch() functions or I/O functions.

Control Statements and Decision Making 18Hrs

Write program for understanding goto statement, Write program for understanding if statement, Write program for understanding if-else statement, Write program for understanding Nesting of if statements, Write program for understanding conditional expression, Write program for understanding switch statement, Write program for understanding while loop, Write program for understanding do…while loop, Write program for understanding for loop, The nesting of for loops, Write program for understanding break statement and continue statement.

Functions 18Hrs

Write program for arithmetic operation using Function, Write program for febonacci series using Recursion Function.

Pointers 18Hrs

Write program for understanding the concept of Pointers, , Write program for addition, subtraction and multiplication using Pointer.

Structures and Unions 04Hrs

Write program for understanding Structuresconcept, Structures and Functions, Arrays of Structures, Pointers to Structures, Self-referential Structures, Unions.

Other Practical 52 Hrs

27) WAP to reverse a number,
28) WAP to compute the sum of the first n terms of the following series S = 1+1/2+1/3+1/4+..... WAP to compute the sum of the first n terms of the following series S =1-2+3-4+5..... Write a function that checks whether a given string is Palindrome or not. Use this function to find whether the string entered by user is Palindrome or not.
29) Write a function to find whether a given no. is prime or not.
30) WAP to compute the factors of a given number.
31) Write a macro that swaps two numbers.

32) WAP to perform following actions on an array entered by the user: i)Print the even-valued elements ii)Print the odd-valued elements iii)Calculate and print the sum and average of the elements of array iv)Print the maximum and minimum element of array v)Remove the duplicates from the array vi)Print the array in reverse order .

33) The program should present a menu to the user and ask for one of the options. The menu should also include options to re-enter array and to quit the program.

34) WAP that prints a table indicating the number of occurrences of each alphabet in the text entered as command line arguments.
35) Write a program that swaps two numbers using pointers.
36) Write a program in which a function is passed address of two variables and then alter its contents.
37) Write a program which takes the radius of a circle as input from the user, passes it to another function that computes the area and the circumference of the circle and displays the value of area and circumference from the main() function.
38) Write a program to find sum of n elements entered by the user. To write this program, allocate memory dynamically using malloc() / calloc() functions or new operator.

39) Write a menu driven program to perform following operations on strings: a)Show address of each character in string b)Concatenate two strings without using strcat function. c)Concatenate two strings using strcat function. d)Compare two strings e)Calculate length of the string (use pointers) f)Convert all lowercase characters to uppercase g)Convert all uppercase characters to lowercase h)Calculate number of vowels i) Reverse the string
40) Given two ordered arrays of integers, write a program to merge the two-arrays to get an ordered array.
41) WAP to display Fibonacci series (i)using recursion, (ii) using iteration.
42) WAP to calculate Factorial of a number (i)using recursion, (ii) using iteration .
43) .WAP to calculate GCD of two numbers (i) with recursion (ii) without recursion.
44) Create Matrix class using templates. Write a menu-driven program to perform following Matrix operations (2-D array implementation): a) Sum b) Difference c) Product d) Transpose
45) Create the Person class. Create some objects of this class (by taking information from the user). Inherit the class Person to create two classes Teacher and Student class. Maintain the respective information in the classes and create, display and delete objects of these two classes (Use Runtime Polymorphism).
46) Create a class Triangle. Include overloaded functions for calculating area. Overload assignment operator and equality operator.
47) Create a class Box containing length, breath and height. Include following methods in it: a)Calculate surface Area b)Calculate Volume c)Increment, Overload ++ operator (both prefix & postfix) d)Decrement, Overload -- operator (both prefix & postfix) e)Overload operator == (to check equality of two boxes), as a friend function f)Overload Assignment operator g)Check if it is a Cube or cuboid Write a program which takes input from the user for length, breath and height to test the above class.
48) Create a structure Student containing fields for Roll No., Name, Class, Year and Total Marks. Create 10 students and store them in a file.
49) Write a program to retrieve the student information from file created in previous question and print it in following format: Roll No. Name Marks
50) Copy the contents of one text file to another file, after removing all whitespaces.
51) Write a function that reverses the elements of an array in place. The function must accept only one pointer value and return void.
52) Write a program that will read 10 integers from user and store them in an array. Implement array using pointers. The program will print the array elements in ascending and descending order.