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Annexure-B

Computer Hardware, Networking and Security Bench:
Features:

- Peer to Peer network, Client - server network
- Networking devices like Managed Layer 2 Ethernet Switch, Managed Layer 3 Ethernet Switch, Media Convertor, Power Over Ethernet Switch, UTP Jack Panel, Wi-Fi LAN card, IP Camera, Network Layers
- Design of Star topology using 100Base-Tx, Design of Bus topology using 10Base-2 (compatible on Windows XP), Design of Ring topology using DB9
- Detailed introduction to TCP/IP model (4 Layer Model)
- Socket programming and processing
  - Wireless LAN with 803.11b/g
- Network monitoring
- Various LAN Protocols
- Error generation (manual and auto)
- Color coded real time graphical representation of entire transmission & reception
- Graphical Analysis of LAN performance with various parameters and protocols
- Encryption/Decryption technique
- User friendly software
- UPS and Antivirus
- Easy identification of different parts of computer
  - Enhanced electrical safety considerations
  - Caster wheel (with locking mechanism) at the legs of WorkBench for easy movement
  - MCB provided with AC supply for safety purpose
  - Licensed windows 10 Operating Software (64 bit)
  - Learning Software NetSys

- IP Camera

- Identification of different parts of computer like motherboard, SMPS, Hard disk, RAM, CD Drive, Web Cam

Practical

Study and implementation:

- Cable designs in Networking

- PC to PC with IEEE 802.3

- Peer to Peer Network

- Client- Server Network

- Star topology using 100base Tx

- Ethernet LAN protocol to create scenario and Study the performance of CSMA/CD (carrier sense multiple access with collision detection) Protocol through simulation

- Wireless LAN Protocol to create scenario and study the performance network with CSMA/CA protocol and compare with CSAMA/CD protocol

- Go back N and Selective repeat protocols

- Bus topology using 10base2 (compatible on Windows XP)

- To create the scenario and study the performance of token bus protocols through simulation

- Ring topology using DB9

- To create the scenario and study the performance of token ring protocols through simulation

- Distance vector routing algorithm

- Link state routing/Dijkistra's algorithm

- Data Encryption and decryption

- Subnet calculation using software

- CRC Technique using software.

Technical Specifications:

Smart Managed 3 Layer Switch-1 no. :

- Number of Ports:10/100/1000 Mbps : 24 nos.

- Gigabit SFP : 2 nos.

- 10G SFP+: 2 nos.

- Full/Half Duplex : Full/half duplex for 10/100 Mbps and Gigabit speed

Smart Managed 2 Layer Switch-1 no.

Number of Ports:

- 10/100/1000 Ports : 8 nos.
- 100/1000 SFP Ports : 2 nos.
- Duplex Mode : Full/half-duplex for 10/100 Mbps Full-
  - duplex for 1000 Mbps
- Switching Capacity : 20 Gbps

Media Convertor-5nos.:

- Transmission Type : 10/100M/FDX/HDX
- Wavelength : 1310nm
- Fiber Distance : Multimode 2km

Power over Ethernet (PoE) Switch- 4 nos.:

- No. of Ports : 8 (10/100BASE-TX PoE)
- PoE Standard : 802.3af
- PoE Capable Ports : Port 1-8 up to 15.4 watts per port
- PoE Power Budget : 72 watts

Power over Ethernet (POE) Adaptor- 4 nos.:

- Power Supply : 230V

UTP Jack Panel : 2 nos.

- No. of Ports : 12 nos.

LAN Cable Tester : 4 no.

IP Camera : 1 no.

- Type : Dome
- Camera : 16 megapixel

Digital Storage Oscilloscope (DSO)-1 no.:

- Analog Bandwidth : DC to 50 MHz
- Channel : 04 nos.
- Memory : Minimum 12 Mpoints
- Display : 7 Inch color

Digital Multimeter (Bench Top)-1 no.:

- Display : 4 ½- digit large LCD displays with back light max.
- Reading : 1.9999,
- Voltage measurement range:up to 1000 VDC and 750VAC.

    DC AC Current : up to 20A,ACV
- Frequency Response : 50KHz,Frequency.
- Included Function : Resistance, Capacitance measurement, Diode check and Continuity test.

LAN Training System-1 no.:

Hardware:

- PC to PC using RJ-45 Connector
- Star topology using RJ45 Connector
- Bus topology by using end terminator (compatible on Windows XP)
- Ring topology using DB9 Connector
- Data transmission speed: 10/100 Mbps 4 Nodes Software:
- Star, Bus & Ring selection
- Protocols: CSMA/CD, CSMA/CA, Stop N Wait, Go back to N, Selective repeat, Sliding Window, Token Bus, Token Ring
- Packet size: 128, 256, 512, 1024, 2048, 4096, 8192, 16384
- Inter Packet delay: 1000 – 5000 ms
- Error generation: Acknowledgment lost, bad packet, auto error generation
- Complete analysis of Network & Protocols

Network & protocol analysis:
Indication of packet serial number, file name, file size, file number, receiver name, receiver IP address, total packets, packet length, time out, protocol, topology, receiver, MAC address, port number, file send start time, file sent completion time, transmission time data rate(Mbps), percentage error.

Computer Hardware Training System -2 nos.:

- CPU with fan : Core i7 Processor with Licensed window 11 Professional OS/Preloaded
- Mother board : With Intel Chipset
- Memory (RAM): 8GB
- Display adaptor card :Built in mother board

- Hard disk
- Monitor : 512 SSD
- Key board : 15.6" TFT colour IPS
- Mouse : Backlit board
- Speakers & Mike : Scroll mouse (optical)
- Video camera : Stereo speakers and built-in microphone
- : Web CAM (Full HD)
- Windows Professional OS : 2 nos. (Windows 11 Professional Licensed/Preloaded)

Digital multimeter- 2 no.

AC Voltmeter	:	2 no.
Voltage	:	10 - 450Vrms
Accuracy	:	± (1% reading + 2 digits)
AC Ammeter	:	1 no.
Current	:	0.2 - 10Arms
Accuracy	:	±(1% reading + 2 digits)
Energy meter	:	1 no.
LED Tubelight	:	1 no.

Included Accessories:

- RJ45 connector : 50 nos.
- Crimping tool : 4 nos.
- LAN cable tester : 4 nos.

Rj45–RJ45 connector cable : 4 nos.

- USB dongles : 2 nos.
- DB9 connector cable : 10 nos.
- END terminators : 10 nos.
- Patch cords 16" (2mm) : 10 nos.
- Cat5 cable : 50 meter.
- A to B USB cable : 2 no.
- Fiber optic cable (SC-SC) : 2No.
- Head Phone : 2 nos.

2. SIGNAL GENERATOR FOR ELECTRICAL AND ELECTRONICS

Specifications	Qty.
Sine : 10Hz -10MHz Square : 10Hz -5MHz Pulse : 10Hz -1MHz Ramp : 10Hz -1MHz White Noise : 5 MHz bandwidth (-3 dB) (typical)Output channels : 1 no.Frequency resolution : 1µHz Vertical resolution : 14bit Standard waveforms : Sine, square, ramp, pulse, and noise Arbitrary waveforms : Sinc, staircase , staircase U, staircase D, etc.	02

3. ELECTRICAL CIRCUIT TRAINER KIT

Specifications	Qty.	
Transistor Characteristics Trainer (CB & CE Mode with Digital Meters) Scope of Learning : * Study of Common Base and Common Emitter 01. Input Characteristics of NPN Transistor 02. Output Characteristics of NPN Transistor 03. Input Characteristics of PNP Transistor 04. Output Characteristics of PNP Transistor Technical Specification :- Digital Meters : * Digital Ammeter 50mA DC. * Digital Ammeter 250uA/50mA DC. * Digital Voltmeter 10V DC. * Digital Voltmeter 1V DC Power Supplies : * DC Supply IC Regulated 0-1V DC, 150mA. * DC Supply IC Regulated 0-10V DC, 150mA. * Operated on Mains power 230V, 50Hz +10% Components are mounted on the panels are : * Zener NPN Transistor SL100 * PNP Transistor SK100 * Voltage Control through Potentiometer Salient Features : * Front panel built with high class insulated Printed Circuit Board sheet with well printed circuits and symbols. * Fuse for Short Circuit protection. * Connections are brought out through 4mm Colored Sockets. * Patch Cords 4mm. * The trainer is housed in ABS Plastic cabinet.	02	

4. SINGLE PHASE SCR HALF/FULL CONTROLLED BRIDGE RECTIF

Specifications	Qty.
S.C.R. : Four Diodes : Two Switch : One to select half OR full controlled bridge rectifier. Trigger circuit : Digital, ramp/comparator (0-180°) Freewheeling Diode : One through switch select Pulse transformer : Two (1:1):1 Resistive load : Wire wound Inductive load : Fixed Inductance AC Supply : Fixed AC supply Trigger supply : AC 10-0-10V Test Points : Separate for waveforms of gate and rectifier circuit. Mains : 220V/50Hz AC Instruction manual : One Size : 320x190x75mm(approx).	01 ✝01 =02

5. LCR RESONANCE APPARATUS

Specifications	Qty.	
OBJECTIVE:LCR Resonance Circuit has be designed to plot the Resonance curve of L, C & R components when connected in Series & Parallel. SPECIFICATION: Analog Moving Coil Meters: Two (5 VAC, 25 mAAC) Inbuilt Sine Wave Oscillator: 100Hz to 100Khz (Variable) Sockets: 4mm Banana type Panel: ISI marked fine quality Backelite Panel Box: Light weight shock proof Plastic cabinet Cabinet Size (mm): 280 x 205 x 85 Power Requirement: 220V AC ±10%, 50Hz Standard Accessories: Patch Cords & Instruction Manual	01	

6. ZENER DIODE CHARACTERISTICS

Specifications	Qty.	A
OBJECTIVE: To study Forward & ReverseV-I Characteristics of Zener Diode. SPECIFICATION: DC Regulated Power Supply: One Variable (0-15V) Analog Moving Coil Meters: Two (15V, 150µ/15mA) Sockets: 4mm Banana type Panel: ISI marked fine quality Backelite Panel Box: Light weight shock proof Plastic cabinet Zener type: (4.3V, 5.6V.8.2V) Cabinet Size (mm): 280 x 205 x 85 Power Requirement: 220V AC ±10%, 50Hz Standard Accessories: Patch Cords & Instruction Manual	01 2	

7. P-N JUNCTION DIODE CHARACTERISTICS

Specifications	Qty.
OBJECTIVE: To study Forward & Reverse V-I Characteristics of P-N JUNCTION Diode. SPECIFICATION: DC Regulated Power Supply: Two Variable (0-3V & 0-30V) Analog Moving Coil Meters: Two dual range (3V/30V, 100μA/10mA) Sockets: 4mm Banana type Panel: ISI marked fine quality Backelite Panel Box: Light weight shock proof Plastic cabinet P-N type: OA-79 Cabinet Size (mm): 280 x 205 x 85 Power Requirement: 220V AC ±10%, 50Hz Standard Accessories: Patch Cords & Instruction Manual	01 2

8 . MOSFET CHARACTERISTICS APPARATUS

Specifications	Qty.
OBJECTIVE: To plot VDS Vs ID for different values of VGS. SPECIFICATION: DC Regulated Power Supply: Two Variable (0-5V &0-25V) Analog Moving Coil Meters: Three (5V, 5mA/25mA,25V) Sockets: 4mm Banana type Panel: ISI marked fine quality Backelite Panel Box: Light weight shock proof Plastic cabinet MOSFET type: IRFZ44N Cabinet Size (mm): 330 x 205 x 85 Power Requirement: 220V AC ±10%, 50Hz Standard Accessories: Patch Cords & Instruction Manual	01 02

9. VERIFICATION OF KCL & KVL

Specifications	Qty.
VERIFICATION OF KCL & KVL OBJECTIVE: To study Kirchoffs current and voltage law SPECIFICATION: DC Regulated Power Supply: One Variable (0-3V) Analog Moving Coil Meters: Two (3V & 250mA) Sockets: 4mm Banana type Panel: ISI marked fine quality Backelite Panel Box: Light weight shock proof Plastic cabinet Cabinet Size (mm): 280 x 205 x 85 Power Requirement: 220V AC ±10%, 50Hz Standard Accessories: Patch Cords & Instruction Manual	01 2

10 . TYRE CHANGER

Technical Specification		Qty
Rim clamping from inside.	12"-21" (305mm-533mm)	01.
Rim clamping from outside	10"-18" (254mm-457mm)	
Max. wheel diameter	37" (930mm)	
Max. wheel width	3"-12" (76mm-305mm)	
Operating pressure	6-8 Bar	
Bead breaker force	2500kg	
Power supply	220V AC, Single phase, 50 Hz	
Power	1.0 HP	
Certification	TUV SUD certified	

10 . LEAD ACID BATTERY CHARACTERISTICS TRAINING SYSTEM

Technical Specification	Qty.	
Control board consist of high grade FRP material to provide utmost safety to the users Machine with Class "B" Insulation Diagrammatic representation for the ease of connections exclusive and Compact Design Standard BS-10 terminals, patch cords for safety purpose study of battery characteristics of Lead-acid battery.In built battery in the system. Real time and interactive training setup. DC Power source and charge controller.LCD Meter and battery level indicator for analysis. Designed with all safety standards.PC Interface for real time curve plotting using built-in DAQ. Provided with cascaded DC load bank. Lead-Acid battery Voltage 12V Capacity 7Ah DC voltmeter range 20V DC ammeter range 30Amp Charge controller PWM based Battery level indicator LCD display Load 12V, 4 Amp approx. Standard BS-10 terminals, patch cords for safety purpose Control Panel consist of high grade FRP material for better safety and in compliance with IS302-1/IEC60335-1, tested from NABL accredited Lab. BS10 safety terminals are in compliance with IS302-1/IEC60335-1, tested from NABL accredited Lab. To understand the overall functioning of Lead-acid battery. To study the charging and discharging characteristics of Lead-acid battery with meters and by using built in DAQ.	01	