MAHARASHTRA STATE BOARD OF TECHNICAL EDUCATION (MSBTE)

I – Scheme
II – Semester Course Curriculum

Course Title: **Workshop Practice** (IF, CO)
(Course Code: ....)

Diploma Programme in which this course is offered	Semester in which offered
Information Technology, Computer Engineering	First

1.   RATIONALE

A diploma engineer (also called technologist) in his/her professional life works in a typical business environment where s/he interacts with computers, peripherals and related devices and instruments. They must be able to use and maintain these equipments authentically. They must also possess basic knowledge/skills of wiring system, selecting components, soldering, de-soldering for elementary level testing and maintenance of such hardware. Hence, this course is designed to develop these vital skills in them through various workshop based activities.

2.   COMPETENCY

The aim of this course is to help the student to attain the following industry identified competency through various teaching learning experiences**:**
  • **Perform simple maintenance operations on computer system, peripherals and network**.

3.   COURSE OUTCOMES (COs)

The theory, practical experiences and relevant soft skills associated with this course are to be taught and implemented, so that the student demonstrates the following *industry oriented* COs associated with the above mentioned competency**:**
   a. Use electrical tools, instruments, devices and equipment for basic level maintenance of computers and peripherals.
   b. Identify active and passive electronic components.
   c. Undertake basic level maintenance of a PC.
   d. Use different kinds of printers and scanners.
   e. Identify the layout of wired and wireless LAN environment.

4.   TEACHING AND EXAMINATION SCHEME

Teaching Scheme (In Hours)			Total Credits (L+T+P)	Examination Scheme				
				Theory Marks		Practical Marks		Total Marks
L	T	P	C	ESE	PA	ESE	PA	
-	-	4	4	-	-	50	50*	100

*(*): For the **practical only courses,** the PA has two components under practical marks i.e. the assessment of practicals (seen in section 6) has a weightage of 60% (i.e.<u>30 marks</u>) and micro-project assessment (seen in section 12) has a weightage of 40% (i.e.<u>20 marks</u>). This is designed to facilitate attainment of COs holistically, as there is no theory ESE.*
***Legends: L**-Lecture; **T** – Tutorial/Teacher Guided Theory Practice; **P** - Practical; **C** – Credit, **ESE** - End Semester Examination; **PA** - Progressive Assessment.*

5.   COURSE MAP (with sample COs, Learning Outcomes i.e. LOs and topics)

This course map illustrates an overview of the flow and linkages of the topics at various levels of outcomes (details in subsequent sections) to be attained by the student by the end of the course, in all domains of learning in terms of the industry/employer identified competency depicted at the centre of this map.
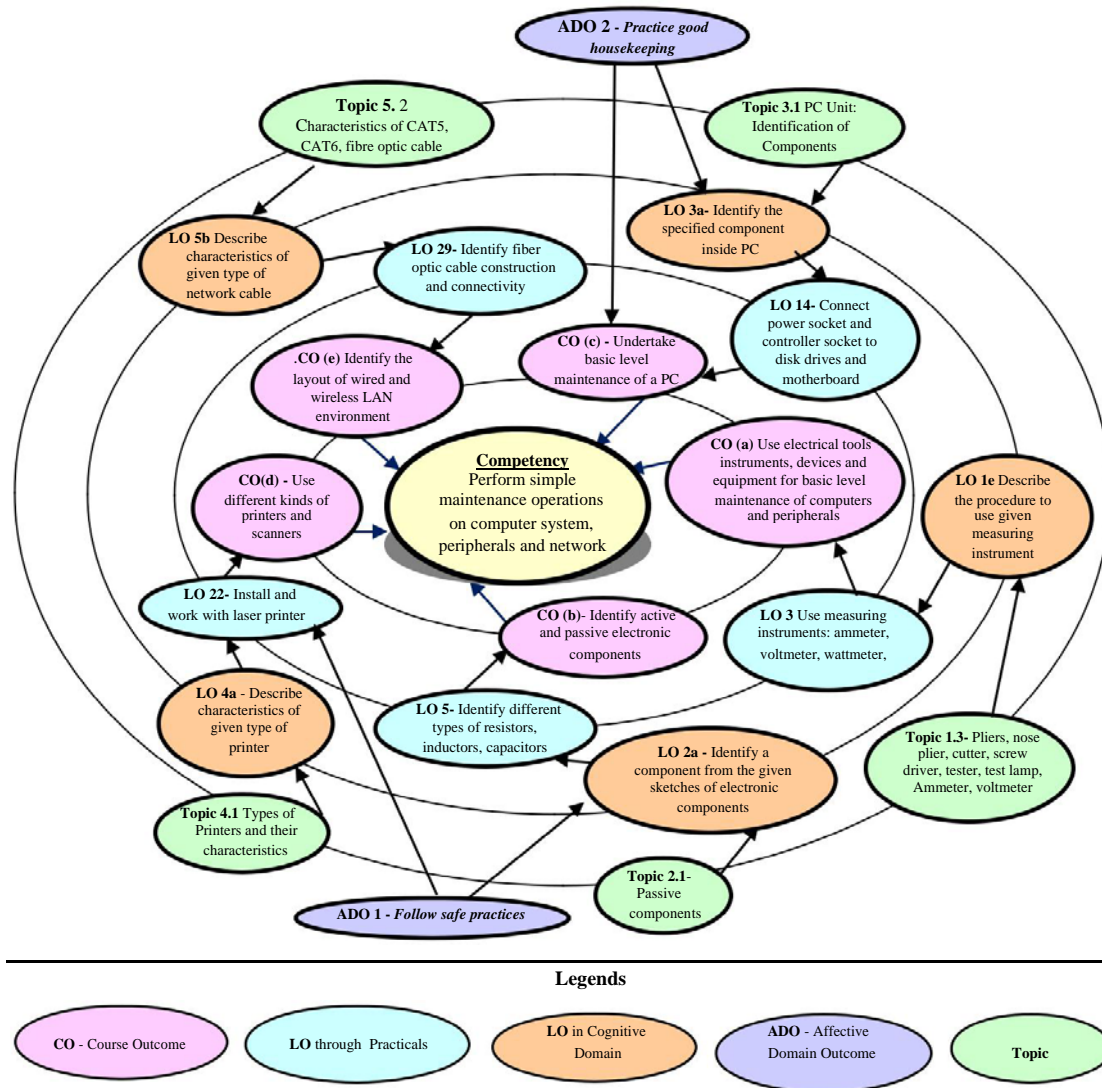

Figure 1 - Course Map

6.   SUGGESTED PRACTICALS/ EXERCISES

The practicals/exercises/tutorials in this section are psychomotor domain LOs (i.e.sub-components of the COs), to be developed and assessed in the student to lead to the attainment of the competency.

S. No.	Practical Exercises (Learning Outcomes in Psychomotor Domain)	Unit No.	Approx. Hrs. required
1	Use devices: Pliers, nose pliers, cutter, screw driver	I	2

S. No.	Practical Exercises (Learning Outcomes in Psychomotor Domain)	Unit No.	Approx. Hrs. required
2	Use devices: tester, test lamp of different sizes	I	2
3	Use measuring instruments: ammeter, voltmeter, wattmeter	I	2
4	Use measuring instruments: clip on meter, multimeter, Megger	I	2
5	Identify different types of: resistors, inductors, capacitors, potentiometers, Thermistor, Transformer, auto transformer from the given components	II	2
6	Identify the terminals of the following components: Diode, Zener diode, Varactor diode, LED, Photo diode, BJT, Photo transistor, FET, LDR, Solar cell, Photocell, Opto-coupler,7 Segment Display, Relays	II	2
7	Perform soldering and de -soldering operations	I	2
8	Connect UPS with mains and batteries	I	2
9	Connect batteries of battery bank	I	2
10	Open PC Panel and Identify Components (Part-I)	III	2
11	Open PC Panel and Identify Components (Part-II)	III	2
12	Clean inside PC - Boards and Slots (Part-I)	III	2
13	Clean inside PC - Boards and Slots (Part-II)	III	2
14	Connect power socket and controller socket to disk drives and motherboard. (Part-I)	III	2
15	Connect power socket and controller socket to disk drives and motherboard. (Part- II)	III	2
16	Connect/disconnect LAN Cable, External Hard disk, Modem	III	2
17	Connect desktop computer and laptop with LCD/DLP Projector	III	2
18	Clean Keyboard and fitting it to computer	IV	2
19	Connect different types of mouse to ports	IV	2
20	Install and work with Dot matrix printer	IV	2
21	Work with Dor matrix printer settings (various types of buttons and their functions, changing ribbon cartridge, paper fitting, eject)	IV	2
22	Install and work with laser printer (various types of configuration settings on printer, removing and mounting cartridge, troubleshooting paper jam)	IV	2
23	Install and work with scanner with default settings	IV	2
24	Change scans settings, scanning documents/images and saving in different formats.	IV	2
25	Connect Modem, Hub/Switches/routers physically.	V	2
26	Prepare and test crossover and straight cable, CAT5,CAT6 Cable, using Crimping tools, Splicer	V	2
27	Connect two Switches/Hubs using normal and uplink port	V	2
28	Write on CD/DVD, single session/multisession	V	2
29	Identify fiber optic cable construction and connectivity	V	2
30	Identify Wi-Fi environment and its setup	V	2
31	Identify wired network environment and its setup	V	2
32	Identify blue tooth based wireless mouse, keyboard and other devices	V	2
Total			**64**

Note

i. *A suggestive list of practical LOs is given in the above table, more such practical LOs can be added to attain the COs and competency. A judicial mix of practical LOs/tutorials needs to be performed so that the student reach the 'Precision Level' of Dave's 'Psychomotor Domain Taxonomy' as generally required by the industry.*

ii. *Hence, the 'Process' and 'Product' related skills associated with each LO of the laboratory/workshop/field work are to be assessed according to a suggested sample given below:*

S. No.	Performance Indicators	Weightage in %
a.	Use of Appropriate tool to solve the problem	10
b.	Operate equipment skillfully	30
c.	Follow Safety measures	10
d.	Quality of output achieved	30
e.	Answer to sample questions	10
f.	Submit report in time	10
Total		**100**

Additionally, the following affective domain LOs (social skills/attitudes), are also important constituents of the competency which can be best developed through the above mentioned laboratory/field based experiences:

a. Follow safe practices
b. Practice good housekeeping
c. Practice energy conservation.
d. Demonstrate working as a leader/a team member.
e. Maintain tools and equipment.
f. Follow ethical practices.

The development of the attitude related LOs of Krathwohl's 'Affective Domain Taxonomy', the achievement level may reach:

- 'Valuing Level' in 1st year
- 'Organising Level' in 2nd year
- 'Characterising Level' in 3rd year.

7.   MAJOR EQUIPMENT/ INSTRUMENTS REQUIRED

The major equipment with broad specification mentioned here will usher in uniformity in conduct of experiments, as well as aid to procure equipment by authorities concerned.

S. No.	Equipment Name with Broad Specifications	Exp. S.No.
1	Computer system with all necessary components like; motherboard, random access memory (RAM), read-only memory (ROM), Graphics cards, sound cards, internal hard disk drives, DVD drive, network interface card	10, 11, 12, 13, 14, 15, 16, 17,18,19
2	LCD/DLP Projector	17
3	Modems, hubs, switches, Router	25,27
4	Wi-Fi set-up with access point and repeater	30
5	Bluetooth based wireless mouse and keyboard or any other device	32

S. No.	Equipment Name with Broad Specifications	Exp. S.No.
6	Uninterrupted Power supply unit with battery	8,9
7	Cat5/Cat6 cable with RJ 45 Connectors	26, 27
8	Fibre optic cable with SC,ST, LC Connectors	29
9	Dot Matrix Printer, Laser Printer, Inkjet Printer	20, 21, 22
10	Scanner	23, 24
11	Hub/Switches/Routers	25, 27
12	Blank CDs/DVDs	28
13	Pliers, nose pliers, cutter, screw driver, tester, test lamp, Crimping tool	1, 26
14	Resistors, inductors, capacitors, potentiometers, Thermistor, Transformer, auto transformer	5
15	Diode, Zener diode, Varactor diode, LED, Photo diode, BJT, Photo transistor, FET, LDR, Solar cell, Photocell, Opto-coupler,7 Segment Display, Relays	6

Note: There are no fixed specifications for the above listed equipments, devices and instruments. Depending on the availability in the institute they can be utilized for the purpose.

8.   UNDERPINNING THEORY COMPONENTS

The following topics/subtopics should be taught and assessed in order to develop LOs in cognitive domain for achieving the COs to attain the identified competency.

Unit	Major Learning Outcomes (in cognitive domain)	Topics and Sub-topics
Unit – I Electrical Tools, Cables and Switches	1a. Explain the characteristics of given type of wires, cables, light sources and switches. 1b. Explain use of the given type of switch. 1c. Describe the procedure to use given electrical Tool. 1d. Describe application of the given type of uninterrupted power supply. 1e. Describe the procedure to use the given measuring instrument.	1.1 Electrical: Basic wiring- Single core cable, multicore cable, single strand wire, multi strand wire, shielded wire 1.2 Use of different types of switches ; Toggle switch, Rotary switch, Push button switch, micro switch, circuit breakers; MCB, ELCB, Regulators. 1.3 Using Pliers, nose plier, cutter, screw driver, tester, test lamp, Ammeter, voltmeter, wattmeter, clip on meter, Multimeter, Megger, Solder iron, solder-stand, solder-wire, flux, desolder pump, De-solder wick 1.4 Using Uninterrupted power supply units-online, offline, batteries and their types
Unit– II Electronic Components	2a. Identify a component from the given sketch of electronic components. 2b. Describe the applications of the given active electronic component.	2.1 Passive components: Different types of: resistors, inductors, capacitors, potentiometers, Thermistor, Transformer, auto transformer 2.2 Active components: Diodes, LED, Photo diode, BJT, Photo transistor, LDR, Opto-coupler, seven segment display

Unit	Major Learning Outcomes (in cognitive domain)	Topics and Sub-topics
Unit– III Inside the Computer system	3a. Identify the specified component inside PC. 3b. Describe applications of the specified device drives. 3c. Explain procedure of Connecting the given cable/ device in a PC. 3d. Describe procedure to handle laptop safely.	3.1 PC Unit: Identification of Components- Motherboard, RAM, ROM, Add-on Cards, CMOS battery, SMPS, Hard disk, DVD, flash Memory And PEN DRIVE, Power Connection, Controller Connection, NIC Cards. 3.2 Connecting and disconnecting LAN Cable, External Hard disk, Modem, Motherboard Supply, Basic handling of laptop, Connecting computer with LCD Projector
Unit– IV Computer Peripheral and Devices	4a. Describe characteristics of the given type of printer. 4b. Classify given type of scanner. 4c. Explain procedure to connect given printer/scanner to computer. 4d. Explain procedure of scanning the given document/ image using a scanner. 4e. Describe working principle of the given type of mouse.	4.1 Types of Printers and their characteristics- DOT Matrix, Laser, Inkjet, Connecting and sharing printer, Scanner – flatbed scanner, hand held scanner, setting scanning parameters, scanning documents and saving in different formats 4.2 Keyboards, different types of mouse- Optical, mechanical, Wireless, trackball, Connecting mouse to ports
Unit– V Network Devices and Components	5a. Explain Application of NIC and the given connecting devices. 5b. Describe characteristics of the given type of network cable. 5c. Describe features of the given type of network 5d. Identify components of the given wired/wireless network set-up.	5.1 Applications of Network interface cards (NIC), HUB, Switches, Routers, Modem 5.2 Characteristics of CAT5,CAT6, fibre optic cable, use of crossover and straight cable, RJ-45 connectors, SC, ST, FC, LC type fibre connectors 5.3 Concept of LAN, MAN, WAN Wireless network and devices; Wi-Fi, Access point, repeaters, Bluetooth

Note: To attain the COs and competency, above listed Learning Outcomes (LOs) need to be undertaken to achieve the 'Application Level' of Bloom's 'Cognitive Domain Taxonomy'.

9. SUGGESTED SPECIFICATION TABLE FOR QUESTION PAPER DESIGN
- Not Applicable -

10. SUGGESTED STUDENT ACTIVITIES
Other than the classroom and laboratory learning, following are the suggested student -related *co-curricular* activities which can be undertaken to accelerate the attainment of the various outcomes in this course**:**

a. Prepare journal of practicals.
b. Prepare chart displaying network set-up layout of their institute.
c. Download videos/ animations to illustrate the following:
    i. Identify components inside the PC.
    ii. Making of Cross/Straight Cat5/Cat6 cables by connecting RJ-45 connector.
    iii. Any other video related to Practical exercises as given above.

11.   SUGGESTED SPECIAL INSTRUCTIONAL STRATEGIES (if any)

These are sample strategies, which the teacher can use to accelerate the attainment of the various outcomes in this course:

a. Massive open online courses (*MOOCs*) may be used to teach various topics/sub topics.
b. *'L' in item No. 4* does not mean only the traditional lecture method, but different types of teaching methods and media that are to be employed to develop the outcomes.
c. About *15-20% of the topics/sub-topics* which is relatively simpler or descriptive in nature is to be given to the students for *self-directed learning* and assess the development of the LOs/COs through classroom presentations (see implementation guideline for details).
d. With respect to item No.10, teachers need to ensure to create opportunities and provisions for *co-curricular activities*.
e. Guide student(s) in undertaking micro-projects.
f. Guide student(s) in undertaking various activities in the lab/workshop.
g. Demonstrate students thoroughly before they start doing the practice
h. Show video/animation films to explain handling/functioning of different instruments.
i. Continuously observe and monitor the performance of students in Lab/Workshop

12.   SUGGESTED MICRO-PROJECTS

Only one micro-project is planned to be undertaken by a student assigned to him/her in the beginning of the semester. S/he ought to submit it by the end of the semester to develop the industry oriented COs. Each micro-project should encompass two or more COs which are in fact, an integration of practicals, cognitive domain and affective domain LOs. The micro-project could be industry application based, internet-based, workshop-based, laboratory-based or field-based. Each student will have to maintain dated work diary consisting of individual contribution in the project work and give a seminar presentation of it before submission. The total duration of the micro-project should not be less than *16 (sixteen) student engagement hours* during the course.

In the first four semesters, the micro-project could be group-based. However, in higher semesters, it should be individually undertaken to build up the skill and confidence in every student to become problem solver so that s/he contributes to the projects of the industry. A suggestive list is given here. Similar micro-projects could be added by the concerned faculty:

a. Prepare a small report on different types of wires, cables, light sources and switches.
b. Prepare a small report on different measuring instrument with their broad specifications.
c. Prepare brief report on different components with their functions inside PC.
d. Prepare a small report of printers and scanners based on their technological differences.
e. Prepare brief report of various networking devices/components installed with their application by doing survey of computer labs.

13.   SUGGESTED LEARNING RESOURCES

S. No.	Title of Book	Author	Publication
1	Peter Norton's New Inside the PC	Norton, Peter; Clark, Scott H.	Sams Publishing, Carmel, Indiana, USA 2010, ISBN: 9780672322891
2	Computer Basics Absolute Beginner's Guide, Windows 10	Miller, Michael	QUE Publishing; Indianapolis, USA, August 2015, ISBN: 978-0789754516
3	Principles of Electronics	Mehta, V. K.; Mehta, Rohit	S. Chand, New Delhi, ISBN:9788121924504

14.   SOFTWARE/LEARNING WEBSITES
   a. IT Essentials: Computer Lab Procedures and Tool Use
   a. http://www.ciscopress.com/articles/article.asp?p=2086239&seqNum=4 Essential Introduction to Computers
   b. http://uwf.edu/clemley/cgs1570w/notes/01%20-%20intro_to_computer.htm How to operate laptop:
   c. http://www.liutilities.com/how-to/operate-a-laptop-computer/