

Program Name : Computer Program Group
 Program Code : CM/CO/IF/CW
 Semester : First
 Course Title : Workshop Practice
 Course Code : 22005

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:

- Use electrical tools, instruments, devices and equipment for basic level maintenance of computers and peripherals.
- Identify active and passive electronic components.
- Undertake basic level maintenance of a PC.
- Use different kinds of printers and scanners.
- Identify the layout of wired and wireless LAN environment.

4. TEACHING AND EXAMINATION SCHEME

Teaching Scheme			Credit (L+T+P)	Examination Scheme											
L	T	P		Theory					Practical						
				Paper Hrs.	ESE Max	ESE Min	PA Max	PA Min	Total Max	Total Min	ESE Max	ESE Min	PA Max	PA Min	Total Max
--	--	4	4	--	--	--	--	--	--	50%	20	50~	20	100	40

(*): For the courses having **ONLY** practical examination, 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. 30 marks) and micro-project assessment (seen in section 12) has a weightage of 40% (i.e. 20 marks). 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, PrOs, UOs, ADOs 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.

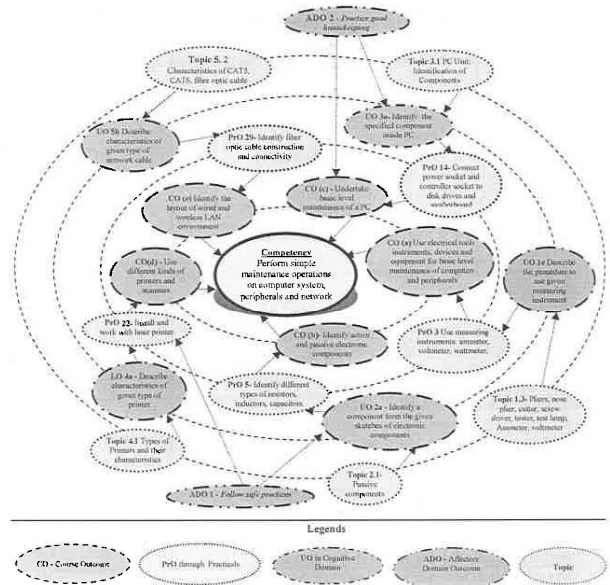


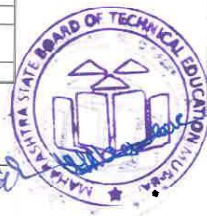
Figure 1 - Course Map

6. SUGGESTED PRACTICALS/ EXERCISES

The practicals in this section are PrOs (i.e. sub-components of the COs) to be developed and assessed in the student for the attainment of the competency.

S. No.	Practical Outcomes (PrOs)	Unit No.	Approx. Hrs. required
1	Use devices: Pliers, nose pliers, cutter, screw driver	1	2
2	Use devices: tester, test lamp of different sizes	1	2

S. No.	Practical Outcomes (PrOs)	Unit No.	Approx. Hrs. required
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 Dot 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, Splice.	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 PrOs is given in the above table. More such PrOs can be added to attain the COs and competency. A judicious mix of minimum 24 or more practical need to be performed, out of which, the practicals marked as "*" are compulsory, so that the student reaches the 'Precision Level' of Dave's 'Psychomotor Domain Taxonomy' as generally required by the industry.
- ii. The 'Process' and 'Product' related skills associated with each PrO is 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

The above PrOs also comprise of the following social skills/attitudes which are Affective Domain Outcomes (ADOs) that are best developed through the laboratory/field based experiences:

- Follow safe practices
- Practice good housekeeping
- Practice energy conservation.
- Demonstrate working as a leader/a team member.
- Maintain tools and equipment
- Follow ethical practices.

The ADOs are not specific to any one PrO, but are embedded in many PrOs. Hence, the acquisition of the ADOs takes place gradually in the student when s/he undertakes a series of practical experiences over a period of time. Moreover, the level of achievement of the ADOs according to Krathwohl's 'Affective Domain Taxonomy' should gradually increase as planned below:

- '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

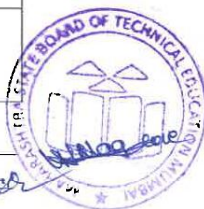
S. No.	Equipment Name with Broad Specifications	Exp. S.No.
3	Modems, hubs, switches, Router	25,27
4	Wi-Fi set-up with access point and repeater	30
5	Bluetooth based wireless mouse and keyboard or any other device	32
6	Uninterrupted Power supply unit with battery	8,9
7	Cat5/Cat6 cable with RJ 45 Connectors	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 equipment, 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 is to be taught and assessed in order to develop UOs 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	2.1 Passive components: Different types of: resistors, inductors, capacitors, potentiometers, Thermistor, Transformer, auto transformer 2.2 Active components: Diodes, LED,



Unit	Major Learning Outcomes (in cognitive domain)	Topics and Sub-topics
	component.	Photo diode, BJT, Photo transistor, LDR, Opto-coupler, seven segment display
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 UOs 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:

- Prepare journal of practicals.
- Prepare chart displaying network set-up layout of their institute.
- Download videos/ animations to illustrate the following:
 - Identify components inside the PC.
 - Making of Cross/Straight Cat5/Cat6 cables by connecting RJ-45 connector.
 - 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:

- Massive open online courses (*MOOCs*) may be used to teach various topics/sub topics.
- '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.
- 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 COs through classroom presentations (see implementation guideline for details).
- With respect to item No.10, teachers need to ensure to create opportunities and provisions for *co-curricular activities*.
- Guide student(s) in undertaking micro-projects.
- Guide student(s) in undertaking various activities in the lab/workshop.
- Demonstrate students thoroughly before they start doing the practice
- Show video/animation films to explain handling/functioning of different instruments.
- 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 PrOs, UOs, and ADOs. 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:

- Prepare a small report on different types of wires, cables, light sources and switches.
- Prepare a small report on different measuring instrument with their broad specifications.
- Prepare brief report on different components with their functions inside PC.
- Prepare a small report of printers and scanners based on their technological differences.



- 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

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