Government of Karnataka

Department of Technical Education

Board of Technical Examinations, Bengaluru

Course Title: **Electronics Servicing Lab**		Course Code	:**15EC57P**
Semester	: **5**	Credits	:**3**
Teaching Scheme in Hr. (L:T:P)	: **0:2:4**	Course Group	: **Core**
Type of course	: **Tutorial + Practical**	Total Contact Hours	: **78**
CIE	: **25 Marks**	SEE	:**50 Marks**

Prerequisites

Basic Knowledge of using a computer, using a multimeter and the basics of digital/analog electronics

Course Objectives

Familiarization of the PC components and generalized troubleshooting procedures for electronics equipments.

Course Outcomes

On successful completion of the course, the students will be able to attain the following COs

Course Outcome		CL	Experiments linked	Linked PO	Teaching Hrs
CO1	Identify the different components of a computer and motherboard	***R/U***	part-A E:1 to 3	1,2,3,4,5, 8,9	12
CO2	Assess the cause of faults in PCs and able to substitute the faulty module	***R/U/ A/E***	part-A E:4 to 6	1 , 2,3,4,5,6, 8,9,10	12
CO3	Disassemble, and Assemble the PC as per the requirements and configure it for optimum performance.	***R/U/ A***	part-A E:7 to 11	2 , 4, 5,6,7,8,9, 10	21
CO4	Analyze the troubleshooting techniques and adopt the same in servicing of electronics equipment	***R/U/ A/E***	part-B E:12 to 17	1, 2,3,4,5,6, 8,9,10	21
				Two IA/CIE Tests	06
				Student activity	06
				Total	**78**

Legends: PO-Program Outcome, CO-Course Outcome, CL-Cognitive Level, R-Remember, U-Understand, A-Apply, An-Analyse, E-Evaluate, C- Create

Mapping Course Outcomes with Program Outcomes

Course Outcomes	**Programme Outcomes**									
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10

CO1	*	*	*	*	*	--	--	*	*	--
CO2	*	*	*	*	*	*	--	*	*	*
CO3	--	*	--	*	*	*	*	*	*	*
CO4	*	*	*	*	*	*	--	*	*	*

Course-PO Attainment Matrix

Course	Programme Outcomes									
	1	2	3	4	5	6	7	8	9	10
Electronic Servicing Lab	3	3	3	3	3	3	1	3	3	3

Level 3- Highly Addressed, Level 2-Moderately Addressed, Level 1-Low Addressed.

Method is to relate the level of PO with the number of hours devoted to the COs which address the given PO.

If ≥40% of classroom sessions addressing a particular PO, it is considered that PO is addressed at Level 3

If 25 to 40% of classroom sessions addressing a particular PO, it is considered that PO is addressed at Level 2

If 5 to 25% of classroom sessions addressing a particular PO, it is considered that PO is addressed at Level 1

If < 5% of classroom sessions addressing a particular PO, it is considered that PO is considered not-addressed.

Course Contents

Unit-1: Tutorials and Graded Exercises 72 Hours

Sl. No.	Topic/Exercises	Duration (Hr)
	Part-A: PC Servicing Experiments	
1	Identification of the different external components like spike busters, UPS, modem, printer, headphone, microphone, web camera, joystick, flash drives, external HD of a computer, discussion of their functions and configurations	4
2	Identification of the different parts of motherboard like CPU/processor, Socket CMOS, RAM,BIOS ROM, Memory Slots, Power Connectors, IDE Connectors, SATA Connectors, CMOS Battery, AGP, PCI, PCI express, Chipset, cache, Heat sink, discussion of their functions, types. SMPS	5
3	Study of ROM BIOS and CMOS setup utility	3
4	Rectify the faults in SMPS, Selection of wattage of SMPS. Study of different types of power connectors like molex, mini molex, ATX power connectors, CPU 4+4, power connectors for PCI, SATA, number of lines, colour codes and their corresponding voltages.	6
5	Study of beep codes for servicing a PC	3
6	Study of how a virus affects the PC, the features of a good antivirus program, the method of installing antivirus programs, updating their data bases.	3
7	Disassembling of PC: steps Involved in disassembly, necessary precautions	4

8	Assembling of PC: detailed study of installation of power supply, CPU heat sink, fan assembly, RAM modules, internal drives, adapter cards, power connectors, data cables and front panel connectors	5
9	Installation of windows 7 or windows10 operating system by partitioning the hard disk.	3
10	Installation of Linux OS on the computer as a standalone OS and also as a dual boot system, concept of live CD.	3
11	Discussion of the importance of motherboard disk (CD)-Installation of device drivers, updating of device drivers in both windows and Linux.	6
Part-B: Electronic equipment servicing		
12	Understand the safety precautions to be taken while servicing. List the basic tools (electronic repair tools) required for servicing electronic equipment's and their purpose (uses) Identify the faults in Digital ICs and Troubleshoot using digital IC tester/ Logic Probe	03
13	Develop skill in assembly of components, wiring, revisiting soldering and de-soldering methods. ICs soldering practice.	03
14	Explain the basic steps of electronic equipment service and maintenance. a) Study of basic procedure of service and maintenance b) Circuit tracing techniques c) Concepts of shielding, grounding and power supply considerations in instruments d) Importance of functional diagram and servicing manuals e) Trouble shooting chart	06
15	Study of Regulated DC power supply and measurement of standard voltages at various stages of RPS. Identify and rectify the various faults in the Regulated DC power supply.	03
16	Minor repair practices on Decade Boxes (Rotary switches, connectors, components connectivity etc.,)	03
17	Troubleshoot Digital IC Trainer kits – practice minor repairs	03
	Two Internal Assessment tests(CIE)	06
	Total sessions	**72**

Unit - 2: Student Activities [CIE- 05 Marks] 06 Hours

Sl. No.	Activity	Duration (Hrs)
1	Explore datasheet of at least five electronics components and analog/Digital ICs.	**06**
2	List the steps for CD/DVD burning using any open source software. Burn the CD/DVD with any application software's and verify.	
3	Explore service manuals of different types of computers	

Execution Mode

1. Students should do activity as per the list of suggested activities/similar activities with prior approval of the teacher
2. Each student activities shall be carried out (select any one activities) throughout the semester and present the hand-written report of maximum 5 to 6 pages per batch at the end of the semester.

3. Assessment shall be made based on quality of activity, presentation/demonstration and report.

References

1. Communication engineering lab-I manual, Sri. M. Shanmukha Chary, sindoor graphics, Hyderabad-60
2. http://www.consumerelectronics.com

Course Delivery

The course will be normally delivered through two-hour tutorials and four-hour hands-on practice per week. Normally, one-hour tutorial followed by two-hour hands-on practice is recommended in each class. Tutorial shall be imparted before the conduction of the experiment. However, activities are carried-out off-class and demonstration/presentation can be in lab sessions.

Course Assessment and Evaluation Scheme

Master Scheme

Assessment Method	What		To Whom	Assessment mode /Frequency /timing	Max. Marks	Evidence Collected	Course Outcomes
Direct assessment	CIE	IA	Students	Two tests[+]	10	Blue Books	1 to 4
				Record[@]	10	Record Book	1 to 4
				Activity[*]	05	Report/Sheets	1 to 4
	SEE	End exam		End of the course	50	Answer Scripts at BTE	1 to 4
				Total	75		
Indirect assessment	Student feedback on course		Students	Middle of the Course	Nil	Feedback Forms	1 to 2 Delivery of course
	End of course survey			End of the Course	Nil	Questionnaires	1 to 4 Effectiveness of delivery instructions & assessment methods

Legends: CIE-Continuous Internal Evaluation, SEE- Semester End-exam Evaluation

[+] Every I.A. test shall be conducted as per SEE scheme of valuation. However, scored marks shall be scaled down to 10. Average of two tests, by rounding off any fractional part thereof to next higher integer, shall be considered for CIE/ IA.

***S**tudents should do activity as per the list of suggested activities/ similar activities with prior approval of the teacher. Activity process must be initiated well in advance so that it can be completed well before the end of the term.

[@]Record Writing: average of marks allotted for all experiments shall be considered; fractional part of the average shall be rounded-off to next higher integer.

Composition of CLs

Sl. No.	Cognitive Levels (CL)	Weightage (%)
1	Remembering	20
2	Understanding	30
3	Applying	30
4	Evaluate	20
	Total	**100**

Continuous Internal Evaluation (CIE) pattern

(i) Student Activity (5 marks)

The student activities in Unit-2 or similar activities of can be assigned

Execution Notes:

1. Maximum of 2 students in each batch for student activity.
2. Either one of the student activity or any similar activity is mandatory for every batch.
3. Project activities shall be carried out throughout the semester and present the project report and demonstration at the end of the semester.
4. Report shall be qualitative and not to exceed 6 pages; one report per batch shall be submitted.
5. Each of the activity can be carried out off-class; however, demonstration/presentation should be done during laboratory sessions.
6. Assessment shall be made based on quality of activity in accordance with the following **rubrics** table.

(ii) Model of rubrics for assessing student activity (for every student)

Dimension	**Scale**					**Marks (Example)**
	1 Unsatisfactory	**2 Developing**	**3 Satisfactory**	**4 Good**	**5 Exemplary**	
1. Research and gathering information	Does not collect information relate to topic	Collects very limited information, some relate to topic	Collects basic information, most refer to the topic	Collects more information, most refer to the topic	Collects a great deals of information, all refer to the topic	3
2. Full-fills team roles and duties	Does not perform any duties assigned to the team role	Performs very little duties	Performs nearly all duties	Performs almost all duties	Performs all duties of assigned team roles	2
3. Shares work equality	Always relies on others to do the work	Rarely does the assigned work, often needs reminding	Usually does the assigned work, rarely needs reminding	Always does the assigned work, rarely needs reminding.	Always does the assigned work, without needing reminding	5
4. Listen to other team mates	Is always talking, never allows anyone to else to speak	Usually does most of the talking, rarely allows others to speak	Listens, but sometimes talk too much,	Listens and talks a little more than needed.	Listens and talks a fare amount	3
					Total marks	ceil(13/4)= 4

(iii) CIE/IA Tests (10 Marks)

Two tests shall be conducted in accordance with SEE pattern and the marks shall be scaled down to 10. Average of two tests, rounding-off any fractional part thereof to next higher integer, shall be considered for CIE/IA.

(iv) Record Evaluation (10 Marks)

Every experiment shall be given marks, in the scale of 10, after its conduction based on student's performance and quality of write-up. Average of them, by rounding-off any fractional part thereof to next higher integer, shall be considered for CIE/IA.

Semester End-exam Evaluation (SEE) Scheme

Sl. No.	Scheme		Max. Marks
1	Short question on both part-A and part-B	Only write-up	10
2	one experiment from Part-A	Write-up	05
		Conduction	15
3	one experiment from Part-B	Write-up	05
		Conduction	10
4	Viva-voce		05
TOTAL			**50**

Note:

1. 6-hour experiments shall be trimmed/scaled down appropriately so that the student shall be able to perform in 3-hour exam.
2. Candidate is expected to submit record for the examination.
3. Student shall be allowed to conduct experiment even if she/he is unable to write the procedure/steps/algorithm.

Laboratory Resource Requirements

Hardware Requirements: For a batch of 20 students

Sl. No.	Equipment's	Quantity
1	Complete PC with all input/output components	05
2	SMPS	05
3	Windows 7 OS, drivers and Linux OS CD/DVD	05
4	Soldering set	05
5	Regulated power supply	05
6	Multimeters	05
7	Signal/function generators	05
8	Digital IC tester	05
9	Logic IC probes	20

Model Questions for Practice and Semester End Examination

Note: The questions are indicative but not exhaustive.

1. Identify and explain the different internal and external components of a PC.
2. Identify and explain the different parts of a motherboard.
3. Explain SMPS and measure the voltages at different output points.
4. Identify and explain the different types of power connectors along with their corresponding voltages.
5. Explain how a virus affects the PC. Write the steps on installation of antivirus software and update its database.
6. Install windows 7 operating system by partitioning the hard disk.
7. Install Linux OS on the computer as a standalone OS.
8. Install device drivers and update in windows OS.
9. Install device drivers and update in Linux OS.
10. Explain the basic steps of electronic equipment maintenance.
11. Measure standard voltages at various stages of RPS.
12. Identify the faults in given RPS

End