SEMESTER S6

ELECTRONIC HARDWARE FOR ENGINEERS

Course Code	OEEVT612	CIE Marks	40
Teaching Hours/Week (L: T:P: R)	3:0:0:0	ESE Marks	60
Credits	3	Exam Hours	2 Hrs. 30 Min.
Prerequisites (if any)	None	Course Type	Theory

Course Objectives:

1. To introduce students to the exciting field of electronic hardware designing and prototyping

SYLLABUS

Module No.	Syllabus Description	Contact Hours
1	Review of Active and Passive Components Introduction to Brief History of Printed Circuits; What is PCB, Difference between PWB and PCB, Types of PCBs: Single Sided (Single Layer), Multi-Layer (Double Layer), PCB Materials Component Package Types Axial lead, Radial Lead, Single Inline Package(SIP), Dual Inline Package (DIP), Transistor Outline (TO), Pin Grid Array (PGA), Metal Electrode Face (MELF), Leadless Chip Carrier (LCC), Small Outline Integrated Circuit (SOIC), Quad Flat Pack(QPF) and Thin QFP(TQFP), Ball Grid Array (BGA), Plastic Leaded Chip Carrier (PLCC).	7
2	Brief History of EDA, Latest Trends in Market, How it helps and why it requires, Different EDA tools, Introduction to SPICE and PSPICE Environment, Introduction and Working of PROTEUS Introduction to PCB Design using OrCAD tool PCB Designing Flow Chart: Schematic Entry, Net listing, PCB Layout Designing, Prototype Designing, Design Rule Check(DRC), Design For Manufacturing(DFM) PCB Making: Printing, Etching, Drilling, Assembly of components Introduction to PCB Design using PROTEUS tool Assembly of simple circuits	10
3	Types of Product Testing Acceptance Testing, Type Testing , Safety Testing, Safety, safety standards, safety certificates (CE, UL and VDE), Effect of	10

	environmental testing(refer to IEC 60068-1 for guidance) Quality Standards General awareness of quality standards, quality management systems & documentation, Awareness on ISO 17025, ISO 9001, Calibration and Uncertainty of measurements, Awareness on disposal of Electronic waste. Testing Procedures: Switch Mode Power Supply - (Applicable Standard: IS 14886) Safety Testing(Earth Leakage current Test, Dielectric Test, Short Circuit Protection), Performance Testing (Line Regulation, Load Regulation for a variation of Load Min to Max load and vice versa. Safety Testing of Household Appliances: (Applicable Standard IS 302-1) Definitions and Terminology, Protection against Shock, Power Input and Current, Leakage Current and Electric Strength at Operating Temperature	
4	Assembly and Maintenance of PC: Introduction to Computer - Difference between Hardware & Software, booting concept, Different input and output devices/ cables, connectors, different types of motherboard, controller cards, Ethernet cards, Different types of RAM used in PC's. Installation: BIOS setting, Formatting of Hard Disk, Installation of Windows, Off-line drive installation / online drive installation / Windows file repairing / BIOS password break / Administrative password break / Data recovery. Application Software Installation, Dual Booting Installation. Assembly and dismantling: Assembly and dismantling of PCs front panel connection, servicing of computer, Type of Backup, Taking Backup files and fine tuning the system, running diagnostics tool, running of virus protection program.	9

Course Assessment Method
(CIE: 40 marks, ESE: 60 marks)

Continuous Internal Evaluation Marks (CIE):

Attendance	Assignment/ Microproject	Internal Examination-1 (Written)	Internal Examination- 2 (Written)	Total
5	**15**	**10**	**10**	**40**

End Semester Examination Marks (ESE)

In Part A, all questions need to be answered and in Part B, each student can choose any one full question out of two questions

Part A	Part B	Total
• 2 Questions from each module. • Total of 8 Questions, each carrying 3 marks **(8x3 =24marks)**	• Each question carries 9 marks. • Two questions will be given from each module, out of which 1 question should be answered. • Each question can have a maximum of 3 sub divisions. **(4x9 = 36 marks)**	**60**

Course Outcomes (COs)

At the end of the course students should be able to:

	Course Outcome	Bloom's Knowledge Level (KL)
CO1	Identify various electronic components along with their specifications.	K2
CO2	Design PC Busing modern software tools.	K3
CO3	Explain various testing procedures of electronic products.	K2
CO4	Experiment and debug various software and hardware issues of a PC.	K3

Note*: K1- Remember, K2- Understand, K3- Apply, K4- Analyse, K5- Evaluate, K6- Create*

CO-PO Mapping Table (Mapping of Course Outcomes to Program Outcomes)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3											**3**
CO2	3	2	2	**3**	3							**3**
CO3	3	2	2	**3**	**3**							**3**
CO4	3	3	2	**3**	3							**3**

Note: *1: Slight (Low), 2: Moderate (Medium), 3: Substantial (High), -: No Correlation*

Text Books				
Sl. No	**Title of the Book**	**Name of the Author/s**	**Name of the Publisher**	**Edition and Year**
1	PCB Designer´s Reference.	C. Robertson.	Prentice Hall,	2003
2	Signal Integrity Issues and Printed Circuit Board Design,	D. Brooks,	Prentice Hall	2003
3	Advances in Electronic Testing,	D Gizopoulos,	Springer	2006

Reference Books				
Sl. No	**Title of the Book**	**Name of the Author/s**	**Name of the Publisher**	**Edition and Year**
1	Printed Circuits Handbook,	C. Coombs,	McGraw-Hill Professional,	6 edition, 2007.
2	Electronic Testing Handbook,		McGraw-Hill,	Dec 1993
3	PC Repair and Maintenance, A Practical Guide,	Joel Rosenthal, Kevin Irwin		, 2003
4	Simple Guide to Computer Maintenance &Troubleshooting,	AdaneNegaTarekegn, AlemuKumilachewTegegne,		2015

Video Links (NPTEL, SWAYAM…)	
Module No.	**Link ID**
1	https://elearn.nptel.ac.in/shop/iit-workshops/completed/electronic-hardware-design-where-to-start/
2	https://onlinecourses.nptel.ac.in/noc22_ee25/preview
3	https://nptel.ac.in/courses/117103148