

Electronic Product Design

B.E. Sem. VIII [ETRX]

(Elective – III)

EVALUATION SYSTEM

	Time	Marks
Theory Exam	3 Hrs.	100
Practical & Oral	–	–
Oral Exam	–	25
Term Work	–	25

SYLLABUS

- **Objective :** To cover product design & development stages and total coverage of product assessment by introducing the basics of reliability and quality of electronic product and then discusses the various modes and causes of failure.

1. Product Design and Development

Introduction, An overview of product development & product assessment, Pilot production batch, Concept of availability, Screening test , Environmental effects on reliability, Redundancy, Failsafe system, Ergonomic & aesthetic design considerations, Packaging & storage

Estimating power supply requirement (Power supply sizing), Power supply protection devices. Noise consideration of a typical system, Noise in electronic circuit, Measurement of noise. Grounding, Shielding and Guarding, Enclosure sizing & supply requirements & materials for enclosure and tests carried out on enclosure, Thermal management and its types.

2. PCB Designing

Layout, PCB sizes, Layout – General rules & parameters. Recommendations for decoupling & bypassing. Design rules for digital circuit PCB & analog circuit PCBs, Noise generation, Supply & ground conductors, Multilayer boards, Component assembly & testing of assembled PCB, Bare board testing. Component assembly techniques

Automation & computers in PCB design, Computer aided design , Design automation. Soldering techniques, Solderability testing. Study of packages for discrete devices & ICs, IC reliability issues. Parasitic elements

Calculations of parasitic elements in high speed PCB. High speed PCB design and points to be considered for designing the high speed PCBs

Mounting in presence of vibration. SMD assemblies, Board layout check list. Tests for multilayer PCB Cable

3. Hardware design and testing methods

Logic analyzer, its architecture & operation and Use of logic analyzer

Spectrum analyzer

Network analyzer, Oscilloscope , DSO trigger modes, Examples using MSO, Signal integrity issues.

Use & limitations of different types of analysis, Monte Carlo analysis

4. Software design and testing methods

Introduction, Phases of software design & Goals of software design, Methods of program flow representation, Structured program construct, Testing & debugging of program, Software design, Finite state machine

Decision to use assembly & / or high level language for software development. Assembler, Compilers, Compilers design, Simulators, CPU Simulators, Emulators.

5. Product testing

Environmental testing for product. Environmental test chambers & rooms. Tests carried out on the enclosures

Electromagnetic compatibility (EMC) with respect to compliance. Electromagnetic compatibility (EMC) testing . Conducted emission test (time domain methods). Radiated emission test

Basics on standard used. Instrument specifications

6. Documentation

PCB documentation- Specifying laminate grade, drilling details, PCB finish- Tin, solder, gold, silver plating, hot air leveling, and bare board testing. Understanding advantages and limitations of each

product documentation- bill of materials, Production test specification- a case study for real circuit, Interconnection diagram- A case study., Front and rear panel diagrams for selected product.

Manuals- Instruction or operating manual, Service and Maintenance manual, Fault finding tree

Software documentation practices- For C programmes, Assembly programmes with particular focus on development of programme by several engineers simultaneously.

Reference Books

1. Electronic Product Design (*R.G.Kaduskar, V.B.Baru*) Wiley India
2. Printed Circuit Board design and technology (*Walter C Bosshart*) Tata McGraw –Hill-CEDT
3. Handbook of Printed Circuit manufacturing (*Raymond H. Clark*) Van Nostrand Reinhold Company, New York.
4. Electronic testing and fault diagnosis (*G.C. Loveday*) Ah wheeler Publication, India
5. Electronics Engineers reference book 5th Edition (*F.F. Mazda*) Butterworths Publication Co., UK
6. Principles of Reliable Soldering Techniques (*Sengupta R.*) New Age International

