

Electrical Power Engineering



By



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Syllabus

1

- Introduction.

2

- Fundamentals of electrical power engineering.

3

- A.C and D.C power transmission.

4

- A.C and D.C power distribution.

5

- Interconnections of power systems.

6

- Transmission and distribution system.

7

- Substations and circuit breakers.

Cont.

8

- Overhead lines.

9

- Cable Systems.

10

- Transformers.

11

- Connection of "green-energy" generation to power systems.

12

- Protection of individuals, equipment and power system installations.

13

- Protective devices and insulation co-ordination.

14

- Generation of high voltage systems.

Cont.

15

- Natural Causes for over voltages.

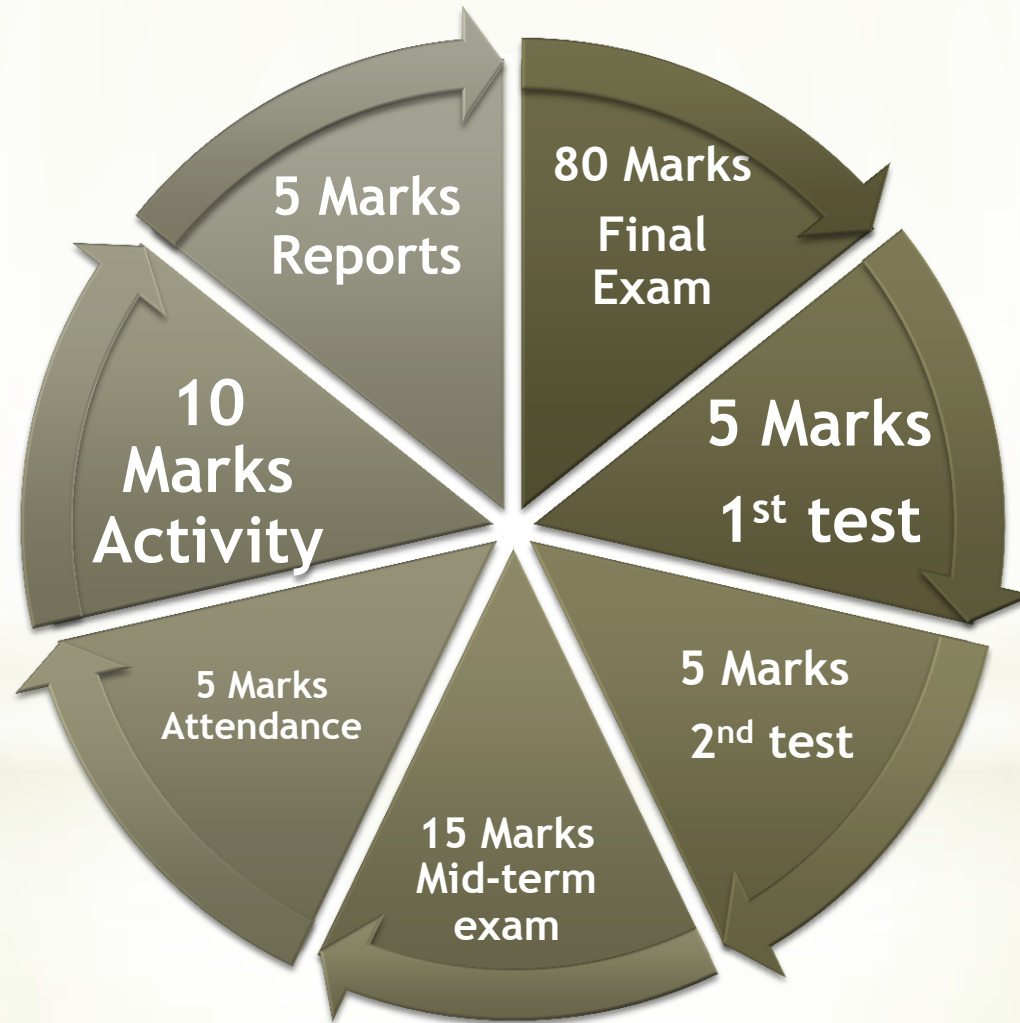
16

- Overvoltages and insulation coordination.

17

- Earthing system.

Marks



Engineering Definition

What is Engineering?

Engineering is the application of math and science by which properties of matter and the sources of energy in nature are made useful.

Engineering Design Definition

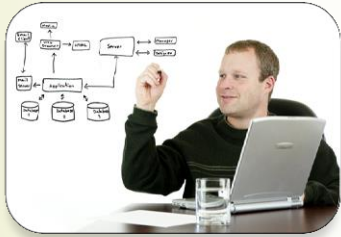
What is Design?

So, Engineering design is.....

Applications & Examples

Why Engineering Design?

Betterment of society through



Design



Manufacturing



Research & Development



Management



Continual Improvement



Logistics

Engineer Definition

Who is Engineer?

Creative

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graph TD; A[Creative] --> B[Iterative]; B --> C[Integrated]; C --> D["Innovation is the key Oven Story!!!!!!!!!!"]
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Iterative

Integrated

**Innovation is the key
Oven Story!!!!!!!!!!**

So, Engineer is.....

Engineering Process Cycle

The engineering process cycle is achieved by following 10 stages.

- 1-Identify the problem/product innovation
- 2-Define the working criteria/goals
- 3-Research and gather data
- 4-Brainstorm / generate creative ideas
- 5-Analyze potential solutions

Engineering Process Cycle

6-Develop and test models.

7-Make the decision.

8-Communication and specify.

9-Implement and commercialize.

10-Perform post-implementation review and assessment.

Stage-1: Identifying the problem/product innovation

- *Engineers are problem solver: and the problems they solve are often identified as the specific needs and problems of customers
- *Example:
 - *increased gas mileage
 - *Safety devices for kid, monitors, etc..

Stage-2: Define the working criteria and goals

Key questions

- 1- How much will it cost?
- 2- Will it be difficult to produce?
- 3- What will be the size, weight, strength?
- 4- What will it look like?
- 5- Will it be easy to use?
- 6- Are there legal concerns?
- 7- Will it be reliable?

Stage-2: Define the working criteria and goals

- 8- Will it meet the standard?
- 9- Is this what the customer truly wanted?
- 10- Will our customers want to purchase it?
- 11- Will customers want to purchase this version instead of a competitor's product?
- 12- Is it feasible for our customer to buy it?

Stage-3: Research and gather data

- 1- What information has been published about the problem?
- 2- Is there a solution to the problem that already may be available?
- 3- If the answer to the above is yes, who is producing it?
- 4- What are the advantages of their solution?
- 5- What are the disadvantages to their solution?

Stage-3: Research and gather data

6- What is the cost?

7- Is cost significant issue?

8- What is the ratio of time compared to overall cost?

9- Are there legal issues to consider?

10- Are there environmental concerns which must be considered?

Stage-3: Research and gather data

Information resources can be

- 1- Libraries.
- 2- Professional Society.
- 3- Journal, publications and newsletter.
- 4- Newspapers and magazines.
- 5- Market assessment surveys.

Stage-3: Research and gather data

- 6- Government publications
- 7- Patent searches and listings
- 8- Technical salespersons and their references catalogs
- 9- Professional experts including researchers, professors and other scientists
- 10- The competition's product (how they designed it? Disassemble their product and study it

Stage-4: Brainstorm/generate creative ideas

- * *Creative problem solving* is a major method of generating multiple ideas to a problem by a technique called *brainstorming*.
- * No preliminary judgments are made about any member's idea, and no negative comments are allowed.
- * The goal here is to list as many ideas as possible.

Stage-5: Analyze potential solutions

- 1- Computer analysis technique.
- 2- Analysis of compatibility.
- 3- Consistency of testing.
- 4- Estimation.
- 5- Economic analysis.
- 6- Common sense.
- 7- Analysis using basic engineering principles and laws.



Stage-6: Develop and test models

- 1- Mathematical models.
- 2- Computer models.
- 3- Scale model.
- 4- Diagrams or graphs.
- 5- Durability.
- 6- Ease assembly.



Stage-6: Develop and test models

7- Reliability.

8- Strength.

9- Environmental.

10- Quality consistency.

11- Safety.

Stage-7: Decision making

<u>*Cost</u>	<u>Point Available</u>	<u>#1</u>	<u>#2</u>
1- Production Difficulty	20	18	13
2- Size, weight, strength	15	10	12
3- Appearance	10	9	7
4- Convenient to use	5	3	4
5- Safety	10	8	8
6- Legal issues	5	4	3
7- Reliability/Durability	15	13	11
8- Recyclability	10	6	4
9- Customer Appeal	10	9	9



Stage-8: Communication and specify

Communicate data and design for each specific solution and get input.

Stage-9: Implement and commercialize

- 1- Implement the best solution.
- 2- Apply methods of business for profit.

Stage-10: Perform post-implementation review and assessment

*Check if the final product is giving you what you actually wanted from feasibility and if the consumer like it, etc.

Thank You
For Your Attention



*Mohamed Ahmed
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