

Subject - M/C Design (308 ME)
Class test - I

Q3. Define factor of safety & Explain various factors considered for selection of factor of safety? Define working stress & fatigue limit? (5)

Answer:-

Factor of Safety:- Factor of safety is the ratio of maximum stress to working stress.

$$F.O.S. = \frac{\text{Max. stress}}{\text{Working or design stress}}$$

Selection of factor of safety:-

Before selecting a proper factor of safety, a design engineer should consider the following points.

- 1) The reliability of properties of material & change of these properties during service.
- 2) The reliability of test results & accuracy of application of these results to actual machine.
- 3) The reliability of applied load.
- 4) The certainty as to exact mode of failure.
- 5) The extent of simplifying assumptions.
- 6) The extent of localised stresses.
- 7) The extent of initial stresses set up during manufacture.
- 8) The extent of life & property if failure occurs.

Working stress:-

When designing machine parts, it is desirable to keep the stress lower than the maximum or ultimate stress at which failure of material takes place. This stress is known as the working stress.

Fatigue limit:-

Fatigue limit is defined as minimum value of completely reversed bending stress which a polished standard specimen can withstand without failure, for infinite no. of cycles (10^7 cycles).

Q.1. Explain general procedure of Machine design? (5)

Answer:- General Design procedure for Machine helps an engineer to design Mechanical equipment that perform better, durable & are easy to manufacture. M/C design procedure:-

• Understand the Requirements:-

The first step of engineering a high performance machine is recognising the need i.e. understanding the need purpose of design. preparing a complete statement of the problem that includes details about the aim or purpose for which the mechanical design project is proposed.

• Analyse & evaluate the design Mechanism:-

Selection of best mechanism for design that will give this machine the desired motion.

• Analysis of Forces:-

Find the forces acting on each member of machine & energy transmitted by each member.

• Material selection:-

Selected material should be best suited for each member of machine.

• Design of elements:-

To design any M/C part for form & size, it is necessary to know the forces which the part must sustain. Suddenly applied load must be considered.

• Modification:-

Modification of size of member, that do not affect the performance of product but facilitates easy manufacturing the machine & its components is advisable.

• Detailed drawing:-

Drawing of all the component of M/C should be complete with all specification for manufacturing processes.

• production:-

The components as per drawing is manufactured in the workshop.

Flow chart for general procedure in M/C design:-

