



College of Engineering & Technology

Department: Mechanical Engineering Marks: 15
 Lecturer: Dr. Rola Afify Time: 3.00 - 4.00
 Course Code: ME356 Date: 4/11/2015

Name: **Model Answer**

R.N.:

Answer the following questions:

Question one (6 marks)

A) Define:

i) Strength:

1. Strength. It is the ability of a material to resist the externally applied forces without breaking or yielding. The internal resistance offered by a part to an externally applied force is called *stress.

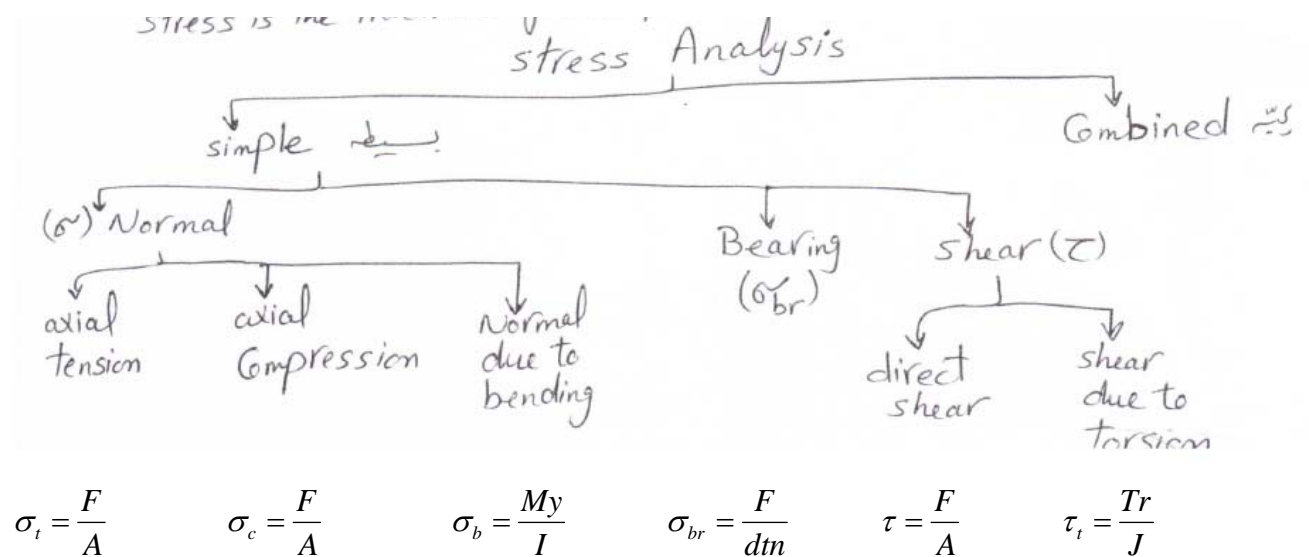
ii) Ductility:

5. Ductility. It is the property of a material enabling it to be drawn into wire with the application of a tensile force. A ductile material must be both strong and plastic. The ductility is usually

iii) Creep:

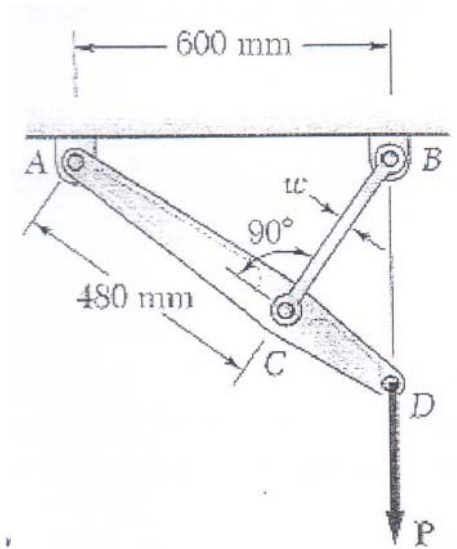
11. Creep. When a part is subjected to a constant stress at high temperature for a long period of time, it will undergo a slow and permanent deformation called creep. This property is considered in designing internal combustion engines, boilers and turbines.

B) What are the types of stresses? mention the equation of each type.



Question two (9 marks)

Link BC, shown in Figure, is 6 mm thick and is made of steel with a 450 MPa ultimate strength in tension. What should be the width w if this structure is designed to support a 20 kN load P with a factor of safety of 3?



Q2

$$A_{BC} = 6 \times w$$

$$S_u = 450 \text{ MPa}$$

$$w = ?? \quad f.s. = 3$$

Soln

$$\sum M_A = 0 \quad (+\uparrow)$$

$$T_{CB} \times 480 - 20 \times 600 = 0$$

$$T_{CB} = 25 \text{ kN}$$

$$\sigma_t = \frac{F}{A} = \frac{S_u}{f.s.}$$

$$\frac{25 \times 10^3}{6w} = \frac{450}{3}$$

$$\therefore w = \frac{25 \times 10^3 \times 3}{6 \times 450} = 27.778 \text{ mm}$$

