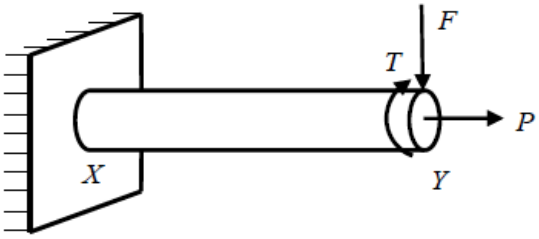
ASSIGNMENT – MACHINE DESIGN

DESIGN FOR STATIC AND DYNAMIC LOADING (Fatigue Strength, S-N Curve):

(1)

A machine element XY, fixed at end X, is subjected to an axial load P, transverse load F, and a twisting moment T at its free end Y. The most critical point from the strength point of view is



(A) a point on the circumference at location Y
(B) a point at the center at location Y
(C) a point on the circumference at location X
(D) a point at the center at location X

[ME GATE 2016]

(2)

The shear strength of a sheet metal is 300 MPa. The blanking force required to produce a blank of 100 mm diameter from a 1.5 mm thick sheet is close to

(A) 45 kN (B) 70 kN (C) 141 kN (D) 3500 kN

[ME GATE 2011]

(3)

The force requirement in a blanking operation of low carbon steel sheet is 5.0 kN. The thickness of the sheet is 't' and diameter of the blanked part is 'd'. For the same work material, if the diameter of the blanked part is increased to 1.5 d and thickness is reduced to 0.4 t, the new blanking force in kN is

(A) 3.0 (B) 4.5 (C) 5.0 (D) 8.0

[ME GATE 2007]

(4)

A 60 mm long and 6 mm thick fillet weld carries a steady load of 15 kN along the weld. The shear strength of the weld material is equal to 200 MPa. The factor of safety is

(A) 2.4

(B) 3.4

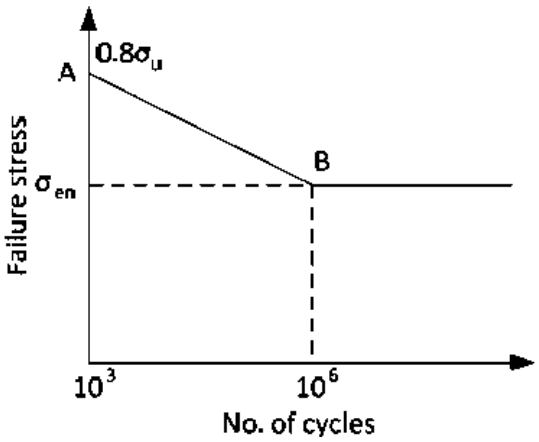
(C) 4.8

(D) 6.8

[ME GATE 2006]

(5)

A machine element has an ultimate strength (σ_u) of 600 N/mm^2, and endurance limit (σ_{en}) of 250 N/mm^2. The fatigue curve for the element on a **log-log** plot is shown below. If the element is to be designed for a finite life of 10000 cycles, the maximum amplitude of a completely reversed operating stress is _____ N/mm^2.



[ME GATE 2017]

(6)

A machine component made of a ductile material is subjected to a variable loading with $\sigma_{min} = -50$ MPa and $\sigma_{max} = 50$ MPa. If the corrected endurance limit and the yield strength for the material are $\sigma_e' = 100$ MPa and $\sigma_y = 300$ MPa, respectively, the factor of safety is_____

[ME GATE 2017]