GOVT.POLYTECHNIC,BHADRAK

SUB: - Design of Machine Elements

BRANCH- Mechanical Engg../ 5th Sem. (Time-1hr)

Internal Assessment Test - 2022 (Winter)

Full Mark=20

1.

Answer all the questions. 5*2=10

(a)What do you mean by Machine Design?

(b)State the mechanical properties of Ferrous Metals.

(c)Draw the stress-strain curve for Mild Steel and identify its each point.

(d)Define Fracture give a suitable example.

(e)Define Welding?

h. What is personal protective equip...

i. Define entrepreneurship.

j. Write the difference between patents and copyrights ? 2

INTERNAL ASSESMENT

GOVT. POLYTECHNIC, BHADRAK

Session - 2022 - 2023

Name : SHUBHRANSU SEKHAR SAHOO

Branch: MECHANICAL SEMESTER 5th

SUBJECT : DESIGN OF MACHINE ELEMENTS

REGD. NO.: F20157004054

Signature of Invigilator

Full Mark : 20

Mark Obtain : 19

Signature of Examinar :

Signature of Student :

1

(a)

→ The machine design is defined as the process of selection of the material, size, shape, and arrangement of mechanical element for the machine whose perform the given task without the failuare.

→ In other word the machine design and mechanical design is developing new ideas to create the machine and the ideas given by planing and the drawing. 2

(b)

→ When the material is iron contain is available then it is called Ferrous metals.

Eg mild steel

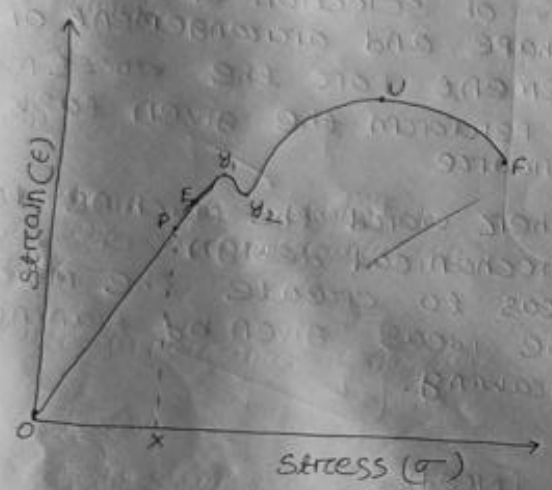
→ The mechanical properties are.

(I) Ductility
(II) Malliability
(III) Low resistance to corrosion
(IV) Brittle ness
(V) Elasticity
(VI) Thaughness
(VII) Stiffness
(VIII) Hardness

2

(1)

(c) Stress - Strain curve for mild steel



P = Limit of proportionality

E = Elastic limit

~~Yielding point~~

y_1 = upper yield point

y_2 = lower yield point

U = Ultiment stress

F = Failuare point (Breaking point)

(1) (d)

→ The fracture is define as when the material is in external load and it is show the less elastic deformation before fracture is called fracture.

→ The example of fracture

- → Fracture by ductility
- → Fracture by general yielding
- → Fracture by brittle.

(1) (e)

→ ~~Welding is defined as the permanent~~ the joint by so

→ welding is an effective method of making permanent joints between two or more metal parts

→ cast iron, steel and alloys, brass and copper are the metals that may be welded easily.

→ welding is a permanent joints which is not separated. ~~without~~ without fracture

→ Example of welding

- → Arc welding
- → Gas welding
- → Fusion welding
- → Resistance welding

(5)

$d = 2.5\,m = 2.5\times10^3\,mm$

$t = 12\,mm$

$\sigma_t = 85\,N/mm^2$

$\eta = 0.85$

Solution

The length of the welding is equal to the circumferance the gas tank.

The circumferance of gas tank

$\Rightarrow L = \pi D$

$\Rightarrow L = \pi \times 2.5\times10^3$

$\Rightarrow L = 7853.98\,mm$

The pressure on the welding

$P = \sigma_t \times l \times t \times \eta$

$P = 85 \times 7853.98 \times 12 \times 0.85$

$P = 6809400.66\,N$

The Total pressure on the gas tank

$\Rightarrow P_i = \dfrac{\text{Pressure on welding}}{\text{internal area}}$

$\Rightarrow \dfrac{6809400.66}{\frac{\pi}{4}\times(2.5\times10^3)^2} = 1.3871\,N/mm^2$

∴ The allowable internal pressure is $1.3871\,N/mm^2$

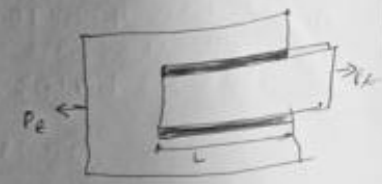
(6) Data given

$w = 100mm$

$h = 10mm$

$P_t = 50kN = 50\times10^3N$

$\tau = 94\,N/mm^2$



Solution

The length of weld is required for double parallel fillet welds

$\Rightarrow \sigma_{P_t} = 1.414 \times h \times l \times \tau$

$\Rightarrow 50\times10^3 = 1.414\times10\times l\times94$

$\Rightarrow l = \dfrac{50\times10^3}{1.414\times10\times94}$

$\Rightarrow l = 37.61\,mm$

⇒ Adding 15mm in the length of the welding to start and stoping the welding run

⇒ Total length = 37.61 + 15 = 52.61 mm

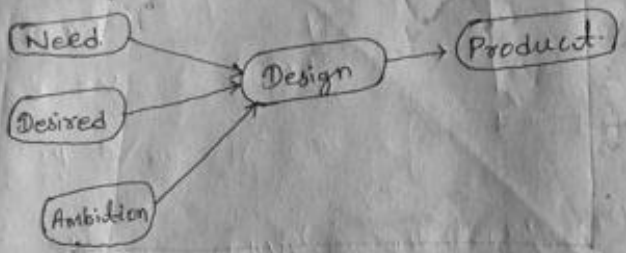
∴ The length required for welds is 52.61mm

DME 5th sem Answer copy

Q-1-a.

→ The machine design is defined as the process of selection of the material, size, shape, and arrangement of mechanical element for the machine whose perform the given task without the failware.

→ In other word the machine design and mechanical design is developing new ideas to create the machine and the ideas given by planning and the drawing.



Q-1-b.

→ When the material is iron contain is available then it is called Ferrous metals.

e.g. :- Midd steel

→ The mechanical properties are.

(i) Ductility
(ii) Maleability
(iii) Low resistance to corrosion
(iv) Brittleness
(v) Elasticity
(vi) Thoughness.
(vii) Stiffness
(viii) Hardness.

Q-1-c

Stress - strain curve for midd steel

P = Limit of properdionality

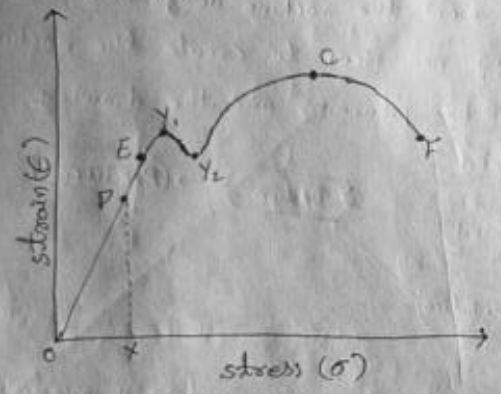
E = Elastic limit.

Y_1 = Upper yeild point

Y_2 = Lower yeild point

U = Ultimate stresses

F = Faiduer point (Breaking point)



Q-1-d

→ The fracture is define as when the material is in external load and it is show the less elastic deformation before fracture is called fracture

→ The example of fracture

- Fracture by ductility
- Fracture by generall yeilding
- Fracture by brittle.

Q-1-e :-

→ Welding is an effective method of making permanent joints between two or more metal parts.

→ cast iron, steel and alloys, brass and copper are the metals that may be welded easily.

$$\Rightarrow P_x = \frac{6809400.66}{\frac{\pi}{4} \times (2.5 \times 10^3)^2}$$

$$= 1.3871 \ N/mm^2$$

∴ The allowable internal pressure $= 1.3871 \ N/mm^2$

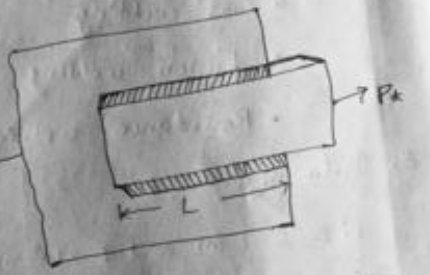
Data given :-

$w = 1000$ mm

$h = 10$ mm

$P_x = 50 \ kN = 50 \times 10^3 \ N$

$\tau = 94 \ N/mm^2$



Solution :

The length of weld is required for double parallel fillet welds,

$\Rightarrow P_x = 1.414 \times h \times d \times \tau$

$\Rightarrow 50 \times 10^3 = 1.414 \times 10 \times d \times 94$

$\Rightarrow d = \frac{50 \times 10^3}{1.414 \times 10 \times 94}$

$\Rightarrow d = 37.61$ mm.

→ Adding 15 mm in the length of the welding to start & stoping the welding run.

$\Rightarrow$ Total length $= 37.61 + 15$

$= 52.61$ mm

∴ The length required for welds is 52.61 mm.

→ Welding is a permanent joints which is not separated without fracture.

→ Example of welding:

- Arc welding
- Gas welding
- Fusion welding
- Resistance welding

3. Data given :-

$d = 2.5\ m = 2.5 \times 10^3\ mm$

$t = 12\ mm$

$\sigma_t = 85\ N/mm^2$

$\eta = 0.85$

Solution :-

The length of the welding is equal to the circumferance the gas tank

The circumferance of gas tank

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The pressure on the welding,

$P = \sigma_t \times L \times t \times \eta$

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The total pressure on the Gas tank.

$\Rightarrow P_t = \frac{\text{Pressure on welding}}{\text{Internal area}}$