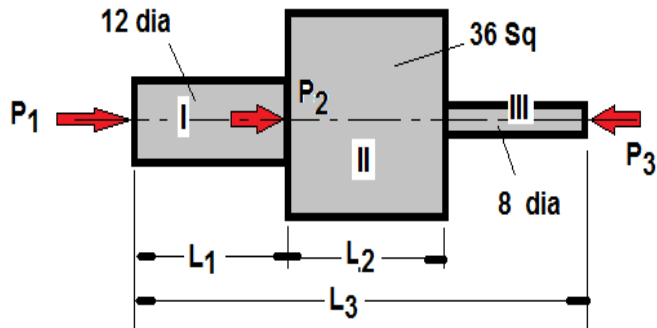


Mechanics of Materials and Their Testings (Destructive and Non-Destructive Tests)

Your Research Must include:

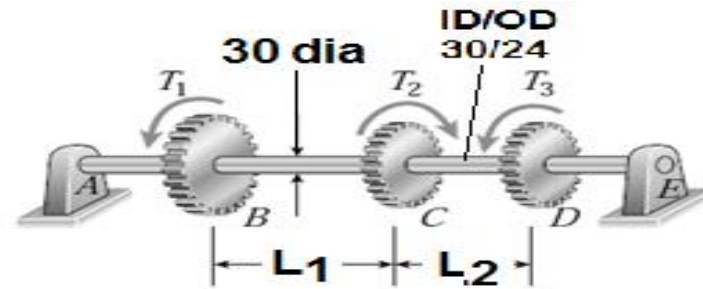
1. Make a Short Survey on the Different studied NDT techniques (Part I)
2. A Brief Concise Survey on:
 - a) Normal Stresses in Bars\Rods and Beams and Some Engineering Applications (As Part II), and
 - b) Shear Stresses in mechanical Joints and Rotating Shafts together with Some Engineering Applications (As Part III),.
3. Numerical Case Studies (Figures a and b) USING the DATA given Table (AA).
4. Numerical Case Studies for Beams of (Fig c) and Column Buckling of (Fig d), using the DATA given Table (AA).
5. A Combined Stresses case Study of (Figure e) with the DATA given Table (AA).
6. General Conclusions for all the above Case Studies.

Best Wishes



Investigate the Normal Stresses, Strains, and Elongations in EACH Rod portions, With Lateral Deformation in EACH

Fig (a)



Study Torsion Stresses and Strains, together with the Twist Angle for EACH shaft portion, with the Overall Twist angle BETWEEN A and E

Fig (b)

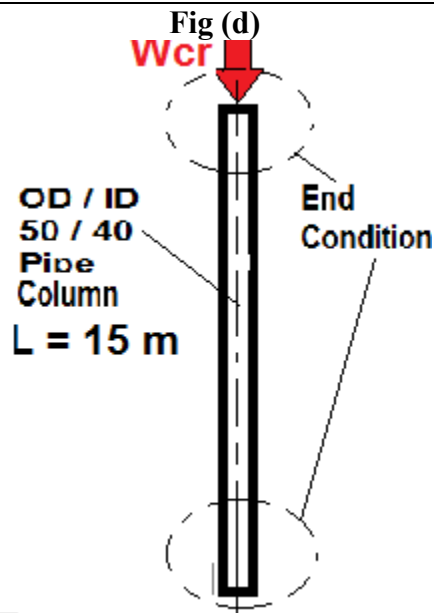
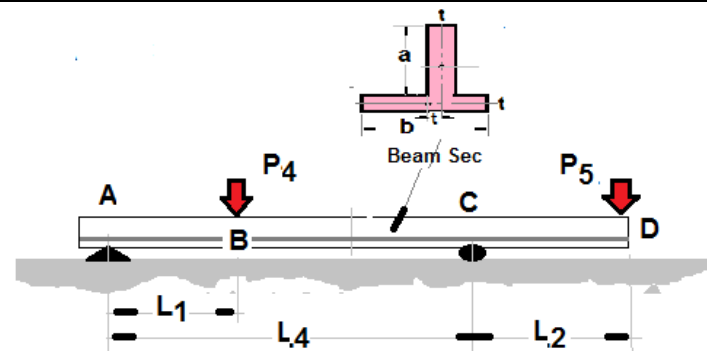


Fig (d) Expected Critical Weight(W_{cr})



Location of Centroid, SFD, BMD, and Max Bending Stresses and their Distributions

Fig (c)

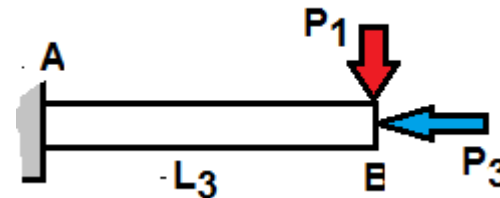


Fig (e) Define BOTH of the Deflection at E and the Combined Stresses at A

Table (AA) : Numerical GIVEN DATA

For **YOUR** specific Research (**Case Studies**) Select **ONE** ROW of the following data,

In accordance to YOUR Arabic Name FIRST letter (الحرف الاول من اسمك باللغة العربية)

1 st Letter in your Arabic Name	Research Number	L1 (mm)	L2 (mm)	L3 (mm)	L4 (mm)	P1 (KN)	P2 (KN)	P3 (KN)	P4 (KN)	P5 (KN)	T1 (N-m) Output	T2 (N-m) Input Power	T3 (N-m) Output Power	a,b,t (mm)	End Conditions
د - ج - ح - خ - هـ	1	80	120	250	300	5	24	?	10	20	800	1200	?	100-80-10	F-F*
ع - غ - ف - ق - ث	2	60	80	190	250	10	?	18	30	16	500	?	300	80-60-8	F-X*
ك - م - ص - ض - ط	3	50	40	150	250	?	10	5	24	16	250	700	?	120-80-10	X-X*
ن - ت - أ - ل - ب	4	20	30	100	150	8	?	12	22	18	?	950	400	80-60-8	X-F*
ي - س - ش - ظ - ز	5	70	100	220	180	18	18	?	20	10	120	680	?	100-80-10	F-X*
و - ر - ذ	6	40	50	140	260	3	?	18	18	10	?	800	380	100-60-10	X-X*

* **F** =Free End **X** = Fixed End

All members are from Mild Steel Material (**AISI 1018**) :

[**E** = 205 GPa - **G** = 80 GPa - σ_u = 440 MPa - σ_y = 360 MPa - **HB** =126 - % **elong** = 15 - **v** =0.29]