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PESHAWAR

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B.TECH CIVIL

BATCH 2015

TEACHER ENGINEER SHEILA
NAWAZ

PAPER MID TERM

SUBJECT THEORY OF
STRUCTURE

DATE 21/08/2020

TIME 9³⁰'CLOCK

Question No 1

what is determinacy?

- * or state of being ^{the quality} determinate
- * The state of being definitely and unequivocally characterized : exactness:
- * The state of being determined or necessitated.

⇒ Determinacy is a subfield of set theory a branch of mathematics that examines the condition under which one or the other player of a game has winning strategy and the consequences of the existence of such strategies.

Type of determinacy

1- External Determinacy:-

The ability to calculate all of the external reaction component force using static equilibrium.

* Internal Determinacy.

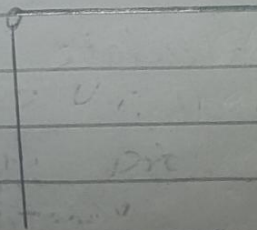
The ability to calculate all of the external reaction component force and internal forces using only static equilibrium.

Example including forces.

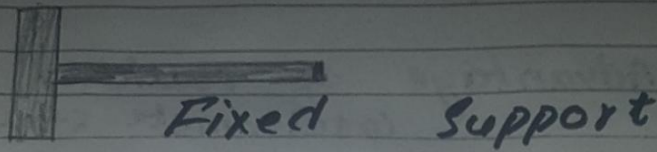
Beam pin connected and frame the classified as determinate depending upon the internal force in the member of external support reaction. Trusses also classified as determinate depending external support reactions.



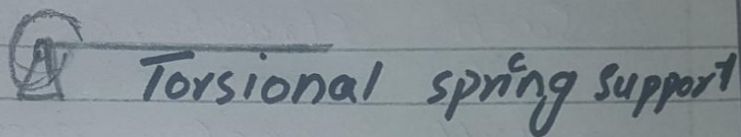
Pin Support



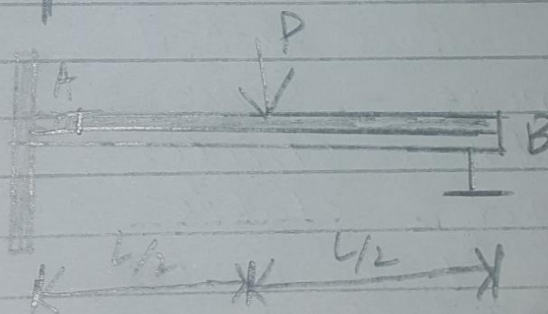
Pin Connected Joint



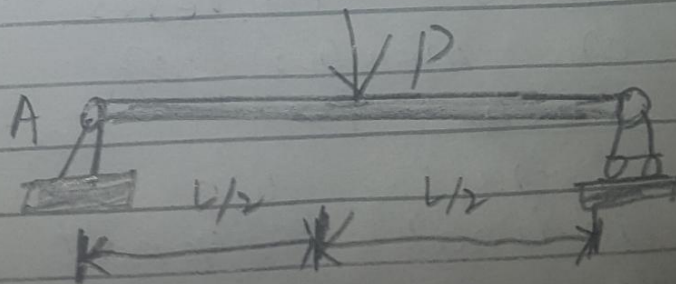
Fixed - connected joint



Torsional spring joint



actual beam



idealized beam

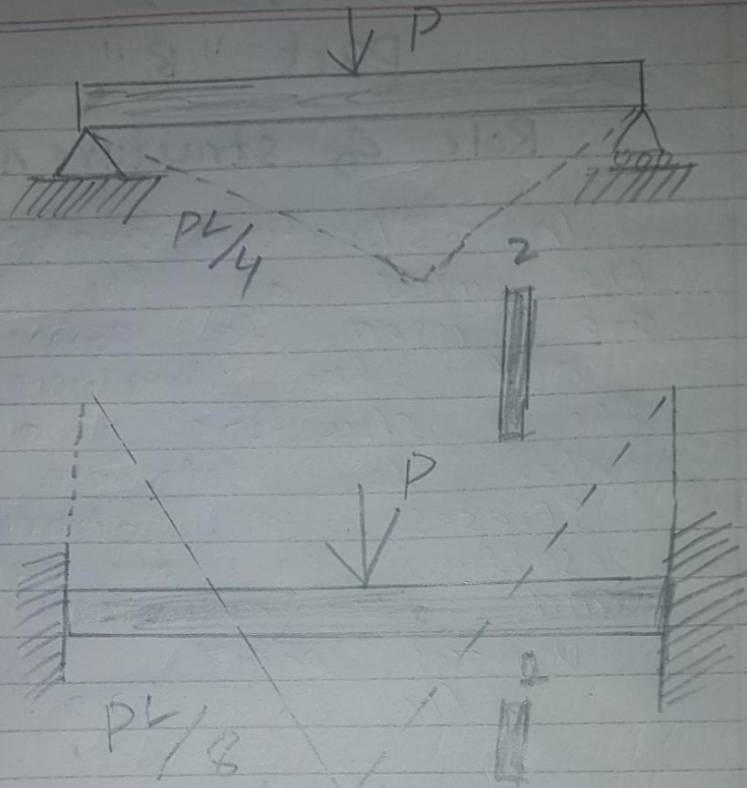
Question No 2

part "A"

Advantage of statically indeterminate structure!

Statically indeterminate structures have capacity to redistribute the load if a part (or number of support) of such structure fail. The entire structure will not necessarily collapse and the load will be redistributed to the adjacent portion of the structure.

When we provide more support and/or member to structure required for static stability it makes structure indeterminate. By providing the excess member it ensures stability and also increases stiffness of member of structure. Such in case of truss we providing additional diagonal member to stability.



* Deflection in case of
 indeterminate structure is
 less than that of compared
 to determinate due
 to greater stiffness.

Question No 2

Part "B"

Role of Structure Analysis

In structure analysis the value of the load are used to carry out the analysis of the structure in order to determine the stresses or stress resultant in the member and the deflection of various point of the structure.

Planning phase

↓
preliminary structure design

↓
estimation of load

↓
structural analysis

↓
Are the safety and

serviceability requirement

satisfied

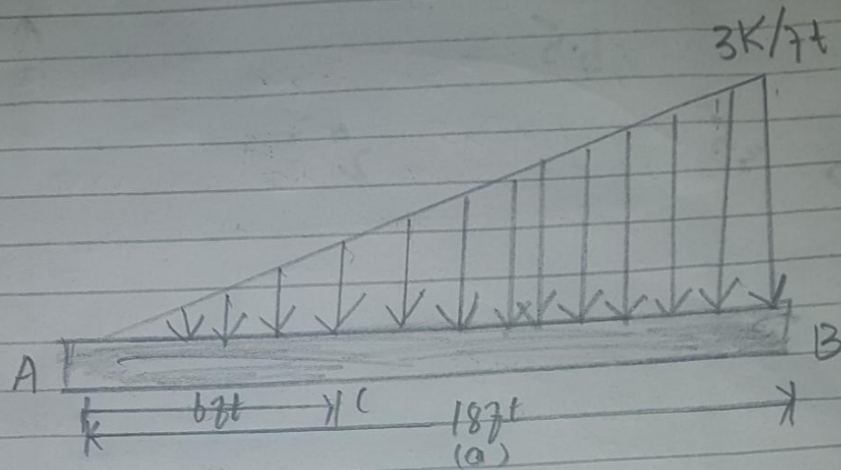
↓
Yes

↓

Construction phase.

→ No → Revised structural design

Question No 3



$$\sum F = 0$$

$$3 \times 6 + 18(1.5) = F_A$$

$$F_A = 3.5 \text{ Kip}$$

$$F_A + F_B = 4.5$$

$$\sum M = 0$$

$$(3 \times 18 \times 4.05) + M_A(6 \times 3.5) = 0$$

$$M_A = 0$$

$$M_C = M_A + (4.5 \times 18) \times 3$$

$$M_C = 18.5$$

$$M_A + M_C + M_B = 0$$

