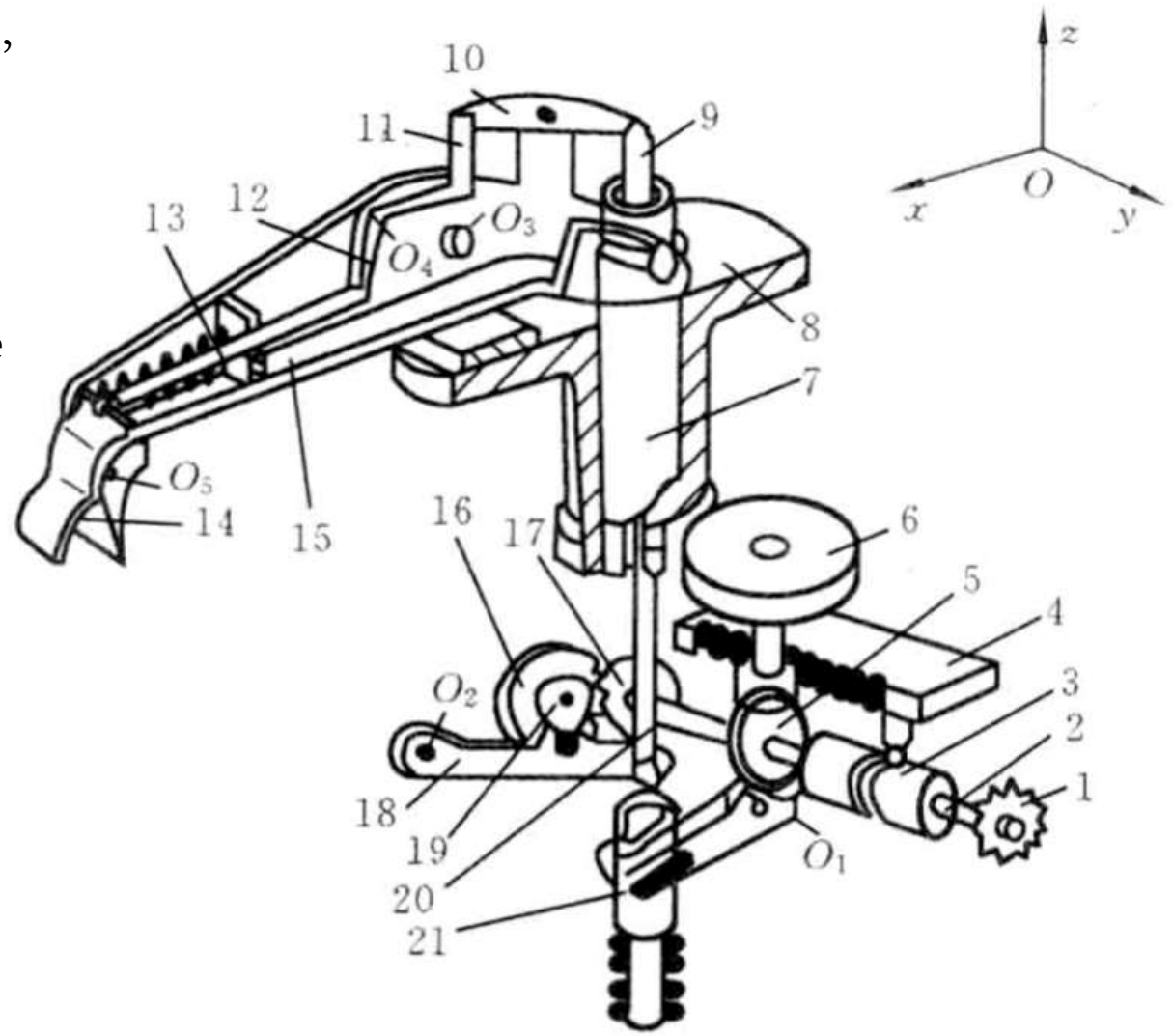
HW01
第01章 机械设计总论
作业

南方科技大学

HW 01.1

分析所示的机械手的组成特点，试指出图示机械手中哪些是零件、哪些是构件、哪些是机构

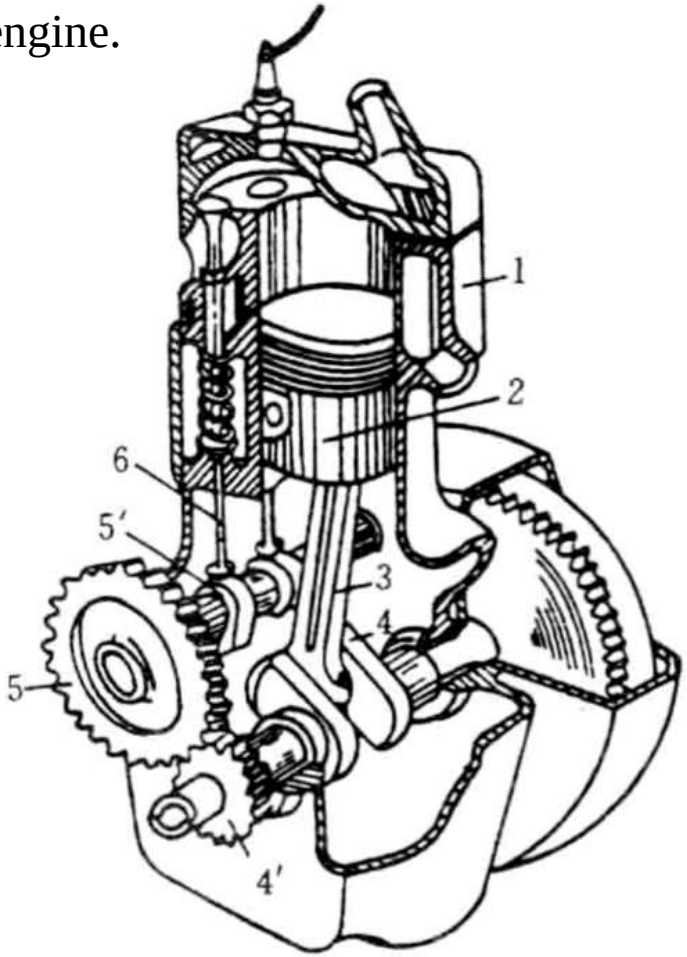
Analyze the composition characteristics of the shown manipulator, and try to point out the parts, components, and mechanisms shown in the figure.

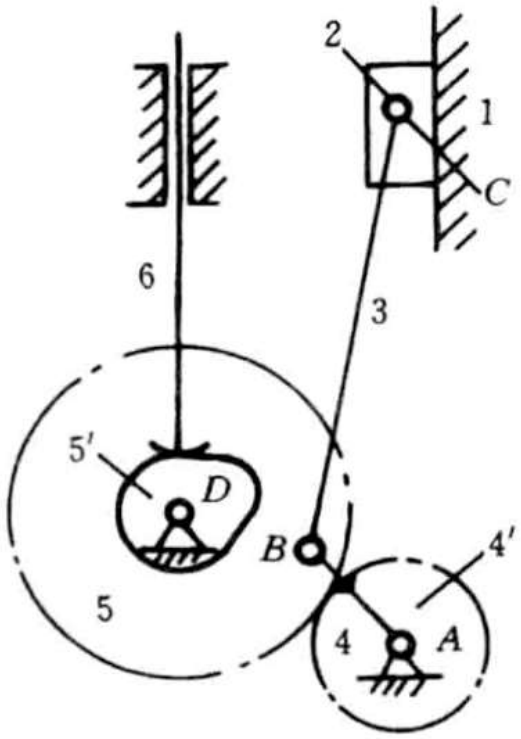


HW 01.2

试分析单缸四冲程内燃机由哪些机构组成

Please analyze which mechanisms make up a single-cylinder four-stroke internal combustion engine.

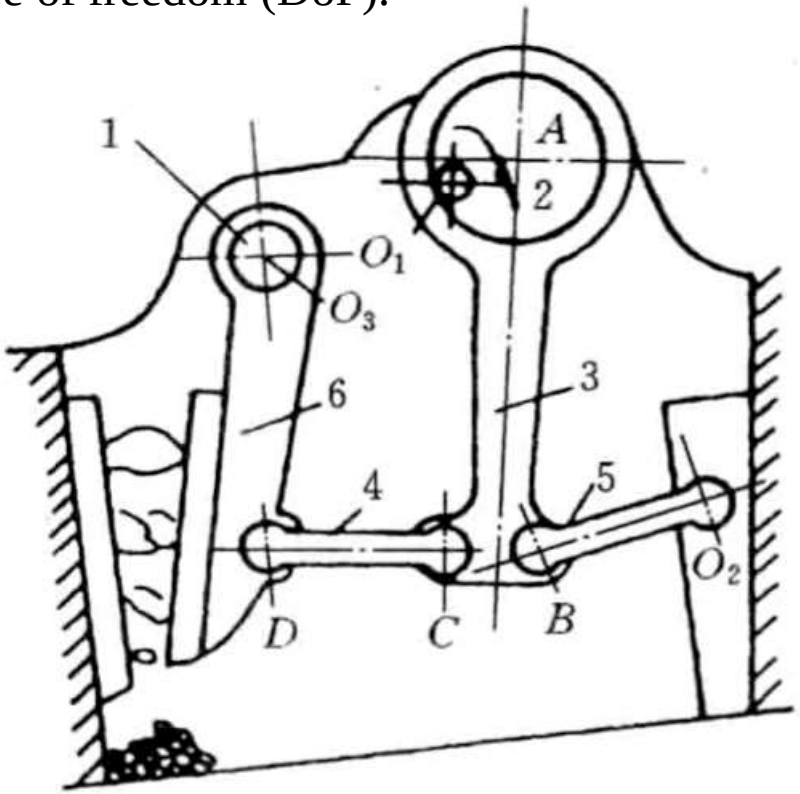




HW 01.3

- 绘制所示机构的运动简图，并计算其自由度。

  Please draw the kinematic diagrams of the shown mechanisms, and calculate their degree of freedom (DoF).



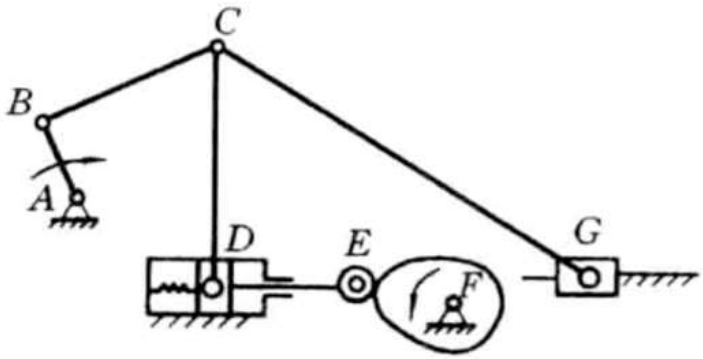
(a)

(b)

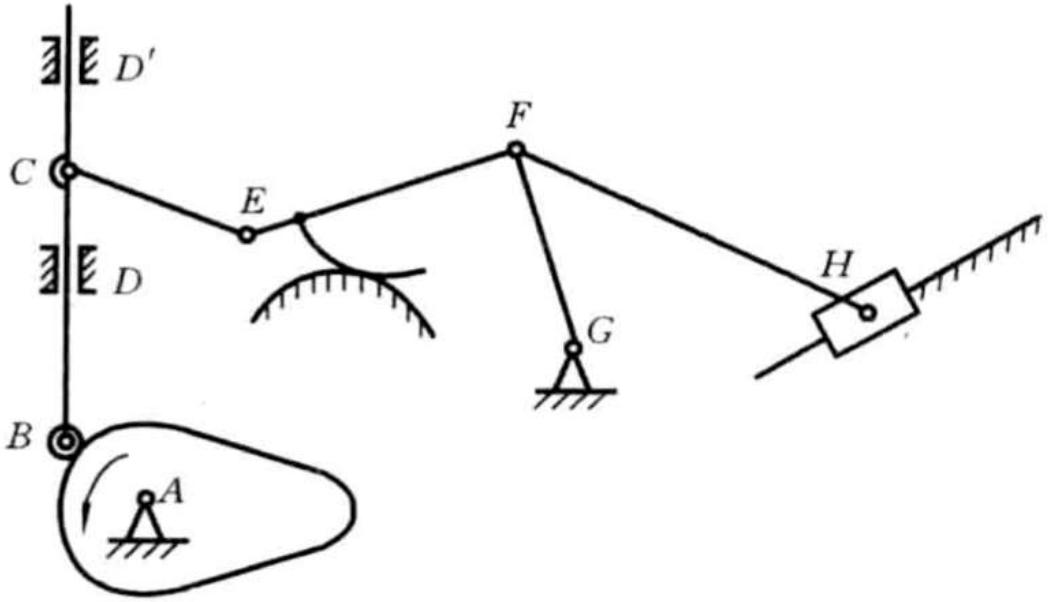
HW 01.4

- 试计算图示机构的自由度。若有局部自由度、复合较链和虚约束，需在图上指出。

Please calculate the DoFs of the shown mechanisms. Local degrees of freedom, composite hinges and virtual constraints needed to be indicated on the figures if there exists any.



(a)



(b)

HW 01.5

2-4 已知某钢制零件受弯曲变应力的作用，其中，最大工作应力 $\sigma_{max}=200$ MPa，最小工作应力 $\sigma_{min}=-50$ MPa，危险截面上的应力集中系数 $k_\sigma=1.2$，尺寸系数 $\varepsilon_\sigma=0.85$，表面状态系数 $\beta=1$。材料的 $\sigma_s=750$ MPa，$\sigma_0=580$ MPa，$\sigma_{-1}=350$ MPa。试：

(1) 绘制零件的简化极限应力图，并在图中标出工作应力点的位置；

(2) 用作图的方法求零件在该应力状态下的疲劳极限应力 σ_r；

(3) 按疲劳极限应力(见式(2-1))和安全系数(见式(2-11))分别校核此零件的安全性(取$[S]=1.5$)。

(The English version is on the next page.)

$$\sigma_{ca} \leqslant [\sigma] = \frac{\sigma_{lim}}{[S]}$$

$$\tau_{ca} \leqslant [\tau] = \frac{\tau_{lim}}{[S]}$$

$$S_\sigma = \frac{\sigma_{-1}}{(K_\sigma)_D \sigma_a + \psi_\sigma \sigma_m} \geqslant [S]$$

HW 01.5

A steel part is subjected to bending stress, where the maximum working stress $\sigma_{max} = 200MPa$, the minimum working stress $\sigma_{min} = -50MPa$, the stress concentration factor of the dangerous cross section $k_\sigma = 1.2$, the size factor $\varepsilon_\sigma = 0.85$, the surface factor $\beta = 1$. $\sigma_s = 750MPa$, $\sigma_0 = 580MPa$, $\sigma_{-1} = 350MPa$ for the material. Please

(1) Draw the fatigue diagram of this part, and mark the working stress state point in the diagram.

(2) Using the fatigue diagram to find the fatigue limit (σ_r) under this stress state.

(3) According to the fatigue limit (as shown in Eq. 2-1) and the factor of safety (as shown in Eq. 2-11) respectively, check the safety of this steel part. Take [S] = 1.5 in this question.

$$\sigma_{ca} \leqslant [\sigma] = \frac{\sigma_{lim}}{[S]}$$

$$\tau_{ca} \leqslant [\tau] = \frac{\tau_{lim}}{[S]}$$

$$S_\sigma = \frac{\sigma_{-1}}{(K_\sigma)_D \sigma_a + \psi_\sigma \sigma_m} \geqslant [S]$$

Deadline of this homework: Sep 19 @ **23:30**

Link to submission:
https://ancorasir.com/?page_id=3987

All homework MUST be hand-written.

Please refer to the above link for further details on how to make the submission and the detailed deadline for submission.

谢谢~

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