重庆大学《机械原理》课程试卷

◉ A卷
○ B卷

2017—2018 学年第 2 学期

开课学院：UC 课程号： ME31803 考试日期：20180428

考试方式： ○ 开卷 ◉ 闭卷 ○ 其他 考试时间：90 分钟

题号	一	二	三	四	五	六	七	八	九	十	总分
得分											

备注：

1. 使用试卷标准格式命题时，大标题一律采用四号宋体、小标题及正文用小四号宋体；

2. 每套试卷满分应该为 100 分；在每大题的题号后面括号内标明该题的分数值；

3. 打印试题时按 A4 纸缩小打印，制卷时再统一按比例放大；试卷原则上要求单面印刷，按份装订。

（以上红色字体为命题时参考内容，命题完成后打印前请删除掉）

考试提示

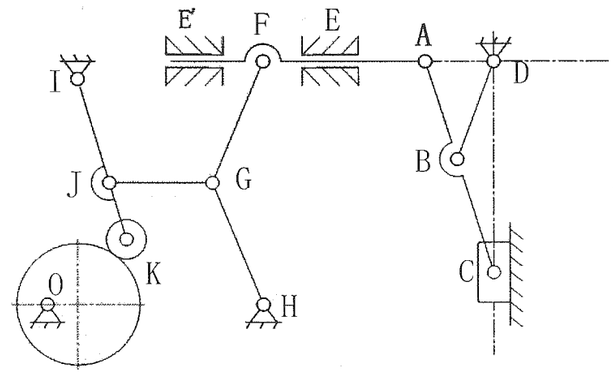
1.严禁随身携带通讯工具等电子设备参加考试；

2.考试作弊，留校察看，毕业当年不授学位；请人代考、替他人考试、两次及以上作弊等，属严重作弊，开除学籍。

TASK-1 (20points)

Determine the number of degrees of freedom (DOF) of the mechanism as show in the figure. Mark out the compound hinges, the isolated (local) degrees of freedom and/or the redundant constraints in the figure (if exist).

Dismember the mechanism into Assur kinematic chains, and the initial links are assumed by yourself. Determine the class of the mechanism.



TASK-2 (30 points)

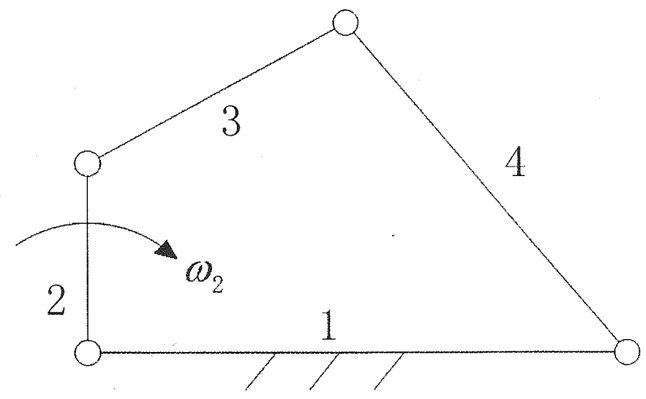
Assume that the length of each link of mechanism shown in the figure below, Known link angular velocityω2 and ε_2 by yourself.

Solve graphically (with instant centers) ω_3, ω_4.

Solve graphically ε_3 , ε_4

Draw Imbalance angle(θ):

Determine Time ratio K, Y min



命题人：刘达斌 组题人：魏静 审题人：刘达斌 命题时间：20180423 教务处制

TASK-3 (20 points)

Short Answer Questions

(1) For a cam machanism, what is rigid impact ? And what is flexible impact? How to avoid the rigid impact andflexible impact (Mark: 7 points)

(2) Wht is the proper meshing and continuous transmission condition of involute gear ? (Mark: 6 points)

(3)Some involute modified gear that have same m、 z、αand standard gear are mixed together, how to distinguish the standard gear, the positive modified gear and the negative modified gear? (Mark: 7 points)

TASK-4 (30 points)

Analysis and calculation questions

(1)An offset disc cam mechanism is shown in the figure，the radius of the disc$R$=50mm, offset distance e=25mm, the angular velocity of cam ω=25rad/s, the velocity of push rod v=50mm/s when the cam turns around90° by clockwise direction. Questions:

1) What is the pressure angle at this position? (Mark: 5 points)

2) What is the displacement of the push rod at this position?(Mark: 5 points)

3) What is the lift h of the push rod? (Mark: 5 points)

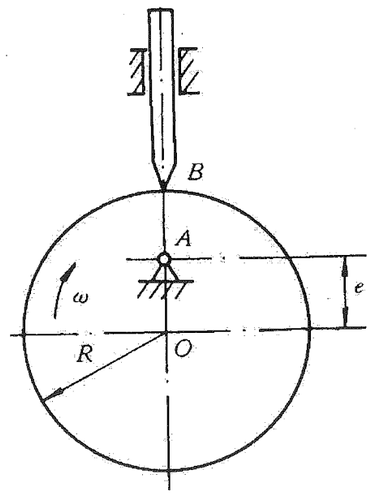


Figure 1

(2) Try to design an involute external spur gear mechanism, the following parameters are given: $z_1=18, z_2=37, m=5\,\text{mm}, \alpha=20^\circ, h_a^*=1.0, c^*=0.25$. To solve:

1)Geometric parameters $r_1, r_2, r_{f1}, r_{f2}, r_{b1}, r_{b2}$ and center distance a. (Mark: 10 points)

2) The contact ratio or coincidence degree. (Mark: 5 points)

(Contact ratio $\varepsilon=\frac{1}{2\pi}[z_1(\tan\alpha_{a1}-\tan\alpha')+z_2(\tan\alpha_{a2}-\tan\alpha')]$)