# 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 |    |    |    |    |    |    |    |    |    |    |      |

## 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).(10 points)

**Dismember** the mechanism into Assur kinematic chains, and the initial links are assumed by yourself. Determine the class of the mechanism.(10 points)
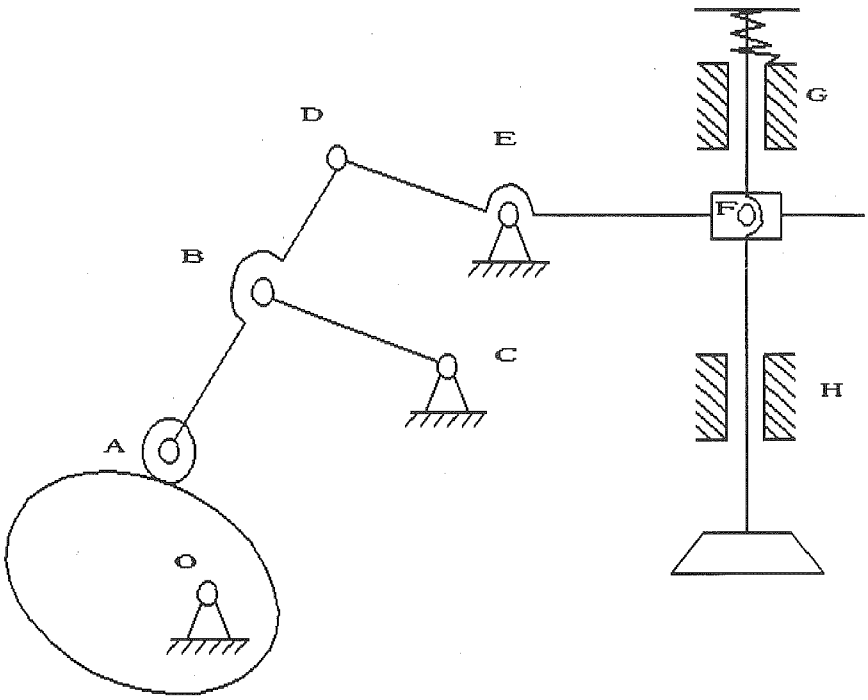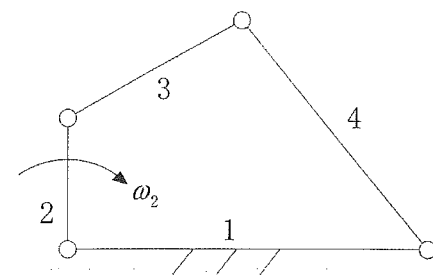
TASK-2 (20 points)

Assume that the length of each link of mechanism shown in the figure below,

Known link AB angular velocity$\omega_2$ and $\varepsilon 2$ by yourself.

**Solve graphically** (with instant centers) $\omega_3$, $\omega_4$(10 points)

**Solve graphically**, $\varepsilon 3, \varepsilon 4$ (10 points)
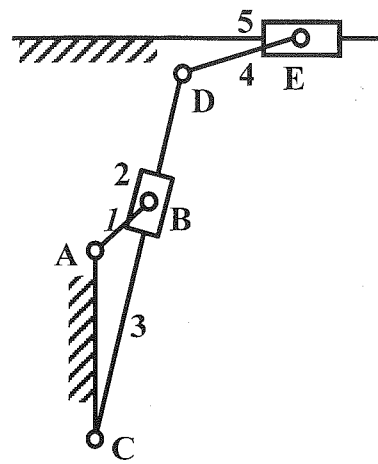
TASK-3 (15 points)

Assume that the length of each link of mechanism shown in the figure below

**Draw** imbalance angle($\theta$); (5 points)

**Determine** Time ratio K, $\gamma_{min}$(10 points)



TASK-4 (15 points)

Answer the following questions according to the Figure 1,:

1) **Draw** the theory profile of cam shown in the figure 1. (Mark: 3 points)

2) **Draw** the radius of base circle$r_b$、lift $_h$、rise angle$\Phi$、high dwell angle$\Phi$s、fall angle$\Phi'$、low dwell angle$\Phi$s′. (Mark: 4 points)

3) **Draw** the displacement s and pressure angle $\alpha$ at the position shown in figure. (Mark: 4 points)

4) **Draw** the displacement s and pressure angle $\alpha$ at the position after the cam turns around 90° in clockwise   (Mark: 4 points)
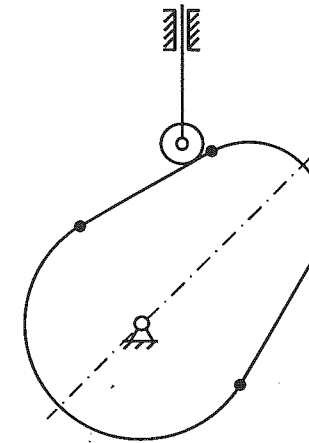
TASK-5 (15 points)

The following parameters are given:

$z_1 = 18$, $z_2 = 37$, $m = 5 \, \mathrm{mm}$, $\alpha = 20°$, $h_a^* = 1.0$, $c^* = 0.25$.

**Questions:**

To calculate Geometric parameters $r_1, r_2, r_{f1}, r_{f2}, r_{b1}, r_{b2}$ and center distance $a$. (Mark: 15 points)

TASK-6 (15 points)

For the shown gear train, gears 1, 2, 3, 4, 7, 8, 9 and 10 are involute spur gears, 5 is a right-handed worm, and 6 is a worm wheel. Link H is a planet carrier to support planet gears 7 and 9 combined together. H is also fixed to the worm wheel 6. The rolling cylinder is fixed to gear 10. Given the number of teeth $z_1=28$, $z_2=42$, $z_3=21$, $z_4=31$, $z_5=2$, $z_6=56$, $z_7=47$, $z_8=22$, $z_9=39$, $z_{10}=33$. The diameter of the rolling cylinder d=250mm. The angular speed of gear 1 is $n_1$=700r/min.

**Determine:**

1) lifting speed of weight W.

2) rotation direction of gear 1 when weight W lifts.