Name : ______________________ Student ID # : _______________

คณะวิศวกรรมศาสตร์
มหาวิทยาลัยสงขลานครินทร์

การสอบกลางภาค ประจำภาคการศึกษาที่ ๑ ประจำปีการศึกษา ๒๕๕๔
วันอาทิตย์ที่ ๗ สิงหาคม พ.ศ. ๒๕๕๔ เวลา ๙.๐๐-๑๒.๐๐ น.
วิชา ๒๑๕-๓๒๔ / ๒๑๖-๓๒๔ : กลศาสตร์เครื่องจักรกล ห้องสอบ A401 / S201

ทุจริตในการสอบ ปรับขั้นต่ำคือปรับตกในรายวิชาที่ทุจริต และพักการเรียน ๑ ภาคการศึกษา

คำสั่ง

๑. ข้อสอบมีทั้งหมด ๕ ข้อ ให้ทำลงในข้อสอบทุกข้อ
๒. อนุญาตให้ใช้เครื่องคิดเลขได้
๓. ให้ใช้เครื่องมือเขียนแบบได้
๔. ไม่อนุญาตเอกสารอื่น ๆ

รศ.ดร. วรวุธ วิสุทธิ์เมธางกูร
ผู้ออกข้อสอบ

ข้อ	*คะแนนเต็ม*	*ได้*
๑	๑๕	
๒	๒๐	
๓	๒๐	
๔	๒๕	
๕	๒๐	
รวม	๑๐๐	

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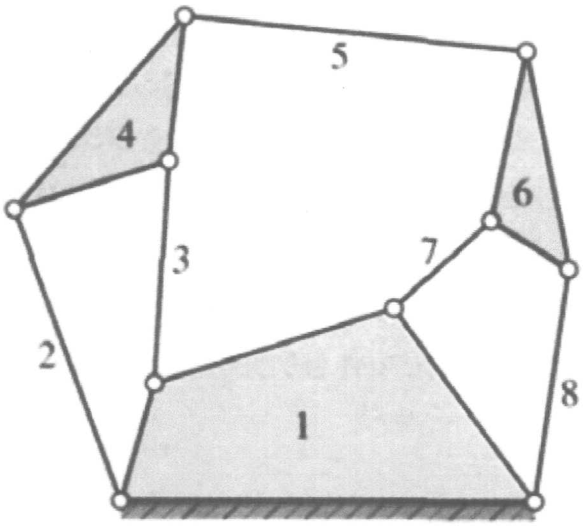
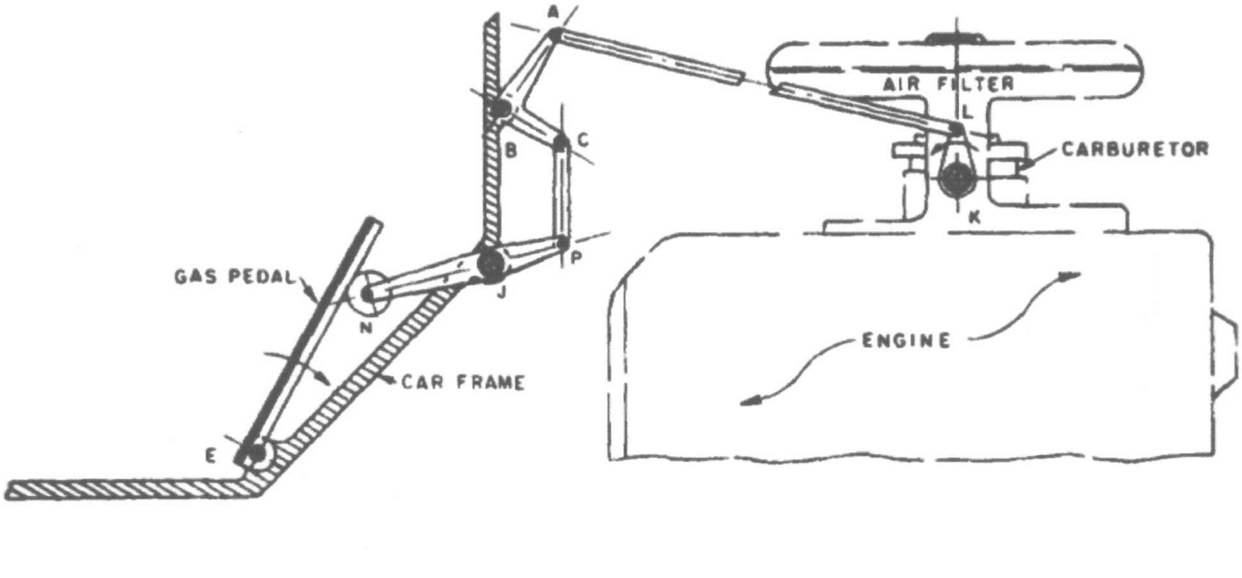
1) (a) (4 points) For the mechanism below, how many inversions does it have ? ________________

How many poles (instantaneous centers of velocity) does it have ? ____________________



(b) (4 points) The mechanism to control the throttle valve of the engine in a car is as shown. Assume the point between the gas pedal and roller is a rolling contact. Determine the mobility of this system.



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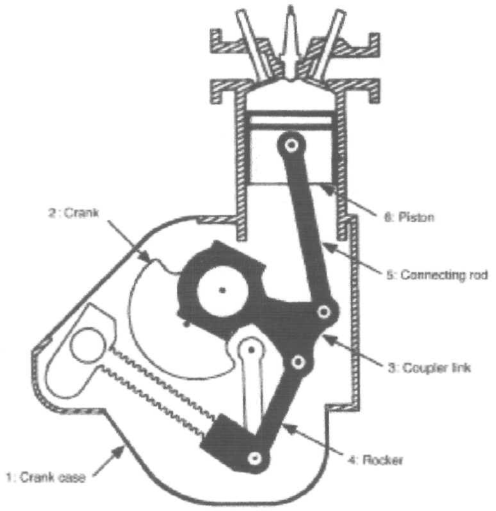
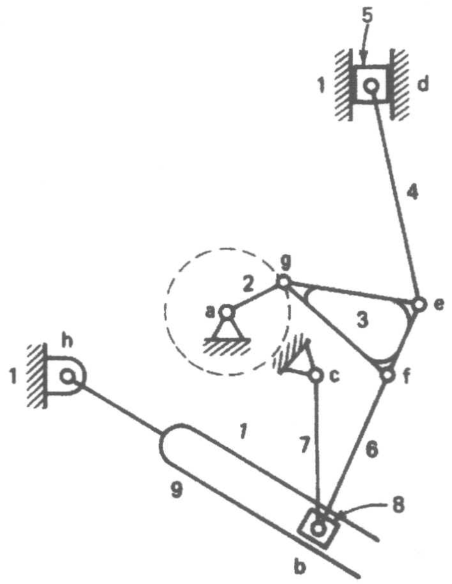
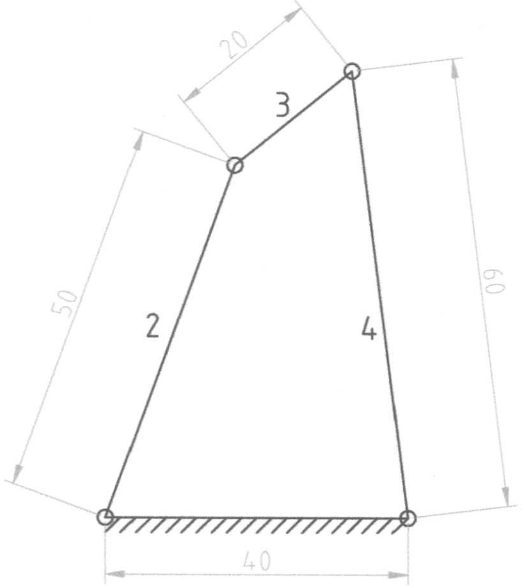
(c) (4 points) The drawing and kinematic diagram of a variable stroke engine is as shown in the following figures. Determine the mobility of this mechanism.

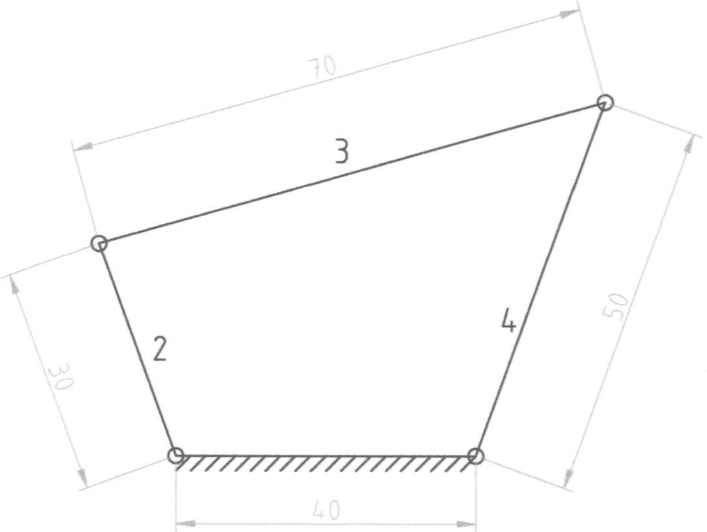




(d) (3 points) Use the pictures below to answer the following answers.



(a)



(b)

- Which one is the Grashof linkage ? ☐ (a) ☐ (b) ☐ None ☐ both
- Which one is the non-Grashof linkage ? ☐ (a) ☐ (b) ☐ None ☐ both

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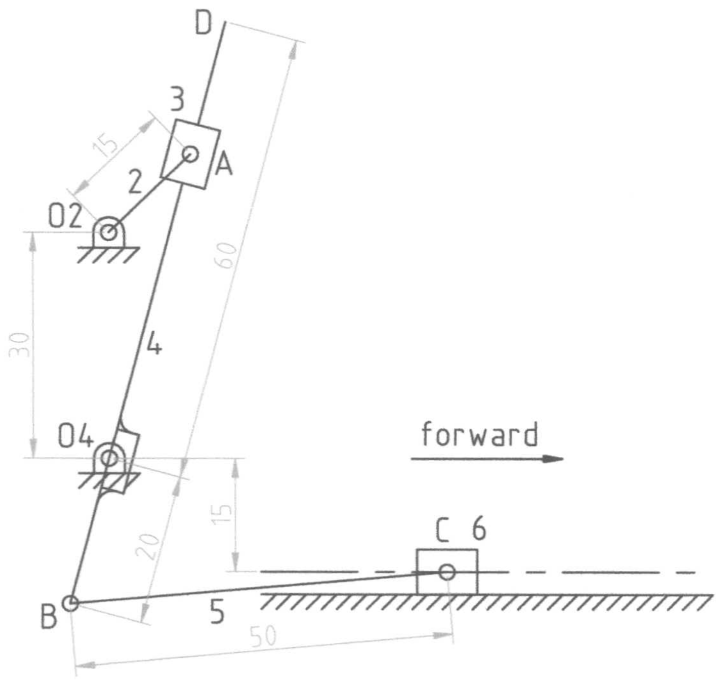
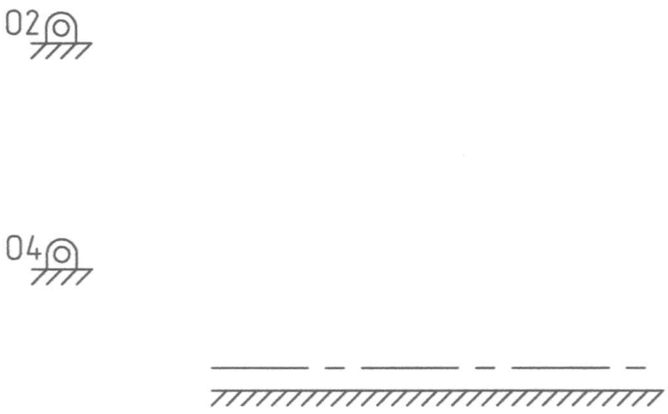
2) (20 points) The mechanism shown is a six-bar quick-return mechanism. The fixed pin joints O_2 and O_4 are 30 mm apart. Link 2 is the input crank and link 6 is the output slider. Link 4 (BO_4D) is fixed at O_4 with block 3 sliding on it.





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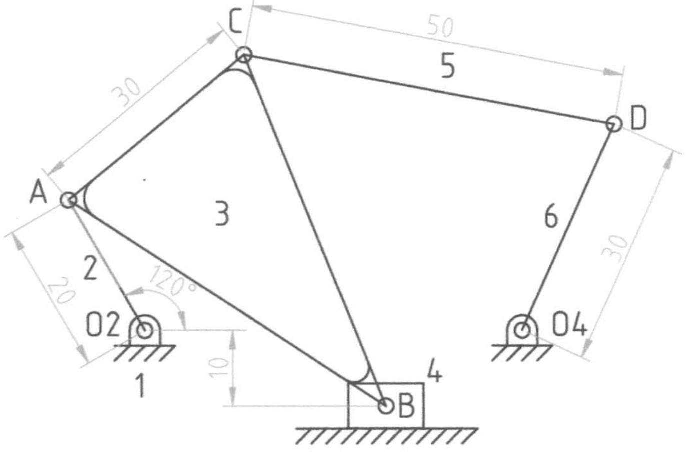
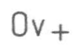
3) (20 points) In the mechanism shown, link 4 is moving to the right with a speed of 40 mm/s. $R_{AB} = R_{BC} = 50$ mm. Using the graphical method to do the velocity analysis, and determine the angular velocities of link 2, link 3, link 5, and link 6.



Scale 1 : 1



Scale 1 mm : 1 mm/s

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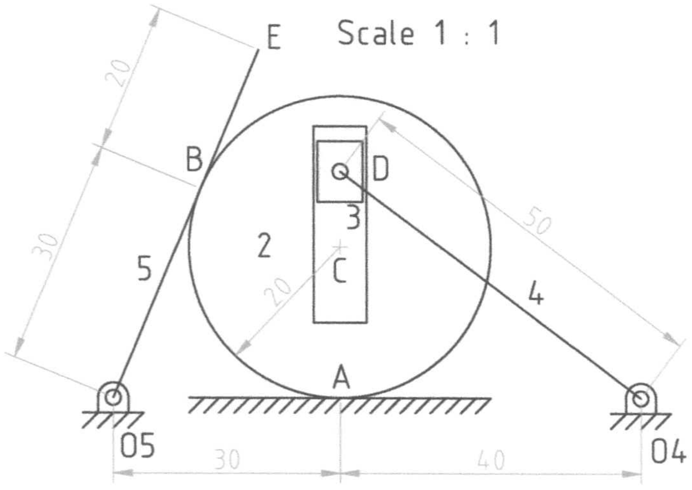
4) (25 points) For the mechanism shown below, link 2 is rotating with an angular velocity of 1 rad/s counterclockwise. The contact between links 2 and 1 at point A is a rolling contact, while the contact at point B between links 2 and 5 is a sliding contact. Block 3 is sliding inside the straight slot of link 2, and is connected to link 4 at D.

(a) Determine the angular velocities of link 4 and link 5, using graphical method.

(b) How many poles (instantaneous centers of velocity) does this mechanism have ? ____________

(c) Find the pole P_{25}, and the velcocity of the point P_{25} on link 2 and link 5.



Scale 1 mm : 1 mm/s

+Ov

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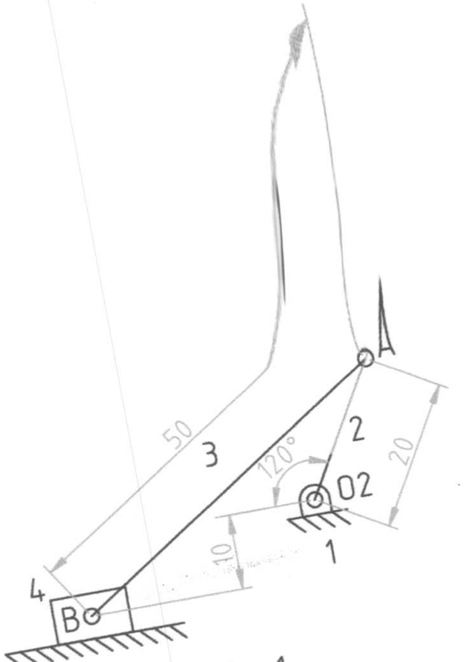
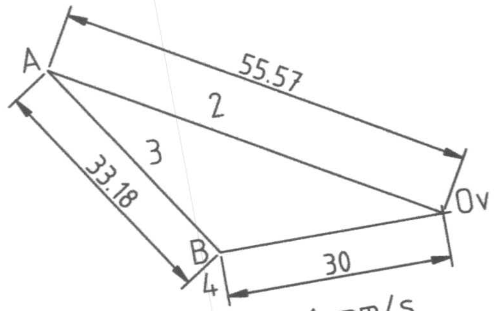
5) (20 points) The slider in the slider-crank mechanism is moving with a velocity of 30 mm/s *to the left*, and with an acceleration of 100 mm/s^2 to the left. The velocity polygon is *given* as shown in the figure below. Determine the angular accelerations of link 2 and link 3.

Scale 1 mm : 2 mm/s^2 Oa



Scale 1 : 1



Scale 1 mm : 1 mm/s