Name : _____ Student ID # : _____

คณะวิศวกรรมศาสตร์
มหาวิทยาลัยสงขลานครินทร์

การสอบกลางภาค ประจำภาคการศึกษาที่ ๒ ประจำปีการศึกษา ๒๕๕๒
วันเสาร์ที่ ๒๖ ธันวาคม พ.ศ. ๒๕๕๒ เวลา ๙.๐๐-๑๒.๐๐ น.
วิชา ๒๑๕-๓๒๔ / ๒๑๖-๓๒๔ : กลศาสตร์เครื่องจักรกล ห้องสอบ R201 และ S104

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	๒๐	
๒	๒๐	
๓	๒๐	
๔	๒๐	
๕	๒๐	
รวม	๑๐๐	

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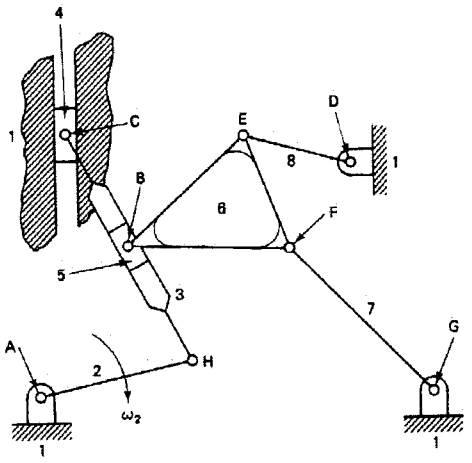
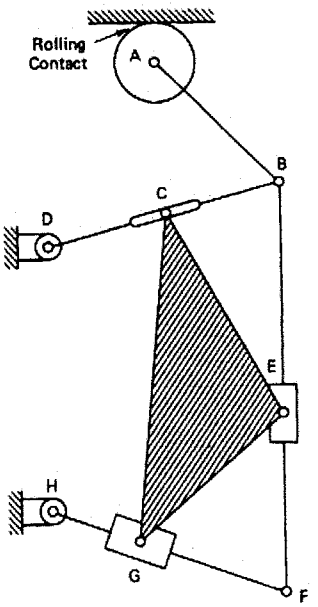
1) Answer the following questions

(a) What is the mobility of this mechanism ?



(b) How many ternary links (links with 3 joints) does the mechanism in (a) have ?

(c) How many inversions does this mechanism have, including the one shown ?



(d) Is the rolling contact joint of the mechanism above J_1 or J_2 (joint with 1 dof or 2 dof) ?

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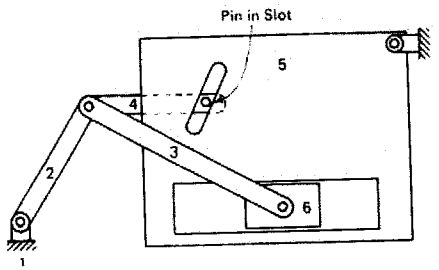
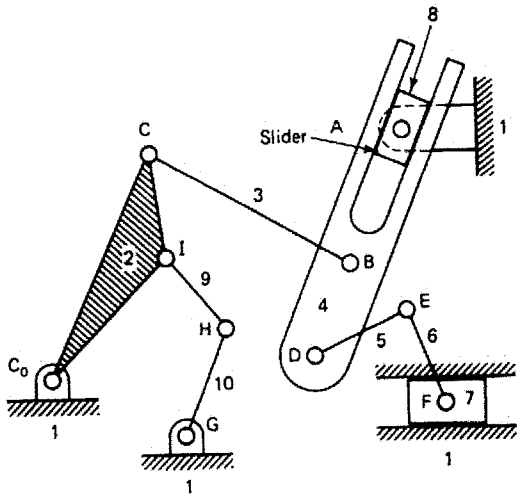
(e) Determine the mobility of this mechanism.



(f) Is the pin-in-slot joint a lower pair ?

(g) Determine the mobility of this mechanism.



(h) Are there quaternary links (link with 4 joints) in the mechanism in (g) ? If yes, which links ?

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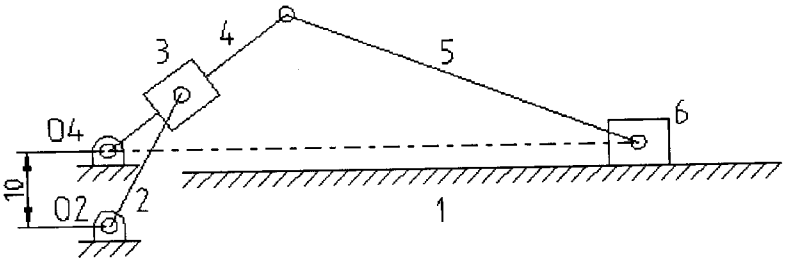
2) The mechanism shown is called Whitworth quick-return mechanism. Link 2 is 20 mm long, link 4 is 30 mm long, and link 5 is 50 mm long. The fixed pin joints O_2 and O_4 are 10 mm apart. Link 2 is the input crank and link 6 is the output slider.

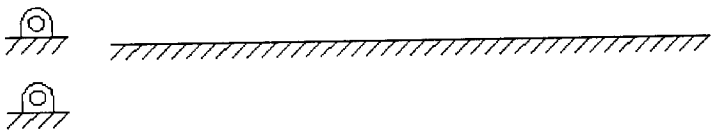
(a) Draw the mechanism when link 6 is at its both limit positions.

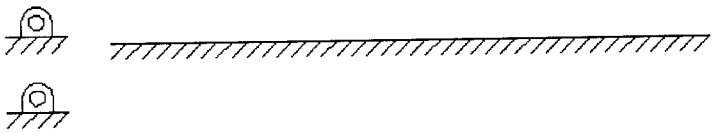
(b) If link 2 is rotating with a constant speed, assuming the forward motion of link 6 is to the right, which direction must ω_2 be so that it is a quick-return ? _____

(c) What is the stroke of this mechanism ? _____

(d) Determine the time ratio between advance stroke and return stroke. _____







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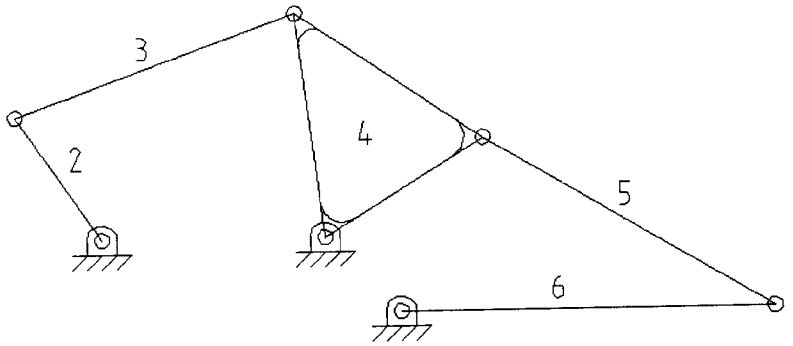
3) For the mechanism shown,

(a) How many poles does it have ? _____

(b) Locate P24, P26 and P46.

(c) If link 2 has an angular velocity of 20 rad/s clockwise, estimate the angular velocity of link 6 using the location of the instantaneous centers.



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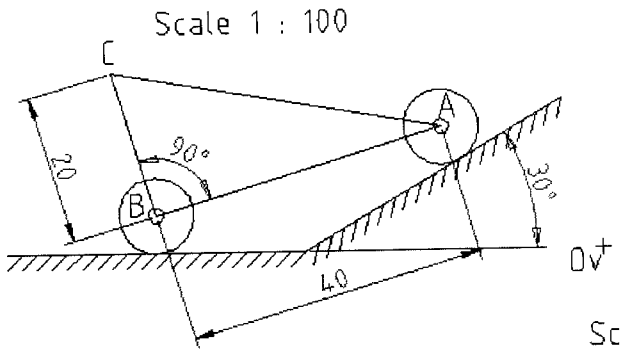
4) The mechanism shown represents a car climbing a slope of 30^{o}. If the rear wheel B is traveling with a speed of 5 m/s to the right, and an acceleration of 3 m/s^2 to the right, determine the angular velocity and angular acceleration of the car body. Also determine the velocity and acceleration of point C.



Scale 10 mm : 1 m/s

0a+

Scale 20 mm : 1 m/s2

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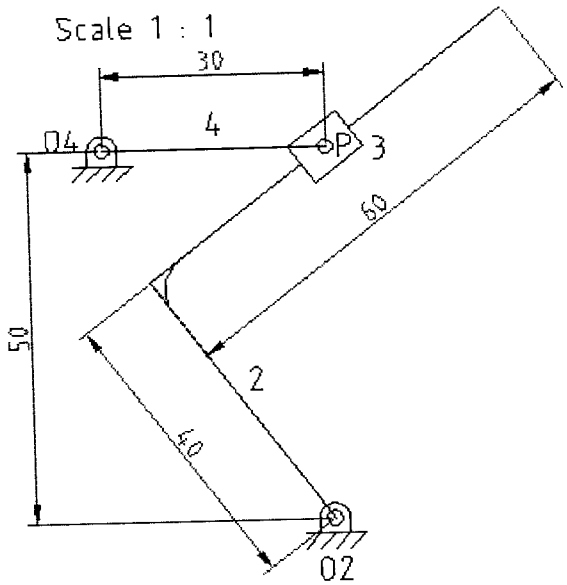
5) For the mechanism shown, link 4 has a constant angular velocity of 1 rad/s counterclockwise.

Determine the angular velocity and angular acceleration of link 2.



Scale 1 mm : 1 mm/s

Scale 1 mm : 1 mm/s2