



University of Technology  
Department of Mechanical Engineering  
Final Examination 2015/2016

Subject: Mechanics I  
Division: All Divisions  
Examiner(s): Dr. Ali Raad & Dr. Sadeq Hussein

Year: 1<sup>st</sup>  
Exam Time: 3 Hrs.  
Date: 13/06/2016



1. Answer Four Questions Only.
2. All Questions Carrying Equal Marks.

Q1:

Represent the resultant of the force system acting on the pipe assembly by a single force  $R$  at  $A$  and a couple  $M$ .

Q2:

Calculate the magnitude of the force supported by the pin  $B$  for the bell crank loaded and supported as shown.

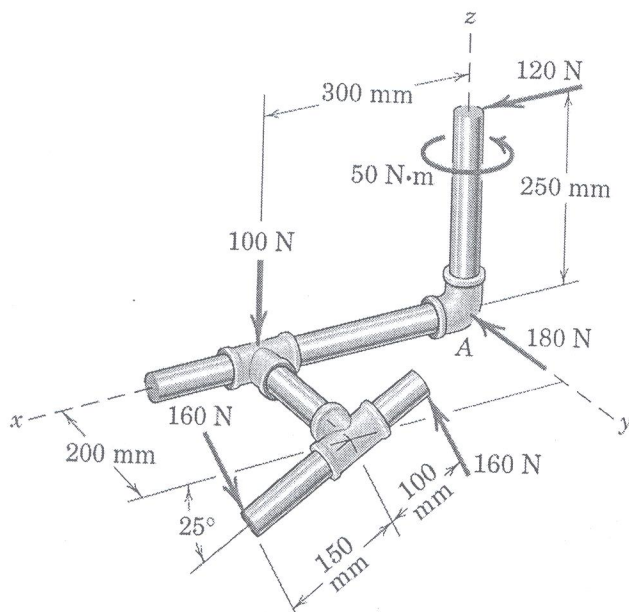


Fig. Q1

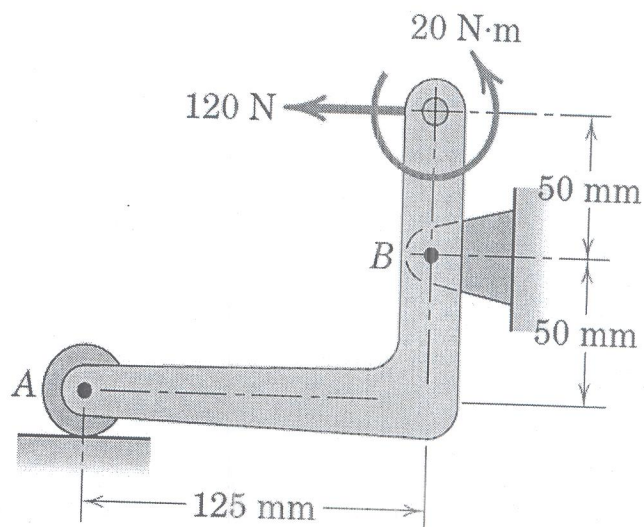


Fig. Q2

Q3:

Compute the force in each member of the loaded cantilever truss by the *method of joint*.

Q4:

Determine the coordinates of the centroid of the shaded area. The plate center is  $M$ .

Q5:

The force  $P$  is applied to the 200 N weight of block  $A$  which rests atop the 100N crate  $B$ . The system is at rest when  $P$  is first applied. Determine what happens to each body if (a)  $P = 60$  N, (b)  $P = 80$  N, and (c)  $P = 120$  N.

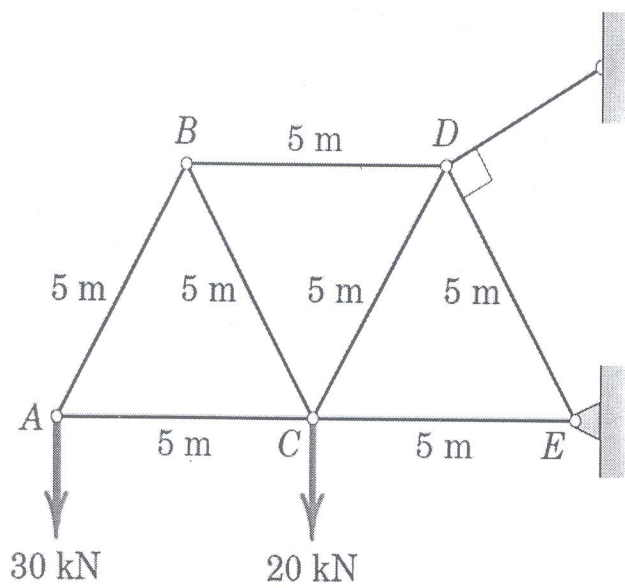


Fig.Q3

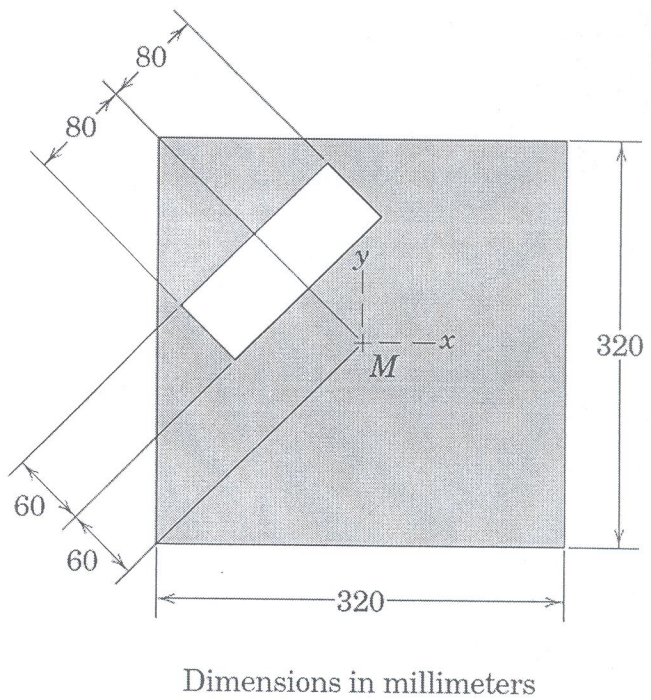


Fig.Q4

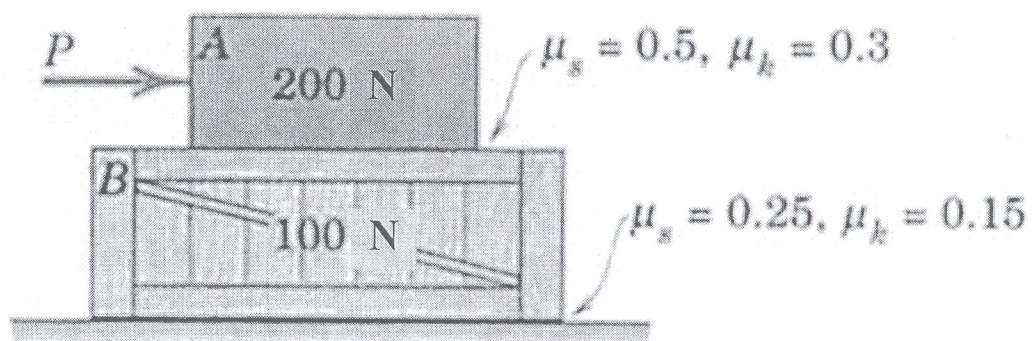


Fig.Q5

Best wishes





University of Technology  
Department of Mechanical Engineering  
Final Examination 2014/2015



Subject: Mechanics I  
Division: All Divisions  
Examiner(s): Dr. Ali Raad & Dr. Sadeq H. Bakhy

Year: 1<sup>st</sup>  
Exam Time: 3 Hrs.  
Date: 8/6/2015

1. Answer Four Questions Only.
2. All Questions Carrying Equal Marks.

Q<sub>1</sub>:

The rigid pole and cross-arm assembly is supported by the three cables shown. A turnbuckle at  $D$  is tightened until it induces a tension  $T$  in  $CD$  of  $1.2 \text{ kN}$ . Express  $T$  as a vector and determine the vector expression for the moment of the  $1.2 \text{ kN}$  tension (a) about point  $O$  and (b) about the pole  $z$ -axis.

Q<sub>2</sub>:

The uniform beam has a mass of  $50 \text{ kg}$  per meter of length. Compute the reactions at the support  $O$ . The force loads shown lie in a vertical plane.

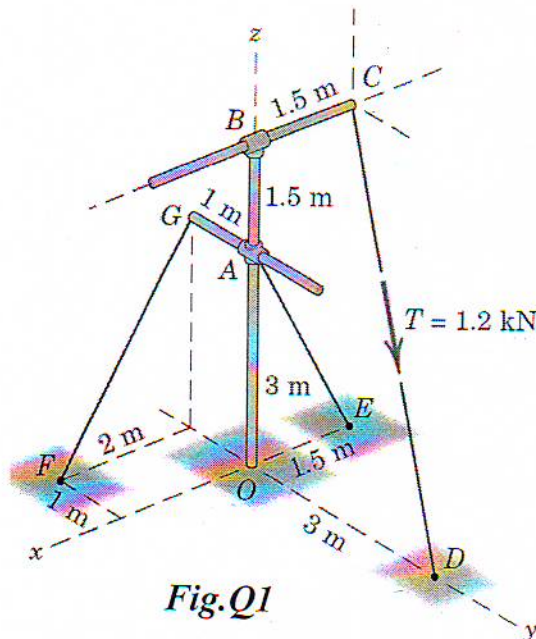


Fig.Q1

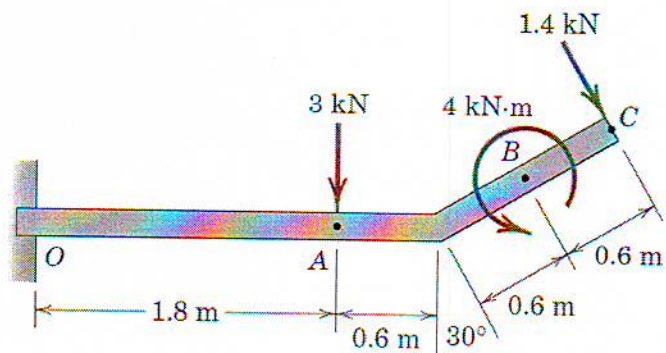


Fig.Q2

Q<sub>3</sub>:

Determine the force in member  $GK$  of the loaded symmetrical truss by using section method.

Q<sub>4</sub>:

Determine the moments of inertia of the  $Z$ -section about its centroidal  $x_o$ - and  $y_o$ -axes.

Q<sub>5</sub>:

The three flat blocks are positioned on the  $30^\circ$  incline as shown, and a force  $P$  parallel to the incline is applied to the middle block. The upper block is prevented from moving by a wire which attached it to the fixed support. The coefficient of static friction for each of the three pairs of mating surfaces is shown. Determine the maximum value which  $P$  may have before any slipping takes place.

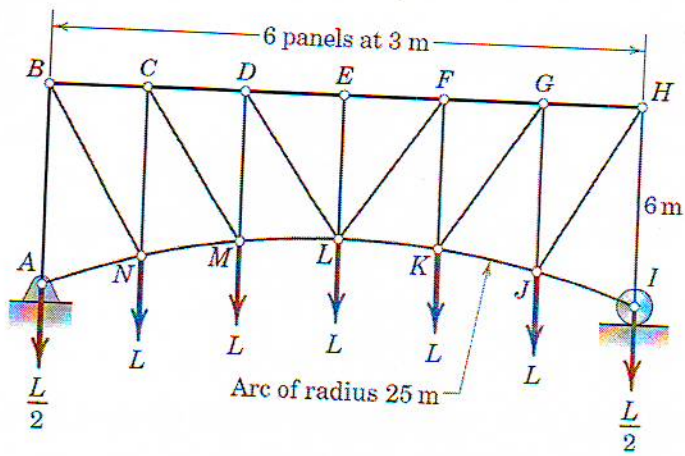


Fig.Q3

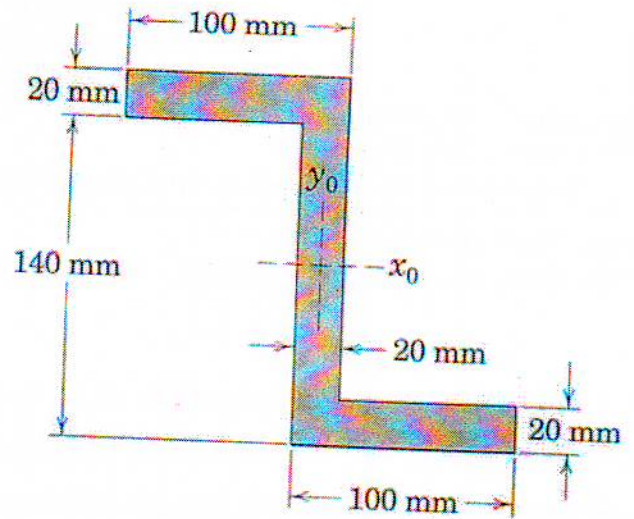


Fig.Q4

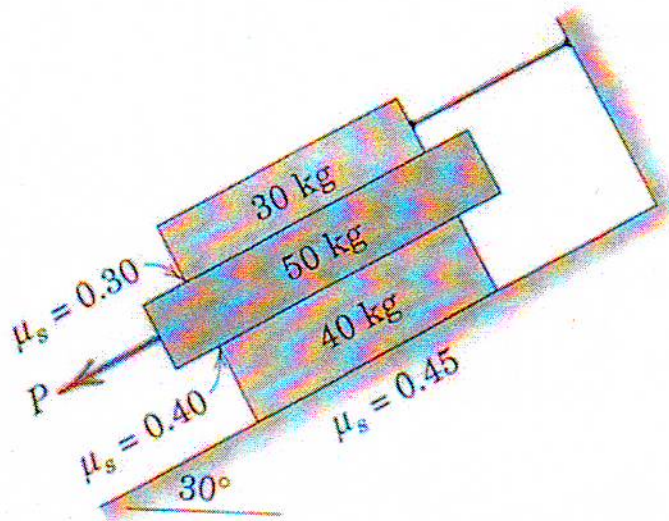


Fig.Q5

Best wishes





Subject: Mechanics I

Division: General Mechanical

Examiner(s): Dr. Ali Raad & Lecturer. Amir A. Kh.

Year: First

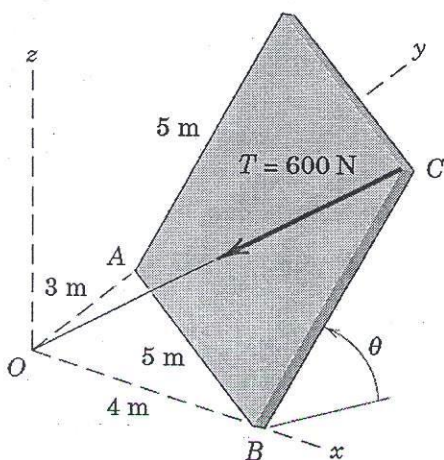
Exam time: 3 Hrs.

Date: 7 / 06 / 2014

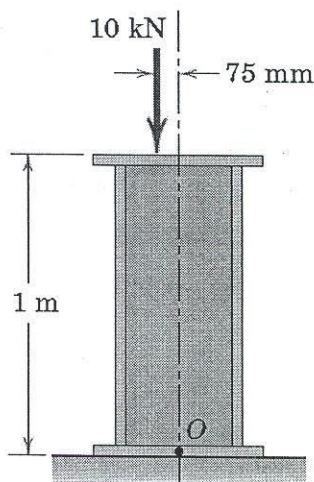
**Answer Four Questions Only**

**Q1:** The rectangular plate is tilted about its lower edge by a cable tensioned at a constant  $600\text{ N}$ . Determine the moment of this tension about the lower edge  $AB$  of the plate for the range  $0 \leq \theta \leq 90$ . (25 marks)

**Q2:** Replace the  $10\text{-kN}$  force acting on the steel column by an *equivalent force-couple system* at point  $O$ . This replacement is frequently done in the design of structures. (25 marks)



**Q1**

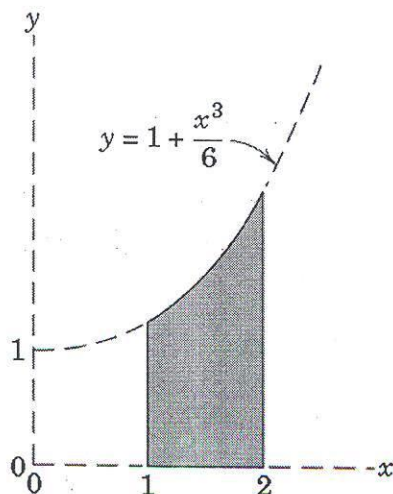


**Q2**

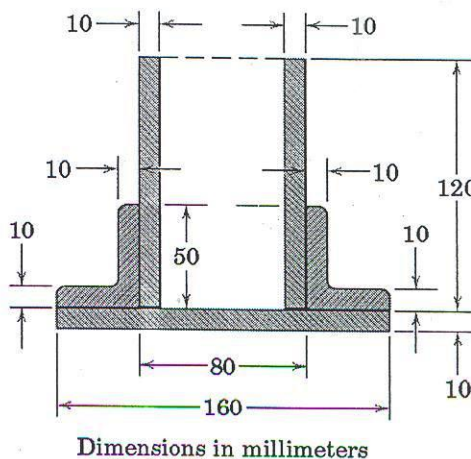
**Q3: Answer A or B only: (25 marks)**

A. Determine the  $x$  and  $y$ -coordinates of the centroid of the shaded area.

B. Determine the distance from the bottom of the base plate to the centroid of the built-up structural section shown.

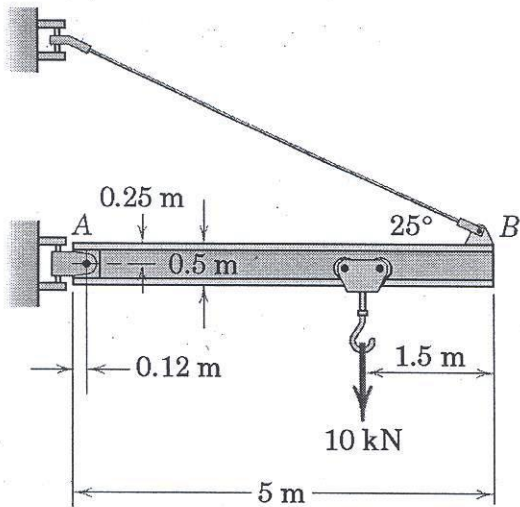


**Q3-A**

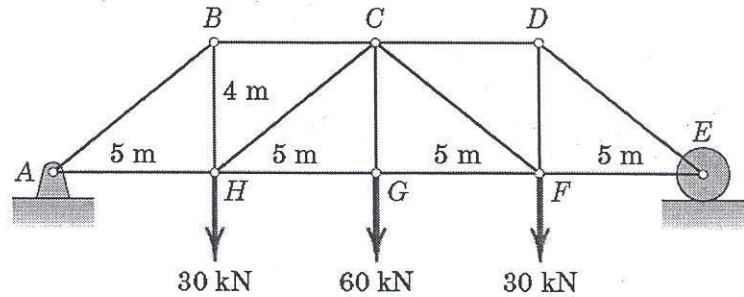


**Q3-B**

**Q4:** Determine the magnitude  $T$  of the tension in the supporting cable and the magnitude of the force on the pin at  $A$  for the jib crane shown. The beam  $AB$  is a standard  $0.5\text{-m}$  *I-beam* with a mass of  $95\text{ kg}$  per meter of length. (25 marks)



**Q4**



**Q5**

**Q5:** Determine the force in each member of the loaded truss. Make use of the symmetry of the truss. (25 marks)

*Best wishes*





Answer Five Questions Only

All Questions Carry Equal Marks

Q1: Find the resultant  $R$  of the three forces and two couples shown in figure (1) and show where it cuts the  $x$ -axis.

Q2 : Replace the system shown in fig (2) by a wrench resultant and find the coordinates of point  $P$  in the  $Y$ - $Z$  plane through which the wrench resultant will pass.

Q3 : The uniform bar  $AB$  with end rollers shown in fig (3) has a mass of  $30\text{Kg}$  and is supported by the horizontal and vertical surfaces and by the wire  $AC$ . Calculate the tension  $T$  in the wire and the reactions at rollers  $A$  and  $B$ .

Q4 : Find the resultant  $R$  of the force system shown in fig (4), move it to point  $O$  with its moment  $M$ .

Q5: The uniform  $7\text{-m}$  steel shaft has a mass of  $200\text{Kg}$  and is supported by a ball-and -socket joint at  $A$  in the horizontal floor. The ball end  $B$  rests against the smooth vertical walls as shown. Compute the force exerted by the walls and the floor on the ends of the shaft .Fig(3).

Q6 : Calculate the forces in members  $FG$ ,  $EG$  and  $GD$  for the truss shown in fig (6).

Note : Figure of each question is required in your answers .

GOOD LUCK

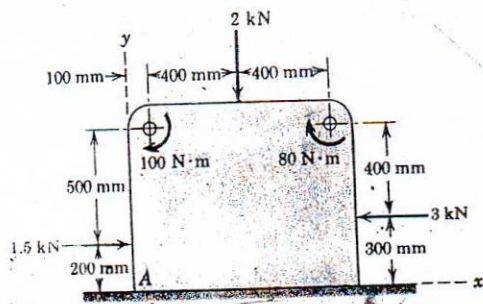


Fig Q<sub>1</sub>

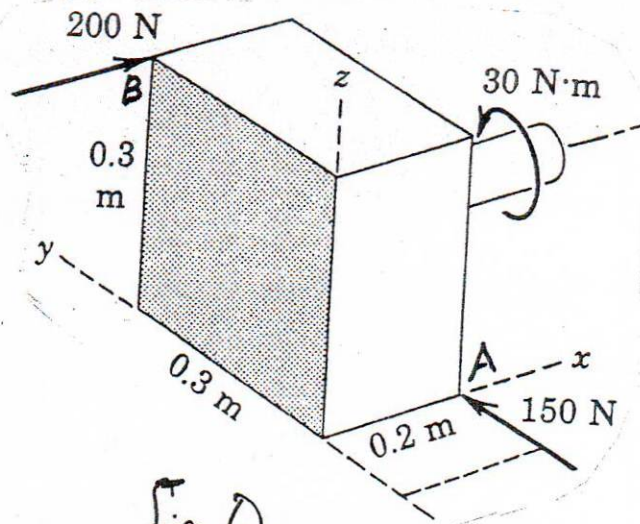


Fig Q<sub>2</sub>

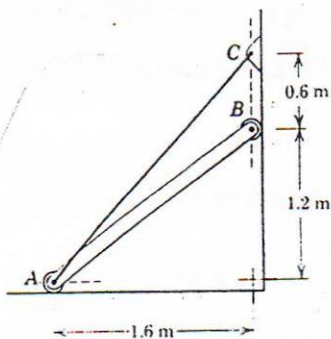


Fig Q<sub>3</sub>

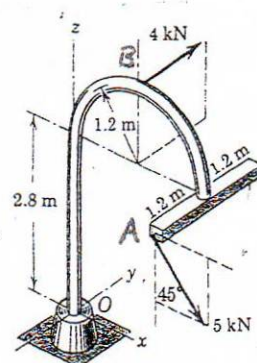


Fig Q<sub>4</sub>

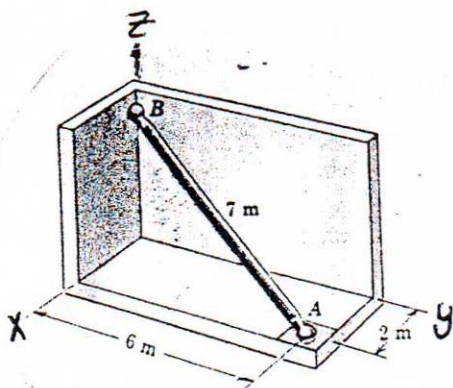


Fig Q<sub>5</sub>

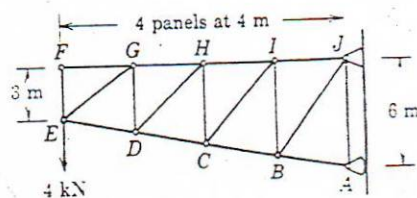


Fig Q<sub>6</sub>





University of Technology  
Department of Machines and Equipment Engineering  
First Term Examination 2012/2013

Subject: Engineering Mechanics/ Statics

Division: All divisions

Examiners: Dr. A. Al-Beirut & Dr. A. Raad

Year: First year

Exam Time: 1½ hrs.

Date: 20/ 1 / 2013



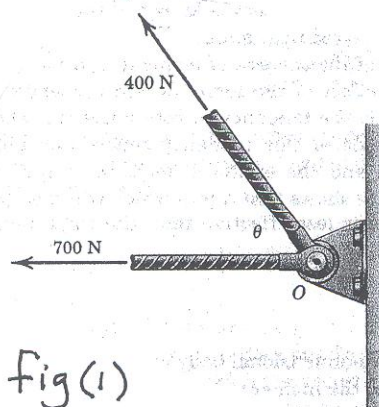
Answer ( THREE ) Questions Only

**Q1:** Find angle  $\theta$  that makes the resultant  $R$  of the two forces shown in fig. (1) equals to 1000N. Also find angle  $\beta$  between  $R$  and the horizontal.

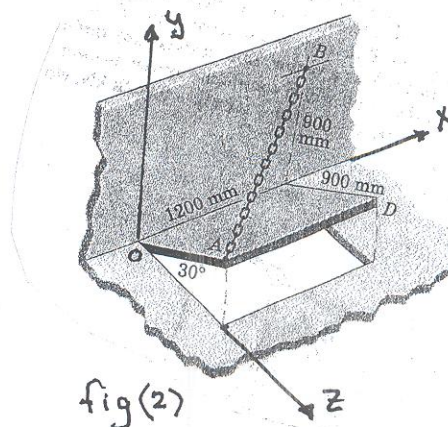
**Q2:** In fig. (2), express the tension in the chain AB  $T=100\text{N}$  as a force vector. Find also the coordinates of point D.

**Q3:** If the resultant of the concurrent force system shown in fig. (3) is equal to zero, find the tension in cables AC and BC.

**Q4:** In fig. (4), find the components of the  
(a) 1900N force on the x, y and z axes,  
(b) 900N force on the x, y and z axes.



fig(1)



fig(2)

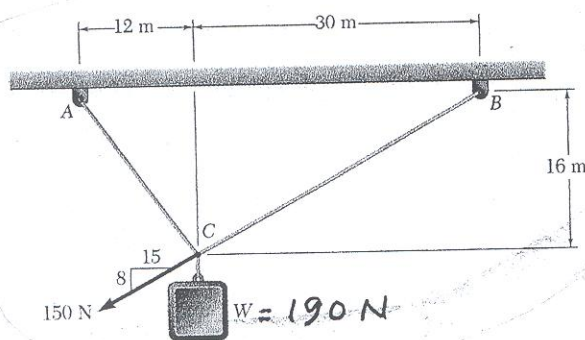


fig (3)

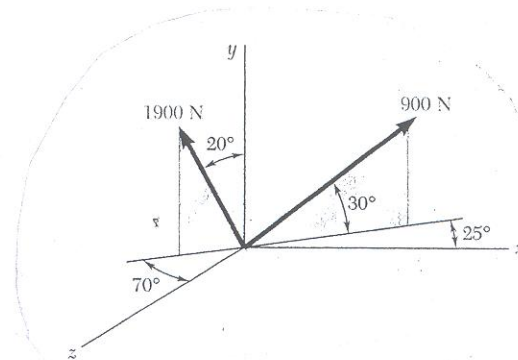


fig (4)

Good Luck



University of Technology  
Machines and Equipment Engineering Department  
Final Examination 2011-2012/ first attempt

Subject: Engineering Mechanics ( I ) Statics  
Branch : Mechanical Engineering  
Examiner: Dr. A. Al.Beiruti  
Dr. Ibtesam Mahdi

Class : First year  
Time : 3 Hours  
Date : 31/5 /2012

University of Technology  
Machines and Equipment Engineering Department

Answer Five Questions Only

All Questions Carry Equal Marks

**Q1-** Replace the three forces and couple by an equivalent force  $R$  at  $A$  and a couple  $M$ . Find  $M$  and the magnitude of  $R$ . Fig(1).

**Q2-** Replace the force system shown in fig(2) by a wrench resultant and find the coordinates of point ( $P$ ) in the  $y$ - $z$  plane through which the resultant force of the wrench will pass.

**Q3-** The uniform ventilator door shown in Fig(3) has a mass of 200Kg and is hinged at the corners  $A$  and  $B$  of its upper edge .The door is held open in a horizontal position by the wire  $C$  to  $D$ . Find the tension in the wire and the forces at the hinge pins at  $A$  and  $B$ .

**Q4-** Find the resultant  $R$  of the force system shown in Fig (4), move it to point  $O$  with its moment  $M$ .

**Q5-** Calculate the forces in members  $DK$ ,  $KL$  and  $CL$  for the truss shown in fig(5).

**Q6-** The frame shown in Fig(6) supports the 400kg ,find the horizontal and vertical components of all forces acting on each of the members.

**Q7-** Find the centroid of the shaded area shown in Fig(7)

**Note: Figure of each question is required in your answers.**

**GOOD LUCK**



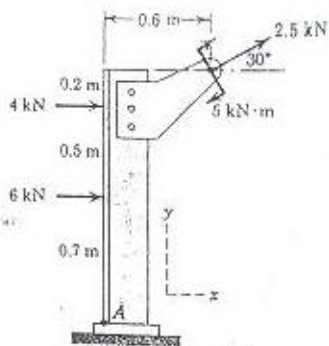


Fig. Q1

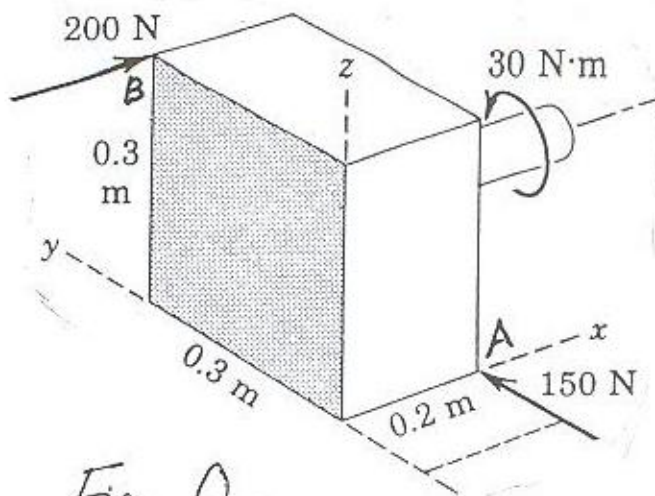


Fig. Q2

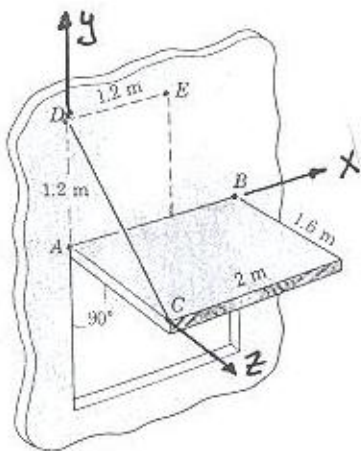


Fig Q3

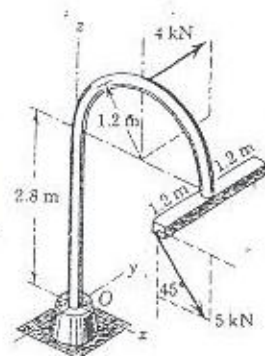


Fig Q4

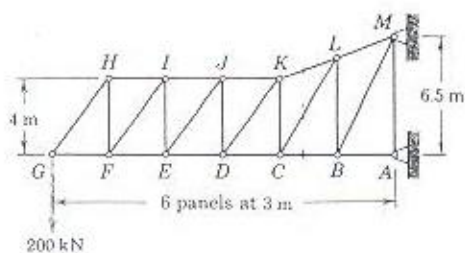


Fig Q5

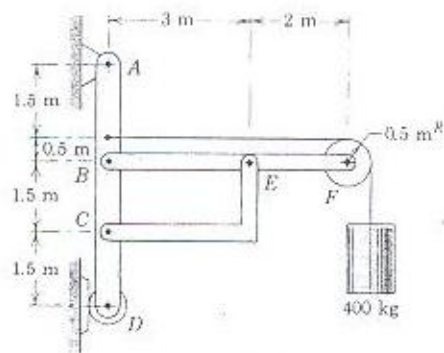


Fig Q6

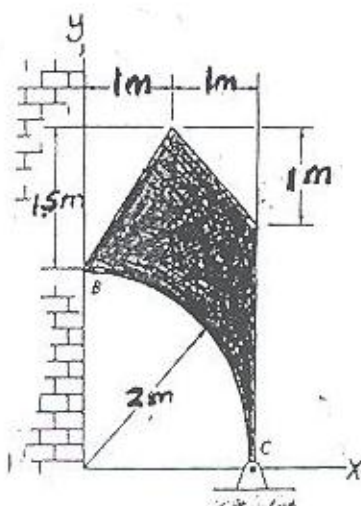


Fig Q7



University of Technology  
Mechanical Engineering Department  
Final Examination 2010/2011

Subject: Engineering Mechanics I<sup>st</sup> Year  
Examiner(s): Dr. Ahmad Al-Beirutli

Exam Time: Three Hours  
Date: 9/6/2011



Answer Five Questions Only  
All Questions Carry Equal Marks

- Q1: Find the resultant  $R$  of the force system shown in figure (1), show its position with respect to point  $O$ . Show also where  $R$  cuts the  $X$ -axis.
- Q2: Bar  $AC$  supports two  $400\text{ N}$  loads as shown in fig (2). Rollers at  $A$  and  $C$  rest against smooth surfaces and cable  $BD$  is attached at  $B$ .  
Find (a) the tension in cable  $BD$ .  
(b) the reactions at  $A$  and  $C$ .
- Q3: Find the projection of the force  $F = 100\text{ N}$  in the chain  $AB$  shown in fig (3) about a line joining point  $C$  and  $D$ .
- Q4: Find the resultant  $R$  of the three forces and a couple shown in fig (4), move it to point  $A$  with its moment.
- Q5: In the truss shown in fig (5), find the forces in members  $AB$ ,  $FE$  and  $BE$ .
- Q6: Find the centroid of the shaded area shown in fig (6).

**Note:** Figures of each question are required in your answers



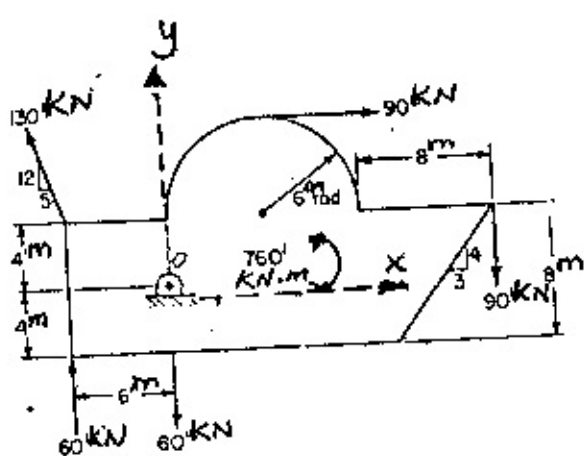


Fig Q<sub>1</sub>

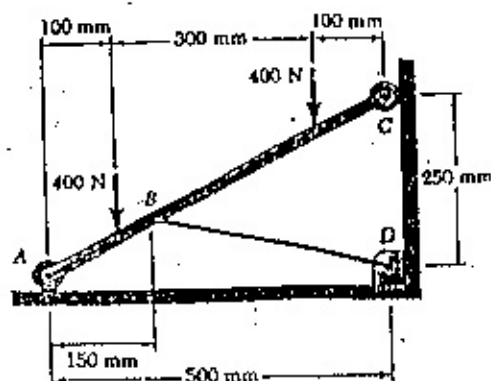


Fig Q<sub>2</sub>

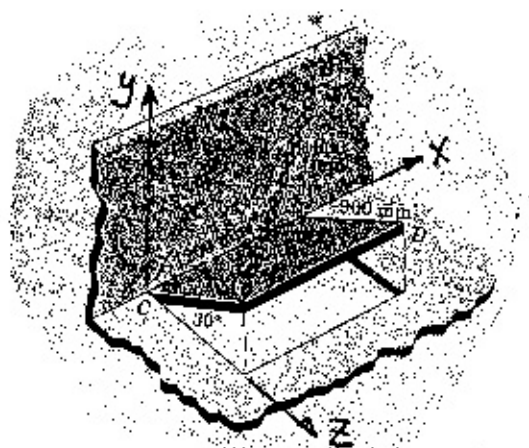


Fig Q<sub>3</sub>

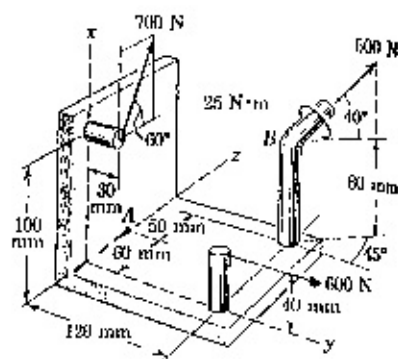


Fig Q<sub>4</sub>

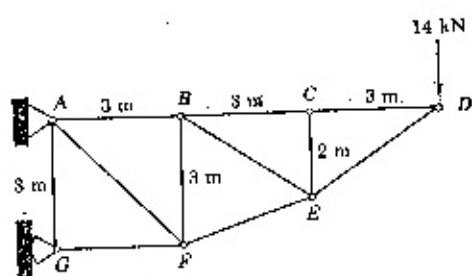


Fig Q<sub>5</sub>

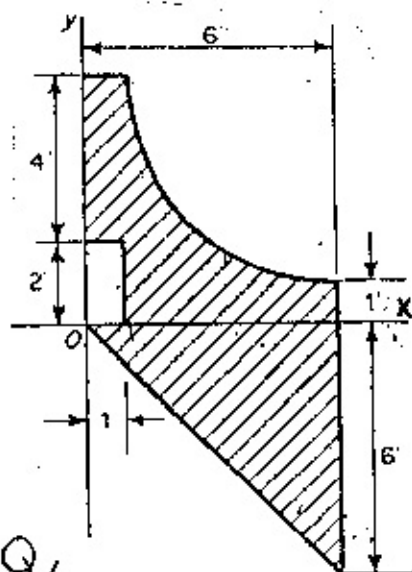


Fig Q<sub>6</sub>

**Answer Five Questions Only**

**Q1:** If the Resultant of the two Forces shown in Fig ( 1 ) is 1000 N Find :  
the angle  $\theta$  . Also find the angle between the resultant R and the  
horizontal.

**Q2:** Find the resultant of the Force System shown in Fig ( 2 ) and find  
its position with respect to point A .

**Q3:** In the equilibrium position shown in fig ( 3 ) , find the distance ( x ) and  
the reactions at A & B.

**Q4:** In Fig ( 4 ) , Find the component of the Force  $F=340$  N along the line AB,  
also find the angle  $\theta$  between F and the component.

**Q5:** In Fig ( 5 ) , replace the two Forces and single couple by a wrench and find  
the coordinates of point P in the y-z plane through which the wrench will  
Pass.

**Q6:** The uniform 7m steel shaft has a mass of 200 Kg and is supported by a ball  
& socket joint at A in the horizontal floor . B is a ball end resting against  
the smooth vertical walls as shown in Fig ( 6 ) , Find the Forces at A & B .

**Q7:** In the truss shown in Fig ( 7 ) Find the Forces in members AB, BC & DF .

الزمن : 3 ساعات  
التاريخ : 2009/6/1  
الممتحن : لجنة الميكانيك الهندسي

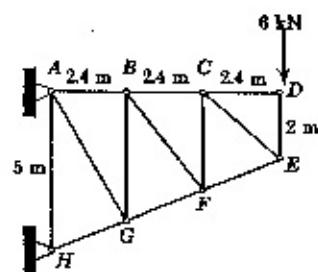
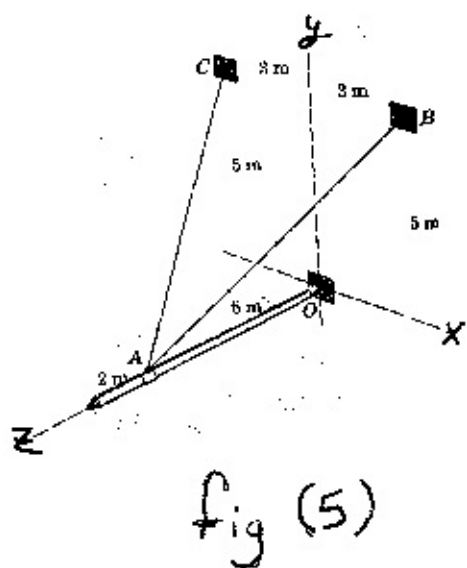
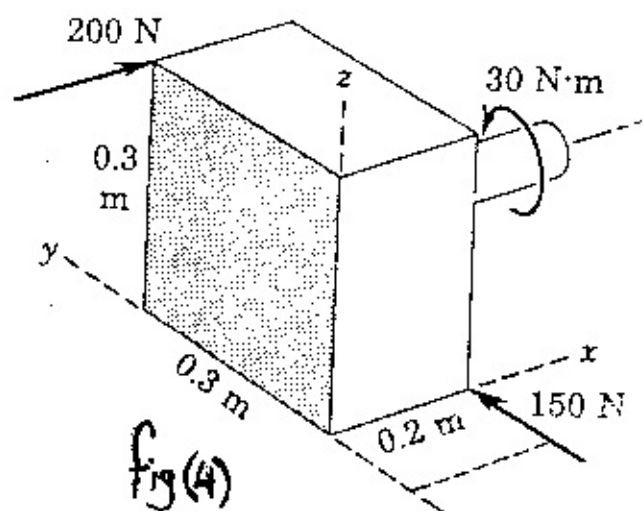
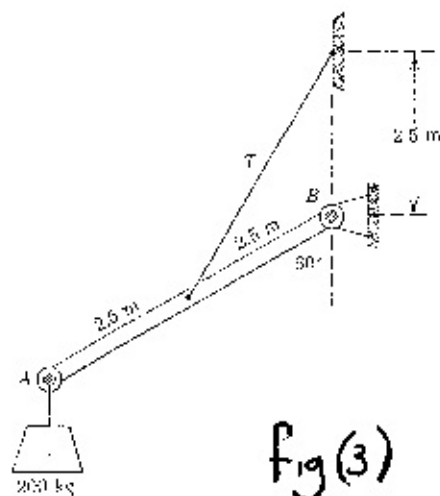
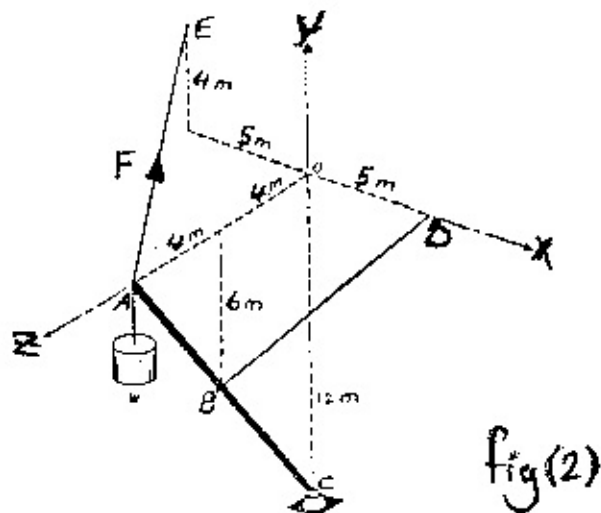
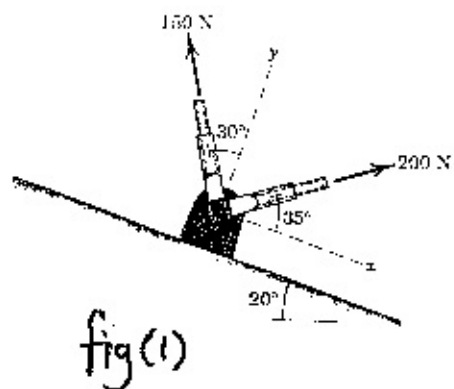
امتحان الدور الاول للعام  
2008/2009

الجامعة التكنولوجية  
قسم هندسة المكان والمعدات  
المادة : الميكانيك الهندسي

Answer five Questions Only

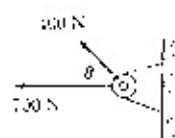
- Q1:** Find the resultant  $R$  of the two forces shown in Fig ( 1 ) .Express  $R$  as a force vector in terms of  $i$  &  $j$  on the  $x$ -and  $y$  axes . Find also the angle between  $R$  and the  $x$ - axis .
- Q2:** If the projection of the force  $F$  on the line  $BD$  is  $75\text{ N}$  , find the magnitude of the force  $F$  .Fig ( 2 ) .
- Q3:** The uniform bar  $AB$  shown in Fig ( 3 ) has a mass of  $50\text{ Kg}$  and supports the  $200\text{ Kg}$  load at  $A$  .Calculate the tension  $T$  and the reaction forces at  $B$  .
- Q4:** Replace the force system shown in Fig ( 4 ) by a wrench resultant and find the coordinates of point  $P$  in the  $y$ - $z$  plane through which the wrench resultant will pass.
- Q5:** The uniform horizontal bar shown in Fig ( 5 ) has a mass of  $240\text{ Kg}$  and is Supported by the two cables at  $B$  and  $C$  and by the ball and socket joint at  $O$  . Calculate the tension  $T$  in cable  $AC$  and the reaction at  $O$  .
- Q6:** In the truss shown in Fig ( 6 ),calculate the force in members  $AB$ ,  $CD$  ,  $BG$



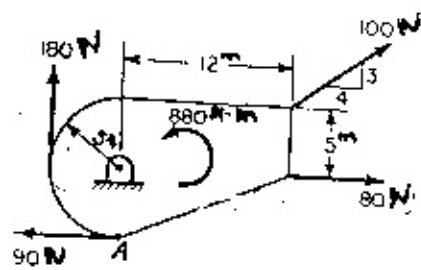


أجب عن خمسة أسئلة على ان يكون السؤال السادس من فضلك

- Q<sub>1</sub>: Replace the force system shown in fig (1) by a wrench.  
Find the magnitude of the moment and the coordinates of point P in the y-z plane through which the resultant force of the wrench passes.
- Q<sub>2</sub>: In the equilibrium position shown in fig (2), the uniform bar AB has a mass of 50 kg and supports the 200 kg load at A. Calculate the tension T in the cable and the magnitude of the force at B.
- Q<sub>3</sub>: A 4 meter bar of negligible weight rests in a horizontal position on the smooth planes shown in fig (3). Find the distance X at which load  $T = 100 \text{ N}$  should be placed from point B to keep the bar in the horizontal position and find the reactions at A and B.
- Q<sub>4</sub>: The pipe ACDE is supported by ball and socket joints at A and E and by the wire DF as shown in fig (4). Determine the tension in the wire when a 640 N load is applied at B.
- Q<sub>5</sub>: Find the projection of the 100 N tension force of the cord CE on the hinge axis BA, also find the angle.
- Q<sub>6</sub>: Find the forces in members AF, FE and DE of the truss shown in fig (6).



fig(1)



fig(2)

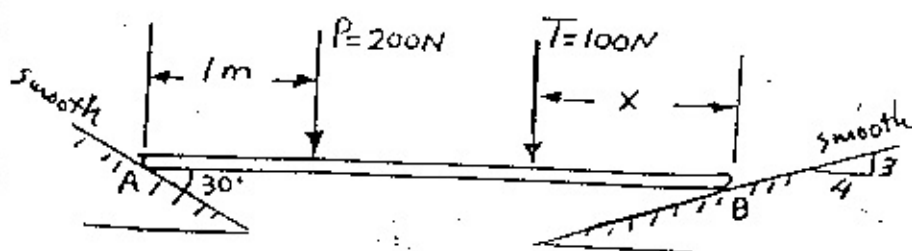


fig (3)

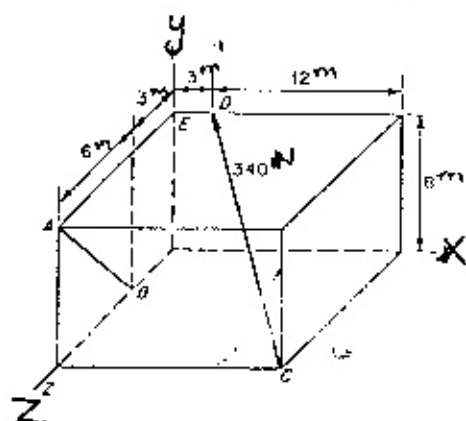


fig (4)

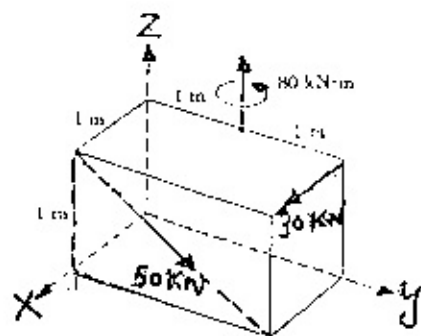


fig (5)

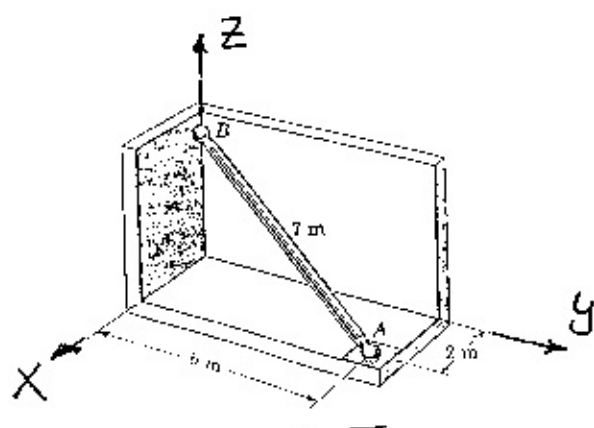


fig (6)

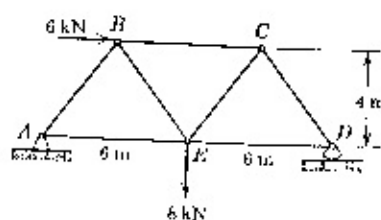


fig (7)





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Answer Five Questions Only

All Questions Carry Equal Marks

Q1: Find  $R$  of the two forces shown in fig(1). Express  $R$  as a force vector using  $i$  &  $j$  on the  $x$  &  $y$  axes. Find also the angle between  $R$  and the  $x$ -axis.

Q2: Find the resultant  $R$  of the force system shown in figure(2) and show where it cuts the  $x$ -axis.

Q3 : If the tension  $T$  in the cable  $AB$  shown in figure(3) is  $24\text{KN}$ , find the moment of  $T$  about  $O$ .

Q4 : Replace the force system shown in figure(4) by a wrench resultant and find the coordinates of point  $P$  in the  $XZ$  plane through which the resultant will pass.

Q5 : The uniform  $15\text{ m}$  pole shown in figure (5) has a mass of  $150\text{ Kg}$  and is supported by its ends  $A$  and  $B$  against the smooth vertical walls and by the tension  $T$  in the vertical cable, find the reactions at  $A$  and  $B$ .

Q6: Calculate the forces in members  $AB$ ,  $BG$  and  $CD$  for the truss shown in figure(6) :

Q7 : Find the centroid of the shaded area shown in figure(7) .

Note : Figures of each question are required in your answers .

GOOD LUCK

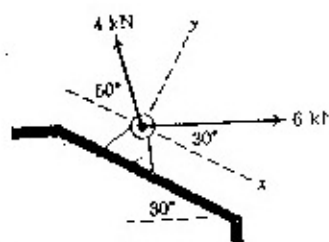


Fig Q<sub>1</sub>

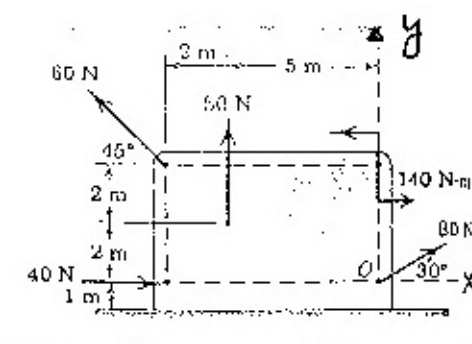


Fig Q<sub>2</sub>

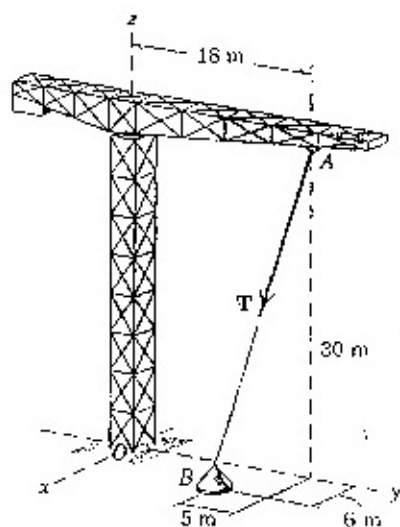


Fig Q<sub>3</sub>

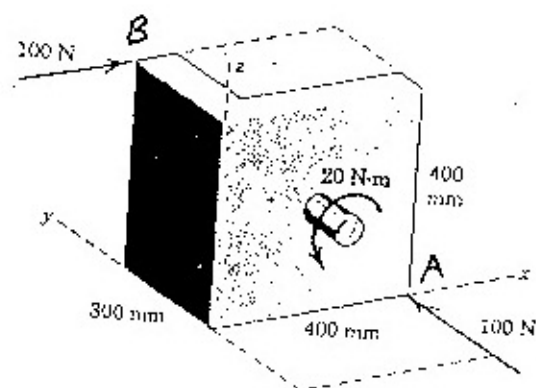


Fig Q<sub>4</sub>

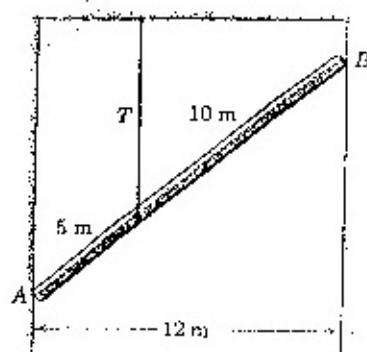


Fig Q<sub>5</sub>

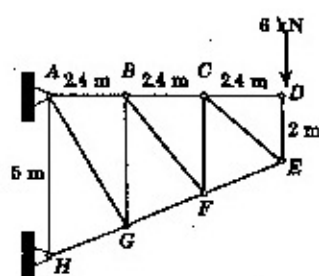


Fig Q<sub>6</sub>

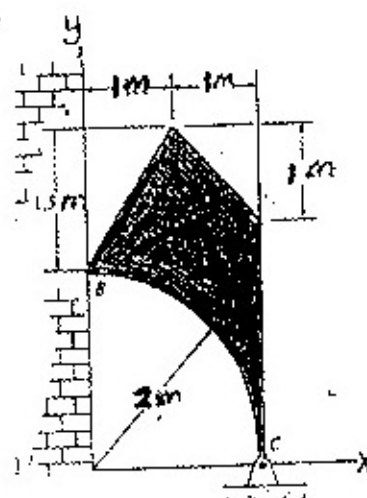


Fig Q<sub>7</sub>



Answer Five Questions Only  
All Questions Carry Equal Marks

Q1: Find the resultant  $R$  of the force system shown in figure (1), show its position with respect to point  $O$ . Show also where  $R$  cuts the  $X$ -axis.

Q2: Bar  $AC$  supports two  $400\text{ N}$  loads as shown in fig (2). Rollers at  $A$  and  $C$  rest against smooth surfaces and cable  $BD$  is attached at  $B$ .

Find (a) the tension in cable  $BD$ .  
(b) the reactions at  $A$  and  $C$ .

Q3: Find the projection of the force  $F = 100\text{ N}$  in the chain  $AB$  shown in fig (3) about a line joining point  $C$  and  $D$ .

Q4: Find the resultant  $R$  of the three forces and a couple shown in fig (4), move it to point  $A$  with its moment.

Q5: In the truss shown in fig (5), find the forces in members  $AB$ ,  $FE$  and  $BE$ .

Q6: Find the centroid of the shaded area shown in fig (6).

**Note:** Figures of each question are required in your answers

GOOD LUCK



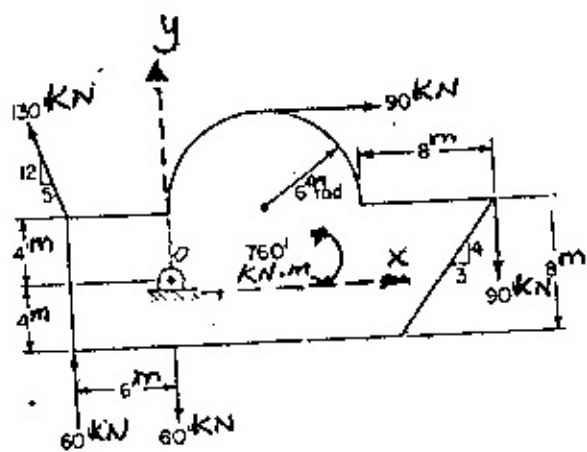


Fig Q<sub>1</sub>

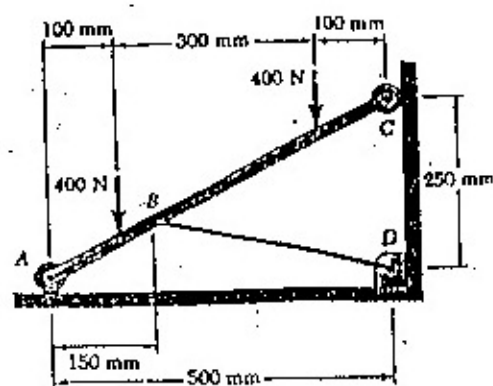


Fig Q<sub>2</sub>

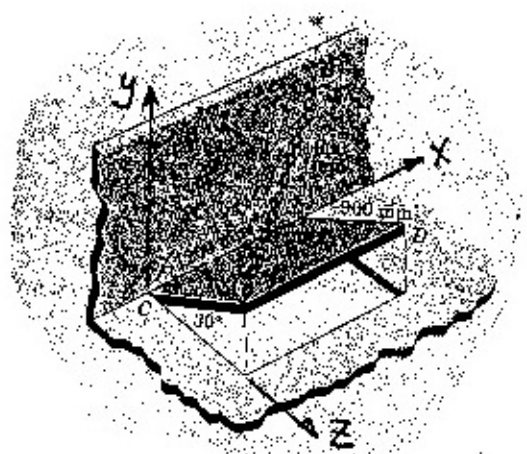


Fig Q<sub>3</sub>

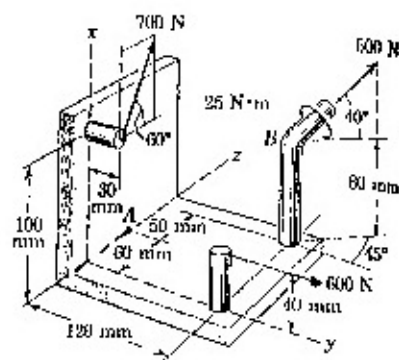


Fig Q<sub>4</sub>

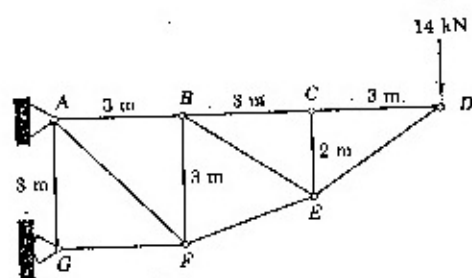


Fig Q<sub>5</sub>

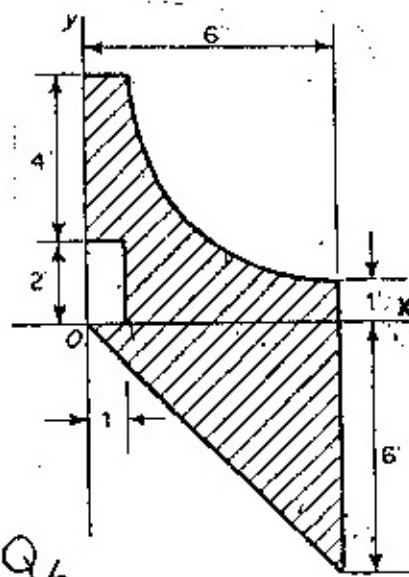


Fig Q<sub>6</sub>

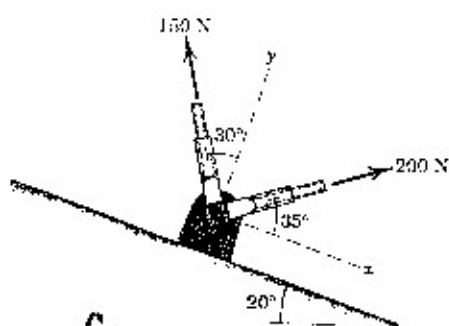
الزمن : 3 ساعات  
التاريخ : 2009/6/1  
الممتحن : لجنة الميكانيك الهندسي

امتحان الدور الاول للعام  
2009/2008

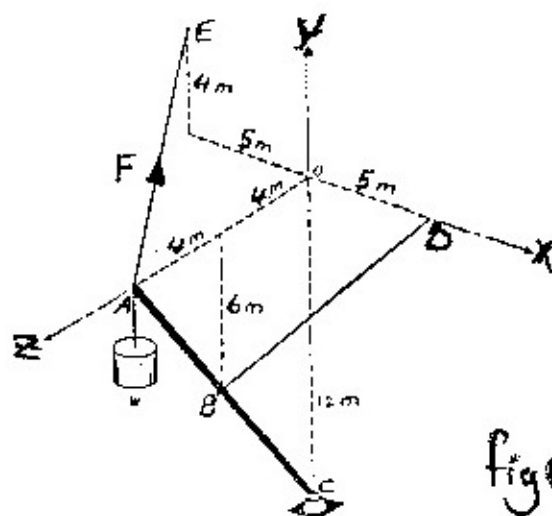
الجامعة التكنولوجية  
قسم هندسة الماكائن والمعدات  
المادة : الميكانيك الهندسي

Answer five questions Only

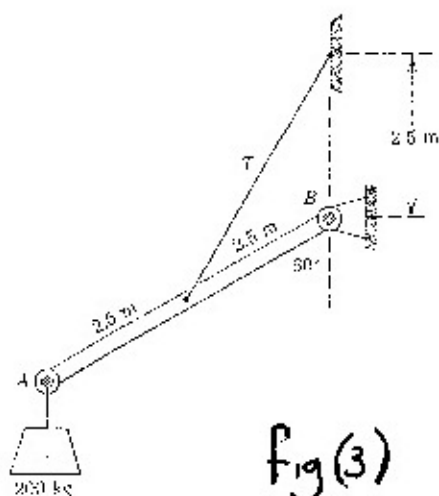
- Q1: Find the resultant  $R$  of the two forces shown in Fig ( 1 ). Express  $R$  as a force vector in terms of  $i$  &  $j$  on the  $x$ -and  $y$  axes . Find also the angle between  $R$  and the  $x$ - axis .
- Q2: If the projection of the force  $F$  on the line  $BD$  is  $75\text{ N}$  , find the magnitude of the force  $F$  . Fig ( 2 ) .
- Q3: The uniform bar  $AB$  shown in Fig ( 3 ) has a mass of  $50\text{ Kg}$  and supports the  $200\text{ Kg}$  load at  $A$  . Calculate the tension  $T$  and the reaction forces at  $B$  .
- Q4: Replace the force system shown in Fig ( 4 ) by a wrench resultant and find the coordinates of point  $P$  in the  $y$ - $z$  plane through which the wrench resultant will pass.
- Q5: The uniform horizontal bar shown in Fig ( 5 ) has a mass of  $240\text{ Kg}$  and is Supported by the two cables at  $B$  and  $C$  and by the ball and socket joint at  $O$  . Calculate the tension  $T$  in cable  $AC$  and the reaction at  $O$  .
- Q6: In the truss shown in Fig ( 6 ), calculate the force in members  $AB$ ,  $CD$  ,  $BC$



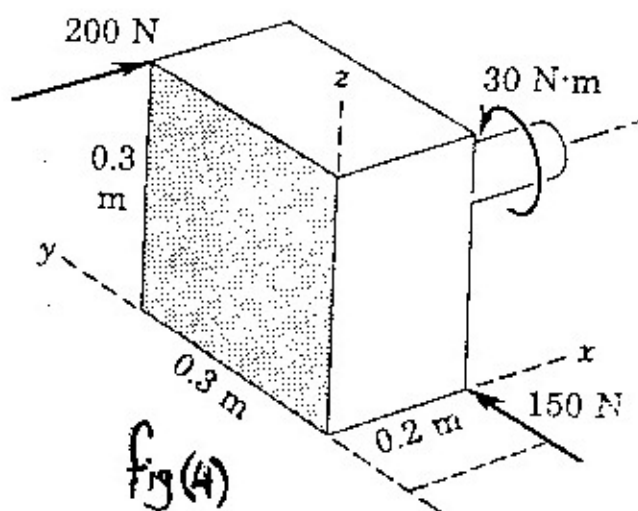
fig(1)



fig(2)



fig(3)



fig(4)

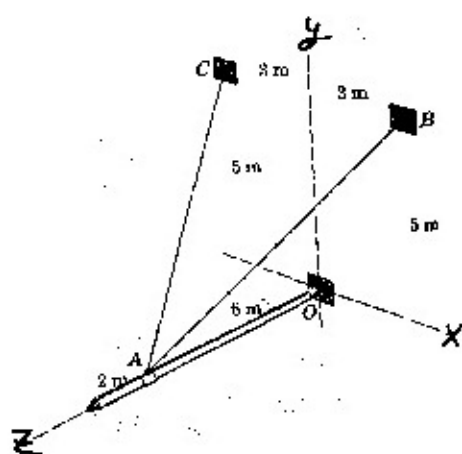


fig (5)

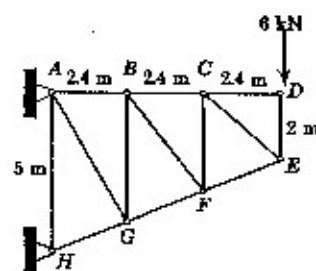


fig (6)



المرحلة الأولى

امتحان مادة الهندسة الكهربائية

مدرس المادة: د. أحمد الخروشي

باسم القاري

بسم الله الرحمن الرحيم

أحداثيات الدور الأول للعام الدراسي ٢٠٠٢ / ٢٠٠٣

التاريخ: ١١ / ٢٠٠٣

الجامعة التكنولوجية

قسم هندسة الميكانيك والمعدات

المزاد: ٢٢٢٢٢٢٢٢

Answer the following

Q1- Find the resultant of the coplanar force system shown in fig.(1) and locate it with respect to point O

Q2- The tension in the chain shown in fig.(2) is 30 N. Find the projected component of the tension force along the line CD. Also find  $\theta$  between the tension force and the projection.

Q3- Replace the force system shown in fig.(3) by a single force  $R$  at  $A$  and a moment  $M$ .

Q4- If the moment of the force  $F$  about the line AD is 1200 N.m find  $F$ .

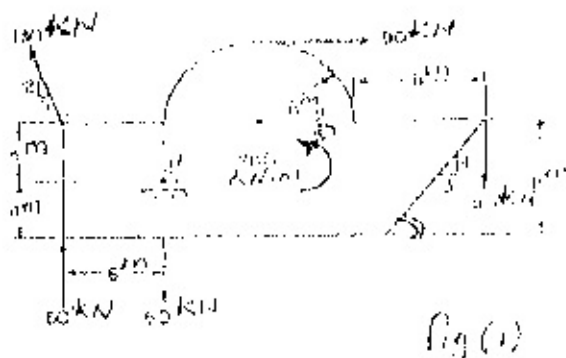


Fig (1)

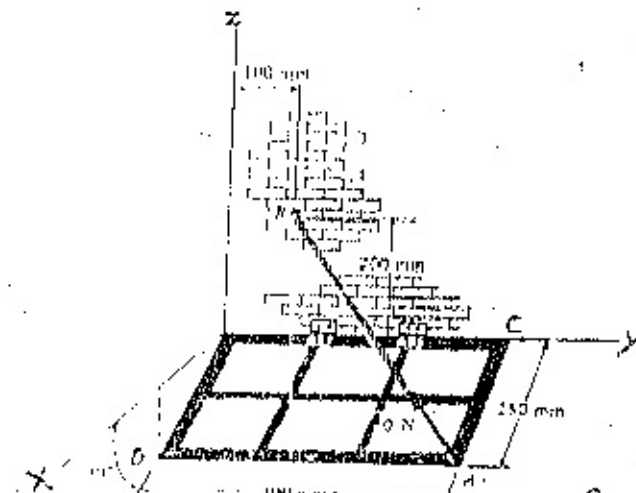


Fig (2)

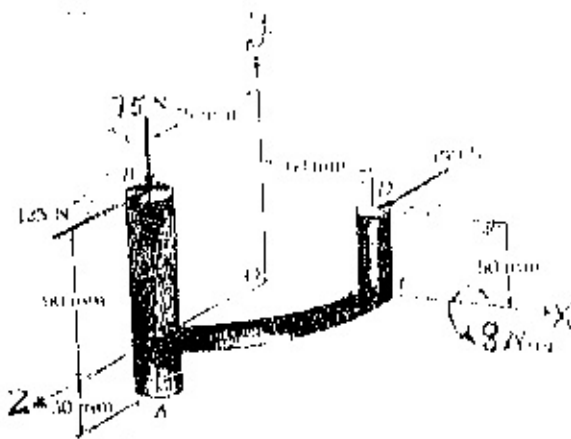


Fig (3)

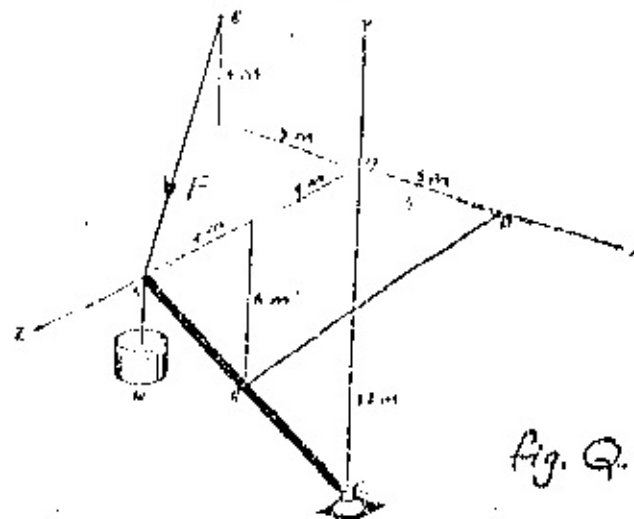


Fig. Q. (4)

الزمن : ساعتان

مدرس المادة : د. محمد البيروي

د. باسم رافعي

الملاحظات :

الدرجة : ١١

المادة : ميكانيك (١)

التاريخ : ١٠ / ١١ / ٢٠٠٢

Answer the following :

Q<sub>1</sub>: The tension in the cord shown in fig (1) is 60N. Find the projected component of the tension on AC. Also find the angle between the tension and AC.

Q<sub>2</sub>: In fig (2) determine:

(a) the angle  $\theta$  for which  $\sum M_A = 0$

(b) for  $\theta = 30^\circ$ , find the distance  $y$  for which  $\sum M_A = 0$ .

Q<sub>3</sub>: Replace the force system shown in fig (3) by a single force and show where it intersect the member AB measured from point A.

Q<sub>4</sub>: Replace the force system shown in fig (4) by a single force  $R$  at A and a moment  $M$ .

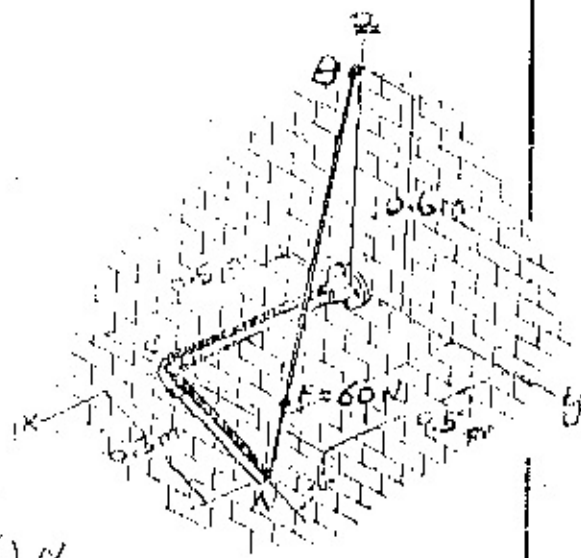


Fig (1)

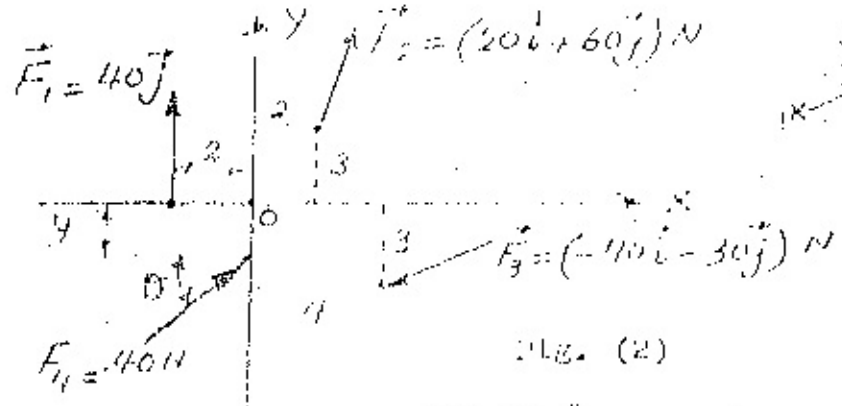


Fig. (2)

All Distances in m

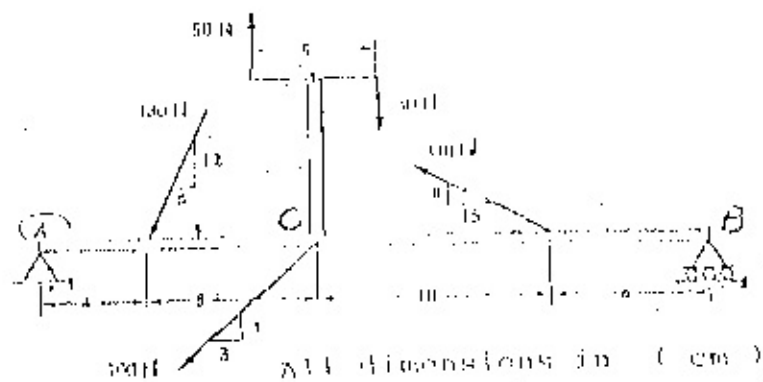


Fig (3)

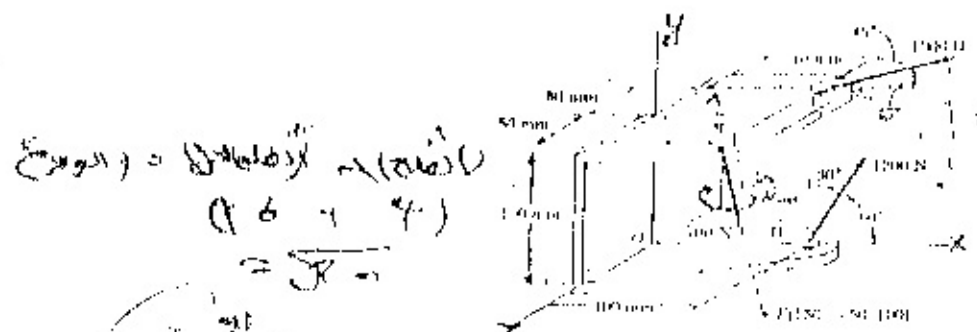


Fig (4)

Answer five Questions Only  
All questions carry equal marks

Q1- Replace the three forces and couple by an equivalent force  $R$  at  $z$  and a couple  $M$ . Specify  $M$  and the magnitude of  $R$ . Fig.(1)

Q2- Replace the force system shown in fig.(2) by a wrench resultant. Find the coordinates of point  $p$  in the  $y-z$  plane through which the resultant force of the wrench will pass.

Q-3 The uniform 7-m steel shaft has a mass of 200 kg and is supported by a ball-and-socket joint at A in the horizontal floor. The ball end B rests against the smooth vertical walls as shown. Compute the forces exerted by the walls and the floor on the ends of the shaft. Fig.(3).

Q-4 Calculate the forces in members  $FG$ ,  $EG$ , and  $GD$  for the loaded cantilever truss. Fig.(4).

Q-5 A 600N horizontal force is applied to pin A of the frame shown in fig.(5). Determine the forces acting on the two vertical members of the frame.

Q-6 For the shaded area shown in fig.(6), find:

- The centroid.
- The moment of inertia about the  $x$ -axis.



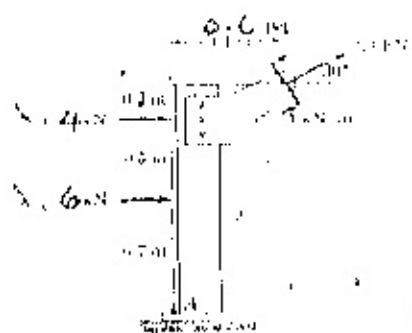


fig (1)

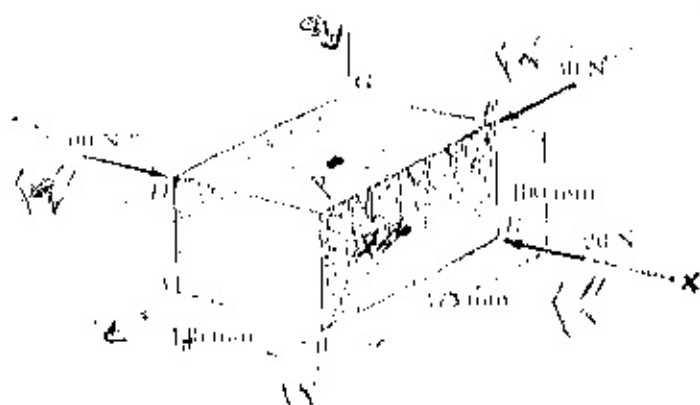


fig (2)

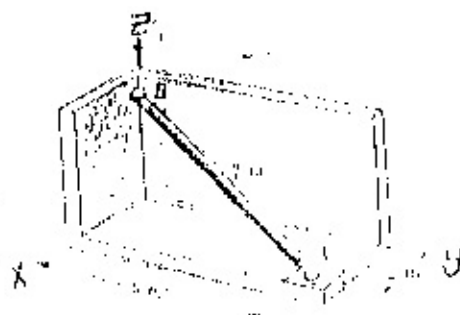


fig (3)

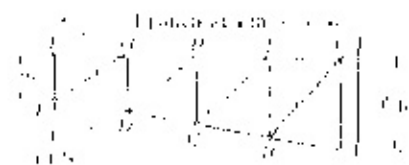


fig (4)

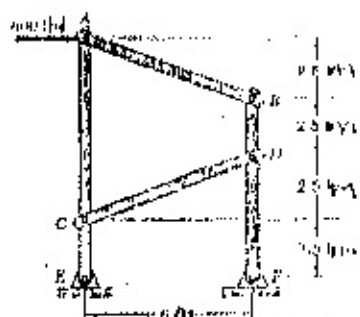


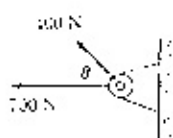
fig (5)



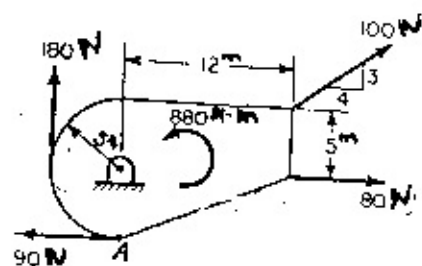
fig (6)

**Answer Five Questions Only**

- Q1:** If the Resultant of the two Forces shown in Fig (1) is 1000 N Find :  
the angle  $\theta$ . Also find the angle between the resultant R and the horizontal.
- Q2:** Find the resultant of the Force System shown in Fig (2) and find its position with respect to point A.
- Q3:** In the equilibrium position shown in fig (3), find the distance (x) and the reactions at A & B.
- Q4:** In Fig (4), Find the component of the Force  $F=340$  N along the line AB, also find the angle  $\theta$  between F and the component.
- Q5:** In Fig (5), replace the two Forces and single couple by a wrench and find the coordinates of point P in the y-z plane through which the wrench will Pass.
- Q6:** The uniform 7m steel shaft has a mass of 200 Kg and is supported by a ball & socket joint at A in the horizontal floor. B is a ball end resting against the smooth vertical walls as shown in Fig (6), Find the Forces at A & B.
- Q7:** In the truss shown in Fig (7) Find the Forces in members AB, BC & DE.



fig(1)



fig(2)

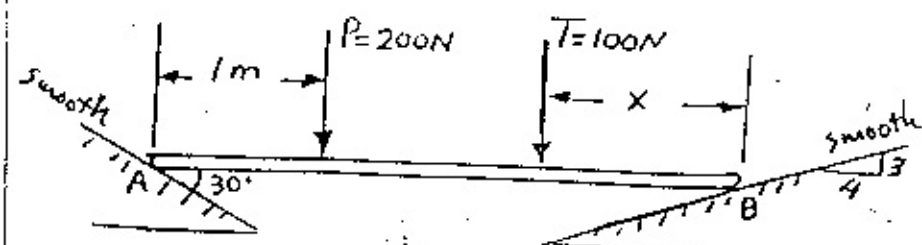


fig (3)

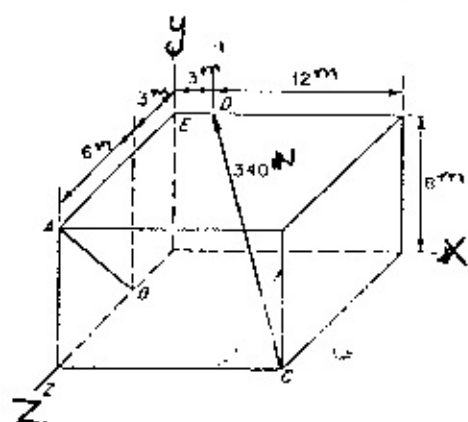


fig (4)

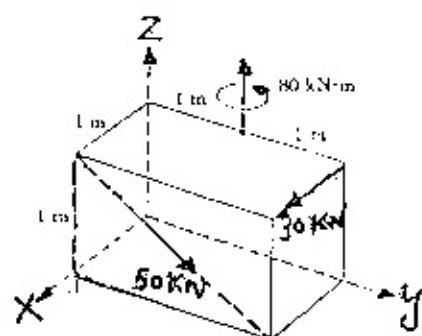


fig (5)

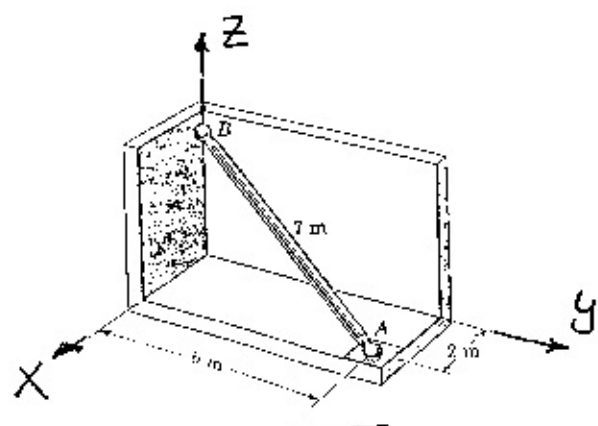


fig (6)

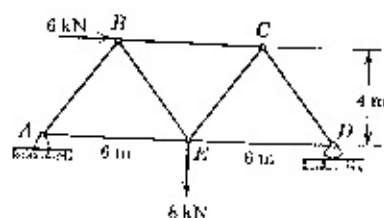


fig (7)



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Answer Five Questions Only

All Questions Carry Equal Marks

Q1: Find  $R$  of the two forces shown in fig(1). Express  $R$  as a force vector using  $i$  &  $j$  on the  $x$  &  $y$  axes. Find also the angle between  $R$  and the  $x$ -axis.

Q2: Find the resultant  $R$  of the force system shown in figure(2) and show where it cuts the  $x$ -axis.

Q3 : If the tension  $T$  in the cable  $AB$  shown in figure(3) is  $24\text{KN}$ , find the moment of  $T$  about  $O$ .

Q4 : Replace the force system shown in figure(4) by a wrench resultant and find the coordinates of point  $P$  in the  $XZ$  plane through which the resultant will pass.

Q5 : The uniform  $15\text{ m}$  pole shown in figure (5) has a mass of  $150\text{ Kg}$  and is supported by its ends  $A$  and  $B$  against the smooth vertical walls and by the tension  $T$  in the vertical cable, find the reactions at  $A$  and  $B$ .

Q6: Calculate the forces in members  $AB$ ,  $BG$  and  $CD$  for the truss shown in figure(6) :

Q7 : Find the centroid of the shaded area shown in figure(7) .

Note : Figures of each question are required in your answers .



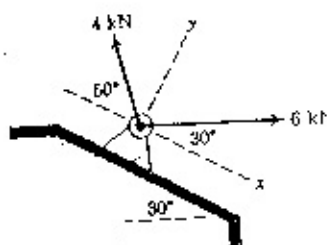


Fig Q<sub>1</sub>

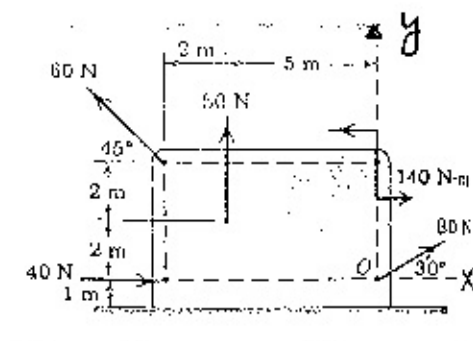


Fig Q<sub>2</sub>

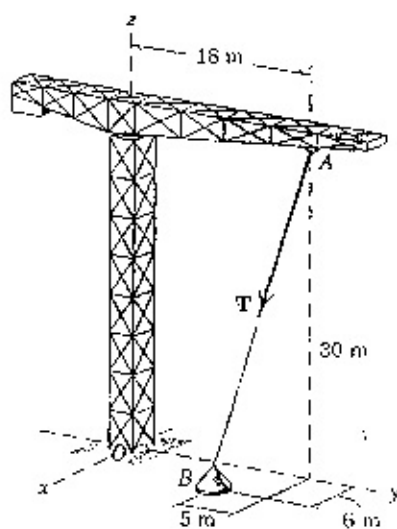


Fig Q<sub>3</sub>

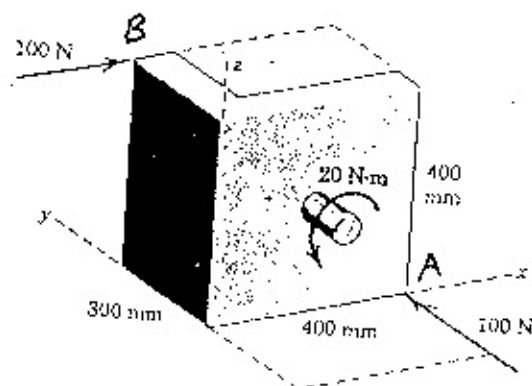


Fig Q<sub>4</sub>

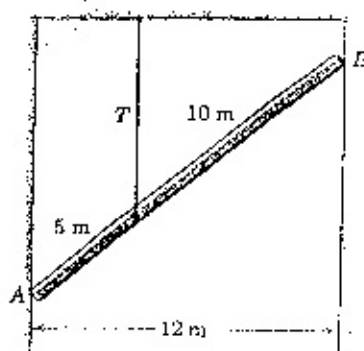


Fig Q<sub>5</sub>

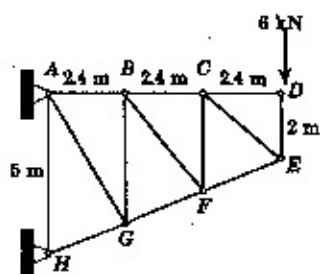


Fig Q<sub>6</sub>

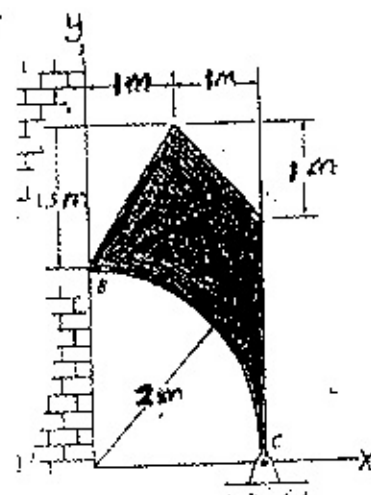


Fig Q<sub>7</sub>



University of Technology  
Mechanical Engineering Department  
Final Examination 2010/2011

Subject: Engineering Mechanics I<sup>st</sup> Year  
Examiner(s): Dr. Ahmad Al-Beirut

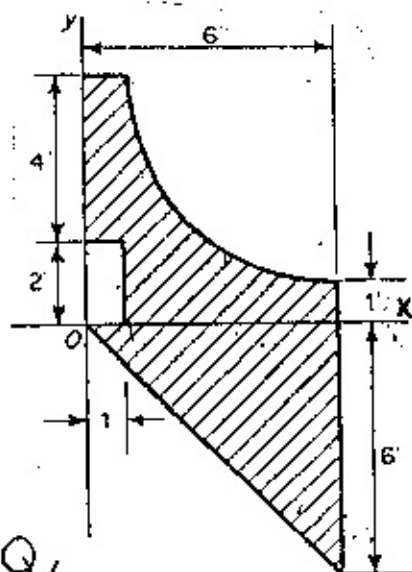
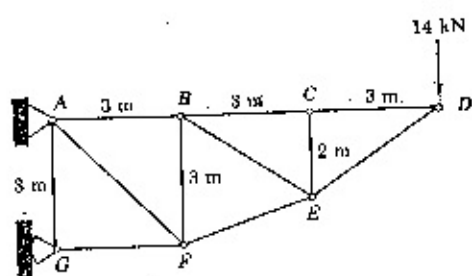
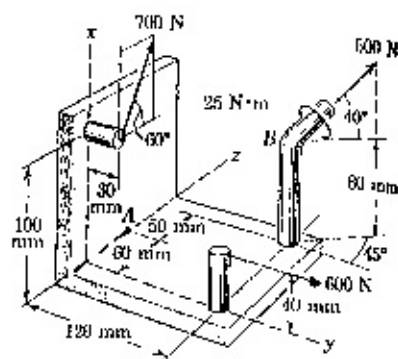
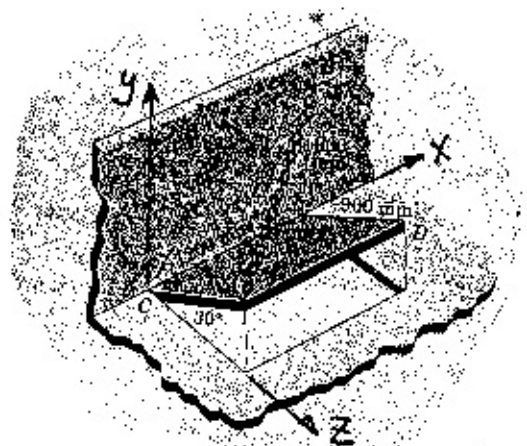
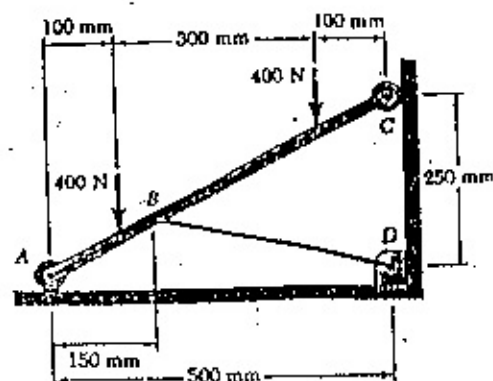
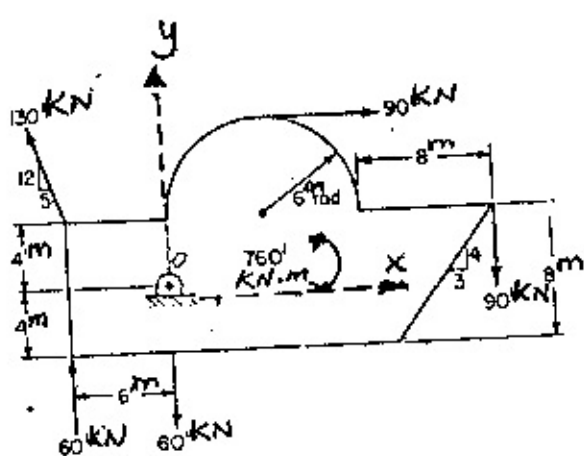
Exam Time: Three Hours  
Date: 9/6/2011



Answer Five Questions Only  
All Questions Carry Equal Marks

- Q1: Find the resultant  $R$  of the force system shown in figure (1), show its position with respect to point  $O$ . Show also where  $R$  cuts the  $X$ -axis.
- Q2: Bar  $AC$  supports two  $400\text{ N}$  loads as shown in fig (2). Rollers at  $A$  and  $C$  rest against smooth surfaces and cable  $BD$  is attached at  $B$ .  
Find (a) the tension in cable  $BD$ .  
(b) the reactions at  $A$  and  $C$ .
- Q3: Find the projection of the force  $F = 100\text{ N}$  in the chain  $AB$  shown in fig (3) about a line joining point  $C$  and  $D$ .
- Q4: Find the resultant  $R$  of the three forces and a couple shown in fig (4), move it to point  $A$  with its moment.
- Q5: In the truss shown in fig (5), find the forces in members  $AB$ ,  $FE$  and  $BE$ .
- Q6: Find the centroid of the shaded area shown in fig (6).

Note: Figures of each question are required in your answers



**Answer Five Questions Only**

**Q1:** If the Resultant of the two Forces shown in Fig ( 1 ) is 1000 N Find :  
the angle  $\theta$  .Also find the angle between the resultant R and the  
horizontal.

**Q2:** Find the resultant of the Force System shown in Fig ( 2 ) and find  
its position with respect to point A .

**Q3:** In the equilibrium position shown in fig ( 3 ) , find the distance ( x ) and  
the reactions at A & B.

**Q4:** In Fig (4), Find the component of the Force  $F=340$  N along the line AB,  
also find the angle  $\theta$  between F and the component.

**Q5:** In Fig ( 5 ) , replace the two Forces and single couple by a wrench and find  
the coordinates of point P in the y-z plane through which the wrench will  
Pass.

**Q6:** The uniform 7m steel shaft has a mass of 200 Kg and is supported by a ball  
& socket joint at A in the horizontal floor . B is a ball end resting against  
the smooth vertical walls as shown in Fig ( 6 ) , Find the Forces at A & B .

**Q7:** In the truss shown in Fig ( 7 ) Find the Forces in members AB, BC & DF .



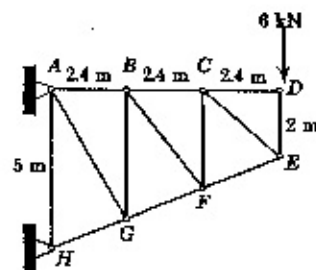
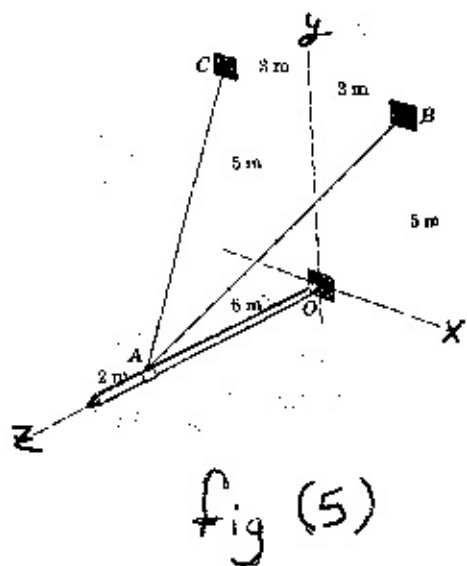
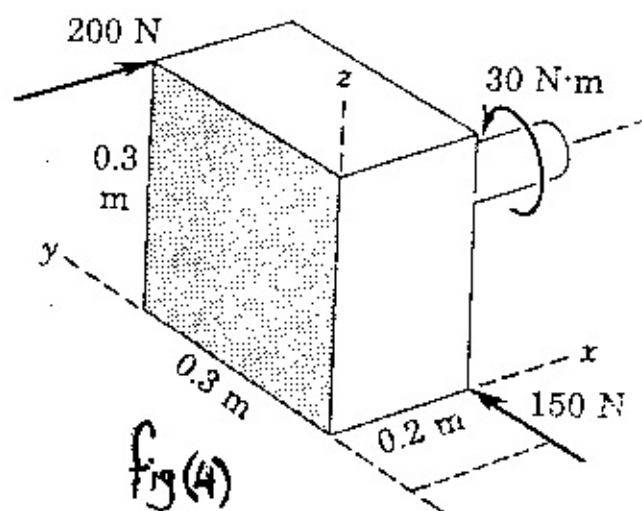
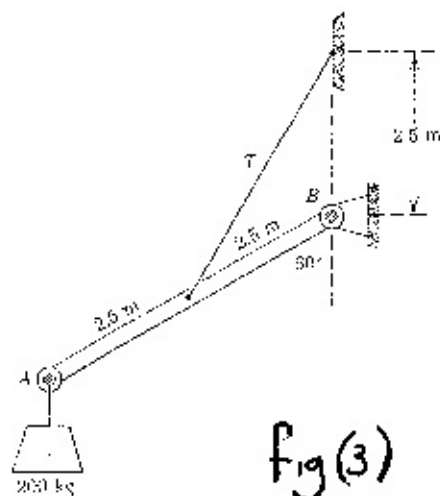
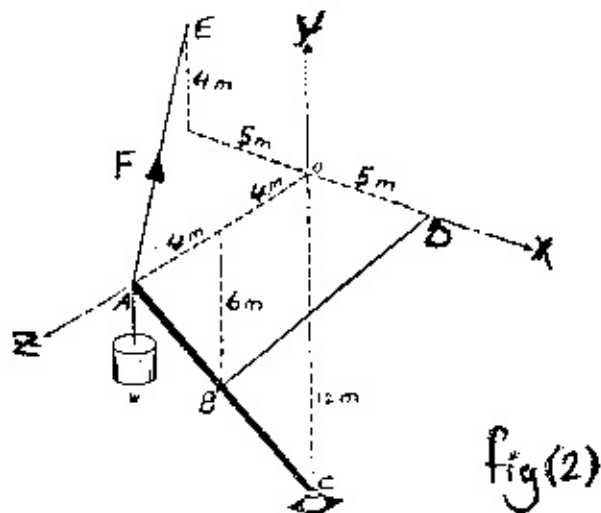
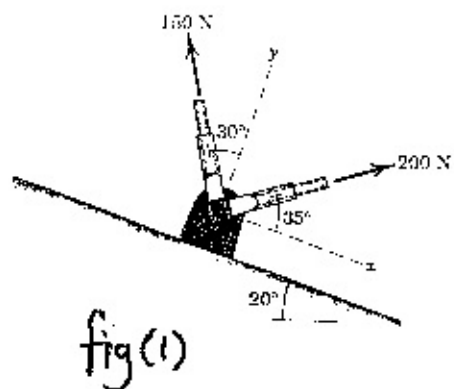
الزمن : 3 ساعات  
التاريخ : 2009/6/1  
الممحقن : لجنة الميكانيك الهندسي

امتحان الدور الاول للعام  
2009/2008

الجامعة التكنولوجية  
قسم هندسة المكان والمعدات  
المادة : الميكانيك الهندسي

Answer five Questions Only

- Q1:** Find the resultant  $R$  of the two forces shown in Fig ( 1 ) .Express  $R$  as a force vector in terms of  $i$  &  $j$  on the  $x$ -and  $y$  axes . Find also the angle between  $R$  and the  $x$ - axis .
- Q2:** If the projection of the force  $F$  on the line  $BD$  is  $75\text{ N}$  , find the magnitude of the force  $F$  .Fig ( 2 ) .
- Q3:** The uniform bar  $AB$  shown in Fig ( 3 ) has a mass of  $50\text{ Kg}$  and supports the  $200\text{ Kg}$  load at  $A$  .Calculate the tension  $T$  and the reaction forces at  $B$  .
- Q4:** Replace the force system shown in Fig ( 4 ) by a wrench resultant and find the coordinates of point  $P$  in the  $y$ - $z$  plane through which the wrench resultant will pass.
- Q5:** The uniform horizontal bar shown in Fig ( 5 ) has a mass of  $240\text{ Kg}$  and is Supported by the two cables at  $B$  and  $C$  and by the ball and socket joint at  $O$  . Calculate the tension  $T$  in cable  $AC$  and the reaction at  $O$  .
- Q6:** In the truss shown in Fig ( 6 ),calculate the force in members  $AB$ ,  $CD$  ,  $BG$



أجب عن خمسة أسئلة على ان يكون السؤال السادس من فضلك

Q<sub>1</sub>: Replace the force system shown in fig (1) by a wrench.  
Find the magnitude of the moment and the coordinates of point P in the y-z plane through which the resultant force of the wrench passes.

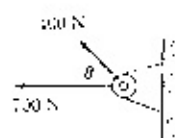
Q<sub>2</sub>: In the equilibrium position shown in fig (2), the uniform bar AB has a mass of 50 kg and supports the 200 kg load at A. Calculate the tension T in the cable and the magnitude of the force at B.

Q<sub>3</sub>: A 4 meter bar of negligible weight rests in a horizontal position on the smooth planes shown in fig (3). Find the distance x at which load  $T = 100 \text{ N}$  should be placed from point B to keep the bar in the horizontal position and find the reactions at A and B.

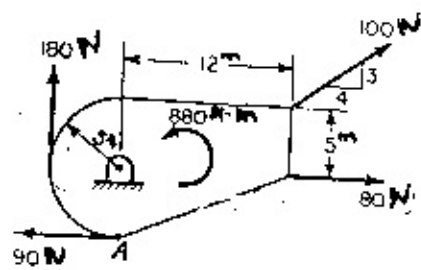
Q<sub>4</sub>: The pipe ACDE is supported by ball and socket joints at A and E and by the wire DF as shown in fig (4). Determine the tension in the wire when a 640 N load is applied at B.

Q<sub>5</sub>: Find the projection of the 100 N tension force of the cord CE on the hinge axis BA, also find the angle.

Q<sub>6</sub>: Find the forces in members AF, FE and DE of the truss shown in fig (6).



fig(1)



fig(2)

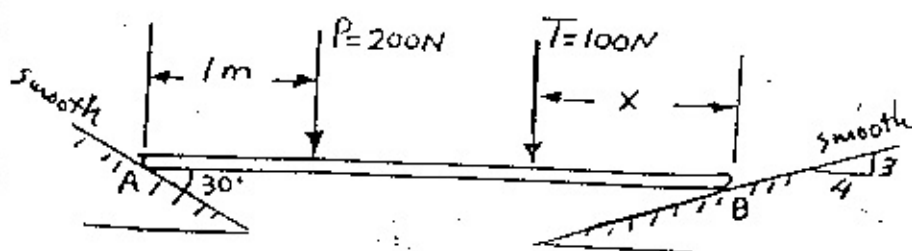


fig (3)

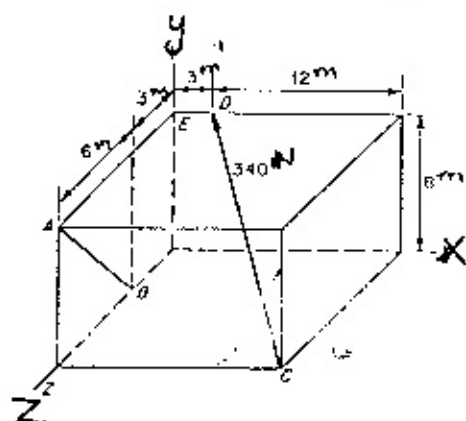


fig (4)

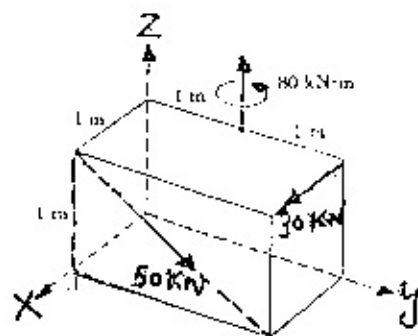


fig (5)

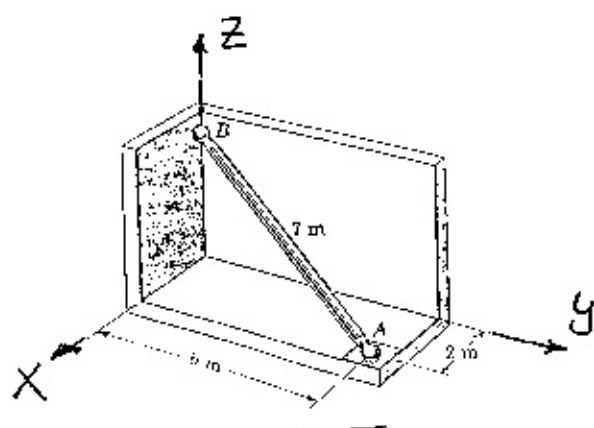


fig (6)

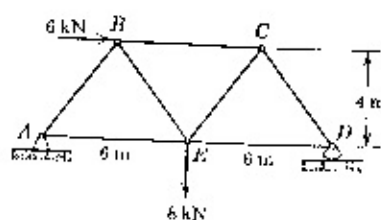


fig (7)





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Answer Five Questions Only

All Questions Carry Equal Marks

Q1: Find  $R$  of the two forces shown in fig(1). Express  $R$  as a force vector using  $i$  &  $j$  on the  $x$  &  $y$  axes. Find also the angle between  $R$  and the  $x$ -axis.

Q2: Find the resultant  $R$  of the force system shown in figure(2) and show where it cuts the  $x$ -axis.

Q3 : If the tension  $T$  in the cable  $AB$  shown in figure(3) is  $24\text{KN}$ , find the moment of  $T$  about  $O$ .

Q4 : Replace the force system shown in figure(4) by a wrench resultant and find the coordinates of point  $P$  in the  $XZ$  plane through which the resultant will pass.

Q5 : The uniform  $15\text{ m}$  pole shown in figure (5) has a mass of  $150\text{ Kg}$  and is supported by its ends  $A$  and  $B$  against the smooth vertical walls and by the tension  $T$  in the vertical cable, find the reactions at  $A$  and  $B$ .

Q6: Calculate the forces in members  $AB$ ,  $BG$  and  $CD$  for the truss shown in figure(6) :

Q7 : Find the centroid of the shaded area shown in figure(7) .

Note : Figures of each question are required in your answers .

GOOD LUCK

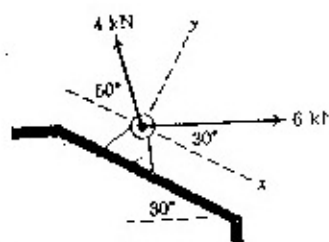


Fig Q<sub>1</sub>

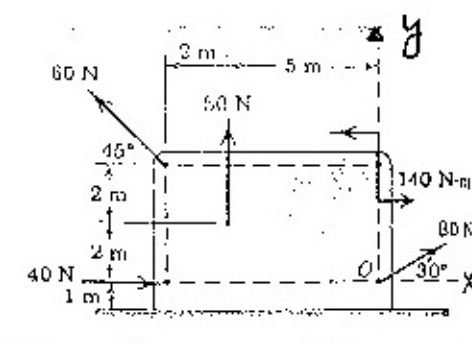


Fig Q<sub>2</sub>

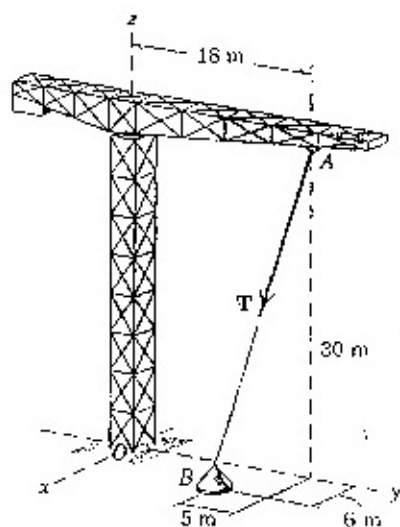


Fig Q<sub>3</sub>

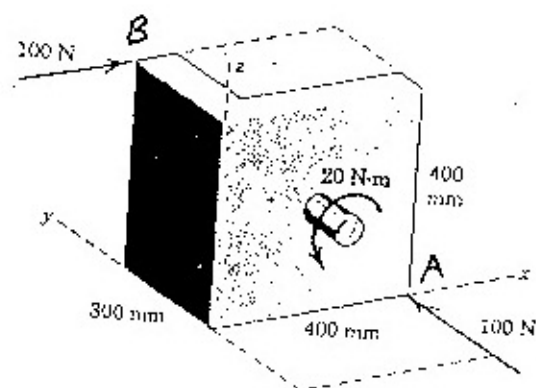


Fig Q<sub>4</sub>

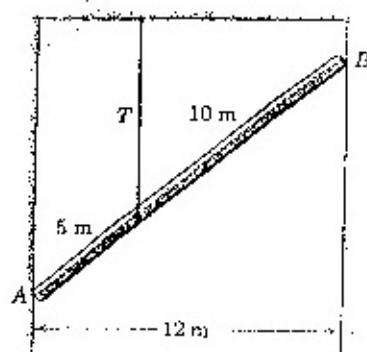


Fig Q<sub>5</sub>

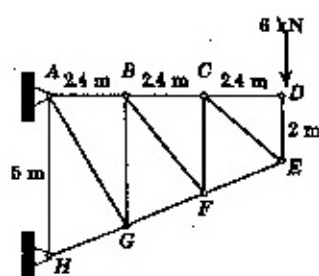


Fig Q<sub>6</sub>

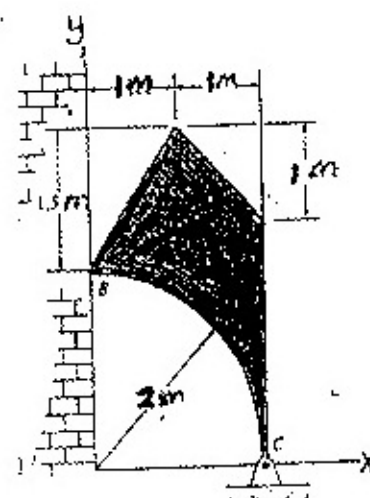


Fig Q<sub>7</sub>



Answer Five Questions Only  
All Questions Carry Equal Marks

Q1: Find the resultant  $R$  of the force system shown in figure (1), show its position with respect to point  $O$ . Show also where  $R$  cuts the  $X$ -axis.

Q2: Bar  $AC$  supports two  $400\text{ N}$  loads as shown in fig (2). Rollers at  $A$  and  $C$  rest against smooth surfaces and cable  $BD$  is attached at  $B$ .

- Find (a) the tension in cable  $BD$ .  
(b) the reactions at  $A$  and  $C$ .

Q3: Find the projection of the force  $F = 100\text{ N}$  in the chain  $AB$  shown in fig (3) about a line joining point  $C$  and  $D$ .

Q4: Find the resultant  $R$  of the three forces and a couple shown in fig (4), move it to point  $A$  with its moment.

Q5: In the truss shown in fig (5), find the forces in members  $AB$ ,  $FE$  and  $BE$ .

Q6: Find the centroid of the shaded area shown in fig (6).

**Note:** Figures of each question are required in your answers

GOOD LUCK

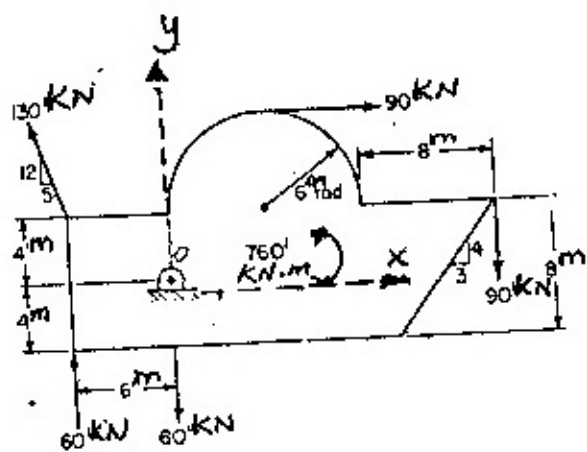


Fig Q<sub>1</sub>

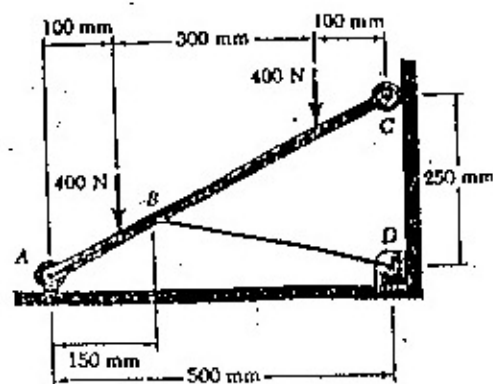


Fig Q<sub>2</sub>

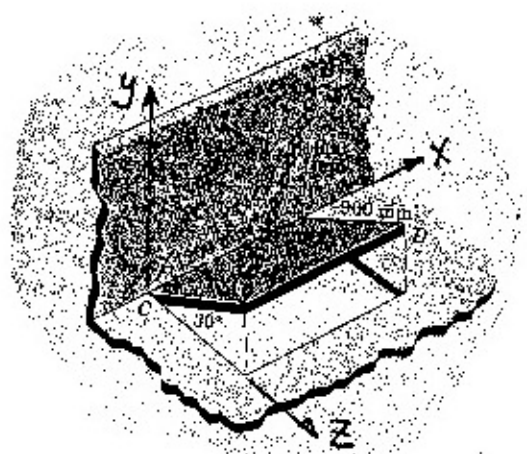


Fig Q<sub>3</sub>

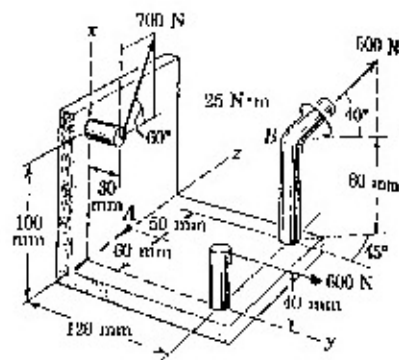


Fig Q<sub>4</sub>

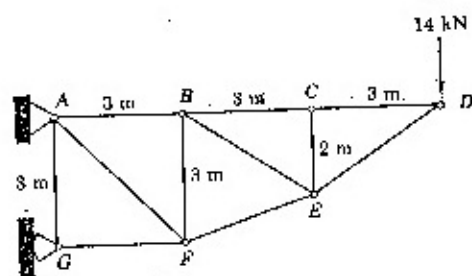


Fig Q<sub>5</sub>

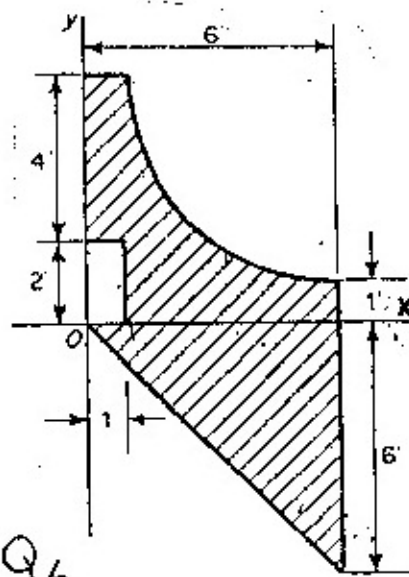


Fig Q<sub>6</sub>

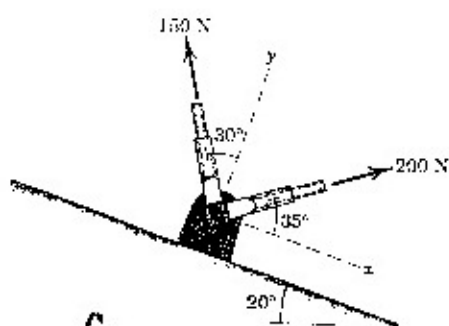
الزمن : 3 ساعات  
التاريخ : 2009/6/1  
الممتحن : لجنة الميكانيك الهندسي

امتحان الدور الاول للعام  
2009/2008

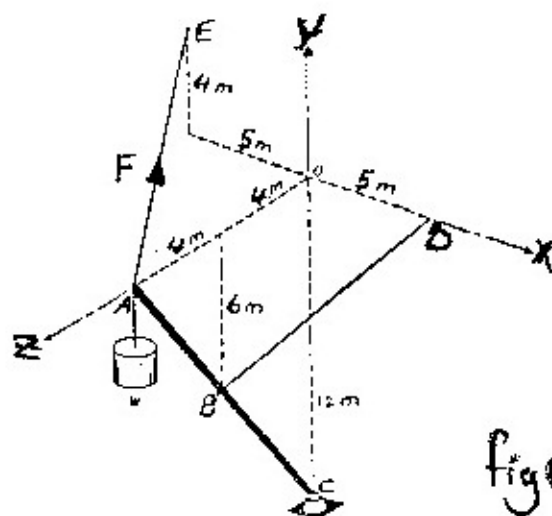
الجامعة التكنولوجية  
قسم هندسة الماكائن والمعدات  
المادة : الميكانيك الهندسي

Answer five Questions Only

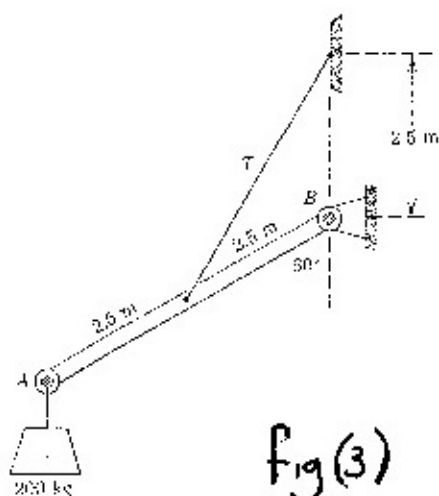
- Q1: Find the resultant  $R$  of the two forces shown in Fig ( 1 ). Express  $R$  as a force vector in terms of  $i$  &  $j$  on the  $x$ -and  $y$  axes . Find also the angle between  $R$  and the  $x$ - axis .
- Q2: If the projection of the force  $F$  on the line  $BD$  is  $75\text{ N}$  , find the magnitude of the force  $F$  . Fig ( 2 ) .
- Q3: The uniform bar  $AB$  shown in Fig ( 3 ) has a mass of  $50\text{ Kg}$  and supports the  $200\text{ Kg}$  load at  $A$  . Calculate the tension  $T$  and the reaction forces at  $B$  .
- Q4: Replace the force system shown in Fig ( 4 ) by a wrench resultant and find the coordinates of point  $P$  in the  $y$ - $z$  plane through which the wrench resultant will pass.
- Q5: The uniform horizontal bar shown in Fig ( 5 ) has a mass of  $240\text{ Kg}$  and is Supported by the two cables at  $B$  and  $C$  and by the ball and socket joint at  $O$  . Calculate the tension  $T$  in cable  $AC$  and the reaction at  $O$  .
- Q6: In the truss shown in Fig ( 6 ), calculate the force in members  $AB$ ,  $CD$  ,  $BC$



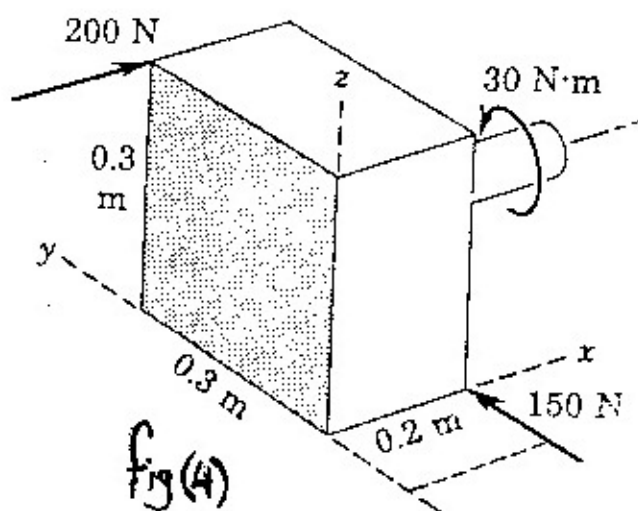
fig(1)



fig(2)



fig(3)



fig(4)

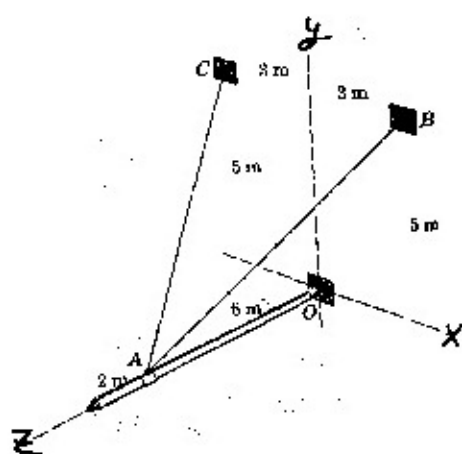


fig (5)

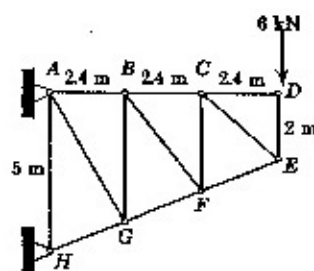


fig (6)



المرحلة الأولى

امتحان مادة الهندسة الكهربائية

مدرس المادة: د. أحمد الخروشي

باسم القاري

بسم الله الرحمن الرحيم

أحداثيات الدور الأول للعام الدراسي ٢٠٠٢ / ٢٠٠٣

التاريخ: ١١ / ٢٠٠٣

الجامعة التكنولوجية

قسم هندسة الميكانيك والمعدات

المزاد: ٢٢٢٢٢٢٢٢

Answer the following

Q1- Find the resultant of the coplanar force system shown in fig.(1) and locate it with respect to point O

Q2- The tension in the chain shown in fig.(2) is 30 N. Find the projected component of the tension force along the line CD. Also find  $\theta$  between the tension force and the projection.

Q3- Replace the force system shown in fig.(3) by a single force R at A and a moment M.

Q4- If the moment of the force F about the line AD is 1200 N.m find F.

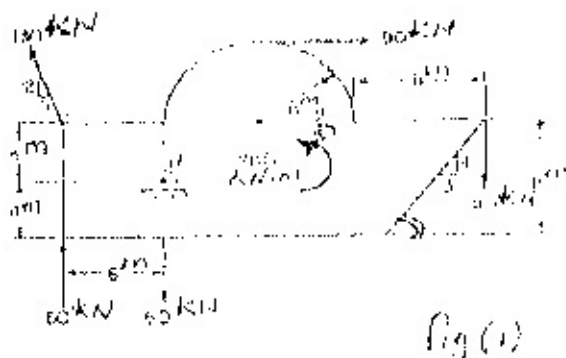


Fig (1)

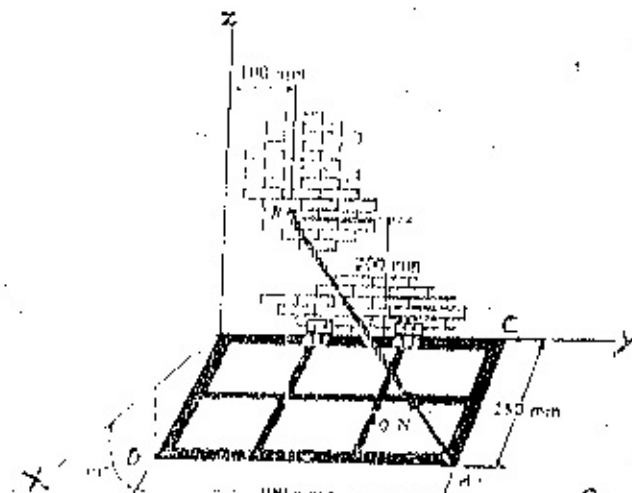


Fig (2)

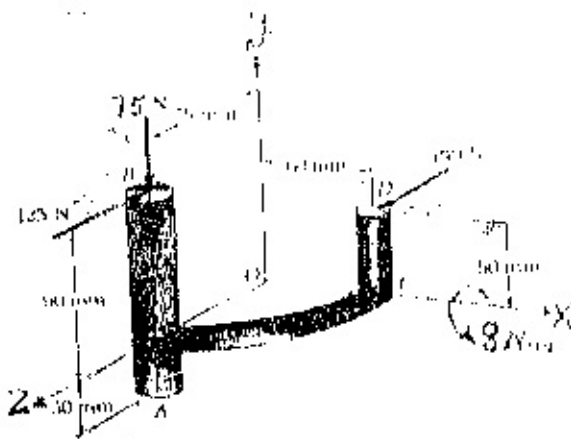


Fig (3)

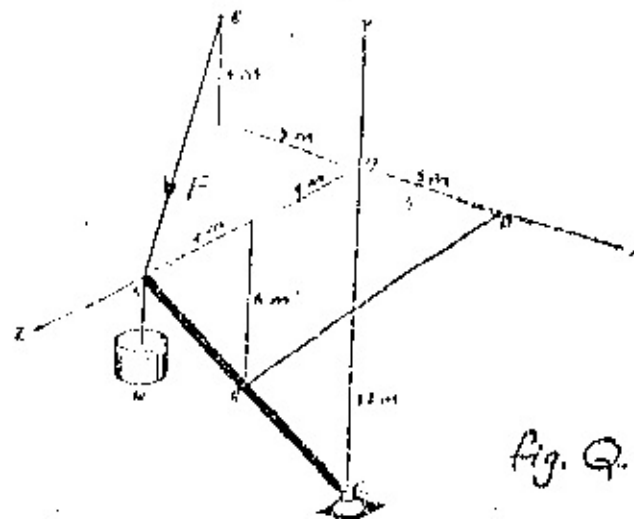


Fig. Q. (4)

الزمن : ساعتان

مدرس المادة : د. محمد البيروي

د. باسم راضي

الملاحظات :

الدرجة : ١١

المادة : ميكانيك (١)

التاريخ : ١٠ / ١١ / ٢٠٠٢

Answer the following :

Q<sub>1</sub>: The tension in the cord shown in fig (1) is 60N. Find the projected component of the tension on ABC. Also find the angle between the tension and ABC.

Q<sub>2</sub>: In fig (2) determine:

(a) the angle  $\theta$  for which  $\sum M_A = 0$

(b) for  $\theta = 30^\circ$ , find the distance  $y$  for which  $\sum M_A = 0$ .

Q<sub>3</sub>: Replace the force system shown in fig (3) by a single force and show where it intersect the member AB measured from point A.

Q<sub>4</sub>: Replace the force system shown in fig (4) by a single force  $R$  at A and a moment  $M$ .

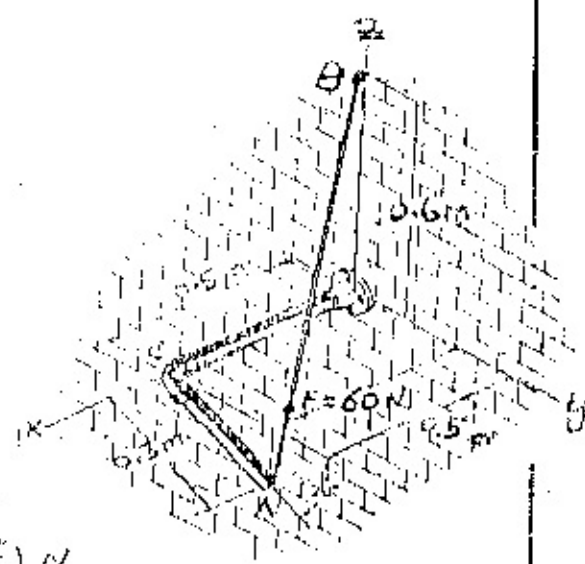


Fig (1)

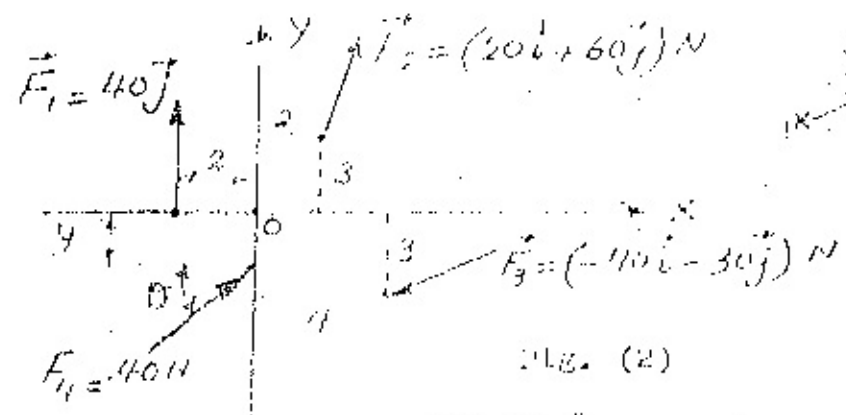


Fig. (2)

All Dimensions in m

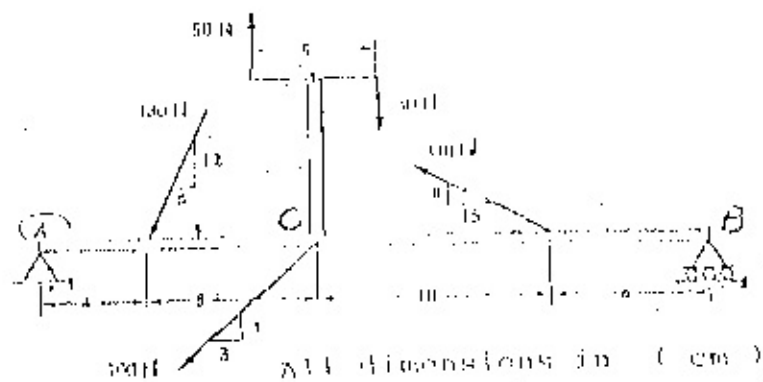


Fig (3)

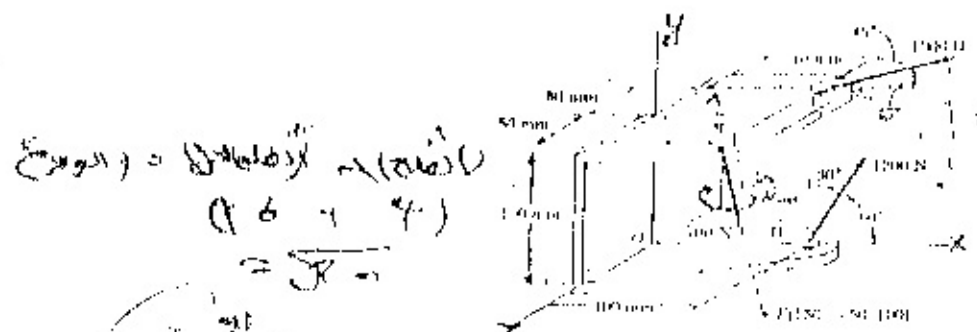


Fig (4)

Answer five Questions Only  
All questions carry equal marks

Q1- Replace the three forces and couple by an equivalent force  $R$  at  $z$  and a couple  $M$ . Specify  $M$  and the magnitude of  $R$ . Fig.(1)

Q2- Replace the force system shown in fig.(2) by a wrench resultant. Find the coordinates of point  $p$  in the  $y-z$  plane through which the resultant force of the wrench will pass.

Q-3 The uniform 7-m steel shaft has a mass of 200 kg and is supported by a ball-and-socket joint at A in the horizontal floor. The ball end B rests against the smooth vertical walls as shown. Compute the forces exerted by the walls and the floor on the ends of the shaft. Fig.(3).

Q-4 Calculate the forces in members  $FG$ ,  $EG$ , and  $GD$  for the loaded cantilever truss. Fig.(4).

Q-5 A 600N horizontal force is applied to pin A of the frame shown in fig.(5). Determine the forces acting on the two vertical members of the frame.

Q-6 For the shaded area shown in fig.(6), find:

- The centroid.
- The moment of inertia about the  $x$ -axis.

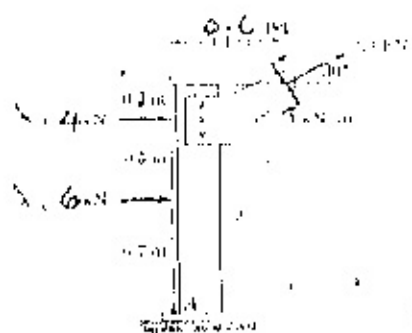


fig (1)

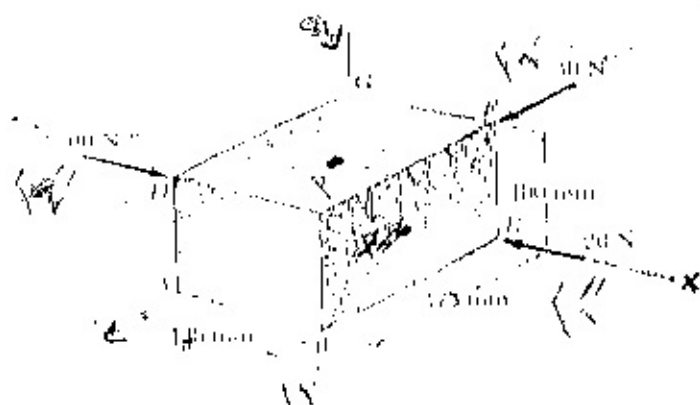


fig (2)

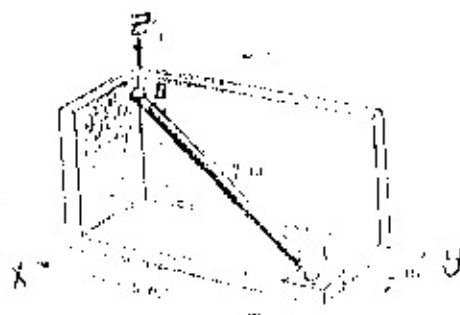


fig (3)

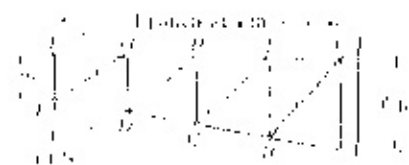


fig (4)

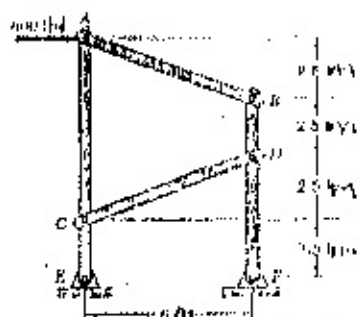


fig (5)

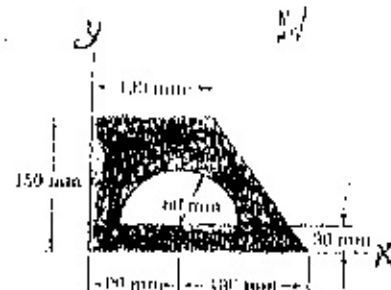
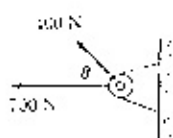


fig (6)

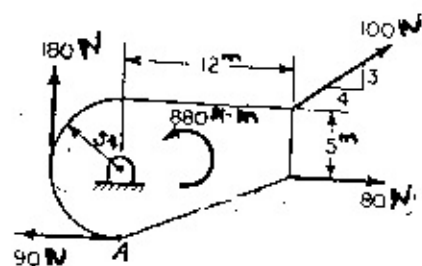
**Answer Five Questions Only**

- Q1:** If the Resultant of the two Forces shown in Fig (1 ) is 1000 N Find :  
the angle  $\theta$  . Also find the angle between the resultant R and the horizontal.
- Q2:** Find the resultant of the Force System shown in Fig ( 2 ) and find its position with respect to point A .
- Q3:** In the equilibrium position shown in fig ( 3 ) , find the distance ( x ) and the reactions at A & B.
- Q4:** In Fig (4), Find the component of the Force  $F=340$  N along the line AB, also find the angle  $\theta$  between F and the component.
- Q5:** In Fig ( 5 ) , replace the two Forces and single couple by a wrench and find the coordinates of point P in the y-z plane through which the wrench will Pass.
- Q6:** The uniform 7m steel shaft has a mass of 200 Kg and is supported by a ball & socket joint at A in the horizontal floor . B is a ball end resting against the smooth vertical walls as shown in Fig ( 6 ) , Find the Forces at A & B .
- Q7:** In the truss shown in Fig ( 7 ) Find the Forces in members AB, BC & DE .





fig(1)



fig(2)

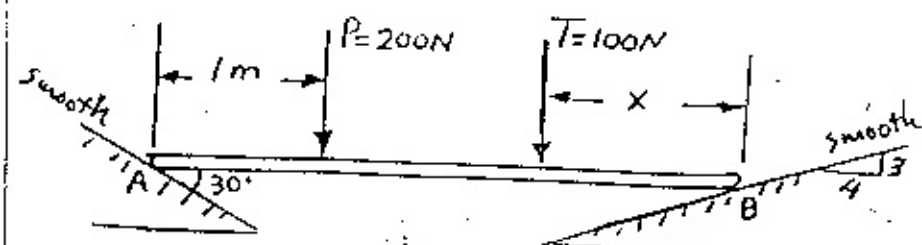


fig (3)

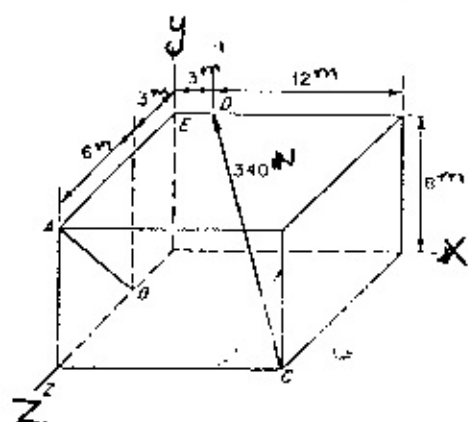


fig (4)

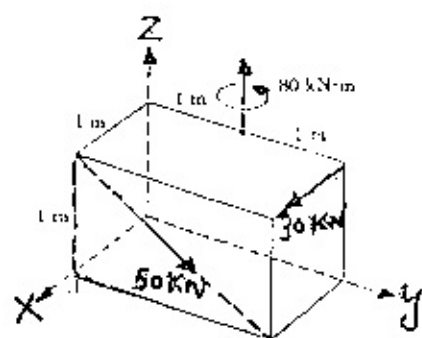


fig (5)

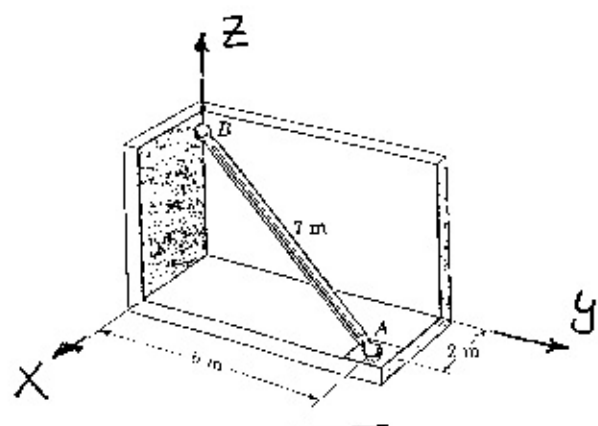


fig (6)

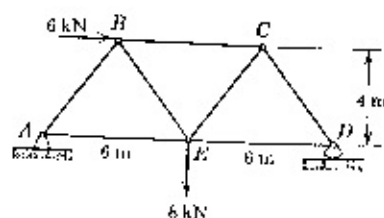


fig (7)



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Answer Five Questions Only

All Questions Carry Equal Marks

Q1: Find  $R$  of the two forces shown in fig(1). Express  $R$  as a force vector using  $i$  &  $j$  on the  $x$  &  $y$  axes . Find also the angle between  $R$  and the  $x$ -axis .

Q2: Find the resultant  $R$  of the force system shown in figure(2) and show where it cuts the  $x$ -axis .

Q3 : If the tension  $T$  in the cable  $AB$  shown in figure(3) is  $24\text{KN}$ , find the moment of  $T$  about  $O$ .

Q4 : Replace the force system shown in figure(4) by a wrench resultant and find the coordinates of point  $P$  in the  $XZ$  plane through which the resultant will pass.

Q5 : The uniform  $15\text{ m}$  pole shown in figure (5) has a mass of  $150\text{ Kg}$  and is supported by its ends  $A$  and  $B$  against the smooth vertical walls and by the tension  $T$  in the vertical cable, find the reactions at  $A$  and  $B$ .

Q6: Calculate the forces in members  $AB$  ,  $BG$  and  $CD$  for the truss shown in figure(6) :

Q7 : Find the centroid of the shaded area shown in figure(7) .

Note : Figures of each question are required in your answers .

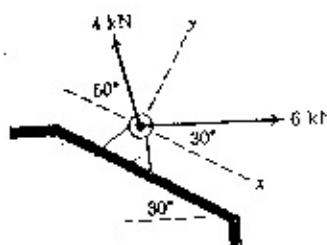


Fig Q1

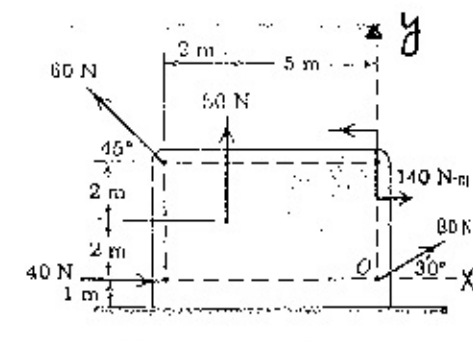


Fig Q2

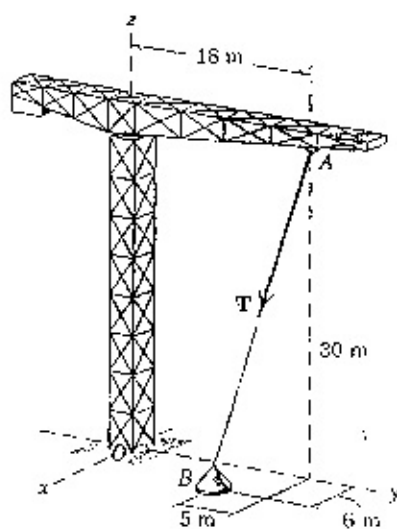


Fig Q3

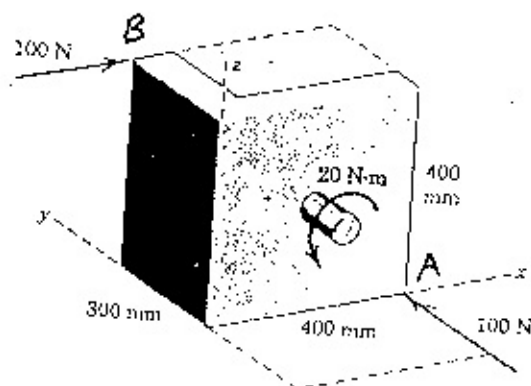


Fig Q4

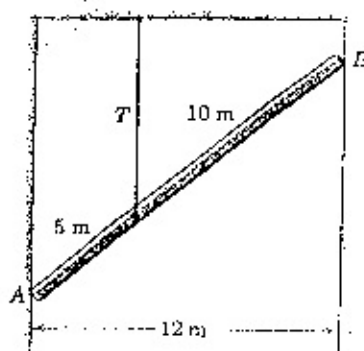


Fig Q5

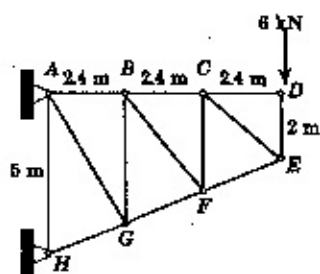


Fig Q6

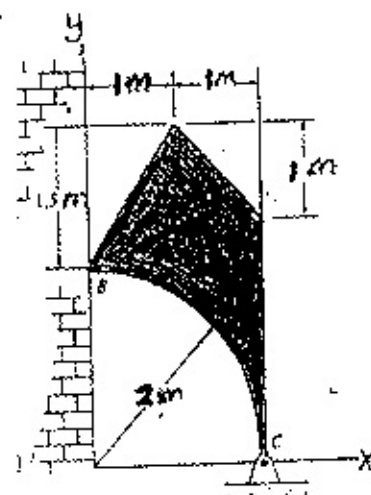


Fig Q7