جـــــمهوريـــــة العـــــراق

وزارة التعليم العالي و البحث العلمي

جامعة الفرات الأوســـط التقنية

الكلية التقنية الهندسية / النجف

قسم هندسة تقنيات الطيران
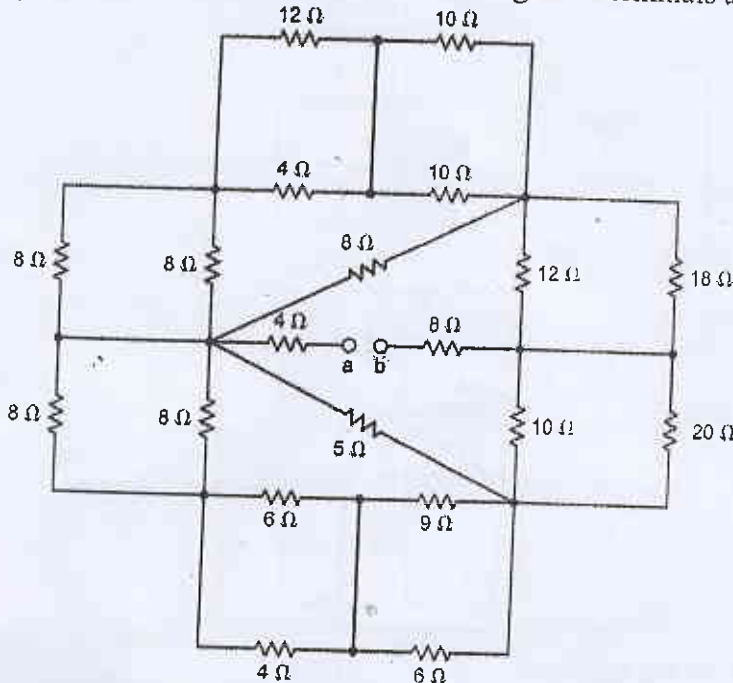
المرحلة الأولى

أسئلة الفصل الأول للعام الدراسي

٢٠١٦-٢٠١٧

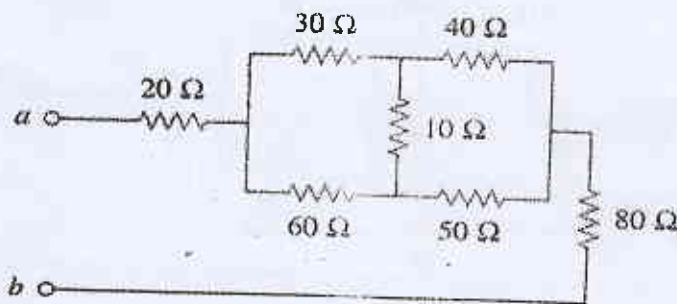## شعبة ضمان الجودة و الأداء الجامعي

Answer all Questions

Q1:// Find the equivalent resistance looking in at terminals a-b in the circuit in Fig1?
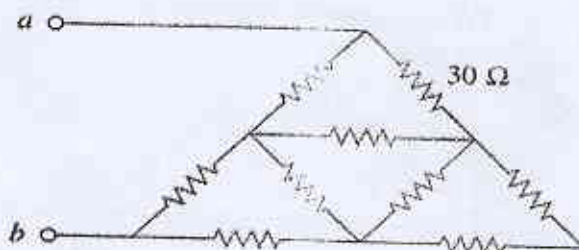

25M

Q2;// Obtain the equivalent resistance in each of the circuits of Fig. 2 In (b), all resistors have a value of 30 ?.
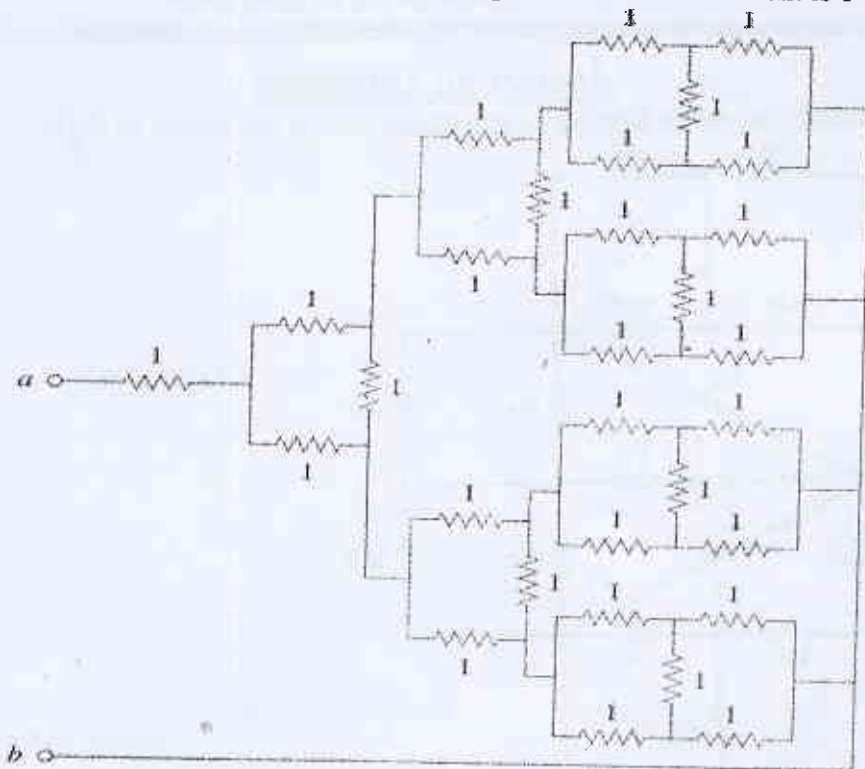

(a)

(b)

30M

رئيس القسم
د.أسعد السهلاني
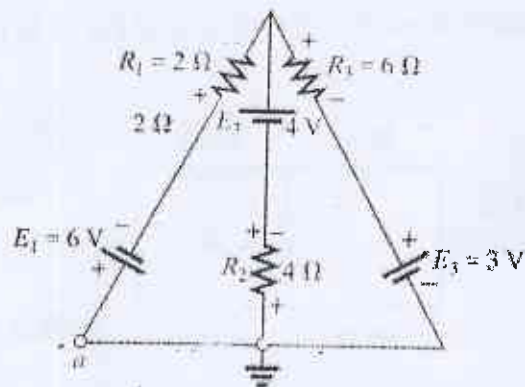
مدرس المادة
عبدالله الزبيدي

Q3;//Find in the eight -way power divider circuit in fig . Assume each element is 1 ?.
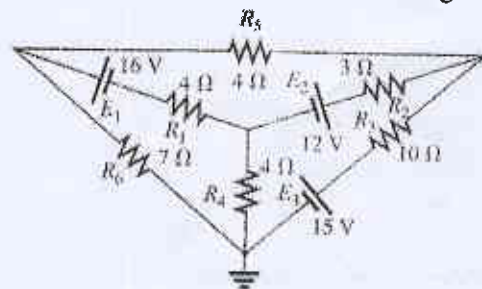

15M

Q4:// Find the branch currents of the network of Fig bellow ?   15M

Q5:// Write the mesh equations for each of the networks of Fig bellow

15M

رئيس القسم
د.أسعد السهلاني

مدرس المادة
عبدالله الزبيدي

urat Al-Awsat Technical University
echnical Engineering College
Department of Engineering Techniques
Aviation

قسم الطيران
م / ١

Subject: Engineering Drawing
Class: 1st Stage
Time: 2 Hours
Examiner: Mohammed Hussein Alnajim

First Semester Exam 2016-2017

Note: Attempt All Questions.
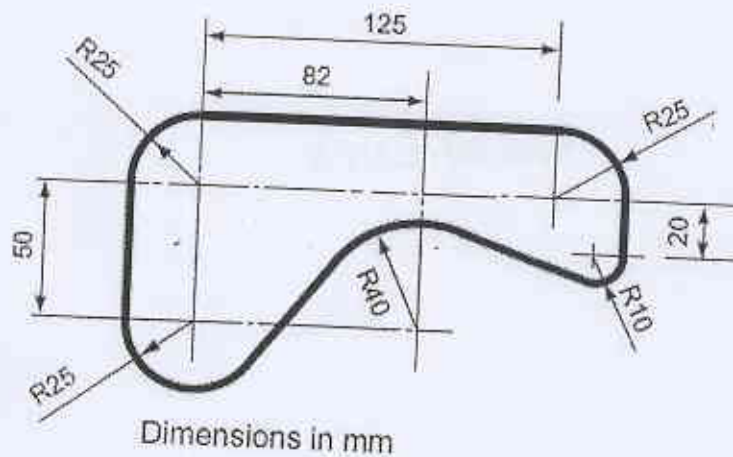
Q1: Using the geometrical construction to draw the regular pentagon and hexagon inside the circle of radius R = 4 cm.

(30 M)
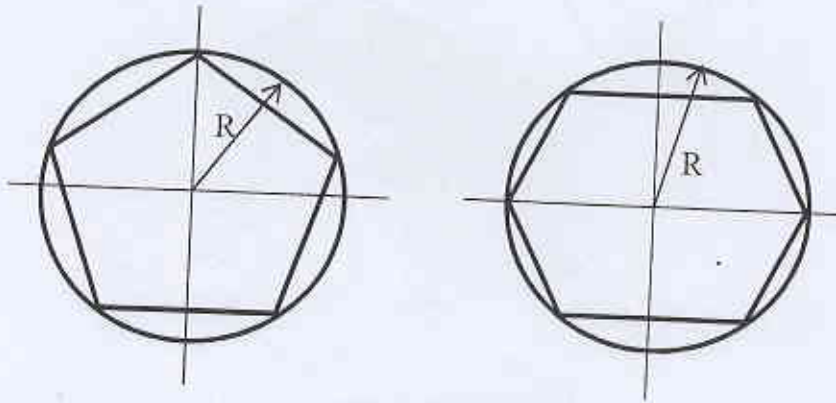
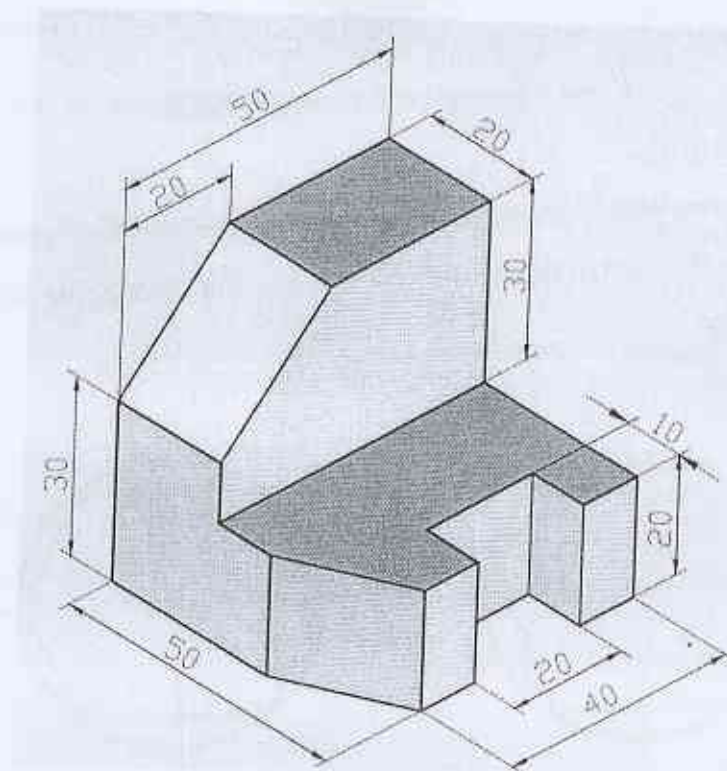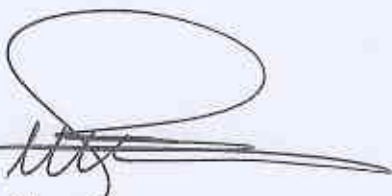Q2: Draw the following figure by applying the geometrical construction.

(30 M)

Dimensions in mm

? 1-1

Q3: Draw the three orthographic views using the first angle projection method. (40 M

Dimensions in mm

Good Luck

Examiner

Head of Department

Q1:   Answer four only   (40 Mark)

1. Air is expanded in a piston-cylinder arrangement at a constant pressure of 200 kPa from a volume of 0.1 m^3 to a volume of 0.3 m^3. Then the temperature is held constant during an expansion of 0.5 m^3. Determine the total work done by the air. ?

(A) 98.6 kJ   (B) 88.2 kJ   (C) 70.6 kJ   (D) 64.2 kJ

2. A 200-mm-diameter piston is lowered by increasing the pressure from 100 to 800 kPa such that the $P\text{-}V$ relationship is $PV^2 = $ const. If $V1 = 0.1$ m^3, the work done on the system is nearest. ?

(A) −18.3 kJ   (B) −24.2 kJ   (C) −31.6 kJ   .   (D) −42.9 kJ

3. Air enters a diffuser at 100kPa and 30°C, with a velocity of 150m/sec. The exit temperature is 40°C. If a heat loss of 0.4 kJ/kg occurred find the exit velocity.? $Cp = 1.005$ KJ/kg.K

4. Air is compressed in a cylinder such that the volume changes from 0.2 to 0.02 m^3. The initial pressure is 200 kPa. If the pressure is constant, the work is nearest ?

(A) −36 kJ   (B) −40 kJ   (C) −46 kJ   (D) −52 kJ

5. Estimate the work necessary to compress the air in a cylinder from a pressure of 100 kPa to that of 2000 kPa. The initial volume is 1000 cm^3. An isothermal process is to be assumed. ?

(A) 0.51 kJ   (B) 0.42 kJ   (C) 0.30 kJ   (D) 0.26 kJ

6. The force needed to compress a nonlinear spring is given by $F = 10x^2$ N, where x is the distance the spring is compressed, measured in meters. Calculate the work needed to compress the spring from 0.2 to 0.8 m ?

7. Methane is heated at constant pressure from 0 °C to 300°C. How much heat is needed if $P_1 = 0.2$ MPa ? $Cp = 2.254$ KJ/kg.K

Q2: A spring loaded piston/cylinder contains 1.5 kg of air at 27C and 160 kPa. It is now heated to 900 K in a process where the pressure is linear in volume to a final volume of twice the initial volume. Plot the process in a P-v diagram and find the work and heat transfer ? $R = 0.287$ KJ/kg.k   **(20 Mark)**

$Cv = 0.717$ KJ/kg. k

Q3: 0.5 kg of air it pressure 1.2 bar and volume 0.4 m^3 compressed isothermally , then compressed adiabatically to 200 °C. if that work is equal in processes . determine the yolume in each the process ? $R = 0.287 \, kJ/kg \cdot K$ (20 Mark)
$K = 1.4$

Q3: A spherical balloon is initially filled with air at a specified state. The pressure inside is proportional to the square of the diameter. Heat is transferred to the air until the volume doubles. The work done is to be determined ? **(20 Mark)**

Air
$m = 10 \, kg$
$P = 30 \, kPa$
$T = 800 \, K$
$R = 0.287 \, \dfrac{kJ}{kg \cdot K}$

رئيس القسم

م. د اسعد عواد عباس السهلاني

مدرس المادة

م.م نوفل محمد باقر

المرحلة: الاولى
الزمن: ساعتان

جامعة الفرات الوسطى التقنية
قسم هندسة تقنيات الطيران- الكلية التقنية الهندسية نجف

قسم الطيران
أ / أ

الاجابة عن ثلاثة اسئلة فقط

س1: حرية التعليم وحرية الفكر الجامعية من اهم انواع الحريات العامة **(ناقش ذلك)**

س2: اجب عن احد الفرعين:

ا- ماهي اهم اجيال وفئات وخصائص حقوق الانسان؟

ب- للحضارة العراقية بصمات واضحة وظاهرة للعيان في المسيرة الانسانية (تحدث عن ذلك)

س3: اجب عن احد الفرعين:

ا- المنظمة العربية لحقوق الانسان لها اهمية خاصة في مجال الاتفاقيات العالمية (ناقش ذلك)

ب- ماهي مصادر تمويل اللجنة الدولية للصليب الاحمر الدولي وماهي اهم اعمالها

س4: اجب عن فرعين:

ا- تحدث عن وصايا امير المؤمنين عليه السلام لعامله على مصر مالك الاشتر رضوان الله عليه بخصوص الحقوق والواجبات.

ب- للاعلان العالمي لحقوق الانسان د..جة (تحدث عنها باسهاب)

ج- ما اهم المناظرات التي كتبتها وبحثتها في مادة الحقوق.

Ministry of Higher Education and Scientific Research
Al-Furat Al-Awsat Technical University
Tech. Eng. College – Najaf/Aeronautical Tech. Eng. Dept.
semester examination 2016-2017

First

Subject: MATLAB
Time: 2 hours

Class: 1ˢᵗ year
Date: / / 2017

Q1 \ Use MATLAB to evaluate: (25)

1. $M = \sqrt[3]{\log\left(\frac{\sin(\frac{\pi}{4})}{3+\sec(\frac{\pi}{5})}\right) + \cot(\ln\sqrt{\pi})}$

2. $Y = [e^{2t} + t^3 \csc(6t)]\tan^2(5t)$ $at\ t = 2\pi$

Q2 \ R= {4,-3, 12, 1, 9} row vector (25)

C = {7, 22,-1, 8, 2} column vector

1. Create matrix (A) by appending transpose of row vector (R^T) with column vector (C).
2. Find the dot division of row vector (R) on transpose of column vector (C^T).
3. Find the magnitude of a row vector $|C|$.
4. Calculate dot product of the transpose of row vector (R^T) and the column vector (C).

Q3 \ $A = \begin{vmatrix} 1 & 2 & 3 & 4 & 5 \\ 2 & 7 & 1 & 8 & 9 \\ 3 & 4 & 5 & 6 & 2 \\ 4 & 9 & 7 & 2 & 1 \end{vmatrix}$ (25)

1. Create sub-matrix (K) by referencing the elements in the 2ⁿᵈ through 4ᵗʰ row and elements in the 2ⁿᵈ through 4ᵗʰ column of matrix (A).
2. Create a row vector (R), from the elements of 3ʳᵈ row of (A).
3. Create a 4-by-4 matrix (W) from (A) by copy the 1ˢᵗ and 5ᵗʰ columns of (A) twice.
4. Calculate the determinant and inverse of (W).

Q4 \ $d = \begin{vmatrix} 1 & 2 & 3 \\ 2 & 6 & 9 \end{vmatrix}$ (25)

$f = \begin{vmatrix} 1 & 2 \\ 2 & 7 \\ 3 & 4 \end{vmatrix}$

1. Create a row vector (V), from the elements of 2ⁿᵈ row of (d).
2. $C = |V| * V^T$.
3. $M = d * f$
4. $Y = |M| * M^T * M^{-1}$

مدرس المادة
م.م. محمد جليل

رئيس القسم
د. اسعد السهلاني

Good Luck

Note: Answer all the following questions

Q.1/ The coordinates of the vertices A,B and C of the triangle ABC are (-3,7), (2,19) and (10,7) respectively:

1. Prove that triangle is isosceles. **(12 Marks)**
2. Calculate the length of the perpendicular from B to AC, and use it to find the area of the triangle. **(8 Marks)**

Q.2/ Find the equations of the lines which pass through the point of the intersection of the lines are x-3y = 4 and 3x+y = 2 respectively, parallel and perpendicular to the line 3x+4y =0. **(20 Marks)**

Q.3/ Discuss the continuity of :

$$f(x) = \begin{cases} x + \dfrac{1}{x} & x < 0 \\ -x^3 & 0 \le x < 1 \\ -1 & 1 \le x < 2 \\ 1 & x = 2 \\ 0 & x > 2 \end{cases}$$

(20 Marks)

Q.4/ A- Prove the following :

1. $\dfrac{1+sin\theta}{1-sin\theta} = (sec\theta + tan\theta)^2$ **(5 Marks)**

2. $\dfrac{d}{dx} sech^{-1} u = -\dfrac{1}{|u|\sqrt{1-u^2}} \cdot \dfrac{du}{dx}$ **(5 Marks)**

B- Solve the following equations for the values of θ from 0 to 360 inclusive:

1) $3cos2\theta - sin\theta + 2 = 0$ **(5 Marks)**

2) $3tan\theta = tan2\theta$ **(5 Marks)**

Q.5/ Find $\dfrac{dy}{dx}$ for the following functions:

1) $y = \sqrt{tan\sqrt{2x+7}}$ **(6 Marks)**

2) $y^{\frac{4}{3}} = \dfrac{\sqrt{sinx.\,cosx}}{1+2.\,lnx}$ **(6 Marks)**

3) $sinh^{-1}(xy) = cos^{-1}(x-y)$ **(8 Marks)**

Good Luck

Module Leader
Dhurgham AL-Khaffaf

Head of Department
Dr. Assaad AL-Sahlani

Al-Furat Al-Awsat Technical University

Technical Engineering College

Department of Engineering Techniques

Aviation

Subject: Statics

Class: 1st Stage

Time: 2 Hours

Examiner: Mohammed Hussein Alnajim

First Semester Exam 2016-2017

Note: Attempt All Questions and All Have Equal Marks.

Q1: Using the principles of equilibrium to verify that the tension in cable **AB** is **85.8%** of the weight of the cylinder of mass m, while the tension in cable **AC** is **55.5%** of the suspended weight. Write each tension force acting on point A as a vector if the mass m is **60** kg.
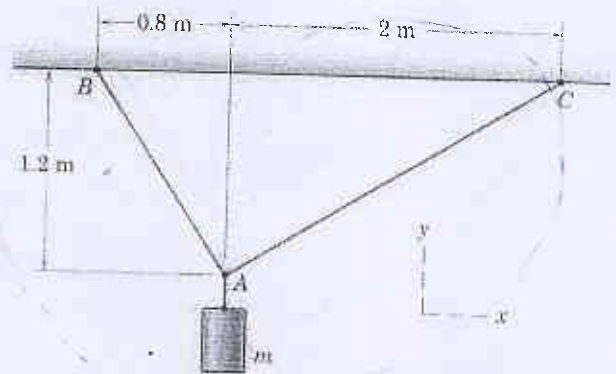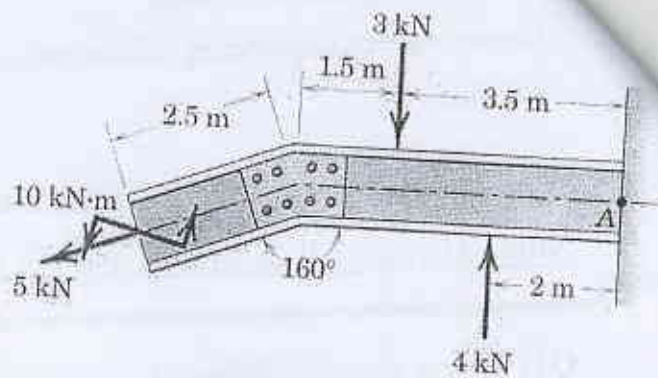

Q2: A force of 200-N is applied to the end of the wrench to tighten a flange bolt which holds the wheel to the axle. Determine the moment M produced by this force about the center O of the wheel for the position of the wrench shown.
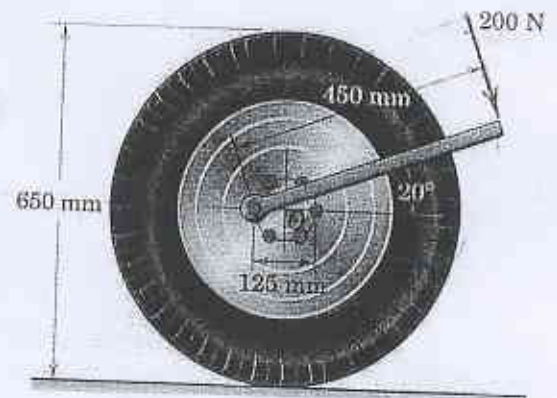
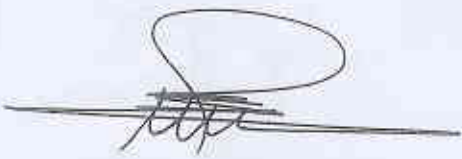**Q3:** The rigid structural member is subjected to a couple consisting of the two 100-N forces. Replace this couple by an equivalent couple consisting of the two forces **P** and **-P**, each of which has a magnitude of 400-N. Determine the proper angle θ.

Dimensions in millimeters
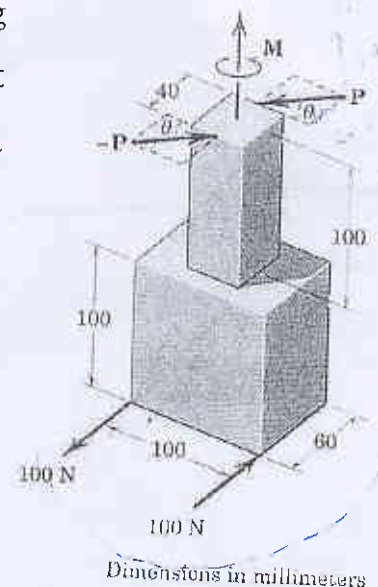
Q4: Using the resultant to replace the three forces and couple by a force-couple system located at point A.

القسم : هندسة تقنيات الطيران
المرحلة : الاولى
المادة: خواص المواد الهندسية
زمن الامتحان:2 ساعة
التاريخ: 2017/1/ 31

قسم الطيران

جمهورية العراق
وزارة التعليم العالي والبحث العلمي
هيئة التعليم التقني
جامعة الفرات الأوسط التقنية
الكلية التقنية الهندسية / نجف

امتحان الفصل الاول- العام الدراسي 2017/2016

ملاحظة: الإجابة عن جميع الأسئلة

Q1/ Explain the following terms: **(20M)**

  1. Metallic bound.

  2. Lattice.

  3. APF.

  4. unit cell,

  5. crystal structure.

Q2/A/ Calculate the radius of Tungsten atom (in nm), APF and coordination number given that W has crystal structure, a density of 22.4 g/cm^3, and an atomic weight of 192.2 g/mol.   **(15M)**

Q2/B/ Cite the difference between atomic number and atomic weight with example.   **(5M)**

Q3/A/ Briefly cite the main differences between ionic, covalent, and metallic bonding.   **(14M)**

Q3/B/ Sketch the following planes and directions within a cubic unit cell: (221) , (030) , $(\bar{1}21)$, $[\bar{1}21]$, $[12\bar{2}]$, $[01\bar{1}]$ **(6M)**

Q4/A/ Titanium has unit cell for which the ratio of the lattice parameters is 1.58. If the radius of the Ti atom is 0.1445 nm, determine the unit cell volume, the APF and coordination number.   **(14M)**

Q4/B/ What are the main classification of materials with examples?   **(6M)**

Q5/A/ Determine the planar density, packing fraction and coordination number for nickel in the (100), (110), and (111) planes. Which, if any, of these planes is closepacked? which has a radius of atom 0.1243 nm.   **(15M)**

Q5/B/ Explain the deference between the terms materials science and materials engineering.   **(5M)**

Good Luck

رئيس القسم
د. اسعد السهلاني

مدرس المادة
م.م. مهدي محمود شاكر