University of Technology
Department of Production Engineering and Metallurgy

Third Class \ Metallurgy Engineering
Subject: Non Metallic Material
Time: 2:00 Hours
14/2/2012
Examiner: Ali Munther Mustafa

Note: Answer only FOUR questions enhanced your answer with graphics

Q1: **A**. Draw flow chart of Different techniques for processing of advanced ceramics.

B. Writ the Basic Steps in Powder Metallurgy and the limitation of powder metallurgy.

Q2: **Green part of aluminum oxide sintered** at a high temperature 1845°C. The specific gravity of aluminum oxide is 3.5 g/cm^3. The ceramic shape subsequently is weighed when dry (200 g), after soaking in water the weighed is one and quarter of the dry sample and while suspended in water (180 g). Calculate the apparent porosity, the true porosity, and the volume fraction of the closed pores and what is the melting point temperature of aluminum oxide.

Q3: **A**. Draw and mention the relationship between density and temperature for glass and Crystalline materials, then mention the Techniques for glass manufacturing and glass forming lass products.

B. Defined (Addition polymerization, Glass temperature, Copolymer).

Q4: Calculate the amount of benzoyl peroxide initiator required to produce 1.2 kg of polyethylene with an average molecular weight of 250,000 g/mol, assumed that the ethylene molecular consist of (2C)and (4H) and the benzoyl peroxide molecular consist of (14C) ,(10H)and (4O). What is the degree of polymerization?

Q5: A. What are the differences between thermoplastic and thermoset polymer.

B. Design the type of polymer materials suitable for the following applications:

a surgeon's glove, a beverage container and a pulley.

Good Luck

الجامعة التكنولوجية
قسم هندسة الانتاج والمعادن
اللجنة الامتحانية

المرحلة والفرع: الرابعه /معادن
المادة: السيطرة النوعية
الزمن: ساعتين
مدرس المادة: د.هجران زين العابدين

٢٠١٢/ ٢ / سئلة امتحان الفصل الدراسي الاول لعام ٢٠١١-٢٠١٢

ملاحظة: الاجابة عن اربعة اسئلة فقط

السؤال الاول:

(أ): ماهي انواع البيانات، وما اهميتها في السيطرة النوعية؟ وكيف يتم وصف وعرض البيانات؟

(ب): في معمل انتاجي لمسبوكات البرونز ، كان الانحراف المعياري لاوزان المسبوكات هو (5) كغم . فاذا كانت نسبة 1.79 % من اوزان المسبوكات اقل من (80) كغم ، فأحسب:

(١) متوسط اوزان المسبوكات التي يفترض ان يتم الانتاج بها؟

(٢) نسبة المصبوبات التي تزيد اوزانها عن (101) كغم؟

السؤال الثاني:

(أ) : في مصنع لانتاج الواح معدنية ، هناك زيادة في كلف السيطرة النوعية ، وقد عزم المشرفون على المصنع تقليل هذه الكلف. (١) حدد اثنين من كل نوع من انواع كلف النوعية . (٢) هل يمكن للمشرفين على المصنع من زيادة بعض من انواع الكلف او تقليلها حتى يمكن الحصول على عملية انتاجية ناجحة وبكلف كلية اقل؟

(ب) : في مصنع للسيارات تم تحديد (30%) نسبة معيبات في خزانات الوقود للوجبة التي تم انتاجها في فترة ما . اذا تم سحب (5) من هذه السيارات بشكل عينات مستقلة ، فما هو احتمال ان يكون اكثر من (3) من هذه السيارات معيبة ؟

السؤال الثالث:

(أ) : اذكر ثلاثة من ما مطلوب لكل فقرة من الفقرات ادناه :

١) تحدد مستويات النوعية المطلوبة قبل البدء بالانتاج من خلال.....

٢) تشمل المواصفات او تتمحور مضامينها بشكل عام على ما يلي.....

٣) من الاهداف العامة للتقييس .....

٤) من اسباب سحب ودراسة (العينة) لتمثل الانتاج الكلي (المجتمع).....

(ب) : من خلال عملك في قسم السيطرة النوعية لاحظت بان العمال يغلفون(75) منتج في الدقيقة بمعدل (6) اخطاء في الساعة، ماهو احتمال عدم حدوث اي خطأ (صفر) اثناء تغليف (255) منتج؟

السؤال الرابع:

(أ) : وضح مبدأ حساب احتمال وقوع حادثتين مستقلتين معا ،وكان احتمال وقوع احدهما مشروطا بتحقيق الاخر.

(ب): ماهي المواصفة القياسية ؟ ولماذا يتم وضع المواصفات للمنتجات ؟ أختر جهازا في منزلك او أي منتج واقترح مواصفات عامة افتراضية له.

السؤال الخامس :

لمعمل انتاج مصبوبات (مسبوكات) معدنية ، ارسم مخططا انسيابيا لجميع مراحل العمل موضحا عليها **عناصر السيطرة النوعية الشاملة** وموضحا اهم المواصفات التي يفترض ان تعتمد للمنتج.

z	0.09	0.08	0.07	0.06	0.05	0.04	0.03	0.02	0.01	0.00
-2.2	0.0110	0.0113	0.0116	0.0119	0.0122	0.0125	0.0129	0.0132	0.0136	0.0139
-2.1	0.0143	0.0146	0.0150	0.0154	0.0158	0.0162	0.0166	0.0170	0.0174	0.0179
-2.0	0.0183	0.0188	0.0192	0.0197	0.0202	0.0207	0.0212	0.0217	0.0222	0.0228
-0.9	0.1611	0.1635	0.1660	0.1685	0.1711	0.1736	0.1762	0.1788	0.1814	0.1841

z	0.00	0.01	0.02	0.03	0.04	0.05	0.06	0.07	0.08	0.09
+1.2	0.8849	0.8869	0.8888	0.8907	0.8925	0.8749	0.8770	0.8790	0.8810	0.8830
+2.0	0.9973	0.9778	0.9783	0.9788	0.9793	0.9798	0.9803	0.9808	0.9812	0.9817
+2.1	0.9821	0.9826	0.9983	0.9834	0.9838	0.9842	0.9846	0.9850	0.9854	0.9857

الجامعة التكنولوجية
قسم هندسة الانتاج والمعادن
اللجنة الامتحانية

المرحلة والفرع: الثانية / هندسة معادن
المادة: حريات
الزمن: ساعتان
مدرس المادة: م.م. وليد حمدي عبد
التاريخ: ٨/ ٤/ ٢٠١٢

اسئلة امتحان الفصل الدراسي الاول للعام 2011-2012

ملاحظة : الاجابة عن أربعة اسئلة فقط .

س1/ عرف مصطلح الديمقراطية ؟ وتحدث عن الجذور التاريخية للديمقراطية لدى الشعوب ؟

س2/ ماهي فكرة الديمقراطية في جزيرة العرب ؟ مع توضيح النصوص والشواهد على هذه الفكرة ؟

س3/ ماهو الدور الذي وصلت اليه جهود دول العلم الثالث من حيث تطبيق النظام الديمقراطي ؟

س4/ ناقش أحد النصين بالشرح والتفصيل :

1ـ ((الديمقراطية بين العالمية والخصوصية)) ؟

2ـ ((متى اسعبدتم الناس وقد ولدتهم امهاتهم احرارا)) ؟

س5/ ماهي نظرة كلا من الامين العام السابق للامم المتحدة (بطرس غالي) والدكتور (محمود شريف بسيوني) للديمقراطية ؟

مع تمنياتي لكم بالتوفيق

University of Technology
Dept. of Production Engineering & Metallurgy

Stage and Branch: Fourth metallurg
Subject: Extraction
Time: 2.0 hours
Examiner: Dr. Mohammed Hliyil Hafiz

Examinations question to 1st term 2011-2012

Notice: Answer Three Questions Only

Q1/ a. Design the process of aluminum extraction.

b. Distinguish between metals and non metals on their physical properties.

Q2/ Differentiation between the following:-

a. Pyrometallurgy and Hydrometallurgy as parameters.
b. Distillation and liquation methods.
c. Roasting and Calcination methods.

Q3/ Discuss the following:

a. Electrolytic refining routes.
b. The enrichment of ores by froth flotation.
c. How will you get metals in nature?

Q4/ Mention the following:

a. Three Factors and Parameters influencing Bacterial minerals oxidation and metal mobilization.
b. Direct and indirect equations for pyrite oxidation.

University of Technology

Department of Production Engineering and Metallurgy

Stage and Branch: First Stage \ All branches
Subject: Computer Programming
Time: 2 Hours
Examiner: Dr. Laith A. Mohammed

First Term Examination 2011-2012

Note: *Answer only Three questions*

Q1: Draw a flowchart to generate the series $1^2+2^2+3^2+\ldots\ldots\ldots+N^2$.

Q2: Fill in the blanks:

1. The speed of the processor is determined by the _____ of the clock signal, and it is typically expressed in _____.
2. _____ is the nerve center of the computer system.
3. A measurement of how close together the phosphor dots are on the computer screen is called _____.
4. _____ is a silicon chip on which transistors are integrated onto it.

Q3:

A. Convert the binary number (101001.1011) into equivalent decimal number.

B. Make a comparison between Application Software & System Software.

Q4: Given a set of (n) students' examination marks (in the range 0 to 100) make an algorithm to count of the number of students that passed the examination. A pass is awarded for all marks of 50 & above.

University of Technology
Dept. of Production Engineering & Metallurgy
2/2/2012

Stage and Branch: 3rd class/ metallurgy
Subject :- Plasticity and metal forming
Time :- 2 hours
Examiner :- Dr. Aseel hamad

Examination questions of 1st term 2011-2012

Note: Answer three question only

Q1/ Discuses the following?

1) The effect of strain rate on stress- strain curve.
2) The difference between homogenous and non- homogenous strain.
3) Proportional limit.
4) Express the stress – strain diagram for following
   a) perfect plastic b) rigid perfect plastic c) elastic – plastic
   d) elastic perfect plastic

Q2/ A bar of material has stress - strain curve $\sigma = K\ (0.2 + \epsilon)^n$ Mpa such a bar in simple tension has maximum engineering stress (150 Mpa) and percentage reduction of area (25%) determine the material constant k and n ?

Q3/ Prove that ? ? (chose two only)

1) $\sigma = \sigma_0\ (e+1)$ 2) $\epsilon = \ln\frac{1}{1-r}$ 3) $\dot{\epsilon} = \frac{\dot{e}}{1+e}$

Q4/ For the state of plain stress, yield stress (100 Mpa) using tresca theory to determine with yielding occur or not when ($\sigma_x = 50$, $\sigma_y = 30$, $\tau_{xy} = 25$) Mpa and determine this state of stress by draw Von Mesis and Tresca criteria?

Good Luck

الجامعة التكنولوجية
قسم هندسة الانتاج والمعادن
اللجنة الامتحانية

المرحلة والفرع: االرابع معادن
المادة: المعاملات الحرارية
الزمن: ساعتان
مدرس المادة: منذر الكبيسي

اسئلة أمتحان الفصل الدراسي الاول للعام ٢٠١١-٢٠١٢

س١/اذكر الاسباب للاربعة مما يلي معزز الاجابة بالرسم ان وجد.

١. تزداد صلادة الفولاذ السبائكي عند مراجعته بعد اضافة عنصر الكروم او عنصر االمولبيدنوم (Mo) له.
٢. يفضل استخدام فولاذ المقاوم للصدا المرتنسايتي في تطبيقات التي تتطلب مقاومة للاحتكاك والحرارة والتآكل.
٣. تنخفض قيمة الصلادة مع زيادة نسبة الكاربون اكثر من (0.8% C) في الفولاذ الكاربوني المصلد.
٤. لا يفضل استخدام المعاملة الحرارية التكوير للفولاذ المنخفض الكاربوني.
٥. يستخدم مخطط (TTT Diagram) بدلاً من مخطط الحديد – كاربيد الحديد في دراسة الاطوار للفولاذ الكاربوني المصلد.

س٢/ ارسم اربعة مخططات مما يلي .

١- مخطط يوضح تأثير العناصر السبائكية (Ni ,Cr) على درجة حرارة التحول التآصلي.
٢- مخطط يوضح منحني التبريد لدورة المعاملات الحرارية لسبائك القبل والبعد يوتكتويد للفولاذ الكاربوني .
٣- مخطط يوضح تأثير زمن ودرجة حرارة المراجعة على صلادة الفولاذ الكاربوني .
٤- مخطط يوضح تأثير عنصر (Mn ,Ti) على كمية الكاربون في نقطة اليوتكتويد وعلى درجة حرارة اليوتكتويد في مخطط الحديد- كاربيد الحديد .
٥- مخطط يوضح تاثير كمية الكاربون على صلادة الفولاذ الكاربوني المصلد .

س٣/أ عرف للاربعة مما يلي .

١- تلدين التجانس ٢- تلدين التكوبر ٣-المعادلة(الاستعدال) ٤-التصليد الثانوي ٥- هشاشية المراجعة .

س٣/ب ارسم منحني التبريد على مخطط (TTT Diagram) للفولاذ اليوتكتويدي (0.8%C) للاثنين مما يلي .

١- M + 25 % I.T by fine pearlite 75% .
٢- B + 50% C.C by coarse pearlite 50 % .
٣- B + 75% C.C by medium pearlite 25 % .

س٤/ اشرح بأختصار مع الرسم للاطوار لكل مرحلة من مراحل المعاملة الحرارية للاثنين مما يلي:

١-تلدين تام لفولاذ كاربوني قبل اليوتكتويد .
٢-المراجعة لفولاذ سبائكي كرومي مقارنة بمراجعة فولاذ كاربوني مصلد .
٣-تلدين التكوير لفولاذ بعد اليوتكتويد .

University of Technology

Dept. of Production Engineering &

Metallurgy

Class : 3rd Metallurgy

Subject: Mechanical Metallurgy

Time: 1:30 hours

Examiner: Dr .Nawal Ezzat

1st Term Examinations 2011-2012

Q1- Explain briefly FOUR of the following:

a- Solid solution hardening.
b-Factors affecting recrystallization temperature.
c- Properties of fibers and particles used in strengthening
d- Strengthening by second phase particles.
e- Second yield point phenomena.

Q2- Achievement of fine grain size leads generally to improve the mechanical properties. Explain briefly two methods used for grain size measurements.

Q3 - What is the different between one of the following :

Precipitation hardening and dispersion hardening .

Age hardening and strain hardening.

Q 4- The hardness value is increase after strain hardening. What are the methods for hardness measurements? Then give brief description of one of them.

Q5- Answer one of the following:

A -From stress-strain curve, How you can determine Ductility, Young's modulus, Toughness

B- Why the hardness of grain boundary is higher than grain,

Republic of Iraq
University of Technology
Dept. of Prod. Engg. and Metallurgy
Metallurgical Engineering

Materials Selection
Final Year
Time: 2 h
Date: 25/2/2012

Dr. Mohammed Jasim Kadhim (DIC, London)

Answer Three Questions
Each question has an equal mark

Q1:

A- What are the most important additional factors to consider in materials selection?

B- Show the flow chart for materials selection from market need to product specification.

Q2:

A- List the important tools for materials selection.

B- Explain the different types of primary and secondary manufacturing processes.

Q3: Explain the importance of Stefan's equation to determine the out power in selection of filament in commercial incandescent bulbs.

Q4: Prove that the value of weibull modulus for the data of bending strength given below is approximately 8.8.

Test Number	1	2	3	4	5	6	7	8	9	10
σ_b (MPa)	230	363	353	258	283	322	316	318	287	306

University of Technology
Dept. of Production Engineering & Metallurgy

Stage and Branch:Metallurigical & Prod Eng.
Subject: Metallurigical Eng.
Time: 2 hours
Examiner:Dr.Israa.A.A

Examinations question to first term 2011-2012

Notice: answer any three questions . you must answer question one

Q1 :- Draw thermal equilibrium diagram for binary alloy (Pb- Sn) from the following data :-

Lead melting at 327 °C , Tin melting at 232 C° , and the eutectic mixture consists of (61.9 wt% Sn – 38.1 Wt % Pb) at 183 C°. The maximum solubility of Sn in Pb 19.5 wt% at 183 °C , but the maximum solubility of pb in Sn 2.6 wt% at 183 C° , and the solubility limits to each others decreasing to zero at room temperature . (Assume solubility lines are straight).

Determine the following:-

1- Identify all phases are present in the diagram.
2- For a 30 wt% Sn- 70 wt% Pb alloy .
3- Determine the composition and the relative amount of each phase present at 300 C°, 200 C° and 180 C°
4- Determine the percentage of eutectic at 180 C°

Q2- A/ What conditions must be satisfied to obtain a solid solution?.

B/ Draw the cooling curve for:-

1- Pure metal .
2- Eutectic alloy .
3- Solid solution alloy .

Q3 –A/ Define the terms :-

Peritectic reaction , Phase , Monotectic reaction , Intermediate phase , Cementite .

B/ The Iron Carbon diagram is characterized by three invariant reaction points what are they?

Q4 – A / Which type of carbon steel would be most suitable for :

1- Railway wagon wheels.
2- Hammers .
3- Channel and angle Iron .

B/ What are the effect of Sulphur and Phosphorous on the properties of carbon steel ?

Good Luck

University of Technology
Dep.of Production Engg. & Metallurgy
1st. class
Examiner: Dr.Rabiha S.Yaseen

Subject: Manufacturing Processes
Time: 2 hours
Date: 26 / 1 / 2011
1st semester examination 2011-2012

Note: answer only four questions.

Q1: Draw the followings:

- Taper consideration in sand casting.
- Types of patterns used in sand casting.

Q2: What are?

- The main differences between expendable mold processes and permanent mold processes?
- The reasons of casting defects?

Q3: Define the followings:

- Composite materials and their types with examples.
- Permeability of sand mold.
- Shrinkage allowance.

Q4:

- What are the main disadvantages of casting processes?
- What are the functions that an ideal gating system should fulfill?

Q5 In the runner system shown in fig., the diameter at points 1&2 is (2 and 1.2 cm) respec00.tively and the velocity at point 2 is 60 cm/s. The metal being cast is Al and has a viscosity of 0.004 N.s/m^2 and its density is 2700 kg/m^3.

Calculate:

1- The metal volume flow rate.
2- Reynolds number at points 1& 2.
3- What is the nature of flow in each point?

GOOD LUCK

University of Technology
Production & Metallurgy Dept.
Exam. Committee
Date : /1 /2012

Class:3ed Metallurgy
Subject: Thermodynamic
Time: 2.5 hour
Examiner :Dr.Sami Abualnon

Half year Exam 2011-2012

Note: Answer (5) question only

Q1- Define **(5)** from the following:
1- Heat capacity 2- Heat of formation 3- Heat of combustion 4- Hess's law
5- Entropy 6- Third law of thermodynamic 7- Fugacity

Q2- calculate:
(a) The enthalpy of NiO at 1727°C ,
(b) The heat required to raise the temperature of 1 mole of NiO from 25°C to 1727°C.

Given:

$\Delta H^{\circ}_{298,<Nio>} = -57.5$ Kcal /mole.

$Cp_{,<Nio>} = 12.9$ cal/deg/mole.

Q3- Prove that:

$$\left[\frac{\partial (\Delta G^{\circ}/T)}{\partial T}\right]_P = -\frac{\Delta H}{T^2}$$

Q4- The heat capacity of solid magnesium at 1 atm. pressure in the temperature range from 0°C to 560°C is given by the expression:

$Cp = 6.20 + 1.33*10^{-3} T + 6.78*10^{4} T^{-2}$ cal/deg/mole

Determine the increase of entropy per mole for an increase of temperature from 27°C to 527°C at 1 atm. Pressure

Q5- Prove that:

$$\text{Log}\ \frac{P_2}{P_1} = \frac{-\Delta H_v}{2.303\ R}\left(\frac{1}{T2} - \frac{1}{T1}\right)$$

Q6- The densities of liquid and solid bismuth are 10.0 g/c.c and 9.673 g/c.c respectively at the normal melting point 270°C .The heat of fusion is 2.633 K cal/mole. Calculate the melting point of bismuth under a pressure of 100 atm. Atomic weight of bismuth is 209.

Good Luck

University of Technology
Dept. of Production Engineering & Metallurgy

1st Stage
Subject: descriptive geometry
Time: 1 Hour
Examiner: Emad Ali

Examination questions to 1st term 2011-2012

Notice: Answer only two Questions.

Q1/ What is Descriptive Geometry? Show briefly the types of projections.

Q2/ Draw the **ELEVATION & PLAN** of the following points and state the quadrant in which each point falls. a (0 , 4) b (-2 , 0) c (-3 , 3)

Q3/ Draw the **three views** for each of the following points.

a (3, 0 , 3) b (-4 , -3, -4) c (-2, -2.5 , 3.5)

Good Luck

الجامعة التكنولوجية

قسم هندسة الانتاج والمعادن

اللجنة الامتحانية

المرحلة والفرع: الاول – انتاج–معادن–صناعية

المادة: الرياضيات

الزمن: ٢ ساعة

اسئلة امتحان الفصل الاول للعام الدراسي ٢٠١١– ٢٠١٢

ملاحظة الاجابة عن ثلاثة اسئلة فقط.

Q1.A- If $y= e^{ax} \sin bx$, prove $y'' - 2ay' + (a^2 + b^2) y = 0$

B- The value of $y''(\pi/4)$ is : a- 4.24264 ,b- 5.24264, c- 7.4532
if $y(x) = \sec x$.

c- Evaluate $\lim_{x\to 1} \frac{x^x - x}{x - 1 - \ln x}$

Q2.A- Find the derivative of :1- $\sin^{-1}\sqrt{\frac{1-\cos 2x}{2}}$,2- $\sqrt{\frac{1-x}{1+x}}$, 3- $\ln x^x$.

B- Find the value of $\lim_{x\to 0} \frac{\ln \sin x}{\cot x}$

Q3-A- If $y^2 = x^2 + \sin xy$ prove $\frac{dy}{dx} = \frac{2x + y\cos xy}{2y - x\cos xy}$

B. A weight is attached to a spring and reaches its equilibrium position x=0 .It is thenset to motion resulting displacement of **x= 3 cos 6t + 4sin 6t** when x is measured in centimeter and t in seconds. Find :

1- Spring displacement when t = 0, t= 3π/4.
2- Spring velocity when t = 0, t= π/3.
3- Spring acceleration when t = 0, t= π/3.

Q 4 A- AIntegrate $\int (\sqrt{y} - \frac{1}{\sqrt{y}})^3 dy$

B-Solve for y the following equation $3^y = 2^{y+1}$

C- Evaluate $\lim_{x\to 0} \frac{xe^x - \ln(1+x)}{x^2}$

الجامعة التكنولوجية
قسم هندسة الانتاج والمعادن
اللجنة الامتحانية

المرحلة والفرع: الرابع ه- معادن
المادة: هندسة تاكل
الزمن: ساعتين فقط
مدرس المادة: د. سامي الربيعي

اسئلة أمتحان الفصل الدراسي الأول للعام ٢٠١١-٢٠١٢

ملاحظة الإجابة عن اربعة أسئلة فقط.

س١: لقد وضعت عدة نظريات لتفسير التآكل حتى مطلع القرن العشرين. اذكرها ، واشرح نظرية بيرو كسيد الهيدروجين معزز الشرح بجميع المعادلات الكيميائية ؟

س٢: ماهو مبدا عمل الخلايا الجالفانية ؟ وماهي مجالات تطبيقاتها في الصناعة عددها واشرح واحدة منها بالتفصيل ؟

س٣: بين أسباب حصول الأنواع التالية من التآكل ؟ واذكر طرق الوقاية من حصولها :

ا- النزع الانتقائي ب- التقصف الهدروجيني ج- التآكل ألصدعي

س٤: اذكر أهم أنواع التآكل التي تصيب المعادن او السبائك المزروعة في جسم الإنسان واشرح أهم الإجراءات الواجب اتخاذها لتفادي حصول التاكل فيها ؟

س٥ : ماذا تعرف عن :

ا- EDTA ب- الهيدرازين ج- الثايوسكلليس

وهل لهذه المواد فوائد في الصناعة اذكرها باختصار ؟

الجامعة التكنولوجية
قسم هندسة الانتاج والمعادن
الممتحن: د.عقيل ظاهر

العام الدراسي 2011-2012
امتحان نصف السنة
التاريخ 21- 1- 2012

الصف: الثالث صباحي
المادة: تحولات طورية
الزمن: 2 ساعة

الملاحظات: اجب على خمسة اسئلة فقط

Q1 Explain with sketch the driving force for solidification?

Q2 Explain briefly the main factors that determine the structure of intermediate phases?

Q3 Explain briefly the **diffusion** along dislocation?

Q4 The melting point **of iron** is 1535 °C at a pressure of 101.3 kPa. What will be its **melting** point under 100 MPa? If $\Delta H = 15.2$ kJ/mol and $\Delta V = 3.5\%$.

Q5 Calculate the change in entropy ΔS during the polymorphic transformation of titanium HCP→BCC which occurs at the transition temperature of 882 °C and heat of transition 4.0 kJ/mol.

Q6 What is the proeutectoid phase for an iron– carbon alloy in which the mass fractions of total ferrite and total cementite are 0.86 and 0.14, respectively? Why?

الجامعة التكنولوجية
قسم هندسة الانتاج والمعادن
اللجنة الامتحانية

المرحلة والفرع: رابع معادن
المادة: ملحومات ومسبوكات
الزمن: ساعتان
مدرس المادة: أ.د.منى خضير عباس

اسئلة أمتحان الفصل الدراسي الاول للعام ٢٠١١-٢٠١٢ تاريخ الامتحان: ٤ / ٢ / ٢٠١٢

ملاحظة: أجب عن أربعة أسئلة فقط مع تعزيز اجابتك بالاشكال والرسومات اينما وجدت

س١ :

ا - وضح ثلاث فوائد رئيسية لاقطاب اللحام المغطاة بالصهيرة المستعملة في عملية اللحام بالقوس الكهربائي اليدوي .

ب - أجريت عملية اللحام بالقوس الكهربائي لصفائح من النحاس وعلى شكل وصلات لحام زاوية (Fillet joints) بمساحة مقطع اللحام (Aw) = $15mm^2$.وكانت قدرة اللحام المتولدة = 3000 watt وكفاءة انتقال الحرارة الى سطح القطعة المراد لحامها $f1 = 0.9$ وكفاءة الصهر $f2 = 0.25$.علما ان درجة انصهارالنحاس $Tm = 1083°C$ و $K = 3.33x10^{-6}$. جد سرعة اللحام الخطية.

س٢

ا- وضح كيف ينشا قوس البلازما .وما هي انواع القوس ثم اشرح باختصار تطبيقات كل نوع في عمليات اللحام.

ب – وضح نوع اقطاب اللحام حسب جمعية (AWS) وطبقا للرموز والارقام المدرجة أدناه مع ذكر طريقة اللحام المستخدمة في كل نوع.

E7018 , E8016-C2 ، E308-15 ، F62-Exxxx , AWS A5.2

س٣– أذكر سببين فقط لحدوث العيوب المدرجة أدناه في وصلات اللحام من الفولاذ منخفض الكاربون ثم وضح طرق معالجتها

المسامية ، شقوق الهيدروجين ، الشقوق الساخنة ، الشوائب ، شقوق جفرون

س٤

ا- وضح باختصار(مع الرسم) انواع التشوهات والاجهادات التي تحدث في التراكيب الملحومة وكيف يمكن معالجتها والسيطرة عليها.

ب - ما هي الشروط الاساسية التي يجب توفرها عند لحام المونة ثم وضح اهم العوامل المؤثرة على خواص الوصلات الملحومة واشرح واحدة منها فقط.

س٥

ا – ما هي أنواع طرق انتقال المعدن المنصهرفي لحام ميج (MIG) وكيف يؤثر ذلك على جودة وخواص وصلة اللحام.

ب - أجريت عملية اللحام بالقوس الكهربائي اليدوي لفولاذ سبائكي ذات تركيب كيمياوي موضح في الجدول ادناه:

C%	Cr%	Mo%	Mn%	Si%	Ni%	V%	Fe%
0.16	1.5	0.5	0.8	0.4	0	0	rem

١– جد المكافئ الكاربوني لهذا الفولاذ ثم وضح تاثير العناصر السبائكية على الخواص الميكانيكية لوصلة اللحام الناتجة.

٢ – ما تاثير المكافئ الكاربوني على نوع التشققات المتكونة في الوصلة الملحومة وكيف يمكن معالجتها.

University of Technology
Dept. of Production Engineering and Metallurgy
3rd class/ Metallurgy

Subject: Technology of Ferrous and Nonferrous Metals
Time: 2 hr
Examiner: Dr. Hijran Zainalabidin
Date: 31 / 1 / 2012

Answer (4) questions

Q 1: answer two branches only

a) What are the main zones in blast furnace? Give in short notes the main steps of pig iron production.
b) What are the main factors that control the cast iron properties?
c) Distinguish between induction furnaces and reverberatory furnace.

Q 2 : answer two branches only

a) What is the sponge iron? What are the main reduction processes according to the type of reductant?
b) What are the main equipments in continuous casting for steel and their purposes?
c) What are the main characteristics of grey cast irons and how its forms?

Q 3 : answer two branches only

a) What are the main features of basic oxygen furnaces? What are the factors that limit capability of this process?
b) Why stirring and homogenizing are important in secondary steel making? How can be achieved?
c) What are the main advantages of electric arc furnaces?

Q 4 : answer two branches only

a) Explain in short notes the ladle (tank) degassing process in secondary steel making.
b) Explain the main characteristics and production principles of malleable cast irons.
c) Explain the melting process in cupola furnace.

Q 5 :

a) What are the main melting periods of steel production in electric arc furnace? Explain the first period only.

b) Answer in three shorts notes for each of the following :
1) Microstructure of ductile cast iron are:
2) Main teeming methods are:
3) Types of steel according to degree of deoxidation are:
4) Benefits of VOD process are:
5) Types of crucibles furnace are:

University of Technology
Dep. of production Engineering
and metullurgy

Stage and Branch: 2nd class Metallurgical Eng.
Subject: Computer Applications
Time: 2 hours
Examiner: Dr. Mohanned AL-Khafaji

1st term examination questions 2011-2012

Note: Answer three questions only

Q1. Write a MATLAB function to take the load, displacement and the specimen dimensions (the gauge length and diameter) as inputs and returns the engineering stress and the engineering strain as outputs using the following equations.

$$\sigma_e = \frac{P}{A_o} \quad \text{and} \quad e = \frac{\Delta l}{l_o} = \frac{l - l_o}{l_o}$$

Where σ_e and e are engineering stress and strain, respectively. P is the load, A_o is the original cross sectional area of specimen, l_o is the original specimen length and l is the instantaneous specimen length.

Q2. An electrical circuit has the following equation

$$L\frac{di}{dt} + R\,i + \frac{1}{C}\int i\,dt = V$$

Find the values of V at the following times (t=4, 5, 6, 8, 19 and 35) if the current equation is ($i = t^5 + 4t^3$). (Where L= 500, R = 300 and C= 0.1).

Q3. Give the results of the following codes. (Note if there is wrong syntax specify it) choose four only.

a)
```
v=linspace(0.4,0.47,16)
```

b)
```
v=[4 55 61 8];w=[17 4 8 24 56];
f=v'*w
```

c)
```
g=[11 23 34 72]; H=eye(4)'*20;
gh=g*H
```

d)
```
v=[ 5, 7 ,8 ,10]; w=[1; 3; 2; 5];
u=w*v
```

e)
```
v=[ 5, 7 ,8 ,10]; w=[1; 3; 2; 5];
u=v*w
```

Q4. Write MATLAB codes to generate a random matrix with (4 x 4 x 6) dimensions contain values between (30 and 150). The codes should compute matrix products between each matrix that has an even index across the third rank of the generated random matrix and store the result in another matrix.

الجامعة التكنولوجية
قسم هندسة الانتاج والمعادن
المدرس: د.عقيل طاهر

العام الدراسي 2011-2012
امتحان نصف السنة
التاريخ 2012 -1- 2012

الصف: الرابع مسائي
المادة: فحوصات هندسية
الزمن: 2 ساعة

الملاحظة: اجب على خمسة اسئلة فقط

Q1 Classify the main discontinuities and their origins that can be detected using nondestructive inspections?

Q2 Explain briefly the major factors that must be considered in order to make nondestructive inspections effective?

Q3 What is meant by 'Lift –Off' factor? Explain with showing its importance in nondestructive inspections?

Q4 Explain briefly the importance of ultrasonic inspection in industry?

Q5 Explain briefly with sketch the generation of characteristic X-rays?

Q6 Calculate the Bragg angles for face-centered cubic crystal having a lattice constant of 400 pm using the X-ray beam with wavelength of 2 Å for diffraction of the following planes: (111), (200), and (220).

University of Technology
Dept. of Production Engineering & Metallurgy

Stage and Branch: 2nd metallurgy
Subject: Extraction
Time: 2. 0 hours
Examiner: Dr. Mohammed Hliyil Hafiz

Examinations question to 1st term 2011-2012

Notice: Answer Three Questions Only

Q1/ Answer the following in brief:

a. Explain the Magnetic separation method.

b. List three ores of aluminum.

c. Mention two factor and parameter influencing Bioleaching

Q2/ Mention the following:

a. The principles of microbial of metal leaching.

b. Characterization of Jaw crusher.

c. Reduction process employed to obtain some metals from their ores.

Q3/ Design the following:

a. Main steps of metal extraction from their ores.

b. The steps for removal impurities associated with ores.

Q4/ Compare between the following:

a. Physical properties of metals and non metals for the following:

(state, density and metallic luster)

b. Chemical properties of metals and non metals for the following:

(nature oxide, solubility and action of acid)

University of Technology
Dept. of Production Engineering & Metallurgy

Stage and Branch:
Subject:
Time:
Examiner:

Examinations question to 1st term 2011-2012

Answer one the Questions bellow

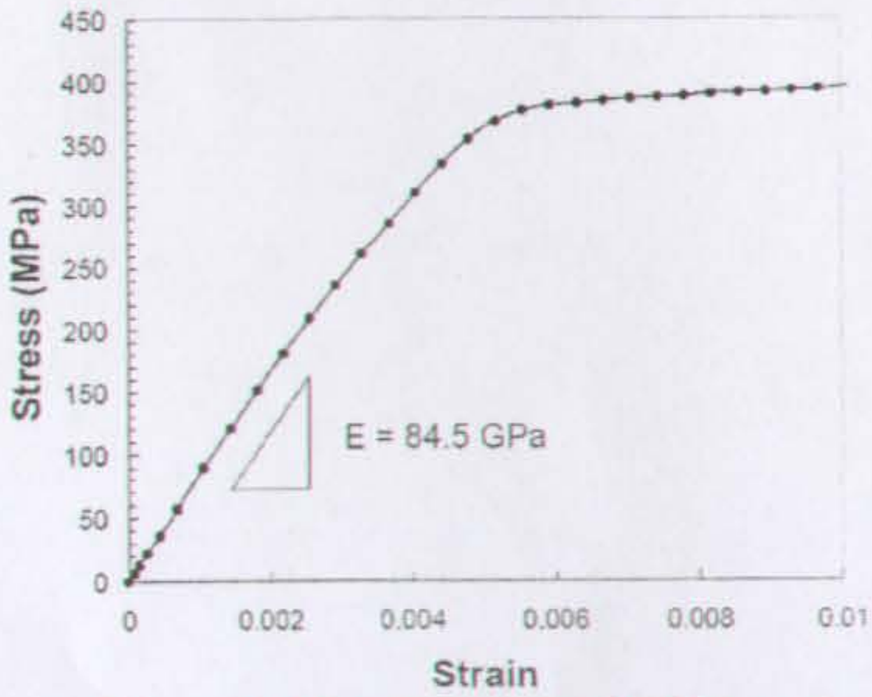
Q1-

A- from the stress strain diagram bellow:

(A-1)Fined the mathematical model that presents the elastic behavior of this material.

(A-2) What is the work that needed to make the material reach the yield point (375 MPa)?

NOTE: Use the numerical analysis methods.



B- Consider that you have An Equilibrium Diagram for complete soluble compounds. Draw a flow-chart the represents the Cantilever rule to find and calculate the phases and their percent.

C- What is meaning of modeling and simulation? Give an example please.

Q2-

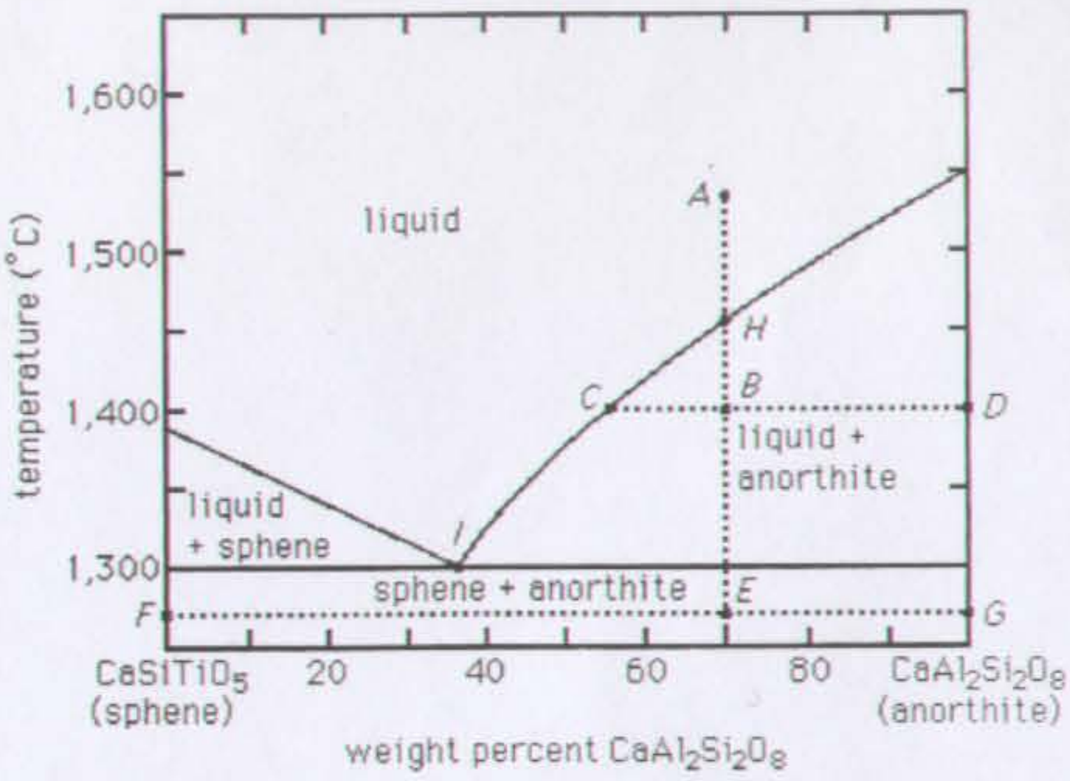
A- For the Diagram Below:

(A-1)Find the mathematical models that present the two liquids curves. (Use Linear Fitting)

(A-2)Find the eutectic point for this system by using the numerical methods.

(A-3)Draw a flow chart for a program simulating the change in phase percent for the composition presented in diagram from (40%-100%).

Consider that the Cantilever rule = CR



B- Why we consider that, the model does not give a real picture for the problem. Give an example. please

الجامعة التكنولوجية
قسم هندسة الانتاج والمعادن
اللجنة الامتحانية

المرحلة والفرع: الثالث معادن
المادة: الحريات
الزمن: ساعتان
مدرس المادة: د.عادل غانم

اسئلة امتحان الفصل الاول للعام الدراسي 2011- 2012

ملاحظة : الاجابة عن ثلاثة اسئلة فقط.

س1 / هناك من يرى أن جزيرة العرب قد ظهر فيها قبل الثورات الديمقراطية في العصر الحديث ما يمكن ان يكون مرادفا للديمقراطية . ما هو هذا المرادف ؟ وما هي أدلتهم ؟ وبم كانت تتميز التقاليد العربية قبل الاسلام ؟

س2 / تحدث بشكل مفصل عن :
أ- الديمقراطية الموجهة .
ب- الديمقراطية الوطنية .

س3 / أذكر خمسا من الافكار التي تثيرها قضية الديمقراطية بين العالمية والخصوصية.

س4 / فيم تتمثل مشاركة الشعب في العمل التشريعي ؟ أجب مع الشرح الموجز .

University of Technology
Dept. of Production Engineering & Metallurgy

Stage and Branch: First year
Subject: Materials science
Time: 2hrs
Examiner: Dr. Ahmed Moosa

Examinations question to 1st term 2011-2012

Note: Do not write any thing above this line . Answer is in English only. Answer without units will not be considered. All question worth 15 points except question one and two they worth 20 points each . Six questions.

Q1)- Fill in Blank with ONE correct answer (20 points)

1-The element $1s^2\ 2s^2\ 2p^6$ is classified as ----------

2- Non crystalline materials is called ----------

3- Write down Bragg's law ----------

4--Two equal charges in magnitude but opposite in direction is called ---

5- The bond in Cu is----------.

6 - Materials that convert electrical energy into mechanical energy is ----

7- The atomic radius of an atom is ----------

8- Metals and non metals are called ----------

9- Diamond has a high melting point because ----------

10- No two electrons in the same system can share the same four (n, l, m, m_s) quantum numbers is called ----------

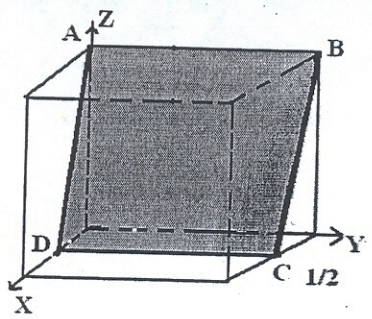
Q2) (20 points)

A) - The angle between [111] and [112] directions in a cubic crystal is ----

B) - A metal has a lattice parameter $2.8A^0$. Calculate the interplannar distance for set of (142) planes. The temperature is 25 °C.

C) - Calculate the weight of palladium (Pd) atom at temperature 25 °C and pressure 1 atmosphere. Pd has an FCC crystal structure, density is 12 gm/cm ^{3} and an atomic weight of 106.4 g/mole.

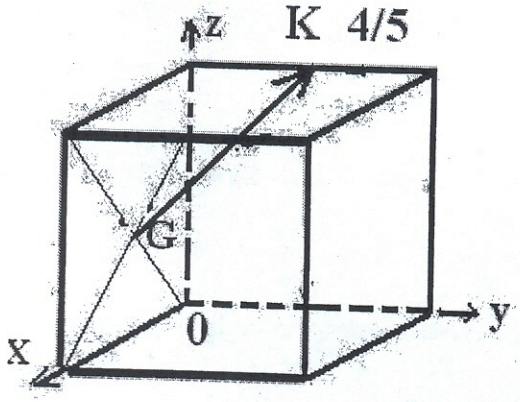
Q3) - Find the indices of the plane ABCD



Q4) - Choose the **ONE** correct answer.

1. Particles that most effects material properties----------
(a) Neutrons (b) Protons (c) Electrons (d) Valence electrons
2. Mean distance between atoms in the range of----------
(a) 25 nm (b) 2.5 nm (c) 0.25 nm (d) 0.025 nm
3. Which one of the following is not a strong bond? ----------
(a) van der Waals bond (b) Covalent bond (c) Metallic bond (d) Ionic bond
4. Electron sea exists in ----------
(a) Polar bonds (b) Ionic bond (c) Covalent bond (d) Metallic bond
5. Repeatable entity of a crystal structure is known as----------
(a) Crystal (b) Lattice (c) Unit cell (d) Miller indices

Q5)- Find the direction GK



Q6)- A metal having a cubic structure has a density of 11.72 g/cm3, an atomic weight of 232 g/mol, and a lattice parameter of 5.08 Å. Determine the crystal structure of the metal.

University of Technology.
Department of Production & Metallurgy Engineering.

Class:- 2nd Year.
Date:- 28 / 1 /2012.
Time allowed:- Two Hours.
Examiner:- Raed R. Shwaish.
Subject:- Mathematics II

first semester exam

Note: Answer two Questions.

Q 1/

A- Determine whether the statement is true or false. Explain the false statement.

1- Two planes perpendicular to a third plane are parallel.

2- Every plane has exactly two unit normal vectors.

3- If the graph of $Z = f(x,y)$ is a plain in 3-space, then both f_x and f_y are constant functions.

4- The symbols ∂z and ∂x are defined in such a way that the partial derivative $\partial z/\partial x$ can be interpreted as a ratio.

5- If A = 2B, then the directional derivative of f in the direction of A at point (x_o, y_o) is twice the directional derivative of f in the direction of B at the point (x_o, y_o).

B- Find equations of the planes that are parallel to the plane $[x+2y-2z=1]$ and two units away from it.

Q 2/

A- The speed of sound traveling through ocean water with salinity 35 parts per thousand has been modeled by the equation $[C=1449.2+4.6T-0.055T^2+0.00029T^3+0.016D]$ where C is the speed of sound (in meters per second), T is the temperature (in degrees Celsius), and D is the depth below the ocean surface (in meters). A scuba diver began a leisurely dive into the ocean water; the diver's depth and the surrounding water temperature over time are recorded in the following graphs, figure (1). Estimate the rate of change (with respect to time) of the speed of sound through the ocean water experienced by the diver 20 minutes into the dive. What are the units?

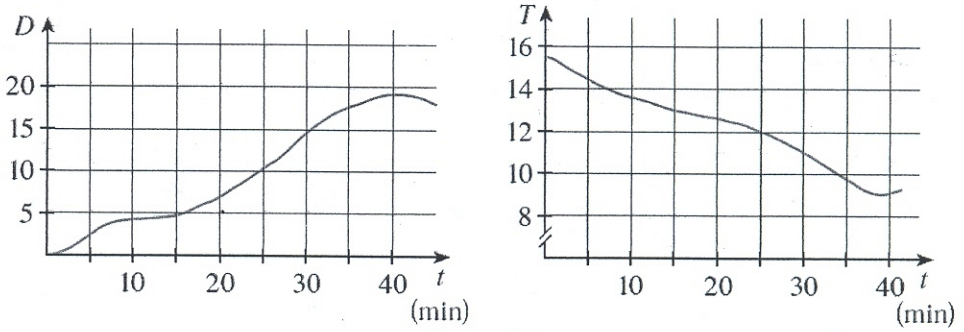


figure (1)

B- Show that the four points, whose position vectors are (3i-2j+4k), (6i+3j+k), (5i+7j+3k) and (2i+2j+6k), are coplanar.

C- Use differentials to estimate the change in the volume $[V=\frac{1}{3}x^2 h]$ of a pyramid with a square base when its height (h) is increased from 2 to 2.2 m and its base dimension (x) is decreased from 1 to 0.9 m. Compare this to $[\Delta V]$.

Q3/

A- Suppose you are climbing a hill whose shape is given by the equation [$z = 1000 - 0.005x^2 - 0.01y^2$], where, x, y, and z are measured in meters, and you are standing at a point with coordinates (60, 40, 966). The positive x-axis points east and the positive y-axis points north.
(a) If you walk due south, will you start to ascend or descend? At what rate?
(b) If you walk northwest, will you start to ascend or descend? At what rate?
(c) In which direction is the slope largest? What is the rate of ascent in that direction? At what angle above the horizontal does the path in that direction begin?

B- Find an equation for the plane that passes through the point (1,2,3) parallel to u=2i+3j+k and v=i-j+2k.

C- Fill in the blanks by using the appropriate word from the words between the brackets;
[***odd, even, rational number, numerals, real numbers, kite, rhombus, trapezoid, arithmetic, calculus, algebraic***].

1- ---------- is The study of properties of functions of one or several variables, using derivatives and integrals.

2- A quadrilateral is a ---------- if and only if one of the following statements is true:
- One diagonal is the perpendicular bisector of the other diagonal. (In the concave case it is the extension of one of the diagonals.)
- One diagonal divides the quadrilateral into two congruent triangles.

3- A ---------- is a number that can be expressed as a fraction with an integer numerator and a non-zero natural number denominator.

4- In linguistics, *number names* (or ----------) are specific words in a natural language that represent numbers. Also In writing, they are symbols representing numbers.

5- Figure (2) of the function $f(x) = x^2$ is an example of an --------- function. While figure (3) of the function $f(x) = x^3$ is an example of an --------- function.

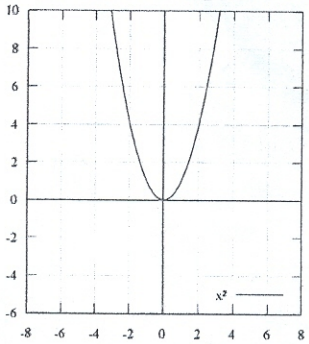


figure (2)

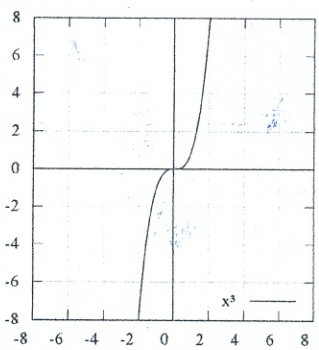


figure (3)

University of Technology
Dept. of Production Engineering & Metallurgy
First Term Examination 2011-2012

Subject: Metal-forming **Time:2 hours**

Class: fourth year **Examiner: Dr. Karem M.**

Attempt 3 questions only

Q/1-

In the strip drawing operation. Prove that the drawing stress, σ_{xa} is given by

$(\sigma_{xa}/S) = (1+B)/B[1-(h_a/h_b)^B]$

Q/2-

What is the theoretical maximum reduction of area that can be taken in one close pass with 25 mm outside diameter,1 mm wall thickness tube on a floating plug?

What is the final inside diameter if the final outside diameter equal to initial outside diameter = 25 mm?

Q/3-

A steel wire 10 mm diameter is drawn to 7 mm diameter through die of 24° included angle, at 2 m/sec.

What is the total work expended in a drawing a 50 Kg coil, density of metal, $\rho = 7.8 * 10^3$ Kg/m^3, and yield stress, Y = 500 N/mm^2, the coefficient of friction at the coil-die interface = 0.1?

Find the power required to performing this operation?

Q/4-

A-In a tensile test on a metal specimen, true strain = 0.08 at a stress = 265 MPa. When the true stress = 325 MPa, the true strain = 0.27. Determine the flow curve parameters n and K.

B- In a ring compression test a specimen 10 mm high with outside diameter 60 mm and inside diameter 30 mm is reduced in height by 50 percent.

By using figure 1. Determine the friction factor, m if the outside diameter after deformation is 70 mm?

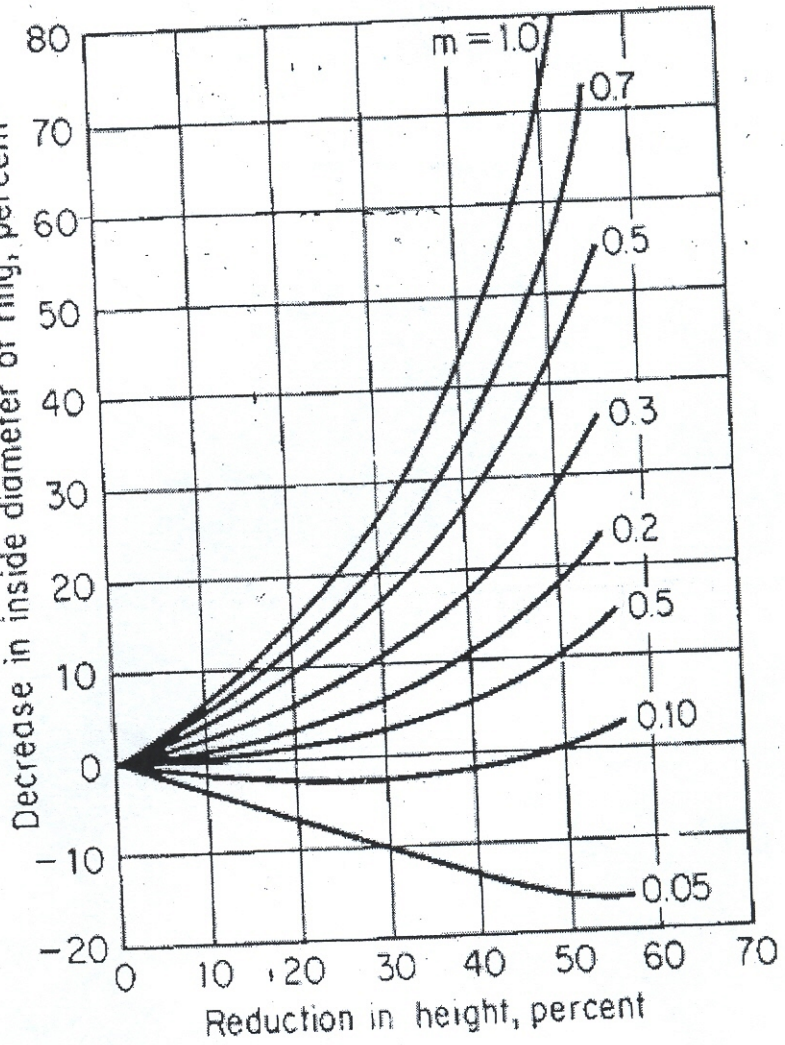


Figure 1 Calibration curve for ring test with outside diameter, inside diameter, and thickness in a ratio of 6:3:1.

University of Technology
Dept. of Production Engineering & Metallurgy

Stage and Branch : 3rd-Metallurgy
Subject: Metallic Material
Time : □/2 hr
Examiner: Dr Munthir Al Kubisy

Examinations question to 1st term 2011-2012

Q1-Explain the meaning of the digite in the following metals and alloys specifications. Ans (10) only.
1-D2 2-2515 3-C1030 4-8620 5-9260 6-4023 7- 201 8- 1010 9-B1113 10-1113 11-301 12-L3

Q2-

A-What the content of alloying elements in the following alloys (Ans four only).

1-Austenitic stainless steels.
2-Medium carbon steels .
3-Water hardening steels .
4-Hadfield manganese steels.
5- Navy steels .

B- Define two of the following.

1-ductility 2- HRC hardenss3-hadfield silicon steel.

Q3-Match branch (A) with branch (B).

A/ alloy	B/ application
1-1.4% carbon steels.	1-drive gears.
2-Low carbon steels.	2-ball and roller bearing.
3-High carbon- High chromium. Q.S	3-turbine blades.
4-Shock resisting tool steel.	4-saws razors.
5-F –steel. (T.S)	5-special purpose.
6-Martensitic stainless steel.	6-forming tool.

Q4- Complete the blanks with suitable words

1-In Ni-Cr steel the ratio of Ni to Cr is approximately _____ parts Ni to_____ parts Cr.
2-Vanadium steel has powerful _____ and a strong _____ former.
3-The better corrosion resistance in stainless steel of type _____more than type _____-and more than type_____-.
4-The low carbon steel, is the steel have _____ carbon content.
5- The series 4xx refer to stainless steel types_____

Q5/ A/ What are the types of cast irons.

Q5/ B / what is the effect of three following alloying elements on properties of alloy cast irons.(Ni, Cr, Mo ,Cu ,V).((select three alloying elements only)).

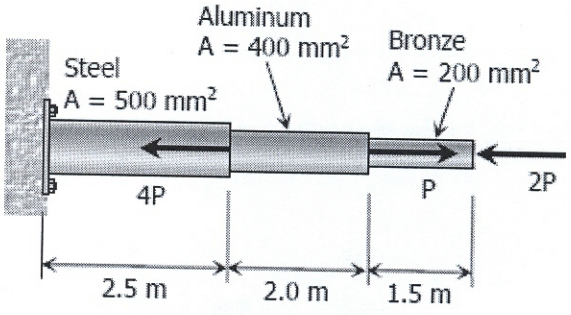
University of Technology
Dept. of Production Engineering & Metallurgy

Stage and Branch: 2nd year Metallurgy
Subject: Strength of Materials
Time: 90 miutes
Examiner: Dr. Ahmed Ali Akbar

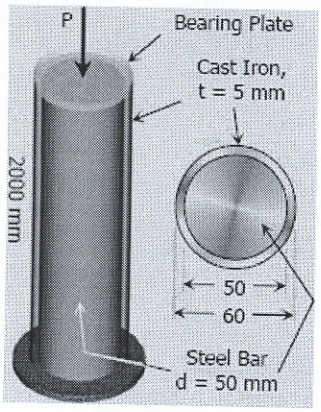
1st Term Examination Questions / 2011-2012

Note: Answer <u>three</u> questions only

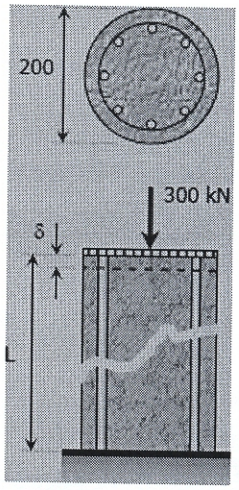
Q1 : If the maximum allowable stress for steel is 140 MPa and the maximum allowable stress for aluminum and bronze are 90 MPa and 100 MPa .What is the maximum safe value of axial load P



Q2:A steel bar 50 mm in diameter and 2 m long is surrounded by a shell of a cast iron 5 mm thick. Compute the load that will compress the combined bar a total of 0.8 mm in the length of 2 m. For steel, E = 200 GPa, and for cast iron, E = 100 GPa.



Q3:A reinforced concrete column 200 mm in diameter is designed to carry an axial compressive load of 300 kN. Determine the required area of the reinforcing steel if the allowable stresses are 6 MPa and 120 MPa for the concrete and steel, respectively. Use E_{co} = 14 GPa and E_{st} = 200 GPa



Q4:The rigid platform in Fig. P-239 has negligible mass and rests on two steel bars, each 250.00 mm long. The center bar is aluminum and 249.90 mm long. Compute the stress in the aluminum bar after the center load P = 400 kN has been applied. For each steel bar, the area is 1200 mm2 and E = 200 GPa. For the aluminum bar, the area is 2400 mm2 and E = 70 GPa.

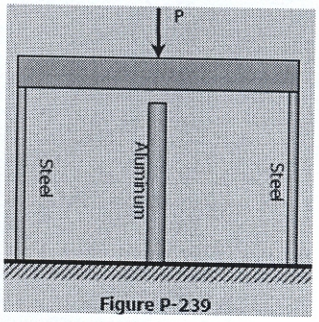


Figure P-239

Q5:Given:The diameter of the pin B=20mm. Find the shearing stress of the pin

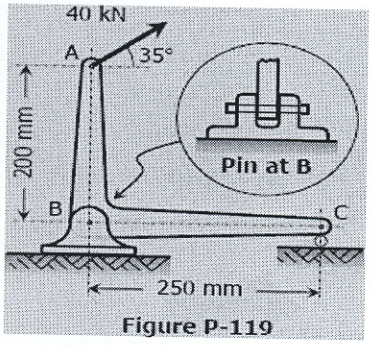


Figure P-119