Q4: **(22 total marks)**

1. In a cubic crystal cell draw the plane which intersects the position coordinates a= (1, ¼, 1); b= (0, 1, 1); c= (½, 1, ½). Find the miller indices of that plane. **(5 marks)**

2. Figure 1 shows the grain structures of an Al-4%Cu alloy after solidification under three different cooling rates (0.7, 1.3 and 2.3 °C/s).
   a) What is the type of the shown grain structure (columnar, dendritic, or equiaxed)? **(2 marks)**
   b) Which one has the most finer grains? **(2 marks)**
   c) Match each of the above cooling rates with its corresponding microstructure. **(3 marks)**
   d) For the given alloy, using the portion of the Al-Cu phase diagram shown in Figure 2, Find the liquidus and solidus temperatures and draw its cooling curve. **(6 marks)**
   e) For age hardening of the alloy, suggest the suitabe temperatures for the solution treatment step and the holding temperation for aging step. **(4 marks)**

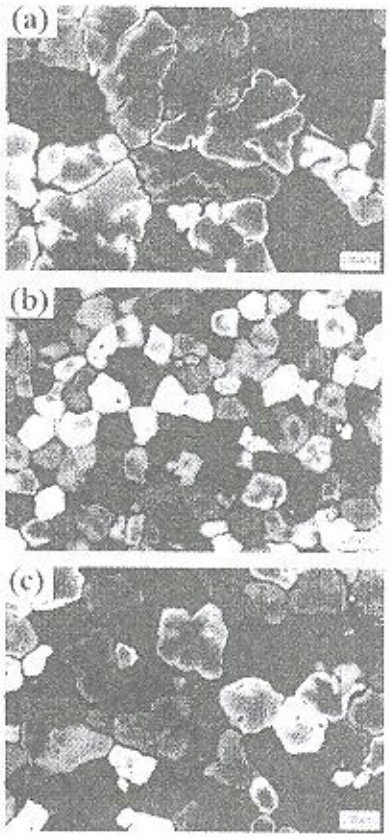


Figure 1

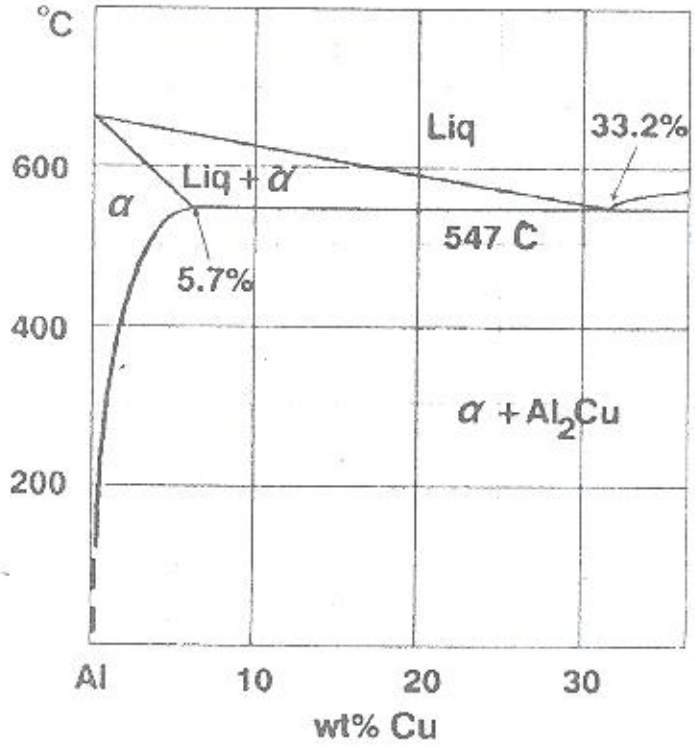


Figure 2

Q5: **(18 total marks)**

1. The microstructure of an alloy on Fe-C diagram was containing 13% pro-eutectoid cementite and 83% pearlite at temperature just below the eutectoid temperature. With the help of schematic illustrations:
   i. Calculate the average carbon content in this steel. **(4 marks)**
   ii. Draw schematically the microstructure of the alloy at room temperature. **(2 marks)**
   iii. Suggest the suitable holding temperature to conduct the following heat treatments: Full annealing – normalizing – spherodize annealing. **(3 marks)**

2. Compare thermoplastics, thermosets, and elastomers considering their structure, thermal behavior, stress-strain behavior. **(9 marks)**

End of the exam questions

Best wishes,
Prof. Dr. Abd-Elwahed Assar
Dr. Mahmoud Ahmadein

جامعة طنطا
كلية الهندسة
قسم هندسة الإنتاج والتصميم الميكانيكي

المادة/ هندسة الانتاج
(MPD1105)
الفرقة الاولى

بسم الله الرحمن الرحيم
التاريخ :١٨ /١/ ٢٠١١
الزمن : ٣ ساعات

أجب عن الأسئلة الآتية:- (٧٥ درجة)

السؤال الأول:- (١٥درجة)

١- اكتب نبذة مختصرة عن جهاز التقسيم واستخداماته مع الرسم كلما امكن.
٢- تكلم بالتفصيل عن أنواع أقلام الخراطة مع الرسم إن امكن.
٣- احسب زمن التشغيل اللازم لخراطه عمود من الصلب بطول ٨٥مم وقطر ٤٢مم إلي قطر ٣٦مم إذا كانت سرعة القطع ١٥م/دقيقه والتغذية ٢٧ وعمق القطع ٠,٥ مم.
٤- احسب زاوية ميل الراسمة عندما يراد عمل سلبه في تشغيلية طولها ٩٥ مم وطول المسلوب ٥٨ مم والقطر الأكبر ٥٦ مم والقطر الأصغر صفر.

السؤال الثاني: (١٠ درجة)

١- تكلم عن العمليات الانتاجيه التي تجري علي المثاقب مع الرسم.
٢- اشرح بالتفصيل الاوضاع المختلفة لقمة القلم بالنسبة لمحور الذنبتين عند الخراطة الطولية الخارجية مع الرسم.
٣- احسب زمن التشغيل لعمل ثقب بقطر ٢١مم بعمق ٢٨مم في قطعة من النحاس إذا علمت أن التغذية للحد القاطع الواحد S_z هي ٠,٠٦ مم / لفة وسرعة الدوران ٢٨٠ لفة / دقيقة .

السؤال الثالث:- (١٥درجة)

١- تكلم بالتفصيل عن مكونات حجر التجليخ - مع رسم بعض اشكال احجار التجليخ.
٢- اكتب نبذة مختصرة عن انواع عمليات التجليخ مع الرسم.
٣- احسب وقت التجليخ لمشوار واحد لسطح اسطواني خارجي بقطر ٥٠ مم وطوله ٥٠٠ مم ويدور بـ ١٥٠ لفه/دقيقه إذا كان سمك الحجر التجليخ ٥٠مم وقطره ٤٠٠ مم وسرعة دورانه ١٢٣٠ لفه/دقيقه وكذلك التغذية تساوي نصف سمك الحجر لكل لفه من الشغله.

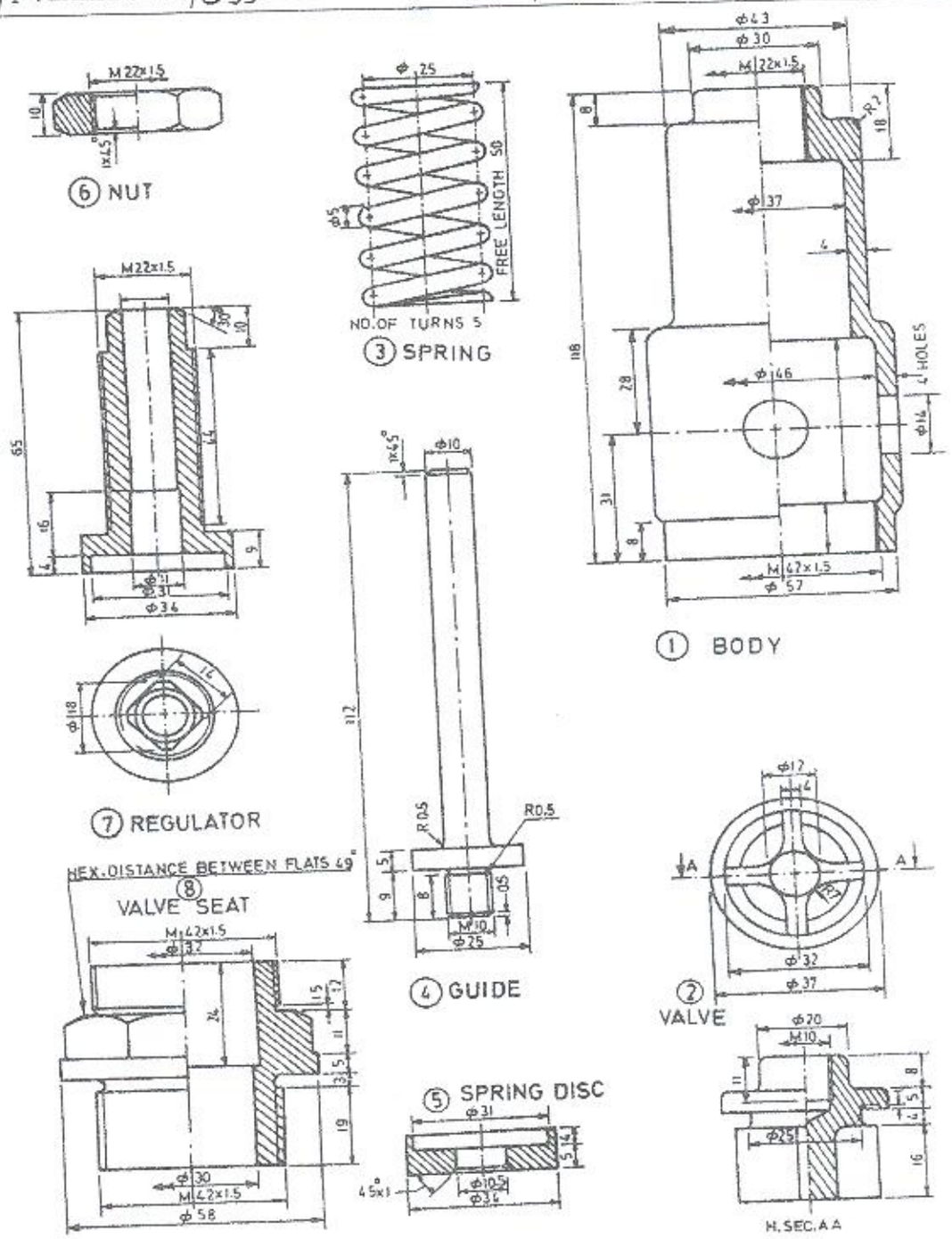
السؤال الرابع:- (٣٥ درجة)

١- تكلم عن ميكانيكية التشكيل اللدن مع الرسم.
٢- تكلم بالتفصيل عن العوامل التي يتوقف عليها مقاومه المعدن للتشكيل.
٣- اكتب نبذة مختصرة عن انواع وطرق السحب العميق مع الرسم كلما امكن.
٤- اشرح بالتفصيل نظريه البثق.
٥- اذكر العلاقة بين قطر الدرافيل وقوه الدرفلة.
٦- صبه من الحديد الكربوني على شكل متوازي المستطيلات ذات قاعدة مربعة طول ضلعها ٣٠مم وارتفاعها ١٠٠م شكلت بالطرق الحر ليصبح ارتفاعها ٦٠ مم احسب:-
١- القوة اللازمة لعملية الطرق الحر.
٢- دورة التسخين المناسب.
علما بأن : معامل الترتيب داخل الفرن (k) = 0.4 ، معامل الاحتكاك (μ) = 0.4
ومقاومة المعدن للتشكيل عند درجة حرارة ١١٠٠ م = ٧٠ نيوتن/ مم٢

جامعة طنطا – كلية الهندسة
الفرقة : الأولى ميكانيكا
الفصل الدراسي: الأول
زمن الإمتحان: 4 ساعات

العام الجامعى: 10 /11
النظام : جديدة

إسم المقرر: رسم ميكانيكي
كود المقرر: MPD1103
النهاية العظمى: 100 درجة
عدد الأوراق/عدد الصفحات: 1/1



You are given the details of a Safety Valve
Assemble all parts and draw the following views;

1. **Sec. Elev.**
2. **Half sec. side view**
3. **Plan**

All dimensions in mm, and all unspecified radii R2.

اولى ميكانيك

Course: **Physics (2)** - EMP1108
Final-Term Exam – 23rd of January 2011
Time allowed: **3 hours**
Questions are in 1 paper/2 Pages

Tanta University - Faculty of Engineering
Department of Engineering Physics and Math.
Examined Students: **1st-Year Mechanical Engineering Programs**

Attempt all questions: **Total Evaluation Mark (60 Marks)**

Question One: (16 Marks)

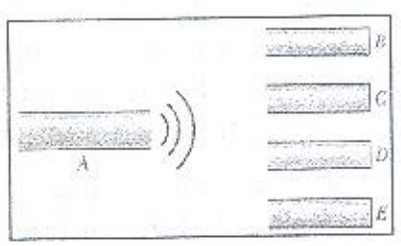
1. a. Using a smart table mention the units of the following physical quantities: 1) Wave number; 2) Phase difference; 3) Speed of standing waves; 4) Power transmitted by a sound wave; 5) Sound intensity; 6) Intensity level; 7) Tension in a string; 8) Linear mass density; 9) Bulk modulus of elasticity; 10) Pressure amplitude; 11) Optical path length; 12) Slit width; 13-15) Resolving power, line half width, and dispersion of a diffraction grating. **(5 Marks)**

1. b. Deduce a relation that gives the speed of a linear transverse mechanical wave moving along a string stretched with a tension τ and has a linear mass density μ. **(5 Marks)**

1. c. Two waves travel along the same string: $y_1(x, t) = (4.00\text{ mm}) \sin(2\pi x + 400\pi t)$ and $y_2(x, t) = (3.00\text{ mm}) \sin(2\pi x + 400\pi t + 0.80\pi\text{ rad})$. What are (a) the amplitude and (b) the phase angle (relative to wave 1) of the resultant wave? (c) Are those two waves *coherent*? Explain. (d) If a third wave with amplitude 5.00 mm is also to be sent along the string in the *opposite* direction of the first two waves, what should be its frequency in order to form a standing wave? **(6 Marks)**

Question Two: (16 Marks)

2. a. In the figure, pipe A is made to oscillate in its third harmonic mode by a small internal sound source. Sound emitted at the right *resonated* four nearby pipes, each with only one open end **(they are NOT drawn to scale)**. Pipe B oscillates in its lowest harmonic, pipe C in its second lowest harmonic, pipe D in its third lowest harmonic, and pipe E in its fourth lowest harmonic. Rank all five pipes according to their length, greatest first. Draw **to scale** the standing waves for each pipe. **(8 Marks)**

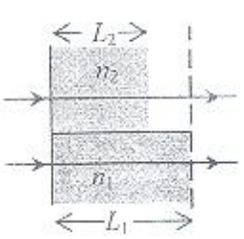


2. b. A point sound source has a power of 1.00 μW. (a) What is the intensity 3.00 m away. (b) What is the sound level in decibels at that distance? **(5 Marks)**

2. c. A police officer *chases* a speeder along a straight road; both cars move at 162 km/h. The siren on the officer's car produces sound at a frequency of 500 Hz. What is the Doppler shift (Δf) in the frequency heard by the speeder? The speed of sound is 340 m/s. **(3 Marks)**

Question Three: (16 Marks)

3. a. Two waves of light in air with wavelength $\lambda = 600.0$ nm *are initially in phase*. They then travel through plastic layers as shown in the figure with $L_1 = 4.00$ μm, $L_2 = 3.20$ μm, $n_1 = 1.33$, and $n_2 = 1.50$. (a) What multiple of λ gives their phase difference at the position of the dashed line? (b) If the waves later arrive at some common point with *the same amplitude* I_0 for each, what is the resultant intensity at this point? **(5 Marks)**



3. b. A double slit interference pattern is produced on the screen of Young's experiment with light of wavelength of 550 nm. A strip of a transparent material with thickness 2.00 μm is to be placed over *one of the slits*. Its presence resulted in shifting the interference pattern *downward*, so that the *upper second-order* bright fringe is shifted to the center of the original pattern. (a) Should the plastic be placed over the top slit or the bottom slit? (b) What is the refractive index of the strip material? **(5 Marks)**

3. c. A slit of width a is illuminated by white light. (a) For what value of a will the second minimum for blue light of wavelength $\lambda = 450$ nm appear at $\theta = 18°$? (b) What is the wavelength λ' of the light whose first side diffraction maximum is at 18°, thus coinciding with the second minimum for the green light? **(6 Marks)**

Question Four: (16 Marks)

4. a. (a) How many bright fringes appear between the first diffraction-envelope minima to either side of the central maximum in a double-slit pattern if $\lambda = 550$ nm, $d = 0.150$ mm, and $a = 35.0$ μm? (b) What is the ratio of the intensity of the third bright fringe to the intensity of the central fringe? **(5 Marks)**

4. b. A diffraction grating has 1.20×10^4 rulings uniformly spaced over width $w = 25.0$ mm. It is illuminated at normal incidence by yellow light from a sodium vapor lamp. This light contains two closely spaced emission lines of wavelengths 589.00 nm and 589.59 nm. (a) At what angle does the first-order maximum occur (on either side of the center of the diffraction pattern) for the wavelength of 589.00 nm? (b) Using the dispersion of the grating, calculate the angular separation between the two lines in the first order. (c) What is the least number of rulings a grating can have and still be able to resolve the sodium doublet in the first order? **(6 Marks)**

4. c. Light of frequency f illuminating a long narrow slit produces a diffraction pattern. (a) If we switch to light of frequency $1.3f$, does the pattern expand away from the center or contract toward the center? (b) Does the pattern expand or contract if, instead, we submerge the equipment in clear water? **(5 Marks)**

Good Luck... Dr. Adel Maher

جامعة المنيا - كلية الهندسة
الفرقة : أولى ميكانيكا الدور الثاني ٢٠١٠/٢٠١١
الفصل الدراسي الأول
زمن الامتحان : ساعتان

اسم المقرر : التخيل الهندسي
الدرجة النهائية : ٤٠ درجة
النظام : لائحة جديدة

أجب عن الأسئلة الآتية :-

السؤال الأول (10 درجات)

أ- اذكر ما تعرفه عن ماهية التخيل ؟ ثم اذكر الفرق بين التخيل والتفكير ؟ (3 درجات)

ب- اذكر ما تعرفه عن تتابع عمليات التخيل الإنشائي ؟ ثم اذكر صورتان التخيل السليم ؟ (3 درجات)

جـ- اذكر ما تعرفه عن الفرق بين المخ والعقل ؟ ثم اذكر المراحل البيولوجية للتخيل ؟ (4 درجات)

السؤال الثاني (13 درجة)

أ- اذكر ما تعرفه عن نماذج التخيل ؟ ثم اشرح أحدهم ؟ (4 درجات)

ب- اذكر ما تعرفه عن أساليب التخيل ؟ ثم اذكر الفرق بينهما ؟ (4 درجات)

جـ- اذكر ما تعرفه عن :-

1- التخيل العلمي 2- التخيل الإبداعي (5 درجات)

السؤال الثالث (17 درجة)

أ- اذكر ما تعرفه عن :-

1- مرحوم المنفوخة 2- التحكم وآليات تنفيذه (5 درجات)

ب- اذكر صفات الفرد :- 1- ذو التخيل التركيبي 2- ذو التخيل التحليلي (3 درجات)

جـ- اذكر ما تعرفه عن الدكتاه ؟ ثم اذكر مقاييس الاكتئاب ؟ (4 درجات)

د- اذكر ما تعرفه عن 1- سمات شخصية الفرد ؟

2- طفل عمره الزمني ٤ سنوات وأجاب على جميع أسئلة اختبار الخامسة وعمره الرابعة أسئلة عن اختبار السادسة فكم تكون نسبة ذكائه ؟ (5 درجات)

٢٠١٠/٢٠١١ / الشناوي عبد الحميد الشناوي

Tanta University | Physics & Mathematics Dept. | Faculty of Engineering

Total Mark : 100

Course Title: Engineering Mathematics (2)A | Course Code: PME1107 | Year: First Year Mechanical

Date: 27/1/2011 (Final First Term Exam) | Allowed time: 3 Hours | No. of Pages: (1)

Please, answer all the following questions

Question 1 — 20 Marks

a- **Write and sketch the domain of the following functions:**

i) $Z = \cos^{-1}(x+y)$ ii) $Z = 3xy + \sqrt[6]{4 - x^2 - y^2}$

iii) $Z = \ln(xy) + \cos^{-1}(x+y)$

b- **If:** $e^{x^2+y^2+Z^2} + \sin\left(\frac{x}{y+1}\right) = 1$, **find** Z_x ?

Question 2 — 15 Marks

a- **If:** $Z = \sqrt{x^3 + xy^2}\,.\cot^{-1}\left(\frac{x^{23} - y^{23}}{xy^{22}}\right)$,

Find the value of: $\frac{1}{Z_x}(x^2 Z_{xx} + y^2 Z_{yy} + 2xyZ_{xy} + yZ_y - 6Z_x - \frac{9}{4}Z)$ **at (x,y)=(1,1)?**

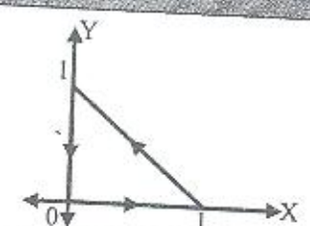
b- **Expand the function** $Z = \sqrt[3]{x+y}$ **in terms of (x) and (y-1)?**

c- **If:** $Z = e^{(y^2/x^2)}$, $x = v - u$, $y = u + 6$

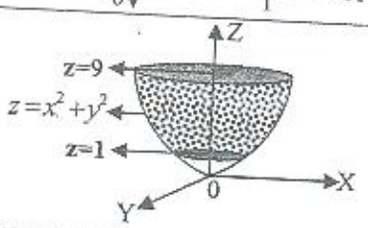
Evaluate Z_u **at (u,v)=(-5,-4)?**

Question 3 — 20 Marks

a- **Evaluate the work done by the force** $\underline{F} = [e^{x+y}]\underline{i} - [3xy]\underline{j}$, **to move an object along the shown triangle in the figure?**



b- **Evaluate the volume of the region which is bounded by** $z = x^2 + y^2$, $z = 1$, $z = 9$, **as shown in the figure?**



Question 4 — 45 Marks

a- **Obtain the ODE whose solution is: y= 14 - A sinh(x) + B cosh(x)**

b- **Solve the following ODEs':**

i) $(x+2y-1)dx - (x+2y+1)dy = 0$

ii) $(2x-y-3)dy - (4x+2y-10)dx = 0$

iii) $(3x^2y^4 + 2xy)\,dx + (2x^3y^3 - x^2)dy = 0$

iv) $x(y' + y) = 1 - y$

v) $y'' - y = \sin(x) + x^2e^x$

vi) $y'' - 6y' + 9y = (e^{3x}/x^2)$

vii) $y'''' - y' = 0$

With my best wishes ... Dr./ Tamer Elsayed Atteya

Tanta University

Department: Production Engineering & Mechanical Design

Total Marks: 90 Marks

Faculty of Engineering

Course Title: **Engineering Materials**
Course Code: MPD1104
Year: 1st – Mechanical Engineering

Date: 16 Jan 2011 (First term, final exam)
Allowed time: 3 hrs
No. of pages: 2

Answer all the following questions. The neat sketches are considered a part of your answer

Q1: State which of the following statements is true and which is false: **(10 marks)**

1. Covalent bonds are formed when atoms are sharing in the valence electrons.
2. During solidification nuclei with radius < the critical radius continue to grow till the formation grain
3. Interstitial solid solutions have limited solid solubility.
4. Hardening of steels is normally followed by full annealing to avoid cracking.
5. Polymorphism is a type of polymers that can easily elongate تستطيل under low forces

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Q2: Underline the most correct answer **(20 marks)**

1. The most important material property for manufacture of heating elements of electrical furnaces is the (thermal conductivity – tensile strength – electrical resistivity – electro-negativity).
2. The directions having the lowest linear atomic density in BCC unit cells are: {010} – <110> – $[1\,\bar{1}\,1]$ – [110] – <111> – <100>
3. Grain refinement can be achieved by (allotropic transformation – increasing cooling rate – addition of single crystals – reduction of cooling rate).
4. **Not** a condition of Hume-Rothery solid solubility rule that metals should have similar (microstructure – valence – electronegativity – lattice structure).
5. Vacant sites in crystal lattice are the missing atoms formed at elevated temperatures due to (mobility of the free electrons –jumping of atoms – interstitial atoms – substitutional atoms).
6. Quenching is an important step in age hardening in order that (fine grains – supersaturated grains – coarse grains – precipitates of solute – homogeneous structure) are obtained.
7. The main alloying element in brasses is (Pb – Sn – P – Zn).
8. The carbon steel with 0.8% c is called (hypereutectoid – eutectoid – proeutectoid – eutectic) steel.
9. (Heating rate – Temperature – Cooling rate – Holding time) is not an important parameter in heat treatment process.
10. In white cast iron carbon exists in the form of (nodules – cementite – flakes – graphite).

Q3: Give short notes about the following **(use neat sketches)** **(4x5 = 20 marks)**

1. Inter-metallic compounds and their properties.
2. Wrought and casting alloys; their applications
3. Martensite; its formation, structure and properties.
4. Composites; properties, types and some applications.
