

أجب على الأسئلة الآتية:-

السؤال الأول

- ١- اذكر ما تعرفه على تقنيات التخليق؟ ثم اذكر مصوغات التخليق السليم؟
- ب- اذكر ما تعرفه على المنح والعتل؟ ثم اشرح الغرض بينهم؟
- ج- اذكر ما تعرفه على نموذج كوست للمصوغات الرئيسية للتخليق؟

السؤال الثاني

- ٢- تقسم أشكال التخليق على أساسيه ١٠ اشرح ذلك؟
- ب- اذكر ما تعرفه على:-
- التخليق الاحادي - التخليق الصليبي - التخليق الابدياخي
- ج- اذكر مع الشرح السمات التي يضيفها التخليق في المرحلة اللاحقة؟

السؤال الثالث

- ٢- اذكر ما تعرفه على مفهوم المنظومة؟ ثم اشرح التكميم وآليات تنفيذها؟
- ب- اذكر الاستراتيجيات الرئيسية والخاصة للتخليق المتكامل؟
- ج- اذكر ما تعرفه على مفهوم الاتجاه؟

السؤال الرابع

- ٢- اذكر ما تعرفه على أساليب التخليق؟ ثم اذكر الصلابة بينهم؟
- ب- اذكر ما تعرفه على:- العاطفة - التصور - التفكير
- ج- فصل محوره الزمني ٣ سنوات وأجاب على جميع الاسئلة له اتمم الرابع عشر وعلم سوائله من اربع اسئلة موضوعه له اتمم الخامس:-
- ١- اصب فيه الذكاء لفرق المنحل؟
- ٢- رشاى مستوى كليم تصنيفه؟



Answer the following questions:

[1] (a) Solve the following differential equations:

i) $y' - y^2 \sin^2 x = x^2 y^2$

ii) $x(1 + e^{y/x})dy + e^{y/x}(x - y)dx = 0$

iii) $\frac{dy}{dx} = \frac{1}{x \cos y + a \sin 2y}$, where a is constant

20 Marks

(b) Find the orthogonal trajectories of the family of curves $x^2 + y^2 = c^2$; give a sketch for the orthogonal families.

[2] (a) Using the method of D-operator find the general solution of the following differential equations:

i) $y'' - 2y' + 5y = e^{2x} \sin x$

ii) $(D^2 - 1)y = \sinh x + 5$

30 Marks

(b) Using the method of variation of parameters find the general solution of the following differential equations:

i) $y'' - 2y' + y = \frac{e^x}{x}$

ii) $y'' - y = (e^x + e^{-x})^{-1}$

(c) Solve the following differential equation:

$$(1+x)^3 y'' + (1+x)^2 y' + (1+x)y = (1+x) \sin 2 \ln(1+x)$$

[3] (a) Expand in Maclurin series the function $f(x, y) = \sin(x^2 + y^2)$

(b) If $f(x, y) = \ln(x^3 y^5 - 2)$, find all first and second order partial derivatives.

(c) Discuss the maximum and minimum of the function $f(x, y) = x^2 + y^2 + 6x + 12$.

24 Marks

(d) Discuss the continuity of the function $f(x, y) = \begin{cases} \frac{x^3 - y^3}{x^3 + y^3}, & (x, y) \neq (0, 0) \\ 0, & (x, y) = (0, 0) \end{cases}$

[4] (a) Evaluate the integral

$$I = \int_{(1,2)}^{(3,4)} (6xy^2 - y^3)dx + (6x^2y - 3xy^2)dy$$

(b) Find the volume of the region bounded by $x^2 + y^2 = 4 - z$, $0 \leq z \leq 4$.

26 Marks

(c) If $\int_0^{\infty} e^{-ax} dx = \frac{1}{a}$; evaluate the integral $\int_0^{\infty} x^n e^{-ax} dx$

1/c. 16/10/21

TANTA UNIVERSITY
FACULTY OF ENGINEERING
PHY. & MATH. DEP.

FINAL EXAM. IN PHYSSIC
(VIBRATIONS AND WAVE MOTION)
TIME :3 Hrs

Answer the following:

- 1-a-When a mass- spring system stretched to a displacement +A on a horizontal friction surface, and then released to move ,the amplitude of its oscillation will decay with time which means loss of its mechanical energy . Comment ! (using all possible and necessary math. equations and graphics).
 - What is the correspondance in the electromagnetic system , and show how we can overcome these loss of energy in these two cases ?
- b- A resistor $R= 1.5 \Omega$ was introduced in LC circuit consists of a 12mH inductor and $1.7\mu F$ capacitor:
 - After what time t will the amplitude of the charge oscillations drop to one half of its initial value ?
 - To how many periods of oscillation does this correspond ?
- 2-a -The harmonic wave function , which describe the displacement of the medium particles through which the energy propagate, is a solution of a linear wave equation .
Deduce this equation .
 - b- In case of longitudinal waves : Write an expression , that describes the particle displacement and pressure variation as afunction of position and time .
 - prove that the pressure amplitude = $\rho v \omega S_m$.
- 3-a- Sound waves are compressional waves traveling through a compressible medium . the speed of such compressional waves depends on the compressibility of the medium and its density . Discuss .
 - b- A solid bar of mass 5kg, length of 10 cm and cross-section $22.5cm^2$ is struck at one end with a hummer, a specific type of pulse will be generate and propagate through the bar .
 - Define the type of this pulse (transverse OR longitudinal) and then , by known Young's modulus = $7 \times 10^{10} N/m^2$
 - calculate the velocity of its propagation .
- 4-a- As the waves propagate throuh the medium , they transport energy by a rate depends on its denesty, velocity and others .
 - Derive the rate at which the energy transport through the medium in sound waves .
 - b- A sound wave in air has a pressure amplitude equal to $4 \times 10^{-3} N/m^2$. Calculate :
 - The displacement amplitude of the wave at a frequency of 10 kHz .
 - c- The area of the eardrum is about $5 \times 10^{-5} m^2$. Calculate the sound power incident on the eardrum at :
 - The thresold of hearing .
 - The thresold of pain .

With the best wishes

$$\rho_{air} = 1.2kg /m^3$$

$$v_{air} = 343m/s$$

1/50 4/10/2013

FINAL TERM EXAM

1- What are the locking devices for screws (Draw neat sketches)?

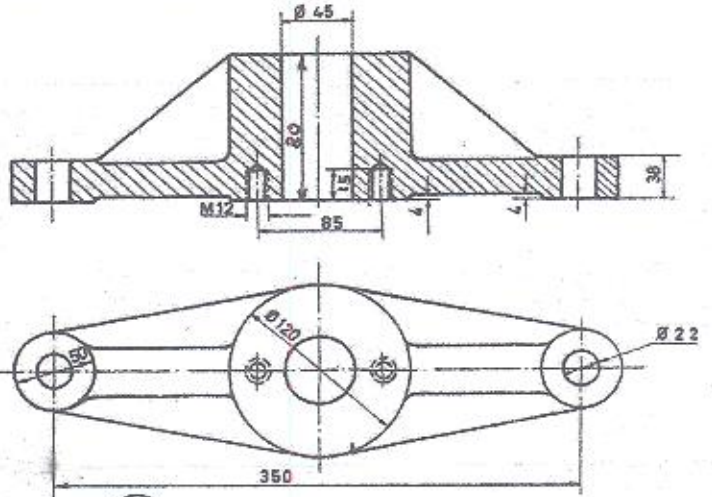
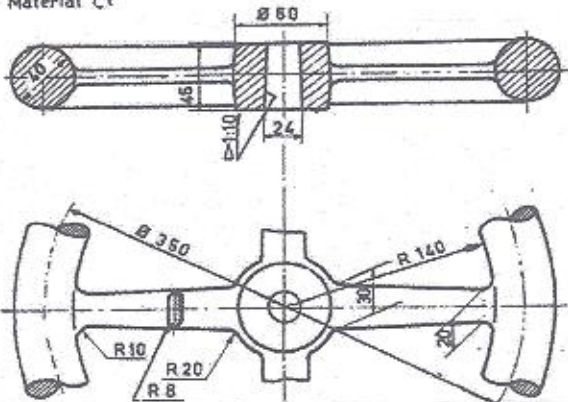
2- Given the details of a SCREW HAND PRESS, assemble all the parts and draw to scale 1:2 the following views considering a minimum distance between part 6 and the base surface (Part 1):

1- SEC. ELEV.

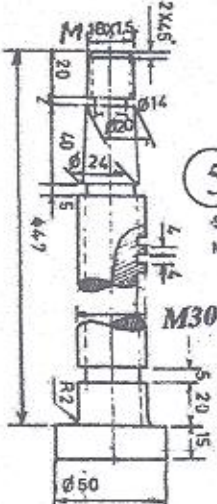
2- H. SEC. S.V.

Assume any missing data. Use two cap screws M12, two nuts M20, and a nut M 18 with its washer. Also, select a suitable key between the spindle No. 5 and the wheel No. 8.

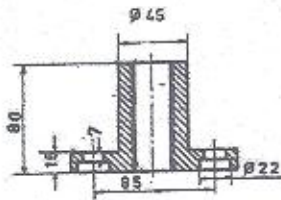
8 Spoked Wheel-No off
 Material: Ct



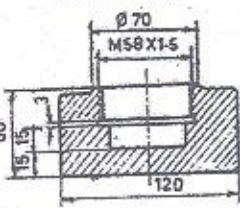
2 Top bracket
 No off: 1
 Material: C.T



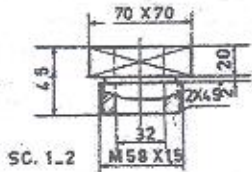
5 Spindle - No off
 Material: Steel



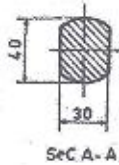
4 Nut No off: 1
 Material: Bronze



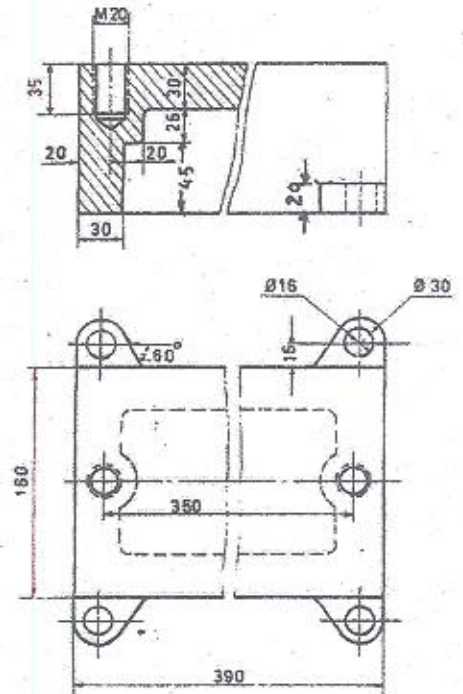
6 Protecting block No-off
 Material: ct.



7 Locating nut - No off
 Material: Steel



3 Tension rod
 No off: 2
 Material: Steel



1 Base No off 1
 Material: C.T

Engineering Materials

This examination consists of 4 questions in one page
The answer of each question should begin in new page

Q1: 20 M

- a- Draw in unit cube the crystal plane which have the following Miller indices (111), also draw the following directions : [110], [101] and [011].
- b- Aluminum has a FCC structure. When shear stress is applied on a piece of aluminum slip would occur more easily on (111) plane. Calculate the planar density in atoms per mm^2 for this plane if the lattice constant a equal 0.4049 nm.

Q2: 20 M

- a. Define: Polymorphism, Atomic packing factor, and Solid solution.
- b. What are the uses of phase diagram?

Q3: 30 M

- a) Aluminum melts at 660 °C and Silicon at 1414 °C. They form a eutectic at 12.6 wt.% Si at 577 °C. The maximum solubility of Si in Al is 1.65 wt.% and Al in Si is 0.2 wt.% at eutectic temperature. Consider that both solubilities decrease to zero wt.% at 20 °C.
- (I) Sketch the Al-Si phase diagram using straight lines, name the points, lines and fields.
- (II) Draw the cooling curves for the alloys containing 1 wt.%Si, 12.6 wt.%Si and 18 wt.%Si in one graph.
- b- A hypoeutectoid steel contains 24 wt% eutectoid ferrite. What its full annealing temperature? (assume straight lines phase diagram).

Q4: 20 M

- a- Draw the Fe - Fe₃C phase diagram showing all fields, compositions and temperatures.
- b- Explain the aim and procedures of the process anneal heat treatment for plain carbon steel
- c- Draw a schematic drawing for the microstructure of the main four types of cast iron showing the phases present.
- d- What are the main types of polymers, give an example and application?.

GOOD LUCK
Prof. A. Assar

أجب عن الاسئلة الآتية:- (75 درجة)

السؤال الأول:-

- 1- أذكر أهم القواعد التي يجب مراعاتها خلال شحذ الأقلام على ماكينات الشحذ.
- 2- تكلم عن أهم عناصر القطع في التشغيل على المخارط.
- 3- تكلم بالتفصيل عن مواد التزليق والتبريد.
- 4- تكلم بالتفصيل عن أنواع أقلام الخراطة مع الرسم إن أمكن.

السؤال الثاني:-

- 1- تكلم عن أنواع الأجنات مع الرسم إن أمكن.
- 2- اشرح مع الرسم جوهر عملية القطع (تشكيل الجذاذة).
- 3- أذكر أهم العمليات الإنتاجية التي تجرى على المثاقيب مع الرسم إن أمكن.
- 4- حجر تجليخ مدون عليه المواصفات التالية وضح هذه المواصفات:

400 x 50 x 127 DIN 69120 A 60 K 5 V 65

السؤال الثالث:-

- 1- وضح بالرسم بعض أشكال أحجار التجليخ.
- 2- أذكر أهم عيوب عمليات التجليخ.
- 3- تكلم بالتفصيل عن عمليات التجليخ مع الرسم إن أمكن.

السؤال الرابع:-

- 1- لماذا تحديد قوة القطع.
- 2- عند تشغيل صلب AISI 2340 بأداة من صلب سريع القطع ، حصلنا على المعادلة الآتية:

$$2035 = V T^{0.13} f^{0.77} d^{0.37}$$

والتي حققت عمرا للأداة بلغ 100 دقيقة عند استخدام سرعة قطع = 75 قدم/دقيقة وعمق 0,1 بوصة وسرعة تغذية = 0,0125 بوصة/دورة. احسب الإثر على عمر الاداة عندما:-

- 1- تزيد سرعة القطع بمقدار 20%.
- 2- تزيد سرعة التغذية بمقدار 20%.
- 3- تزيد سرعة عمق القطع بمقدار 20%.
- 4- يزيد الثلاثة في نفس الوقت بمقدار 20%.