Tanta University	Maintenance Technology	3 rd year
Faculty of Engineering	Final Exam. (Second Term)	Time: 3 Hours
Production Engineering Dept.	60 marks	٢٣ - ٥ - 2007

Answer 4 only from the following questions:

Question 1:

a- "Unbalance due to unequal weight distribution is the most common cause of vibration in machines". Explain some reasons for unbalancing and why balancing of machines is necessary?

b- Explain the static unbalance and the dynamic unbalance in details.

c- A fan with six blades with the following positions (0°,60°, 180°, 240°, 300°). The following measurements were made during balancing job:

Initial condition: $\vec{v}_0$ = 20 mm/sec, $\Phi_0 = 190°$

With trial mass. $\vec{v}_1$ = 25 mm/sec, $\Phi_1 = 290°$

Trial mass = 4 gm, total weight of rotating parts = 5kg, diameter of fan = 200mm. Draw the vector diagram; calculate the correction mass and the position where it should be mounted.

Question 2:

a- What are the technical precautions that you must undertake in order to prevent failures caused by fracture in: Shafts and axles - Threaded fasteners.

b- "The Stress Concentration Factor (SCF) plays a vital role as a root cause of too many failures in the real engineering practice." Explain this statement with the aid of necessary sketches, and what is the most popular technique used for minimizing the effect of the SCF?

c- What are the sources of vibration that come from gears?

Question 3:

a- What is the best parameter for all vibration measurements? Why?

b- What is the importance of automatic monitoring system? State its components.

c- Explain "transmissibility versus frequency ratio curve".

Question 4:

a- What are the main types of pickups, indicating the factors that affect the pickup performance and the methods of pickup attachment? Explain "in detail" the velocity pickup.

b- What are the common materials for vibration isolation and the factors that should be considered during making isolation?

c- A milling machine of mass 450 kg operates at 1800 rpm and has an unbalance which causes a harmonic repeated force of magnitude 20000 N. Design an isolation system to limit the transmitted force to 4000 N, the amplitude of vibration during operation to 1 mm, and the amplitude of vibration during start-up to 10 mm.

Specify the required stiffness of the isolator and the minimum mass that should be added to the machine. Assume a damping ratio of 0.05.

Question 5:

Explain the following:

a- The significance of active isolation and passive isolation.

b- Two different methods for recording measurement data are in common use for vibration analysis. (Illustrate your answer with diagrams).

c- Resonance.

d- Two different practical applications using vibration measurement.

Good Luck

جامعة طنطا ــ كليــة الهندســة إمتحان الفصل الدراسى الثانى التاريخ:
قسم هندسة الانتاج والتصميم المادة: إستخدام الحاسب فى التصنيع الزمن: 3 ساعات
الفرقــة : الثالثــة ـ إنتــاج

Question No. 1

Define and explain :

a) CAD system . b) CAD system architecture.

c) Steps of desigen by using CAD

Question No.2

Design a complete fortran program (CAD) for relation between cutting force (F), feed(Y) and depth of cutting (X) by using a least square method for the following data:-

X (10^{-3} mm)	*5*	*5.5*	*6*	*6.5*	*7*	*7.5*	*8*
Y (10^{-2} mm)	*1*	*2*	*3*	*4*	*5*	*6*	*7*
F (Kg)	*34*	*40*	*45*	*60*	*65*	*72*	*80*

Using the following liner equation :- $F = a + b X + c Y$

Question No.3

By using CAD system, design a complet fortran program for key joint wich as:- A cast iron pullyis to be keyed to a 70 mm, shaft made of mild steel, and is to transmit 85 Hp, at 1200 rpm. A flat key of cold finished carbon steel having ultmate strength of 3000 Kg/cm^2 is to be used. Since the drive is expected to be subjected to quite minor vibration, a safety factor of 1.75 may be used.

Question No. 4

By using CAD system, design the flat belt drive required to transmit power from an electric motor to a small air compressor in a horizontal plan by a pully-cum-flywheel overhang and keyed to crankshaft of lather:-

Delivered power to compressor pulley	2.5 Kw.
Center distance between the pulleys	2.0 M .
Dia. Of motor pulley	3.5 Cm.
Approx. r.p.m. of comprosser pulley	175
r.p.m. of motor pulley	750
Allowable tension in the belt	18 Kg/cm^2
Maximum tension in the belt	21 Kg/cm^2
Slip with this tension	2 % assumed
Material of the pulley	C.I.

ميكانيكا انتاج

كلية الهندسة — قسم هندسة الإنتاج والتصميم الميكانيكي — تكنولوجيا التشغيل
اختبار نهاية الفصل الثاني ٢٠١٠ — الزمن ثلاث ساعات
الفرقة الثالثة — ٧٠ درجة

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١) أ- المقارنة بين العمليتين Grinding و Milling
ب- ١- اسم تخصيص لعمليات التكليس المختلفة مبينا الخطوات الأساسية اللازمة للتشغيل
جـ- ما هو ناتج عملية Dressing و Truing لحجر التكليس
د- ناقش تأثير طريقة التشغيل بالتكليس على wheel wear والحرارة المتولدة.

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٢) أ- اذكر أنواع مواد الربط Bonding Mate. المستخدمة في صناعة حجر التكليس مع ذكر استخداماتها
ب- المقارنة بين Creep Grinding و Conventional Grin.
جـ- اسم تخصيص لعمليات Lapping و Honing
د- اسم تخصيص لفكرة electrochemical Grin. مع ذكر فكرة عملها واستخداماتها ومميزاتها وعيوبها.

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٣) أ- احسب رقم التكليس لتشغيل أبعاد 200×160 mm وسمك التكليس 0.5 سم عدد القطعيات 4 وحجم التكليس له 20 mm، والتغذية العرضية ٦ مم/مشوار وسرعة القطع له ٤ م/دقيقة.
ب- اجر الحسابات اللازمة لتقسيم رأس عدد أسنانه 143.
جـ- اي سكينة تصلح لتقطيع رأس 100 teeth - 16DP.
د- احسب البيانات اللازمة لتركيب معشقين متكاملين لتشغيل ترس CD = 120 mm وكل رأس عدد أسنانه 24 سنة.
$CD = (PD_1 + PD_2)/2$.
هـ- احسب زاوية ميل القطع اذا كانت القاطنة القطرية ذات خطوة 10.29 in وقطر 3.25 in وهي حلزونة يمينية.
و- احسب رقم التكليس لتقطيع حلزونة خطوتها ٥٦٠ مم وحجر التكليس ذات خطوة ٥ مم. اسم تخصيص.
ز- إذا قطع ترس حلزوني Normal diametral pitch = 5 in
و الخطوة متوازية، S = 8 inch, gear ratio 2:1

اصبع لفكرة س Nc c C

اعداد السقوف الصغارة ذوات السقوف الكبار المقسم

I 15 - 16 - 17 - 18 - 19 - 20

II 21, 23, 27, 29, 31, 33, 35

III 37, 39, 41, 43, 47, 48, 49

ترس السقوف الصغارة لعمل المقسم الفرنسي

24, 24, 28, 32, 36, 40, 44, 48, 56, 64, 72, 86, 100

سكاكين قطع الترس في النظام الانجليزي

cutter No	Range
1	135 teeth to a rack
2	55 to 134 teeth
3	35 to 54 "
4	26 to 34 "
⋮	
1	

البيانات ناقصة في الشكل الثالث : أوضح مع ذكر السبب

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[٤] أ - رسم توضيحي لفكرة قطع الترس على ماكينة Gear Shaper.

مع رسم تخطيطي لعدد من Gear shaper Cutters

ب - رسم تخطيطي Typical Hobbing operations

ج - رسم تخطيطي لفكرة Straight Bevel gear Generator

Tanta University
Faculty of Engineering
Tanta
Mech. Design & prod. Eng. Dept.

Technology of Metal Forming
Third Year
Time : 3 hours
Date : June 3 , 2007

Final Second Term Exam

Answer All Questions :-

Question No. (1)

A. List and describe the processes used in forming plastics. Give the type of plastic that may be formed in each.
B. Describe the process of rotational molding and give its advantages.
C. What processes do you recommend for producing automotive elements, packaging food and radio cabinets?

Question No. (2)

A. Sketch three methods for the manufacture of metallic pipe.
B. Explain the following terms : cold and hot working, advantages of hot working over cold working and disadvantages of working at high temperature.
C. List the high-energy rate forming operations state the type of work for which each is adapted.

Question No. (3)

A. What are the two most important characteristics of a powdered-metal part, and explain the factors which can effect on the characteristics and physical properties of the compact product.
B. Give an explanation of the following processes: impact extrusion, coining, embossing, stretch forming, electroforming and metal spraying. State the limitations of electroforming.
C. In steady state condition of rolling, prove that biting angle is less or equal the two of friction angle ($\alpha \leq 2\beta$).

Question No. (4)

A. Design a process for producing a small pinion and splines holes. Sketch the operation system.
B. Describe the metallurgical phenomena which takes place in both hot and cold forming processes.
C. Design a die and explosive forming system that makes a small metal drinking cup.

Question No. (5)

A. Describe the following shapes used in connection with rolling of steel : ingot, bloom, slab, and billet. Sketch the shape of the rolls in hot rolling a round steel from an ingot and describe the operations.
B. Explain the steps of the manufacture metal powder parts (flow chart).
C. What stretch forming pressure is required for a material having a yield strength of 105,000 psi for a part that has an area of 194 in^2. ?

Good luck

TANTA UNVIRSITY	*MACHINE DESIGN*	*3rd YEAR (PROD.)*
FACULTY OF ENGINEERING	*FINAL EXAM.*	*DATA: 2007-05-27*
PRODUCTION ENG. DEPT.		*TIME: 3 HOURS*

An electric motor with a power of (20 KW) and runs at (960 rpm) it runs a sliding gear box with three different speed, through a flat belt with reduction ratio (i_b=1.5). Assume, the number of teeth for the first pair of gear box are Z_1=Z_2=24 tooth. A flange coupling with 6 bolts transports the gear box motion to run a flat belt to transports the work pieces in a factory. The driving pulley diameter is 250 mm and the center distance between the tow shafts of the flat belt (A=400 mm). The center distance between the shaft I and shaft II equal (Ag =96 mm) as shown in Fig.1

Design and calculate following:

1-The power in KW, number of revolutions in rpm, torsion moment for shafts
2- Design the flange coupling which transports the gear box motion to the flat belt.
3-Determine the number of teeth for all six gear in the gear box and its dimensions.
4-Design the flat belt which transports the work pieces in factory and its pulleys.
5- Design the shaft (I) in the sliding gear box.
6-If the number of revolution for the three different speed are (640, 320, 240, rpm) determine, the linear velocities for the driven pulley.
7-Complet design for one pair of sliding gear box.

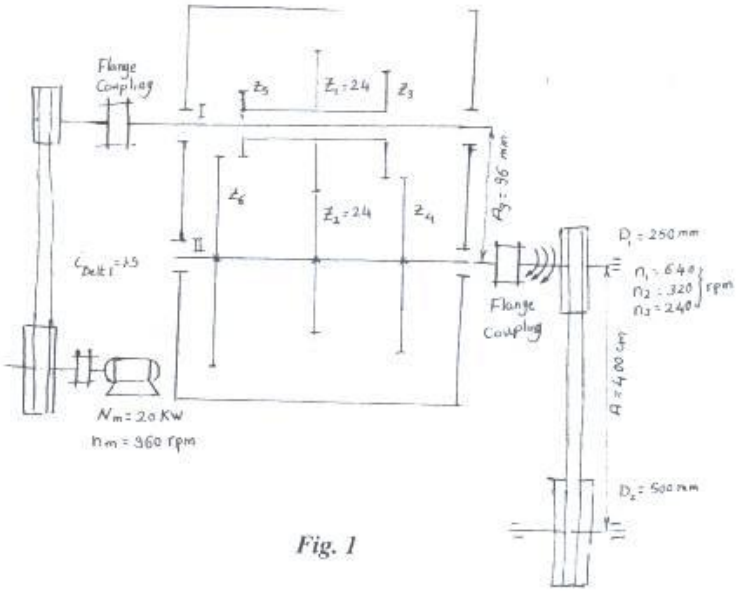

Fig. 1