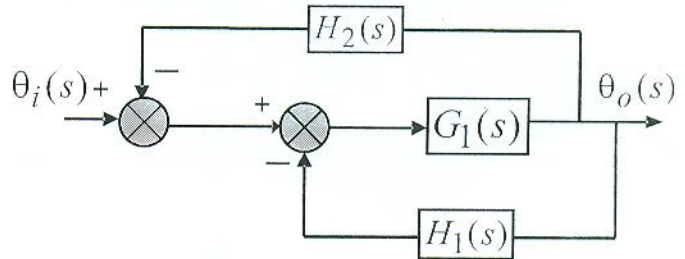


Solve only FIVE of the following Six questions.

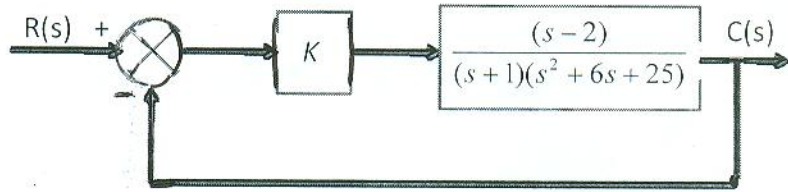
When you solve the Six questions we will consider the highest FIVE marks.

Problem No. 1 (17 marks)

- (a) For the system in Figure 5, $G_1(s) = K_1 / (s(1 + T_1s))$, $H_1(s) = K_2$, $H_2(s) = 0.5K_1$, $K_1 = 1$, $T_1 = 1$, and $K_2 = 0.5$. Calculate the maximum overshoot, the peak time, and the rise time. Obtain the settling time for tolerances of 2% and 5%. Calculate the steady state error resulting from inputs of $1/s$, $1/s^2$, $1/s^3$.



- (b) Consider the closed-loop system shown in the Figure shown below. Determine the range of K for stability. Assume that $K > 0$.



Problem No. 2 (17 marks)

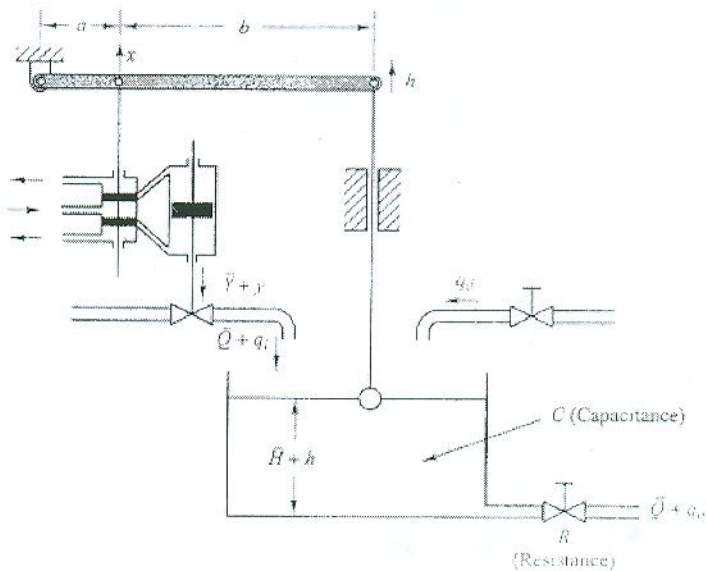
For a unity feedback system, the feedforward and feedback gains are given by:

$$G(s) = \frac{K(s^2 + 3s + 1)}{s(s^2 + 5s + 2)}, \quad H(s) = 1$$

Plot the root locus for the system.

Problem No. 3 (17 marks)

Consider the liquid-level control system shown below. The inlet valve is controlled by a hydraulic integral controller. Assume that the steady-state inflow rate is \bar{Q} and steady-state outflow rate is \bar{Q} , the steady state head is \bar{H} , steady state valve displacement is $\bar{X} = 0$, and steady state valve position is \bar{Y} . We assume that the set point is fixed. Assume also that the disturbance inflow rate q_d , which is a small quantity, is applied to the water tank at $t = 0$. This disturbance causes the head to change from \bar{H} to $\bar{H} + h$. This change result in a change in the outflow rate by q_o . Through the hydraulic controller, the change in head causes a change in the inflow rate from



Final-Term Examination

Tables can be use .

Q- 1 (25 Marks)

A full journal bearing is 2 In. long & 2 In. diameter. The bearing load is 700 Lb. & the journal runs at 1200 R.P.M. Using a clearance of 0.001 In & an average viscosity of 2×10^{-7} REYN. Design the solid journal bearing.

Q-2 (25 Marks)

Select a Rolling Bearing to carry satisfactory a 6500 N radial load together with a 1000 N thrust load. The journal supported by the bearing rotates at a constant 1400 R.P.M. for an estimated 2000 hrs. life . The outer race of the bearing is pressed into a stationary housing. The bearing bore is 65 mm. Assume there is a 10 % probability that the bearing will fail before its expected design life.

Q-3 (25 Marks)

A single reduction worm gear with worm above the worm gear is turned with an electric motor which has 1.7 KW and 960 R.P.M. The gear shaft is to be run at 46 R.P.M. Design the worm & worm gear . The following data may be useful to use :

Worm material ;St 35Si.Mg , $[\sigma_b] = 30 \text{ Kg/mm}^2$, $S_o = 30 \text{ Kg/mm}^2$ & $[\sigma_c] = 7590 \text{ Kg/cm}^2$.

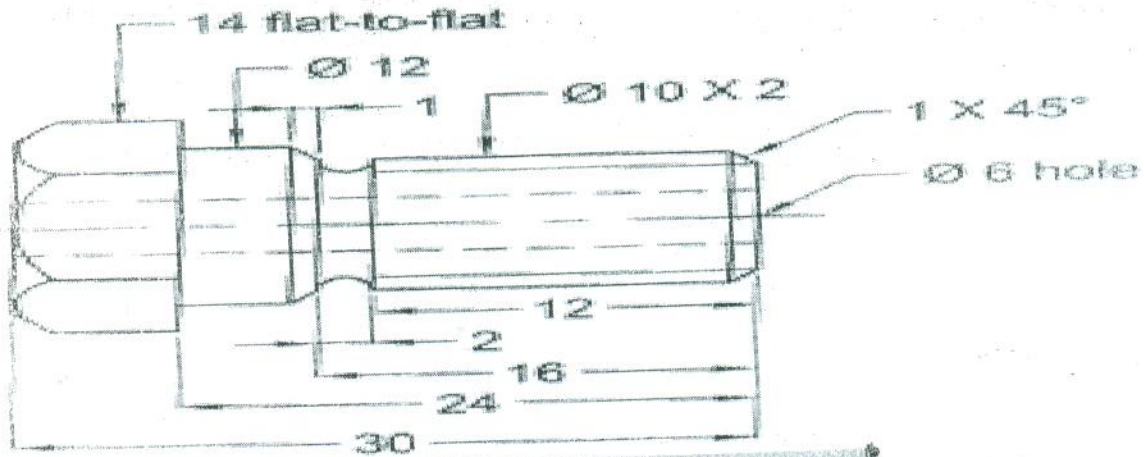
Worm gear material : Cl 21-40, $[\sigma_d] = 5600 \text{ Kg/cm}^2$, $K_d = K_a = 1.5$, $\psi = 10$,

$K_c = \text{Contact factor (St / Cl)} = 43200 \text{ Kg/m}^2$, $f = 0.035$ & $\eta = 0.85$.

Problem number (3) (25 Marks)

(5 Marks)

Explain the different ways to make a taper on lathe machine?
 Compute total machining time (machining time and non-productive time) for the workpiece 16 mm diameter and 35 mm length to produce the hollow hexagonal headed mild steel bolt (14 mm diameter, 30 mm length and thread M 10 X 2) as shown in Figure below, spindle speed for turning and drilling 640 rpm and 64 rpm for threading. Feed 0.10 mm/rev for rough and 0.05 mm/rev for fine operations (turning, facing, grooving, parting and chamfering). Velocity of cutting for milling is 30 m/min, feed 0.12 mm/tooth, an 8 teeth HSS mill cutter of 32 mm diameter. Using the process sheet and flow process chart as shown in Figures below. (20 Marks)



No.	Operation Description	Sketch of Operation	Cutting Tools	Jigs and Fixture	Cutting Condition			
					Feed mm/rev	Speed m/min	Depth mm	No. of Cut
								M/C time min.

Process sheet

No.	OPERATION DESCRIPTION	QTY.	TIME (MINS.)	SYMBOL					REMARKS
				○	↑	□	▽		
1									
2									

Flow process chart

Problem number (4) (15 Marks)

Mention the work holding methods in lathes, Distinguish between arbors and mandrels? (5 Marks)
 Determine the time that will be required to drill a blind hole of diameter 25 mm and depth 40 mm in a mild steel solid block by HSS drill of 118° cone angle, cutting velocity = 25 m/min and feed = 0.16 mm/rev. (5 Marks)

The available index plate hole circles are as follows:
 Plate 1: 15, 16, 17, 18, 19, 20; Plate 2: 21, 23, 27, 29, 31, 33; Plate 3: 37, 39, 41, 43, 47, 49

Calculate indexing for 63°40'
 Calculate the indexing and change gears required for 57 divisions. The change gears supplied with the dividing head are as follows:

- 24, 24, 28, 32, 40, 44, 48, 56, 64, 72, 86

(10 Marks)

Write short notes on: composition and structure of grinding wheel, the basic grinding operations, what does mean: A-46-M-5-V. (5 Marks)


 Course Title: Machining Technology
 Date: Juneth 2011 (Second term)

 Course Code: MPD3221
 Allowed time: 3 hrs

 Year: 3rd
 No. of Pages: (2)

Remarks: (answer the following questions... assume any missing data... answers should be supported by sketches)
 افرض ايه بيانات قد تكون غير مذكورة ودعم اجاباتك بالرسم التوضيحية.

Problem number (1) (15 Marks)

Distinguish between the basic sawing equipments? (3 Marks)

How does tapping differ from dieing? (2 Marks)

Multiple Choice Questions

Which of the following operations is also known as internal turning? (2 Marks)

- a) Milling. b) Tapping. c) Boring. d) Facing.

Which of these statements is correct?

- a) A margin of a drill bit does most of the cutting.
-
- b) The relief angle on the tip of the drill bit makes it a conical shape.
-
- c) A large drill bit point angle is useful for cutting soft materials.
-
- d) None of the above. (2 Marks)

Which of the following is least hard?

- a) Diamond. b) Cubic boron nitride. c) Aluminum oxide. d) Silicone carbide (2 Marks)

Which of the following is not a typical drill press operation?

- a) Counter boring. b) Spot facing. c) Counter sinking. d) None of the above. (2 Marks)

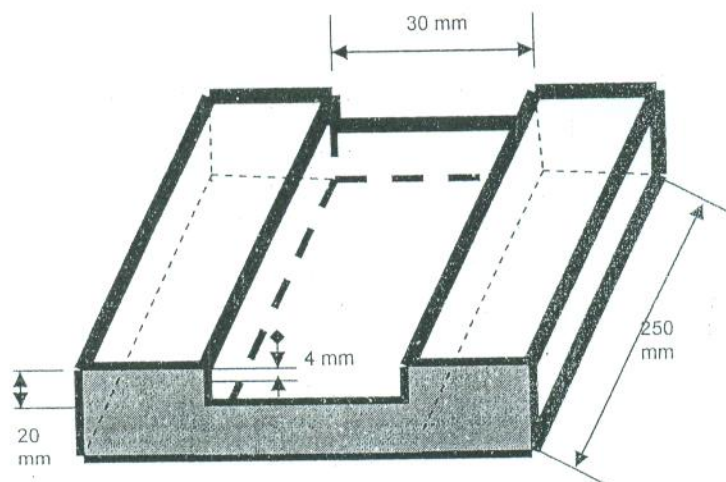
Which of the following operations can produce chips of very small size?

- a) Boring. b) Grinding. c) Milling. d) Turning. (2 Marks)

Problem number (2) (25 Marks)

Explain the principle of quick return motion mechanism of a shaper. What is need of this mechanism? Explain various safety precautions associated with shaper? (5 Marks)

Work length = 250 mm, V cutting = 15 m/min in Figure below, V return = 25 m/min, Approach (c) = 5 mm (C, R), Depth of cut = 4 mm, width of tool 10 mm, Width of slot to be cut = 30 mm, High of slot to be cut = 20 mm, Calculate: i) Number of strokes per minutes (N); ii) Number of strokes to finish the job (S); iii) Time per stroke; and iv) Total time (10 Marks)



Explain the components of drill and broaching tool? (5 Marks)

A spiral groove of 180 mm lead is to be machined on a shaft using a universal milling machine a 5 mm pitch table lead screw. The dividing head available is a standard Cincinnati with a standard set of change gears. Calculate: a) the machine lead, b) a suitable gear train for dividing head. (5 Marks)

Tanta University
Faculty of Engineering
Time : 3 hours
Subject : Forming Technology
Total Marks: 90 Marks

Year: Third Year
Production Eng. and
Mechanical. Design Dept.
Final Second Term Exam
Date: 14/ 6 / 2012

Answer all the following Questions:

Question (1) : 25 marks

- Explain five defects that may occur during hot flat rolling process indicating the causes and the corrective action.
- Describe the rotational molding process indicating their advantages and applications (materials and products),
- Classify the construction of thermoforming techniques used for heated thermoplastic sheets.
- How are plastic bottles made?
- Give an explanation of the following terms: seams, magnetic forming, impact extrusion and press forging.

Question (2): 25 marks

- Describe the various roll arrangements which can be used during flat rolling processes.
- What are the major differences between embossing and coining?
- Explain two methods used extensively in production of kitchenware.
- Describe the process of compression molding.
- Explain the difference between the thermoplastic and thermosetting materials and their available forming operation.

Question (3) : 25 marks

- What processes do you recommend for producing the following products: squeeze toys, garbage containers, packaging food, and cabinets?
- Sketch five methods for the manufacture of pipe.
- List the high-energy rate forming operations and state the type of work for which each is adapted.
- Explain the passes and sequences of the manufacture round bar using hot rolling process.
- Describe the diagram of a manufacturing system.

Question (4) :20 marks

- Name five products that can be made by extrusion.
- Sketch a method to extrude a lead sheath on wire cable.
- List the advantages and limitation of hot and cold metal forming.
- How are splines and internal gears made ? Use Interaforming operation.
- Can thermosetting compounds be easily extruded into tube and rods? Why?

Good Luck

بسم الله الرحمن الرحيم
التاريخ: ٢٠١٢ / ٦ / ١٩
الزمن : ساعتين

المادة / قوانين وتشريعات
الفرقة الثالثة (انتاج)

جامعة طنطا
كلية الهندسة
قسم هندسة الإنتاج والتصميم الميكانيكي

أجب عن الأسئلة الآتية:-

السؤال الأول:-

- ١- ما هو القانون .
- ٢- ما الفرق بين القاعدة القانونية والقرار الإداري .
- ٣- تكلم بالتفصيل عن صور الجزاء .

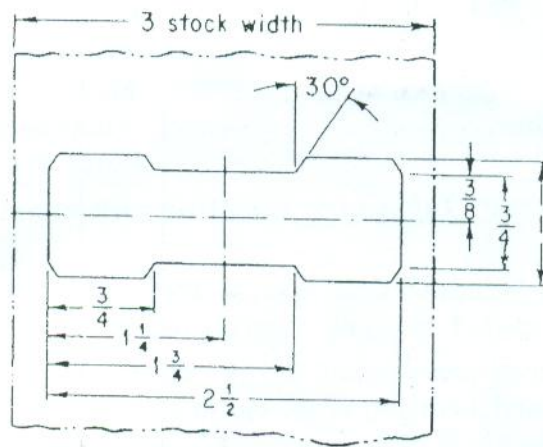
السؤال الثاني:-

- ١- تعريف العقد- وما هي أركانه .
- ٢- تكلم بالتفصيل عن أقسام العقود .
- ٣- اكتب نبذة مختصرة عن:-
الإكراه - عناصر الإكراه المعنوي المفسد للإرادة - عناصر الاستغلال واثره .

السؤال الثالث:

- ١- ما الفرق بين السبب والباعث .
- ٢- ما هي الشروط الواجب توافرها في العقود الإدارية .
- ٣- اكتب نبذة مختصرة عن أنواع المناقصات الثلاثة .
- ٤- ما هي المبادئ الأساسية التي تقوم عليها المناقصات والمزايدات .

مع أطيب التمنيات بالنجاح
ا.د/عبد الفتاح مصطفى خورشيد



Dimension in inch

Figure (2)

Question (4):

(25 marks)

- Describe the various factors to be considered for the selection of a press to perform an operation.
- Determine the center of pressure if the contour to be blanked and piercing with the dimensions shown in Figure (3). (All dimensions in inches).
- A steel blank 50 mm square having a 20 mm diameter hole in the centre is to be blanked from 2 mm thick sheet.
 - Calculate the maximum punch force necessary to shear the blank in one operation if $\tau = 380 \text{ N/mm}^2$, and what will be the % reduction in punch force if 0.5 mm double shear is ground upon the tool?
 - Find the required length of sheet for producing 400 pieces from the above part, assume the width of sheet is 500 mm. Also, determine the percentage of stock used.
 - Assuming that the break clearance (clearance on one side of die and punch) equal to $0.05 t$ and the modulus of elasticity is 200 GPa. Find the dimensions of tools required for piercing and blanking and suggest the materials from which the tools are made..

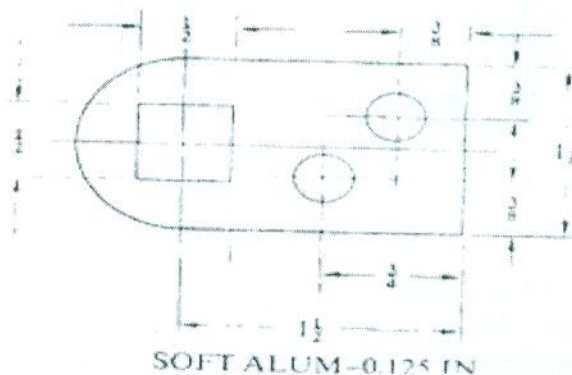


Figure (3)

Good Luck

Answer all the following Questions: (assume any missing data)

Question (1) : (20 marks)

- What are the various types of dies used in press working?
- Assuming strip thickness 5 mm and shear strength of strip material as 350 N/mm^2 , calculate the total pressure and the tool dimensions to make a washer of 6 cm outside diameter and 3 cm hole. Take clearance as 10 % strip thickness.
- A hole of 60 mm diameter is to be produced in steel plate 2.5 mm thick. The ultimate shear strength of the plate material is 45 kg/mm^2 . If the blanking force is being reduced to half the force using a punch without shear; Estimate the amount of shear on the punch. Take the percentage penetration 40 %.
- If the required holes have diameters less than the stock thickness. What are the facilities that can be done to be successfully punched.

Question (2) : (25 marks)

- Write short notes on three types of presses.
- A cylindrical-cup workpiece with the given dimensions shown in the Figure (1). The workpiece material is 1020 cold-rolled steel 0.032 in thick. Make the necessary calculations for designing the die for drawing the part, given that yield strength 51000 psi. (All dimensions in inches).
- Explain the used methods to reduce cutting force during piercing and blanking operations.

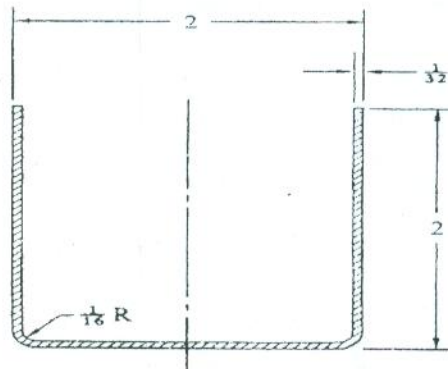


Figure (1)

Question (3) : (25 marks)

- Explain five defects that may occur during deep drawing process indicating the causes and the corrective action.
- What is the correct clearance between a punch and die in shearing operations. Why is it important? What is the effect of excessive clearance and too small clearance? On which member the clearance should be given.
- What is the importance of determining the center of pressure for the irregular shapes?
- Make the necessary calculations for producing the shown part in Fig. 2, given that the thickness of sheet 3 mm, shear strength equals 28 kg/mm^2 , and the clearance is 6%.