



Course Title: Machine Technology
Date: June 14th, 2023 (Final term exam)

Course Code: MPD3221
Allowed time: 3 hrs

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

Remarks: (answer the following questions... assume any missing data...)

Question one: Choose the correct answer (20 Marks)

1. For sawing:

- a) Removal rate is based on cross-sectional area of the cut.
- b) Removal rate is based on volume removed for roughing passes, and surface area finished for finish passes.
- c) Plunge feed rate is based on the diameter and the depth of the hole.

2. Which one of the following manufacturing processes will likely result in the worst surface finish:

(a) cold rolling, (b) grinding, (c) machining, (d) sand casting, or (e) sawing?

3. Which of the following are examples of generating the workpart geometry in machining, as compared to forming the geometry (two correct answers): (a) broaching, (b) contour turning, (c) drilling, and (d) profile milling?

4. In a turning operation, the change in diameter of the workpart is equal to which one of the following: (a) 1 x depth of cut, (b) 2 x depth of cut, (c) 1 x feed, or (d) 2 x feed?

5. For milling, turning and grinding:

- a) Plunge feed rate is based on the diameter and the depth of the hole.
- b) Removal rate is based on cross-sectional area of the cut.
- c) Removal rate is based on volume removed for roughing passes, and surface area finished for finish passes.

6. A lathe can be used to perform which of the following machining operations (three correct answers): (a) boring, (b) broaching, (c) drilling, (d) milling, (e) planing, or (f) turning.

7. A facing operation is normally performed on which one of the following machine tools: (a) drill press, (b) lathe, (c) milling machine, (d) planer, or (e) shaper?

8. Knurling is performed on a lathe, but it is a metal forming operation rather than a metal removal operation: (a) true or (b) false?

9. For drilling and tapping:

- a) Removal rate is based on volume removed for roughing passes, and surface area finished for finish passes.
- b) Plunge feed rate is based on the diameter and the depth of the hole.
- c) Removal rate is based on cross-sectional area of the cut.

10. Which one of the following turning machines permits very long bar stock to be used: (a) chucking machine, (b) engine lathe, (c) screw machine, (d) speed lathe, or (e) turret lathe?

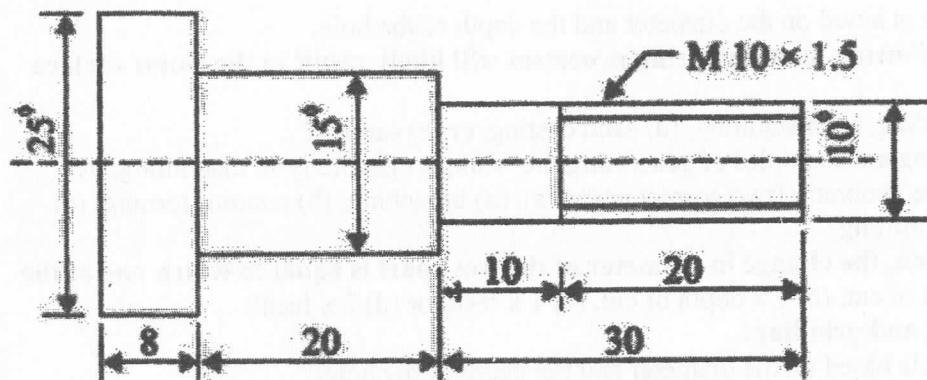
Question Two: (20 Marks)

Write short note about:

- a) The sequence of the proposed time estimation method?
- b) Differential Indexing?

Question Three: (30 Marks)

- How would you make a bolt?
- Calculate the machining time required to produce one piece of the component shown in Figure given below starting from f 25 mm bar. The following data is available. For turning: Cutting speed = 40 m/min, Feed = 0.4 mm/rev, and Depth of cut = 2.5 mm/per pass. For thread cutting: Cutting speed = 8 m/min. Using process sheet.



Question Four: (20 Marks)

- Calculate indexing for 60° ?

- Calculate Indexing 77 divisions (using compound indexing two methods)?

Brown and Sharp Index plate:

Plate 1 15-16-17-18-19-20

Plate 2 21-23-27-29-31-33

Plate 3 37-39-41-43-47-49

Cincinnati Standard Plate

One side 24-25-28-30-34-37-38-39-41-42-43

Other side 46-47-49-51-53-54-57-58-59-62-66

- Distinguish between Two principal methods of gear manufacturing?
- Explain in detail types of grinding process, support your answer using neat sketches?

Final Exam - Forming Machines

Solve all questions and assume any missing data:

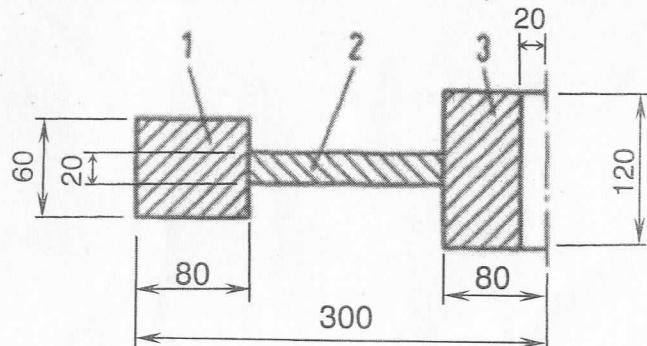
Question 1 : (30 marks)

- a) A crank press has a maximum frame capacity of 1200 kN and a stroke of 100 mm.
- Draw on the same scale both the allowable frame capacity and drive motor loading capacity of the press with the crank angle.
 - Get from the diagram the allowable loading at 45° above BDC.
 - Three different forming processes listed in the given table should be performed on the press. Check if these processes are allowable for the press.

Process number	Position of maximum force	Maximum pressing force (kN)
1	at 15° crank angle	1000
2	at 40° crank angle	850
3	constant force between BDC of the press and 45 mm above	700

- Discuss a method to protect the press from the overload.
- b) Sketch a friction drive screw press showing its main parts, then explain the method of work for this press.
- c) The shown flywheel working in a screw press made of a material with density 7250 kg/m³ and has a rotational speed of 1500 rpm.
- Name the numbered part.
 - What is the work capacity of this screw press in N.m. ?
 - Calculate the press impact velocity if the spindle pitch is 3 cm.

<i>Solid cylinder</i> $I_d = z \cdot h \cdot r^4$	$z = \frac{\rho \cdot \pi}{2}$	
<i>Hollow cylinder</i> $I_d = z \cdot h \cdot (R^4 - r^4)$		



Dim. in mm

Question 2 : (20 marks)

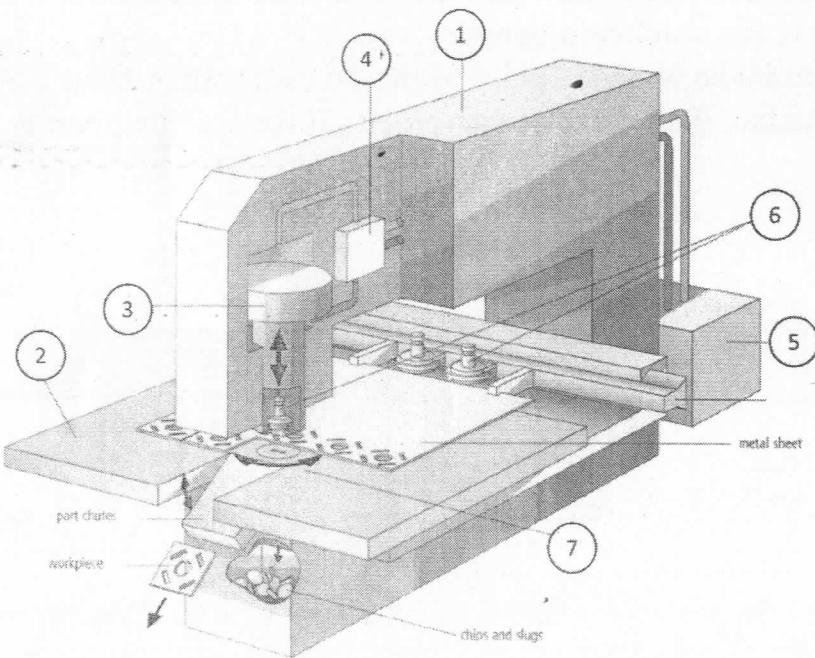
- Show the different characteristics between a toggle press and a knuckle lever press on the time-displacement diagram. Hence determine which of them is more suitable for deep drawing operations. Justify your answer.
- Sketch a rocker arm press and talk about its applications.

Question 3 : (20 marks)

- Design a hydraulic circuit to control the action of a piston in a hydraulic press. The circuit shall include controls of oil -direction, -speed and -pressure.
- Draw a simple layout of a hydraulic fine blanking press showing its main components and talk about the role of its main parts.

Question 4 : (20 marks)

- One of the hammer types is the counterblow hammers.
 - Draw a schematic of a counterblow hammer showing its main components and talk about its method of work..
 - Talk about the materials used in producing its main parts.
 - Write down the calculation of its impact energy as well as the impact velocity.
- For the shown machine:
 - What is the name of the machine?
 - Explain with the aid of the numbered parts the methodology of work of the machine.
 - State the main advantages of this machine.
 - Draw a cross-section in one of the tools operating on this machine.





Course Title: قوانين و تشريعات صناعية
Date: 21-06-2023

Course Code: MPD32H4
Allowed time: 2 Hr

Year: 2nd Mech Prod. Dept
No. of Pages: 1

أجب عن جميع الأسئلة التالية موضحاً إجابتك بأمثلة توضيحية كلما أمكنك ذلك!!!(درجات الأسئلة متساوية)..

السؤال الأول:-
أ- بين كيف يتم التمييز بين القاعدة القانونية وبين غيرها من القواعد الاجتماعية الأخرى؟ وما هي خصائص القاعدة القانونية؟.
ب- عرف القانون وبين خصائصه؟ وما هي وظيفة القانون وأساسه؟.

السؤال الثاني:-
ا- "الأساس الذي يقوم عليه تقسيم القاعدة القانونية هو وجود الدولة أو عدم وجودها في العلاقة القانونية بصفتها صاحبة سلطان و سيادة". إشرح و علل ذلك.
ب- إشرح بإيجاز نبذة مختصرة عن مصادر القانون؟ مبيناً تعريفاً مختصراً لكل منهم؟.

السؤال الثالث:-
ا- عرف عقد العمل وأذكر الطوائف المستثناء كلياً من الخضوع لعقد مع ذكر سبب الاستثناء؟ وبين أهمية القانون عند التعاقد بعقد عمل في أي منشأة صناعية؟.
ب- "الالتزامات التي تقع على عاتق العامل لا تختلف اختلافاً كبيراً في العقود الخاضعة لقانون العمل عنها عن العقود الخاضعة للقانون المدني". إشرح هذه الالتزامات وما الجزاء على مخالفتها.

السؤال الرابع:-
ا- أذكر ما تعرفه عن مضمون الرضا في عقد العمل؟ وأذكر ما هي عيوبه؟ وما الجزاء الذي يرتبه القانون لتفاف ركن من أركانه أو شرطاً من شروطه.
ب- ما هي المراحل التمهيدية التي تسبق إبرام عقد العمل؟ وما هي الأحكام الخاصة بالتوظيف والتخديم؟.

السؤال الخامس:-
ا- عرف كلاماً مما يأتي:-
الدعوى - المصلحة - التقاضي - التشريع - العدل - الدين - العرف - القاعدة الأخلاقية - القانون الطبيعي.
ب- عرف الحق و بين أركانه؟ وأذكر كيف يتم تقسيم الأشياء من حيث ثباتها؟.

السؤال السادس:-
ا- "القانون فرع من فروع العلوم الإنسانية الأخرى ولا غنى لأى متخصص عن الإمام بالعلوم الاجتماعية الأخرى". وضح ذلك و بين صلة القانون بغيره من العلوم الاجتماعية الأخرى.
ب- كيف يتم التعريف بالقانون؟ وما هي خصائصه؟ وأذكر أهدافه؟ وكيف يتم إصلاح القانون علمًا بأن الجزاء عنصر جوهري من عناصر القاعدة القانونية. فبئنه إذا ما خولفت القاعدة القانونية..

جـ- أكمل:-

- 1- عقد العمل الفردي عقد يتعهد بمقتضاه عامل بأن يعمل لدى و تحت و مقابل
- 2- لا يجوز تشغيل الطفل قبل بلوغه سنة كما لا يجوز تدريسه قبل بلوغه كما لا يجوز تشغيله أكثر من ساعات يومياً كما لا يجوز تشغيله فيما بين الساعة مساءً و صباحاً.
- 3- يمنحك العمال بالمنشأة التي يعمل بها عمال فاكثر علاوة دورية سنوياً لا تقل عن 6% من الأجر الذي تحسب على أساسه إشتراكات التأمين من الضمان الاجتماعي بعد أننى و بحد أقصى جنيهات وذلك لمدة عاماً من تاريخ إستحقاق أول علاوة.
- 4- لا يجوز تشغيل العامل تشغيلاً فطرياً أكثر من ساعات في اليوم أو ساعة في الأسبوع لا تدخل فيها الفترات المخصصة و التي لا تقل في مجموعها عن بحيث لا يعمل العامل أكثر من ساعات متصلة.
- 5- لا يوجد تشغيل النساء في الفترة ما بين الساعة مساءً و الساعة صباحاً إلا في الأحوال التي يصدر بها قرار من وزير القوى العاملة كما لا يجوز تشغيلهن في الأعمال أو الضارة بهن أو أو
- 6- تكون الأجازة السنوية لمدة يوماً في السنة الأولى و لا يستحقها العامل إلا بعد مضي و تكون لمدة يوماً لمن أمضى في الخدمة سنة فاكثر تزداد إلى يوماً لمن أمضى في الخدمة سنوات متصلة.
- 7- في المنشآت التي تستخدم عاملًا فاكثر يكون للعاملة الحق في الحصول على أجازة بدون أجر لرعاية طفلها لمدة و هذه الأجازة طوال مدة خدمتها.
- 8- في المنشآت غير الصناعية يكون للعامل الذي ثبت مرضه حق في الحصول على أجازة مرضية تصل إلى يوماً في السنة يمنح خلال الأولى منها من الأجر و يمنح خلال ثمان أشهر التالية أما فيحصل على أجازة بدون أجر إذا قرر الطبيب المختص
- 9- يجوز لصاحب العمل منح العامل الذي أمضى في خدمته أجازة للحج أو لمدة أقصاها يمنح خلالها من الأجر و تكون هذه الأجازة طوال مدة خدمة العامل.
- 10- لصاحب العمل حق فصل العامل إذا تغيب عن العمل بدون مبرر مشروع أكثر من يوماً متقطعة خلال السنة الواحدة أو أكثر من أيام على أن يسبق الفصل إنذار العامل كتابة بعد غيابه أيام في الحالة الأولى أيام في الحالة الثانية.

"انتهت الأسئلة"

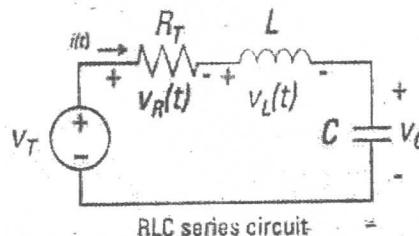
مع أجمل التمنيات بالنجاح والتوفيق ..

Course Title	Automatic Control in Mechanical Systems	Academic Year 2022/2023 Second Semester Exam	Course Code	MPD3223
Year/ Level	Third		Total Marks	85
Date	11-6-2023	No. of Pages (3)	Allowed time	3 hrs

Remarks: Answer all the following questions

Question Number (1)

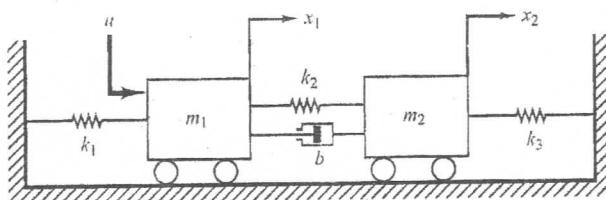
- a) Find the differential equation for the following system.



(15 marks)
(7 marks)

- b) Find the transfer function $\frac{X_1(s)}{U(s)}$ and $\frac{X_2(s)}{U(s)}$.

(8 marks)

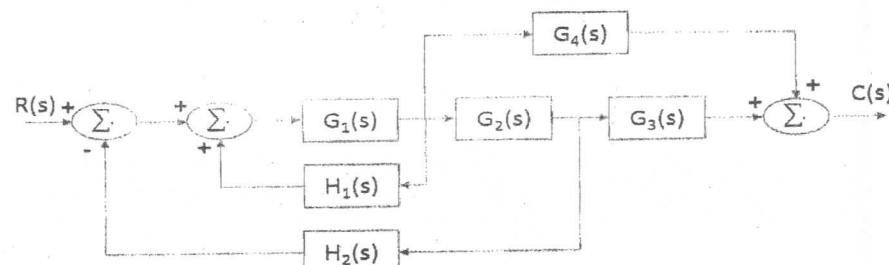


(20 marks)

Question Number (2):

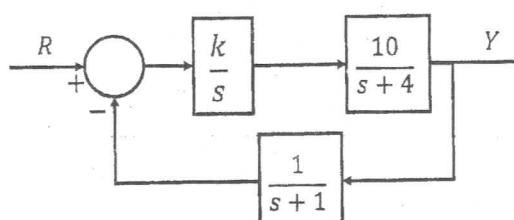
- a) Determine the system transfer function given by the block diagram given below.

(10 marks)



- b) For the system shown in the figure below, Determine the range of k for stable system.

(10 marks)



Question Number (3):

- a) For each of the following characteristic equations, determine whether the system is stable, critically stable, or unstable. (9 marks)

$$1. F(s) = s^3 + 4s^2 + s + 16$$

$$2. F(s) = s^6 + s^5 + 2s^4 + 2s^3 + 3s^2 + 2s + 4$$

$$3. F(s) = s^7 + 3s^6 + 3s^5 + s^4 + s^3 + 3s^2 + 3s + 1$$

- b) A unity-feedback system has an open-loop Transfer function. (6 marks)

$$G(s) = \frac{2}{s^2(s+2)(s^2+2s+2)}$$

1. Calculate the position, velocity, and the acceleration error constants.
2. Determine e_{ss} for a unit-step, a unit-ramp, and unit-parabolic inputs.

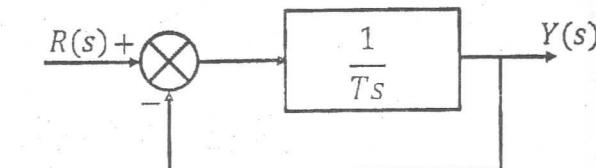
Question Number (4):

- a) Consider the unit-step response of the unity-feedback control system whose open-loop transfer function is (10 marks)

$$G(s) = \frac{1}{s(s+1)}$$

Obtain the rise time, peak time, maximum overshoot, and settling time.

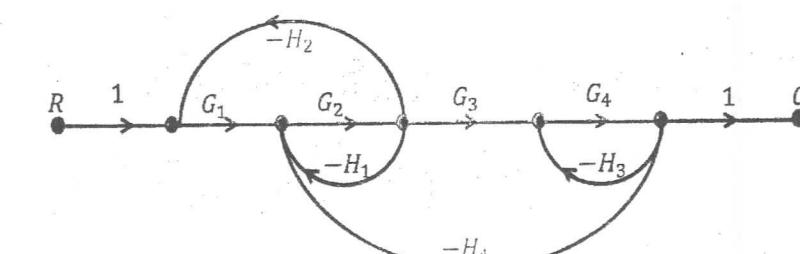
- b) For the following first order system, find both the impulse response and step response. (10 marks)



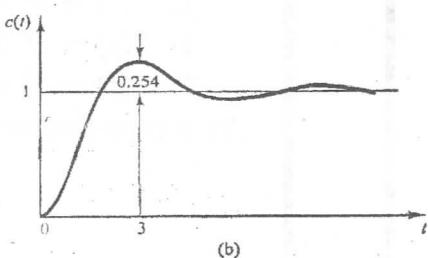
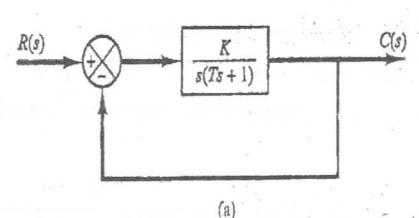
(15 marks)

Question Number (5):

- a) Determine the transfer function using Mason's rule. (8 marks)



- b) When the system in (a) is subjected to a unit-step input, the system output responds as shown in
 (b). Determine the values of K and T from the response curve. (7 marks)



End of questions.....

Time domain	S- domain
$u(t)$	$\frac{1}{s}$
t	$\frac{1}{s^2}$
e^{-at}	$\frac{1}{s+a}$

Transient Time Response Specification:	
$T_d = \frac{1 + 0.7\zeta}{\omega_n}$	$T_r = \frac{\pi - \tan^{-1}(\frac{\sqrt{1-\zeta^2}}{\zeta})}{\omega_n \sqrt{1-\zeta^2}}$
$T_p = \frac{\pi}{\omega_n \sqrt{1-\zeta^2}}$	$T_s = \frac{4}{\zeta \omega_n}$
$\% M_p = 100 * e^{-\frac{\pi \zeta}{\sqrt{1-\zeta^2}}}$	

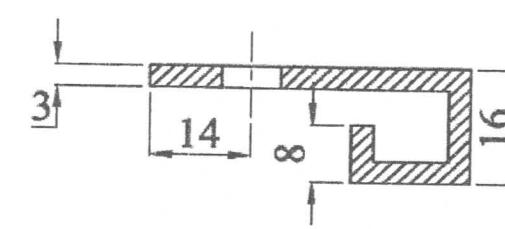
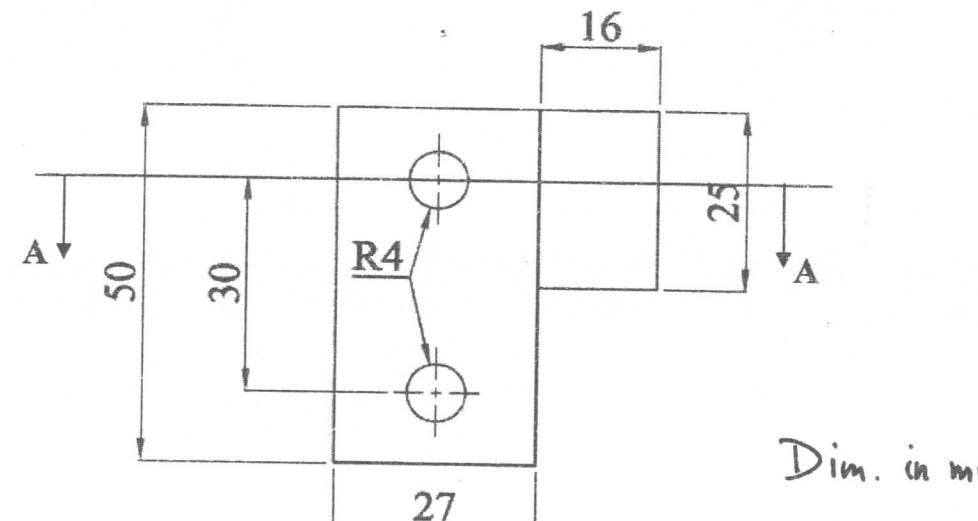
*Best Wishes
 Dr. Basma Elkilay*

Final Exam

Solve all questions and try to use drawings as much as possible to support your answer and assume any missing data:

Question 1 : (30 marks)

- a) Show with neat sketches the difference between the following shearing processes:
piercing - planking - deburring - lancing
- b) It is required to produce the shown part in mass production from cold drawn steel sheets of 195 MPa shear strength and 3 mm thickness.
 - i. Suggest and construct a suitable die-set to produce the part.
 - ii. Calculate the required force according to your die-set design and the center of pressure due to the shearing process only.
 - iii. Show with neat sketches the possible defects in the sheared part and the methods to avoid these defects.



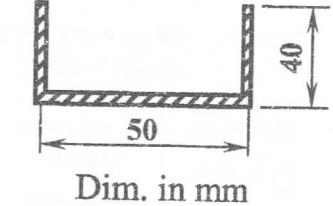
Sec A-A

Question 2 : (25 marks)

- a) Show in one diagram the effect of cold work on strength, hardness, ductility and grain boundaries
- b) A steel wire of 0.5% C content is wet drawn from 12 mm to 10 mm diameter through a wire drawing die.
 - i. Suggest a proper heat treatment for the wire material to have a best possible drawing performance?
(Use every possible chart, diagram, sketch,...etc. to explain your answer)
 - ii. How can we prepare the wire surface for the drawing process?
 - iii. Draw a cross-section of the drawing die showing its main zones and dimensions. (make use of the given useful information)
 - iv. If the wire breaks during the process, mention the possible reasons for that...
 - v. If the given process is part of a drawing line consists of 3 drawing stations, draw the possible tandem machine configurations.

Question 3 : (20 marks)

- a) What are the advantages of forming processes over other manufacturing techniques.
- b) The channel with the shown cross-section is required to be produced by contour rolling. The distance between the two stations is 1 m. The material has a modulus of elasticity of 200 GPa and a yield stress of 250 MPa.
 - i. Plot the change of the strain and stress along the cross-section contour.
 - ii. Is it recommended to use the given rolling conditions? Justify your answer.
 - iii. What are the actions to be done in order to have a successful rolling process.

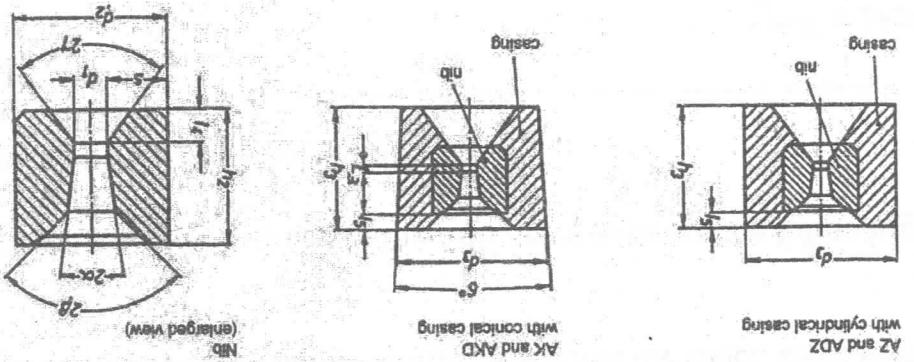


Question 4 : (15 marks)

- a) Discuss about the factors affecting the recrystallization temperature.
- b) Why is water being used as the transmitting medium of the shock wave in explosive forming?
- c) Explain with the aid of neat sketches the difference between the following forging processes:
drawing down – heading – fullering

د. نادر الليثى

مع تمنياتي بالتفوق والنجاح



Steel wire Nonferrous metals d_1 in mm	d_2	h_2	d_3	h_3	l_3	2γ	2θ	l_3 in mm in mm	h_3 in mm in mm	d_1 in mm in mm	in degrees degrees	90	60	75	0.6	0.5	1.2	1.5	35	75	40	24	30	13	12				
3.0	3.5	12	10	28	20	0.5	0.5	90	90	60	75																		
2.0	2.5	10	8	28	16	0.5	0.5																						
1.0	1.5	8	4	28	12	0.5	0.5																						
3.0	3.5	12	10	28	20	0.5	0.5																						
5	6	16	13	43	25	0.9	0.9																						
6.5	8	20	17	43	32	1.2	1.2																						
9	10.5	25	20	75	35	1.5	1.5																						
12	13	30	24	75	40	1.8	1.8																						

Table 2: Dimensions of carbide drawing dies for steel wires (ISO-A) and wires made of nonferrous metals (ISO-B)

Material	Approach angle α		ϕ_p in %	Dry draw	Wet draw	Steel ($C < 0.4\%$), brass, bronze	Steel ($C > 0.4\%$)																				
	Dry draw	Wet draw																									
	11°	9°																									
11°	9°	10°	10	10	12°	12°	14°	15°	17°	18°	15°	35	19°														

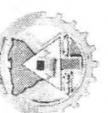
Table 1: Optimum approach angle

For wire drawing:

$$\text{For roll forming of a trapezoidal section: } e = \frac{e_2(1-\cos\theta)}{L^2} \quad \text{and} \quad \theta = \frac{Ee_2(1-\cos\theta)}{L^2}$$

Useful Information:

B7



TANTA UNIVERSITY

FACULTY OF ENGINEERING

DEPARTMENT OF: Production Engineering & Mech. Design Dep.

EXAMINATION (3 YEAR) STUDENTS OF Production ENGINEERING

COURSE TITLE: Mechanical Design (3)

COURSE CODE: PMD3219

1/2

Notes: Systematic arrangement of calculations and clear neat drawings are essential.

Any data not given is to be assumed - Answer as many questions as you can. Answer as brief as possible.

Question One (40%)

A-For bevel gears answers the flowing questions

- 1- The wear strength indicates the maximum value of radial force at the large end of the tooth that the tooth can transmit without pitting failure.
a) True b) False c) >90 d) None of the listed
- 2- For crown bevel gear, pitch angle is
a) <90 b) $=90$ c) 3 d) 4
- 3- There are _____ common types of bevel gears.
a) 1 b) 2 c) No, vibration problem d) none of the listed
- 4- Straight bevel gears are easy to design and manufacture and give reasonably good service with quieter operation.
a) True b) No, noise problem
- 5- Which of the following creates smoother motion?
a) Straight bevel gears b) Spiral bevel gears c) Equal for straight and spiral d) None of the mentioned?
a) True b) False a) True b) False
- 6- In hypoid bevel gears, shafts may continue past each other.
a) 4mm b) 22mm c) 15.6mm d) 20.2mm
- 7- Zero gears are straight bevel gears with zero spiral angles.
a) If back cone distance is 12mm and module at large end of the tooth is 4mm, then formative number of teeth will be?
a) 3 b) 6 c) 4 d) 12
- 8- Calculate the cone distance in a pair of bevel gears if pitch circle diameter of pinion and gear are 20mm and 24mm respectively.
a) 44mm b) 22mm c) 15.6mm d) 20.2mm
- 9- Calculate the pitch angle if pitch circle diameter of the pinion and gear are 150 mm and 210 mm.
a) 28.14° b) 35.54° c) 36.22° d) 63.22°
- 10- Calculate the radius of pinion at midpoint along the face width if pitch circle diameter of pinion is 150mm and of gear is 210mm. Also, the face width of the tooth is 35mm.
a) 56.35mm b) 64.83mm c) 66.57mm d) 58.69mm
- 11- Calculate the tangential component of gear tooth force if power transmitted is 6kW and diameters of pinion and gear are 150mm and 210 mm with face width of tooth being 35mm. Power is transmitted at 3000rpm.
- 12- Calculate the radial component of gear tooth force if power transmitted is 6kW and diameters of pinion and gear are 150mm and 210 mm with face width of tooth being 35mm. Power is transmitted at 3000rpm. Also, the pressure angle is 20° .
- 13- Calculate the axial component of gear if power transmitted is 6kW and diameters of pinion and gear are 150mm and 210 mm with face width of tooth being 35mm. Power is transmitted at 3000rpm. Also, the pressure angle is 20° .
- 14- Calculate the axial component of gear if power transmitted is 6kW and diameters of pinion and gear are 150mm and 210 mm with face width of tooth being 35mm. Power is transmitted at 3000rpm. Also, the pressure angle is 20° .
- 15- Lewis's equation is used to obtain _____ strength of bevel gears.
a) Beam b) Abrasive c) Wear d) Corrosive
- 16- Beam strength indicates the maximum value of the _____ force at the large end of the tooth that the tooth can transmit without bending.
a) Tangential b) Radial c) Axial d) None of the listed
- 17- If the back cone radius is 10mm, then pitch circle diameter of the formative pinion is given by?
a) 10mm b) 20mm c) 5mm d) $10\sqrt{2}$ mm

B - For Helical Gears answers the flowing questions

- 1- Crossed helical gears have very low load carrying capacity.
a) True b) False
- 2- A pair of parallel helical gears consists of 15 teeth pinion meshing with a 40 teeth gear. The helix angle is 22° and normal pressure angle 19° . The normal module is taken as 4mm. Calculate the transverse module?
a) 4.3mm b) 4.1mm c) 3.9mm d) 3.7mm
- 3- A pair of parallel helical gears meshing with a 40 teeth gear. The helix angle is 22° and normal pressure angle 19° . The normal module is taken as 4mm. Calculate the axial pitch?
a) 34.2mm b) 29.6mm c) 33.4mm d) None of the listed
- 4- A pair of parallel helical gears consists of 15 teeth pinion meshing with a 40 teeth gear. The helix angle is 22° and normal pressure angle 19° . The normal module is taken as 4mm. Calculate the pitch circle diameter of the gear.
a) 172.6mm b) 142.6mm c) 180.3mm d) 202.4mm
- 5- A pair of parallel helical gears consists of 15 teeth pinion meshing with a 40 teeth gear. The helix angle is 22° and normal pressure angle 19° . The normal module is taken as 4mm. Calculate the outer circle diameter of the gear.
a) 300N b) 302.5N c) 93.26N d) 215.6N

- 7- Which of the following have stronger teeth?
- Stub teeth
 - Full depth teeth
 - Both have equal strength
 - Cannot be determined
- 8- A pair of helical gears consist of 25 teeth pinion meshing with a 115 teeth gear. The normal module is 5mm with a helix angle 25°. Calculate the center distance?
- 9- In the above question, calculate the outer circle diameter of both gears?
- 10- In the above question, calculate the tooth thickness?
- 11- Beam strength indicates the maximum value of radial force that a tooth can transmit without fatigue failure.
- True
 - False
- 12- A pair of helical gears consists of 25 teeth pinion gear meshing with a 90 teeth gear. Calculate the wear load (F_w) if surface hardness is 250BHN. Also face width=35mm, module=4mm, pressure angle =20° and helix angle=25°.
- 13- A pair of helical gears consists of 25 teeth the pinion meshing with a 90 teeth gear. Calculate the tangential force? Assume $3F_t=F_w$, also face width=35mm, module=4mm and helix angle=25°. The velocity of operation is 3.5m/s.
- 14- The net axial force acting on bearing is zero in case of double helical gears while none zero in case of herringbone gears.
- True
 - False
- 15- Helix angle of herringbone and double helical gears is relatively higher.
- True
 - False
- 16- A herringbone speed reducer consists of 20 teeth pinion driving a 100 teeth gear. The normal module of gear is 2mm with helix angle of 30°. The face width of each half is 30mm and geometry factor is 0.4. If the max allowable design stress is 500N/mm², then calculate the tangential force. Disregard other factors.
- 17- A herringbone speed reducer consists of 20 teeth pinion driving a 100 teeth gear. The normal module of gear is 2mm. The face width of each half is 30mm and geometry factor is 0.4. Calculate the ratio factor Q.
- 18- A herringbone speed reducer consists of 20 teeth pinion driving a 100 teeth gear. The normal module of gear is 2mm and the helix angle is 35°. The face width of each half is 30mm and geometry factor is 0.4. Calculate the wear load factor K if the dynamic load (F_w) is 10000N.
- 19- In the above question assume $F_w=3F_t$ at speed $N=1450\text{RPM}$. What is the transmitted power recommended for this gear train?
- 20- Helical gears mounted on parallel shafts are called crossed helical gears.
- True
 - False

Question Two (10%)

- I-Conduct a comparison between worm gear reducer and a spiral gear reducer. (5%)
- II-What are the advantages and disadvantages of the helical-gear reducer? (5%)

Question Three (60%)

A speed reducer receives 15 Kw at 1450 RPM. The output speed is 200RPM. It consists of two stages; the first stage is helical gear, and the other stage is spur-gear with speed reduction of 1:2. The gear box should have a service life of 2000 hours, with reliability of 99%. The power source is assumed to be uniform while the driven machine is assumed to be medium shock. The diameter of the output gear should be 240 mm. This gear box is used to rotate the spindle of a lathe machine. What is the maximum cutting force that could be produced by this gear box if the working piece diameter is 95cm?

Design the gear box and specify the material, surface hardness, number of teeth and the face width for all gears?

Draw simple drawing for the gear box and show the detail drawing for the intermediate shaft with its support bearings.
(30%)

Good luck

Prof. Ezzat Showaib

ملاحظة هامة:
يجب تسليم ورقة الأسئلة مع ورقة الإجابة مع كتابة رقم التوزيع على ورقة الإجابة والاتوحة