جامعة طنطا - كلية الهندسة
قسم هندسة القوى الميكانيكية
الاقتصاد الهندسي – ثانية ميكانيكا قوى

الزمن : ساعتين
٢٠٠٨-٢٠٠٧

يسمح باستعمال جداول الفائدة

أجب على الأسئلة التالية

السؤال الأول

أ- ماهى المصروفات السنوية للمنشأة مع الشرح؟

ب- ماهى الحالات الثلاثة لاتخاذ القرار مع الشرح؟

ثلاثة مواقع لبناء منشأه صناعيه A,B,C .الجدول التالي يوضح التكاليف الثابتة و المتغيرة.

الموقـــع	التكلفة الثابتة/السنة	التكلفة المتغيرة
A	$100,000	$2.5
B	80,000	4.0
C	75,000	5.0

(ا) اختر الموقع المناسب اذا كان حجم الإنتاج السنوي 10,000 وحده.

(ب) احسب حجم الإنتاج المناسب لكل موقع اذا كان الربح السنوي المطلوب $40,000 وكان سعر البيع $6.

السؤال الثانى

شركة تنتج ثلاث منتجات Z,Y,X الجدول الموضح يبين عناصر التكاليف السنوية والاحتياجات السنوية من ساعات التشغيل الآلى لهذا المستوى الإنتاجى :-

تفصيلات التكاليف السنوية	المنتجات		
	X	Y	Z
تكاليف المواد المباشرة $(L.E.)$	1300	1500	2000
تكاليف العمالة المباشرة $(L.E.)$	1000	1200	1800
عدد ساعات التشغيل الآلية (hr)	300	500	650
عدد المنتجات (وحدة فى السنة)	600	800	1200

فإذا كانت مجموع المصروفات العامة (الثابتة Overhead Costs) السنوية لهذه الشركة هى $(5000\ L.E.)$ فالمطلوب هو : حساب التكلفة الكلية لوحدة الإنتاج من كل نوع ، وذلك باستخدام طريقتين مختلفتين من طرق توزيع المصروفات العامة المختلفة

السؤال الثالث

إذا أعطيت البيانات التالية لعناصر التكاليف لمعدة ما فأحسب التكاليف الكلية المتجمعة لكل ساعة تشغيل وكذلك احسب العمر الأمثل للإحلال لهذه المعدة .

البيانات هي :-

-ثمن الشراء $I = 100000 \quad (L.E.)$

-العمر الإقتصادى $N = 5 \quad (years)$

-سعر الخردة $S = 25000 \quad (L.E.)$

-متوسط عدد ساعات التشغيل السنوية القياسية $H_S = 2000(hr)$

-الساعات القياسية تقابل 95% نسبة تشغيل وتقل بمعدل 3% سنويا بتقادم هذه المعدة

-نسبة الفائدة المركبة المطبقة $r = 12\%$

-ضريبة الملكية $r = 2\%$

-التأمين $r = 1\%$

وذلك تبعا للمتوسط السنوى المتبع

-تكاليف ايجار معدة من نفس النوع $R = 30 \ (L.E./hr)$

-معدل الزيادة فى أسعار المعدات $r_1 = 5\%/year$

-معدل انخفاض القيمة الشرائية للعملة (الجنية المصري) $r_2 = 2\%/year$

-ظهر فى الأسواق بعد ثلاث سنوات من بدء التشغيل ، معدة أخرى ذات إنتاجية أعلى بنسبة 8% سنويا

-من واقع سجل هذه المعدة تكاليف التشغيل السنوية كما يلى :

السنة	الأولى	الثانية	الثالثة	الرابعة	الخامسة
تكاليف التشغيل	٣٥٠٠	٥٢٠٠	٧٨٠٠	١٣٢٠٠	١٧٩٠٠

استخدم أى طريقة لحساب قسط الإهلاك

مع أطيب التمنيات بالتوفيق

أ.م.د/ عبد النبى قابيل

جامعة طنطا
كلية الهندسة
قسم الإنتاج و...

إقتصاد هندسي
الزمن: ٢ ساعة
التاريخ: يناير ٢٠٠٨

أجب علي الأسئلة التالية:

١/١ تعتمد الطرق المركبة (الديناميكية) لتقييم المشروعات الصناعية على وضع معدل الخصم للنقود في الإعتبار ، أذكر أهم هذه الطرق.
٢/١ مشروع صناعي قائم يحقق مبيعات سنوية مقدارها ٥٠ مليون دولار ، وتصل تكلفة ما يقوم بشرائة من مواد من خارجه سنويا ٣٥ مليون دولار ، كما يبلغ قسط الإهلاك السنوي لهذا المشروع ٣ مليون دولار ، فما هي صافي القيمة المضافة التي يحققها هذا المشروع سنويا؟

٢- ماهي العوامل الرئيسية التي تؤثر علي تكلفة الإستثمار للمشروعات الصناعية ، وما هو المقصود بنقطة التعادل لهذه المشروعات؟

٣- إحسب قسط الإهلاك السنوي بإستخدام طريقة المجموع الرقمي للسنوات لمعدة بلغت تكلفة شرائها ٦ ملين دولار ، وتكلفة النقل والتركيب لها ٠,٨ مليون دولار ، مع عمر نافع لها مقدر بستة سنوات، وقيمة نفاية لها بما مقدارة ١٠% من إجمالي تكلفتها.

٤- عرف ما يلي:
- القيمة الدفترية للأصل
- القيمة السوقية للأصل
- معدل سعر الخصم للنقود
- الإهلاك
- رأس المال الثابت
- رأس مال التشغيل

١/٥ ما هي اهم المؤشرات التي يمكن الأخذ بها في تصنيف المشروعات الصناعية بالنسبة لأحجامها؟
٢/٥ أذكر أربعة صناعات مختلفة تدخل تحت تصنيف الصناعة التحويلية.

جامعة طنطا - كلية الهندسة
قسم هندسة القوى الميكانيكية

التخصص: هندسة القوى الميكانيكية
المادة: ميكانيكا موائع ٢

العام الجامعي ٢٠٠٨/٢٠٠٩
الفصل الدراسي الأول
السنة الدراسية الثانية
الزمن ٣ ساعات

عدد الصفحات: ٢ عدد الأسئلة: ٤ أجب على جميع الأسئلة

1-a) Derive the "Work-Energy equation using the concept of the control volume.

b) Derive the Euler equation for 2-D steady flow in the differential form.

c) Using the derived Euler equation, derive the Bernoulli's equation for 2-D incompressible steady flow.

2.a) Analyze the conditions of irrotational flow for both stream and potential functions and also express the continuity equation in terms of both.

b) Derive the relation for the vorticity ζ considering the square differential element in x-y plane, then derive the relation between vorticity ζ and rotation ω.

c) Derive the linear impulse-momentum equation.

3-a) Define and explain with help of drawing if necessary:

- Steady and unsteady flow, path line, streamline and streakline and streamtube.
- Energy Line and Hydraulic Grade Line.
- Control volume, control surface and Fluid system.
- Dynamic and kinematic viscosities.

3-b) In the ideal flow around a half streamline body, the stream function ψ is given in polar coordinates by:

$$\psi = V_o\, r \sin\theta + q\,\frac{\theta}{2\pi}$$

Whereas the free stream velocity $V_o = 0.5$ m/s and the strength of the source $q = 2$ m²/s. And the radial and tangential velocity components are:

$V_r = \frac{\partial \psi}{r\partial\theta}$ & $V_t = \frac{\partial \psi}{\partial r}$ respectively.

Determine the fluid velocity and its direction at a point $r = 10$m and $\theta = 120°$.

And draw the stream function for $\psi = 4$ and $\psi = 6$.

4) The angle between a pair of lock gates is 140° as shown in plan view, Fig.a and each gate is 6 m height and 1.8 m wide and is supported on two hings 0.6 m from top and bottom of the gate, Fig.c. If the depth of water on the upstream and downstream sides are 5 m and 1.5 m respectively, Fig.b.

Calculate the reactions at the top and bottom hings for each gate. Assume that the force exerted by one gate on the other F is act perpendicular to the axis of the lock as shown in Fig. b. While for the equilibrium state F, R (resulant of both reactions at hings) and P (resultant water pressure force on the gate) are coplaner and they will meet at a point.

given: $\rho_{wat} = 1000$ kg/m³; for rectangular shape $\square$ (b, H), $I_c = \frac{bH^3}{12}$

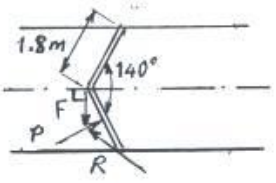

Fig.a

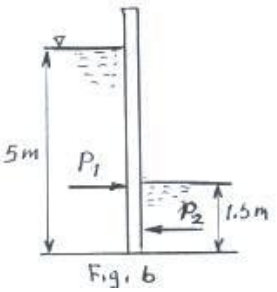

Fig. b

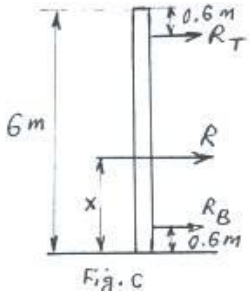

Fig. c

Lock gates

جامعة طنطا - كلية الهندسة
قسم هندسة القوى الميكانيكية

التخصص: هندسة القوى الميكانيكية
المادة: ميكانيكا موائع ٢١

العام الجامعي ٢٠٠٨/٢٠٠٩
الفصل الدراسي الأول
السنة الدراسية الثانية
الزمن ٣ ساعات

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جامعة طنطا - كلية الهندسة
قسم هندسة القوى الميكانيكية

التخصص: هندسة القوى الميكانيكية
المادة: ميكانيكا موائع ٢١

العام الجامعي ٢٠٠٨/٢٠٠٩
الفصل الدراسي الأول
السنة الدراسية الثانية
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جامعة طنطا - كلية الهندسة
قسم هندسة القوى الميكانيكية

التخصص: هندسة القوى الميكانيكية
المادة: ميكانيكا موائع ٢١

العام الجامعي ٢٠٠٨/٢٠٠٩
الفصل الدراسي الأول
السنة الدراسية الثانية
الزمن ٣ ساعات

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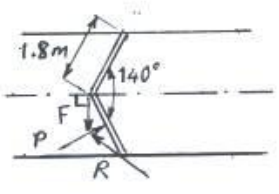


Fig.a

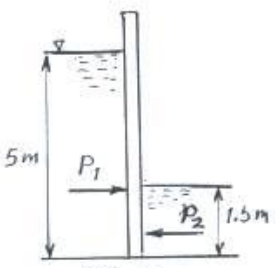


Fig. b

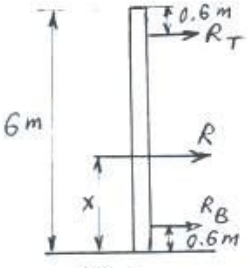


Fig. c

Lock gates

نظرية الآلات لطلبة الإنتاج

TANTA UNIVERSITY
FACULTY OF ENGINEERING
PRODUCTION ENG. & MECH. DESIGN DEPT.

THEORY OF MACHINES
2nd YEAR, 2007-2008
TIME: 3 HOURS

FINAL TERM EXAM

1- For a machine, the driving torque is constant while the driven torque is given by:
$T_r = 100 + 20 (\cos \theta + \sin 0.5 \theta)$ N.m
Find the moment of inertia of the flywheel to keep the speed between 591 and 609 r.p.m.

2- Two meshing gears have 30 and 40 teeth involute of diametral pitch 2 and 20° pressure angle. The addendum on each gear is taken such that the length of the path of contact on each side of the pitch point is equal to half the maximum possible length. Determine:
   a- The contact ratio.
   b- The minimum number of teeth, the pinion and the gear can have for the given gear ratio.

3- Draw the cam profile to give an oscillating flat face follower the following motion:
   a- Outward motion through an angular displacement of 25° during the first 120° of the cam rotation with S.H.M.
   b- Return motion to its initial position during the next 120° of the cam rotation with cycloidal motion.
   c- Dwell motion during the next 120° of the cam rotation.
   The minimum radius of the cam is 50 mm. The location of the pivot of the follower is 70 mm to the left and 60 mm above the axis of rotation of the cam. The *normal distance* from the pivot of the follower to the flat face of the follower is 10 mm.

4- For the mechanism shown in Fig. 1, the velocity and the acceleration of the slider C are 3 m/sec and 100 m/sec^2, respectively. Find the angular velocity and angular acceleration of links 2 and 5.
   Given that: OA=7.5 cm, OQ= 15 cm, $\theta = 30°$.

5- For the mechanism shown in Fig. 1, consider the position of the mechanism at which the slider C is along OQ, find the following:

   a- The ratio of the velocity of the slider C when it occupies that position on the forward stroke to that when it occupies the same position on the return stroke, *using the instantaneous center method.*

b- The driving torque of link 2 if a resisting force of 500 N is acting upon link 6.

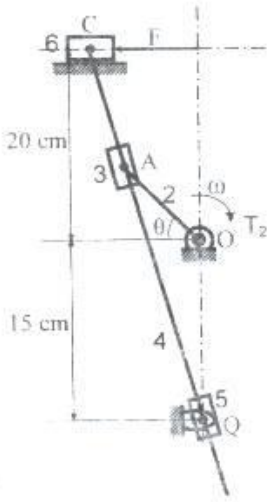


Fig. 1

Best Wishes

Answer the following questions:-

The first question :

(a) Explain the two statements of the second law of thermodynamics ?

(b) A thermal storage is made with a rock bed of 2 m^3 which is heated to 400 °K using solar energy. A heat engine receives a Q_H from the bed and rejects heat to ambient at 290 °K. The rock bed therefore cools down and as it reaches 290 °K the process stop. Find the total energy output of the heat engine. What is the heat engine efficiency at the beginning of the process and what is it at the end of the process? For the rock bed take ρ = 2700 kg / m^3 and Cp = 1 kJ / kg. °K.

The second question :

(a) What are the factors that make processes irreversible ?

(b) In a Carnot engine with water as the working fluid, the high temperature is 250 °C and as Q_H is received, the water changes from saturated liquid to saturated vapor. The water pressure at the law temperature is 100 kpa. Find T_1, the cycle thermal efficiency, the heat added per kilogram, and the entropy at the beginning of the heat rejection process.

The third question :

(a) Deduce the thermal efficiency of air-standard Diesel cycle ?

(b) Consider a simple Brayton cycle gas-turbine engine with air as the working fluid. The pressure ratio across the compressor is 8 to 1. The compressor inlet temperature is 25 °C, the isentropic compressor efficiency is 75 % and the isentropic turbine efficiency is 85 %.

a- What is the lowest maximum cycle temperature at which the engine will run (no net power output)?

b- If the maximum cycle temperature is 1150 °C, what is the thermal efficiency?

The fourth question :

(a) Explain and draw the methods used to increase the Rankine cycle efficiency ?

(b) In a steam power plant utilizing the reheat cycle, the turbine inlet condition is 30 bars and 500 °C. After expansion to 5.0 bars, the steam is reheat to 500 °C and then expanded to the condenser pressure of 0.1 bar. Compute the cycle efficiency and the state of the steam at the outlet of the turbine.

The fifth question :

(a) Why is the throttling valve not replaced by an isentropic turbine in the ideal vapor-compression refrigeration cycle?

(b) An ideal vapor-compression heat-pump cycle operates between an evaporator temperature of 0 °C and a condenser pressure of 8 bars. Refrigerant-12 leaves the evaporator as saturated vapor and enters the expansion valve as saturated liquid. If the heat pump supplies 1000 kJ / min to a high-temperature region, determine (a) the temperature at the exit of the isentropic compressor, (b) the coefficient of performance (c)the effective displacement of the compressor (c) the power input required if electric resistance heating used.

The sixth question :

(a) Explain how to determine the calorific value of a solid fuel ?

(b) A boiler uses coal having a mass analysis of 82 % carbon, 4 % hydrogen, 8 % oxygen, 0.5 % sulphur and the remainder ash. If 20 kg air are supplied per kg of coal, determine the analysis of the dry flue gases by mass and by volume.

بسم الله الرحمن الرحيم

جامعة طرابلس — المادة: تصميم ماكينات
كلية التقنية — الفصل الدراسي الأول ٢٠٠٧/٢٠٠٨ — التاريخ: ١٥/١/٢٠٠٨
الفرقة الثانية — ميكانيكا قوى لائحة جديدة — الزمن: ثلاث ساعات

Answer all the following questions :

(1)- A cantilever 3 m long is of rectangular section 100 mm wide and 200 mm deep. It carries a uniformly distributed load of 20 KN/unit meter length for a length of 2 m from the free end and a point load of 12 KN/ at the free end as shown in Fig. (1), $E = 200\ GN/m^2$. Find the slope and deflection at A.

(2)- A machine member is represented by a cantilever beam ana loaded as shown in Fig. (2). The member has a square cross-section bXb and made from steel having a yield stress of 300 MPa. Calculate the dimension b of this member. Assume safty factor 3. If the member is hollow and the inner to outer square area ratio is 0.5 6 calculate the percentage change in the member weight.

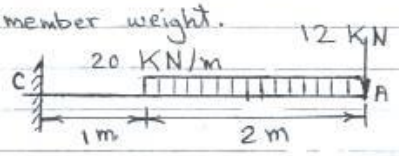


Fig. (1)

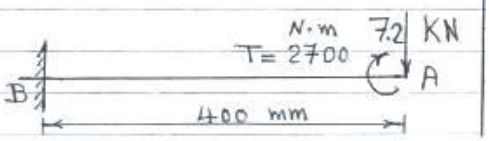
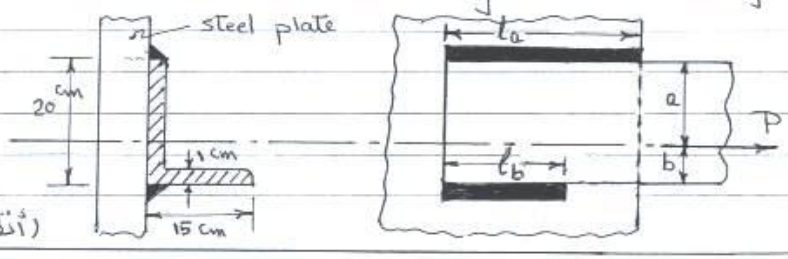


Fig. (2)

(3)- A 20 X 15 X 1 cm angle is to be welded to a steel plate by fillet welds as shown in Fig. (3). If the angle is subjected to a static load of 20 ton, find the lengths of weld at the top and bottom. The allowable shear stress may be taken as 750 Kg/cm^2.

Fig. (3)



(أنظر خلف)

(4) - An eccentrically loaded lape riveted joint is to be designed for a steel braket. The bracket plate is 25 mm thick and is riveted to a vertical column by 6 rivets of same size as shown in Fig.(4). Loads on the bracket is P = 5000 Kg and Q = 4000 Kg at a distance of 200 mm from the top rivet. Allowable shear and crushing stresses of the rivet material are 650 Kg/cm^2 and 1200 Kg/cm^2 respectively. Determine the diameter of the rivets.

(5) - Two parallel shafts whose centre lines are 4.8 m a part, are connected by an open belt drive. The diameter of the larger pulley is 1.5 m and that of smaller pulley 1.05 m. The initial tension in the belt when stationary is 3 KN. . The mass of the belt is 1.5 Kg/m length The coefficient of friction between the belt and the pulley is 0.3. Taking centrifugal tension into account, calculate the horse power transmitted, when the smaller pulley rotates at 400 r.p.m.

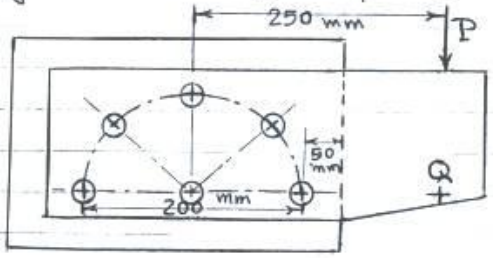


Fig. (4)

End of Questions

Good Luck

Dr. H. M. Hendawy

Tanta University Faculty of Engineering Second Year Students Mechanics Section	Final Exam Frist Term (2007-2008) Date of Exam : 12 /1/2008 January 2008 Engineering Mathematics	Dep. of Phys. Math. Eng. Time : 3 hours

Answer the following questions :

1- a) Express the following functions in the form $u+iv$ (6 marks)

i) $f(z)=\cos z\sin z$ ii) $f(z)=z^2+2z-3i$.

b) Prove that $\sin 5\theta=16\sin^5\theta-20\sin^3\theta+\sin\theta$. (8 marks)

c) Chick the analyticity of the following functions : (6-marks)

i) $f(z)=z\bar{z}$ ii) $f(z)=\log(z\bar{z})$

2- a) State Cauchy integral formula , then evaluate $\oint_C \frac{6e^z}{2z-1}\,dz$, $C:|z|=1$. **(5-marks)**

b) Find the points of discontinuity of the function $f(z)=\frac{z}{\cos z-1}$. **(5 marks)**

c) Prove that $\Gamma(-\frac{1}{2})=-2\sqrt{\pi}$. (10 marks)

3-a) Prove that $\beta(m,n)=\frac{\Gamma(m)\Gamma(n)}{\Gamma(m+n)}$ and $\Gamma(n+1)=n!$. (10 marks)

b) Using the residue theorem , evaluate $\int_0^{2\pi}\frac{\cos 3\theta}{5-4\cos\theta}\,d\theta$. (5 marks)

c) Evaluate $\int_0^1 x^5(\ln x)^4\,dx$. $\int_0^{2\pi}\sin^2\theta\cos^3\theta\,d\theta$. (5 marks)

4- a) Evaluate the real integral $\int_{1-2i}^{3+4i}(z^3+\cos z+5)\,dz$

along the straight line joining 1-2i to 3+4i. **(5 marks)**

b) Find a series solution of the initial differential equation: (10 marks)

$(1-2x)y''+y'=0, y(0)=3, y'(0)=1$.

c) prove that $\tan^{-1}z=\frac{i}{2}\ln(\frac{1-z}{1+z})$. (5 marks)

5-a)find the zeros of $\ln z-2z=0$ which lies inside the disc $|z|=4$. (5 marks)

b) Evaluate $\oint_C \frac{e^{2z}}{(z+\frac{5}{2})(z-1)^2}\,dz$, $C:|z|=3$, and $\oint_{|z-2|=2}\frac{z\cosh\pi z}{z^4+13z^2+36}\,dz$. **(10 marks)**

c)Is the function $u(x,y)=x^3+6x^2y-3xy^2-2y^3$ harmonic ? if so , find its conjugate.

(5 marks)