جامعة حلوان
كلية الهندسة

امتحان الفصل الدراسي الأول
العام الجامعي ٢٠٠٦ / ٢٠٠٧

الفرقة : الثانية ميكانيكا (قوى)
لائحة جديدة
المادة : اقتصاد هندسي
الزمن : ساعتان

أجب عن الأسئلة الآتية

السؤال الأول

١- اشرح الغرض من دراسة الاقتصاد الهندسي ؟ ثم اذكر الخطوات الرئيسية للدراسة الاقتصادية.
ب- اذكر ما تعرفه عن عناصر اقامة منشأة صناعية ؟ ثم ارسم دائرة الانتاج ؟
جـ- اذكر ما تعرفه عن المبادئ الأساسية التي يعتمد عليها الاقتصاد الهندسي ؟
د- اقترضت منشأة ما مبلغ 60000 جنيه لمدة ٥ أعوام بمعدل 10 % سنوياً بين المنشأة وبين البنك تم الاتفاق على أن يكون القرض على أقساط ربع سنوية متساوية مع دفع فائدة الرصيد ربع سنوية أيضاً مع قسط الأصل بصورة ظهر السداد ؟ ثم وضح الاجابة من صورة جدول ؟

السؤال الثاني

أ- اذكر ما تعرفه عن :- (أ) سياسة الاحتكار (ب) قانون العوائد المتناقصة
(ج) المنفعة الكلية و الحدية موضحاً الاجابة بأمثلة مع الرسم ؟
ب- اذكر ما تعرفه عن الطلب و العرض و المرونة ؟ ثم اذكر ما تعرفه عن مرونة الطلب ومرونة العرض؟
جـ- اذكر ما تعرفه عن : (أ) الكم و الكيف (ب) القياس والتبسيط (ج) الكمال والتفوق
د- اشترى محمد شقه واتفق مع البائع على دفع ثمنها على أقساط سنوية بفائدة 7 % سنوياً ، ولمدة 8 سنوات بحيث يدفع 15000 جنيه سنوياً خلال الخمس سنوات الأولى ثم 10000 جنيه خلال الثلاث سنوات التالية . فما هي الدفعة الاجمالية لشقته ؟

السؤال الثالث

أ- اذكر ما تعرفه عن الجذر و الخطأ موضحاً الاجابة بالرسم ؟
ب- اذكر عناصر تكوين المشروع الاقتصادي ؟
جـ- اذكر ما تعرفه عن التقارير الهندسية وما هي مكوناتها ؟
د- عين - باستخدام جداول الربح والاستكمال كلما أمكن ذلك - معدلات الربح التقريبية التي تعبر عنها القيم المقدرة التالية للتوالية المتوقعة للدفوعات المستقبلية :-
١- 5000 جنيه من الوقت الحالي تكون تعطي 600 جنيه سنوياً من نهاية كل سنة من الـ 20 القادمة
ب- 3000 جنيه من الوقت الحالي تكون تعطي 500 جنيه سنوياً من نهاية كل سنة من الـ 8 سنوات القادمة بالاضافة الى 15000 جنيه من نهاية السنة الـ 15

بسم الله الرحمن الرحيم

Tanta University
Engineering Faculty
Second year Production

لفرقة ثالثة إنتاج

Stress Analysis

Date : 22/1/2007
Time : 3 hours

Answer all the following questions :

(1) - The shaft shown in Fig.(1) transmits 20 KW. between th input point A and the output point D at a speed of 150 r.p.r Calculate the shaf diameter if the yield stress of its material is 300 MPa, the factor of safety is 3.

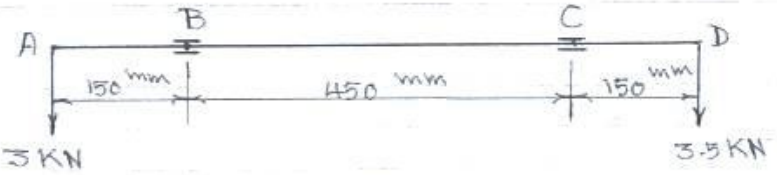


Fig.(1)

(2)- A compound steel cylinder having outer diameter of 400 mm, intermediate diameter of 200 mm, and inner diameter 100 mm, is subjected to pressure of 3000 atm. If an initial diametrical interference of 0.35 mm is applied, determine the stresses acting on both cylinders. What will be the maximum stress supported by this cylinder knowing that the yield stress is 600 MPa. ($E = 210$ GPa & $n = 0.3$).

(3)- A cantilever 3 m long and of symmetrical cross section 50 cm deep, carries a uniformly distributed load of 3 ton/m run through its length, if $I = 51000\ cm^4$ and $E = 2000\ Tn/cm^2$ Calculate the deflection at the free end. Also; what is the maximum point load which the cantilever can carry at a distance 2.1 m from the fixed end in addition to the distributed load if :

a)- The bending stress must nowhere exceed 1.4 ton/cm^2,

b) - The deflection at the free end must not exceed 6 mm.

تتمنى لكم النجاح

(4)- An electric motor delivering 3 KW at 1500 r.p.m through a pulley connected to the motor shaft as shown in Fig. (2). If the diameter of the shaft is 28 mm, determine the position of the critical section and give the value and direction of principal stresses.

(5)- A PVC cylinder having 40 mm inner diameter and 100 mm outer diameter is inserted inside a rigid steel block. If the PVC cylinder's outer diameter is restricted from displacement while its inner diameter is subjected to a pressure of 200 atm, obtain the stress and strain components at its outer and inner diameters assuming that cylinder is also restricted in the axial direction. Sketch the distribution of these stress and discuss the points of initial yielding failure. What will be the maximum allowable pressure if the design, yield stress for PVC is 35 MPa. ($E = 3.5$ GPa, $n = 0.42$)

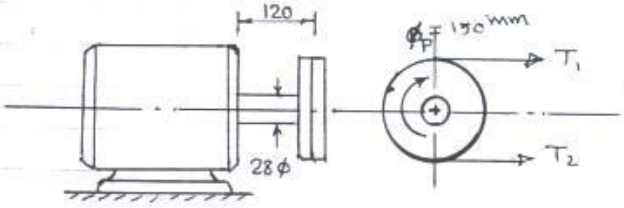


Fig. (2)

End of Questions
Good Luck

Dr. H.M. Hendawy

جامعة حلوان كلية الهندسة	امتحان الفصل الدراسي الأول للعام الجامعي ٢٠٠٦/٢٠٠٧	المادة : ديناميكا حرارية (لائحة جديدة) المرحلة : الثالثة ميكانيكا (شرف) الزمن : ثلاث ساعات

Answer the following questions :-

(For air $c_p = 1.005$ kJ/kg.k and $R = 0.287$ kJ/kg.k)

The first Question

(a)- Draw [1]- Schematic diagram [2]- TS process diagram for a gas-turbine power cycle with interooling, reheating and regeneration

(b)- The initial conditions for an air-standard Otto cycle operating with a compression ratio of 8:1 are 0.95 bar and 17°C. At the beginning of the compression stroke, the cylinder volume is 2.20 L, and 3.60 kJ of heat is added during the constant-volume heating process. Calculate the pressure and temperature at the end of each process of the cycle, and determine the thermal efficiency and mean effective pressure of the cycle.

The second Question

(a)- Draw the Pv and Ts diagrams of the Stirling and Brayton cycles.

(b)- The intake conditions for an air-standard dual cycle operating with a compression ratio of 15:1 are 0.95 bar and 17°C. the pressure ratio during constant-volume heating is 1.5:1 and the volume ratio during the constant-pressure part of the heating process is 1.8:1. Calculate [1]- The temperatures and pressures around the cycle. [2]- the heat input and the heat rejection. [3]- The thermal efficiency.

The third Question

(a)- Draw and explain the modification of the Rankine cycle.

(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 reheated 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 fourth Question

(a) - Draw the equipment Schematic and Ts diagram for an ideal regenerative vapor cycle with one open feedwater heater?

(b) An ideal regenerative steam power cycle operates so that steam enters the turbine at 30 bars and 500 °C and exhausts at 0.1 bar. A single closed feedwater heater is employed which operates at 5 bars. Compute the thermal efficiency of the cycle.

The fifth Question

(a) - Draw a schematic of the equipment and Ts and Ph diagrams for a vapor-compression-refrigeration cycle?

(b) - An ideal vapor-compression-refrigeration cycle with refrigerant -12 as the working fluid operates with an evaporator of -20 °C and a condenser pressure of 9.0 bars. The mass flow rate of the refrigerant is 3 kg/min through the cycle. Compute the coefficient of performance, the tons of refrigeration, and the coefficient of performance of a Carnot reversed heat engine operating under the same maximum and minimum temperatures as the actual cycle.

The Sixth Question

(a) Draw the Bomb calorimeter ?

(b) A gaseous fuel has the following analysis by volume: 5 % CO, 55 % H_2, 25 % CH_4, 2 % O_2, 3 % CO_2, 10 % N_2. During combustion 50 % excess air is supplied. Determine the volume of air supplied per m^3 of fuel gas, and the volumetric analysis of the exhaust gases.

جامعة طنطا ـ كلية الهندسة الفرقة / الثانية (حديث) المادة / آلات كهربية	امتحان الفصل الدراسي الثانى التاريخ : ٢٠٠٧/٦/١٤	بسم الله الرحمن الرحيم قسم هندسة القوى الميكانيكية الزمن / ٣ ساعات

ANSWER THE FOLOWING QUESTIONS:

1-a) Prove the condition under which a DC shunt generator may operates at its maximum efficiency.

b) A 400 V shunt generator has a full-load current of 200 A, its armature resistance is 0.06 Ω and field resistance is 100 Ω, the stray losses are 2000 W. Find the h.p. of prime mover when it is delivering full load, and find the load for which the efficiency of the generator is maximum.

2-a) Discuss how the speed of a DC series motor can be controlled.

b) A DC series motor, connected to 400 V supply, runs at 800 r.p.m when taking a current of 60 A. Calculate the value of a resistor which when inserted in series with the motor, will reduce the speed to 500 r.p.m, the torque being then 1/2 its previous value. Resistance of the motor (field and armature) = 0.2 Ω. Assume the flux to be proportional to the field current.

3-a) Explain the no-load and short circuit tests of a single-phase transformer.

b) A 50 KVA, 5000/500 V, 50 Hz, 1- phase transformer has the high- voltage winding with a resistance of 8 Ω and low –voltage winding with a resistance of 0.06 Ω. The no-load losses of the transformer is 1000 W. Calculate the efficiency of the transformer when delivering its full-rated output at a power factor of 0.8. With the same power factor, what will be the efficiency if the output drops down to 40 % of the rated value.

4-a) Draw the torque-slip characteristic for an induction motor for different values of rotor resistance. Show on the curves, starting torque, maximum torque, and slip at which torque is maximum.

b) The power input to the motor of a 400 V, 50 Hz, 3- phase, 6-pole induction motor is 62 KW, if the rotor frequency is 1.5 Hz, and the stator losses are 2 KW, calculate: (i) The slip. (ii) Rotor speed. (iii) Rotor copper loss.
(iv) Mechanical power developed.
(v) The rotor resistance per phase if the rotor current is 50 A.

5-a) Draw the phasor diagram for a loaded alternator for : Unity p.f, lagging p.f and leading p.f.

b) A 3-phase, star connected alternator is rated at 2000 KVA, 13.5 KV, The armature effective resistance and synchronous reactance are 1.3 Ω and 20 Ω respectively per phase. Calculate the percentage regulation at full-load for power factor of : (i) 0.8 lagging. (ii) 0.8 leading. (iii) Unity.

GOOD LUCK

جامعة طنطا
كلية الهندسة
قسم هندسةالانتاج والتصميم الميكانيكى

المادة/ هندسة الانتاج
الفرقة الثانية(قوى)

بسم الله الرحمن الرحيم
التاريخ :٦/٧/ ٢٠٠٧
الزمن : ٣ ساعات

أجب عن الاسئلة الاتية:-

السؤال الأول:-

١- لماذا يعتبر غاز الاستيلين من أهم أنواع الوقود المستخدم؟ مع ذكر أهم عيوب الرطوبة فى الغاز .

٢- قارن بين اسطوانتى الاكسجين والاستيلين .

٣- اشرح نظرية عمل كل من:- بورى اللحام - بورى القطع مع التوضيح بالرسم .

٤- أذكر مع الرسم أشكال الوصلات الملحومة ورموزها .

السؤال الثانى:-

١- - مما يتكون سيخ اللحام مع ذكر نبذة عن مساعدات الصهر .

٢- تكلم بالتفصيل عن مميزات وعيوب القطع الحرارى .

٣- تكلم عن أهم العدد والادوات المستخدمة فى اللحام تحت سطح الماء .

٤- اكتب نبذة مختصرة عن :- طريقة لندا للحام- التكسية بالرش .

السؤال الثالث:-

١- اشرح مع الرسم أهم عيوب المسبوكات .

٢- تكلم عن التشكيل بالبثق موضحا اجابتك بالرسم .

٣- اذكر أهم أنواع الافران المستخدمة فى صهر المعادن بالمسابك مع شرح تفصيلى لأحد الأنواع الرسم .

٤-اذكر أهم مميزات وعيوب السباكة فى القوالب المعدنية (الدائمة والاسطمبات) .

السؤال الرابع:-

١- تكلم عن أهم العوامل المؤثرة على مقاومة المعدن للتشكيل .

* صبه من الحديد الكربونى على شكل متوازى المستطيلات ذات قاعدة مربعة طول ضلعها ٣٠مم وارتفاعها ١٠٠م شكلت بالطرق الحر ليصبح ارتفاعها ٦٠مم . احسب:-
١- القوة اللازمة لعملية الطرق الحر .
٢- دورة التسخين المناسبة .
علما بأن : معامل الترتيب داخل الفرن (k) = 0.4 ، معامل الاحتكاك (μ) = 0.4 ومقاومة المعدن للتشكيل عند درجة حرارة ١١٠٠ م = ٧٠ نيوتن/ مم٢ .

مع أطيب التمنيات بالنجاح
د/عبد الفتاح مصطفى خورشد

جامعة قنا
كلية الهندسة

امتحان الفصل الدراسي الأول
للعام الجامعي ٢٠٠٦/٢٠٠٧

المادة: ديناميكا حرارية (لائحة جديدة)
المرحلة: الثالثة ميكانيكا (قوى)
الزمن: ثلاث ساعات

Answer the following questions :-

(For air $c_p = 1.005$ kJ/kg·k and $R = 0.287$ kJ/kg.k)

The first Question

(a)- Draw [1]- Schematic diagram [2]- TS process diagram for a gas-turbine power cycle with interooling, reheating and regeneration

(b)- The initial conditions for an air-standard Otto cycle operating with a compression ratio of 8:1 are 0.95 bar and 17°C. At the beginning of the compression stroke, the cylinder volume is 2.20 L, and 3.60 kJ of heat is added during the constant-volume heating process. Calculate the pressure and temperature at the end of each process of the cycle, and determine the thermal efficiency and mean effective pressure of the cycle.

The Second Question

(a)- Draw the Pv and Ts diagrams of the Stirling and Brayton cycles.

(b)- The intake conditions for an air-standard dual cycle operating with a compression ratio of 15:1 are 0.95 bar and 17°C. the pressure ratio during constant-volume heating is 1.5:1 and the volume ratio during the constant-pressure part of the heating process is 1.8:1. Calculate [1]- The temperatures and pressures around the cycle. [2]- the heat input and the heat rejection.
[3]- The thermal efficiency.

The third Question

(a)- Draw and explain the modification of the Rankine cycle.

(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 reheated 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 fourth Question

(a) - Draw the equipment Schematic and Ts diagram for an ideal regenerative vapor cycle with one open feedwater heater?

(b) An ideal regenerative steam power cycle operates so that steam enters the turbine at 30 bars and 500 °C and exhausts at 0.1 bar. A single closed feedwater heater is employed which operates at 5 bars. Compute the thermal efficiency of the cycle.

The fifth Question

(a) - Draw a schematic of the equipment and Ts and ph diagrams for a vapor-compression-refrigeration cycle?

(b) - An ideal vapor-compression-refrigeration cycle with refrigerant -12 as the working fluid operates with an evaporator of -20 °C and a condenser pressure of 9.0 bars. The mass flow rate of the refrigerant is 3 kg/min through the cycle. Compute the coefficient of performance, the tons of refrigeration, and the coefficient of performance of a Carnot reversed heat engine operating under the same maximum and minimum temperatures as the actual cycle.

The Sixth Question

(a) Draw the Bomb Calorimeter ?

(b) A gaseous fuel has the following analysis by volume: 5 % CO, 55 % H_2, 25 % CH_4, 2 % O_2, 3 % CO_2, 10 % N_2. During combustion 50 % excess air is supplied. Determine the volume of air supplied per m^3 of fuel gas, and the volumetric analysis of the exhaust gases.

جامعة حلوان
كلية الهندسة

انشاء المقعل الرئيسي الدور
العام الجامعي ٢٠٠٦ / ٢٠٠٧

الفرقة : الثالثة ميكانيكا طرق (دورة تدريبية)
المادة : ديناميكا حرارية
الزمن : ثلاث ساعات

Answer the following questions :-
(For air $c_p = 1.005$ kJ/kg.k and $R = 0.287$ kJ/kg k)

The first Question

a- Deduce the thermal efficiency of Diesel cycle ?

b- An air. standard Diesel cycle has a compression ratio of 18, and the heat transferred to the working fluid per cycle is 1800 kJ At the beginning of the compression process the pressure is 0.1 MPa and the temperature is 15 °C. Determine :

1. the pressure and the temperature at each point in the cycle.
2. the thermal efficiency.
3. the mean effective pressure.

The second Question

a- Draw PV, TS and schematic diagrams of Ericsson cycle ?

b- In an air-standard Brayton cycle the air enters the compressor at 0.1 MPa, 15 °C. the pressure leaving the compressor is 1.0 MPa and the maximum temperature in the cycle is 1100 °C. Determine :

1- The pressure and temperature at each point in the cycle.
2. The compressor work, turbine work, and the cycle efficiency.

The third Question

a - Draw the heating pump in a heating mode and cooling mode?

b- Consider the simple air-standard refrigeration cycle. Air enters the compressor at 0.1 MPa, -20 °C, and leaves at 0.5 MPa Air enters the expander at 15 °C. Determine :

1- The Coefficient of performance of this cycle.
2- The rate at which air must enter the compressor in order to provide 1 kW of refrigeration.

The fourth Question

a- Draw and explain the modification of Rankine cycle.

b- A Rankine cycle has an exhaust pressure of 0.008 MPa and

a turbine-inlet pressure of 6.0 MPa. Determine:

1- The moisture content at the turbine cut let.

2- The thermal efficiency

3- The mass flow rate of steam, in kg/h, for a net power output of 10 MW for turbine-inlet temperatures of (a) 540 °C and (b) 440 °C.

The fifth Question

a- Draw an Equipment schematic and Ts diagram for an ideal regenerative vapor power cycle with one closed feedwater heater.

b- An ideal regenerative steam power cycle operates so that steam enters the turbine at 30 bars and 500°C and exhausts at 0.1 bar. A single, open feedwater heater is employed which operates at 5 bars. Compute the thermal efficiency of the cycle.

The sixth Question

a- Drow the gas calorimeter ?

b- A fuel gas having a volumetric analysis of 30% CH_4, 10% C_2H_4, 40% H_2, 10% CO, 2% CO_2, 7% N_2, 1% O_2, is burned with a volumetric air : fuel ratio of 6:1. Determine the analysis of the dry exhaust gases by mass and by volume.

جامعة طنطا - كلية الهندسة
قسم هندسة القوى الميكانيكية

العام الجامعي ٢٠٠٦/٢٠٠٧
الفصل الدراسي الأول
السنة الدراسية الثانية
الزمن ٣ ساعات

التخصص : هندسة القوى الميكانيكية (لائحة قديمة)
المادة : ميكانيكا موائع (١)

عدد الصفحات ٢ | عدد الأسئلة ٥ | أجب عن جميع الأسئلة

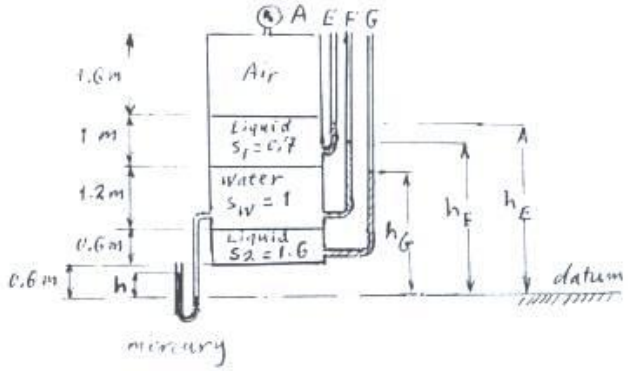
1-a) State and derive both laws of buoyancy and floating.
b) Derive the Euler equation for one dimensional incompressible ideal fluid, then from which derive the Bernoullis equation.
c) Using the control volume concept, derive the law of mass conservation (continuity equation) for 1-D steady flow.

2-a) Determine the resultant liquid pressure force (magnitude, direction and point of action) on a curved surface by both methods: direct integration method and basic mechanics method.
b) Explain with help of drawing:
- pressure measurement devices.
- Stability of submerged and floating bodies.
c) Draw the diagram showing the relation between absolute pressure, gauge pressure, vacuum and atmospheric pressure, with writing the relation between them.

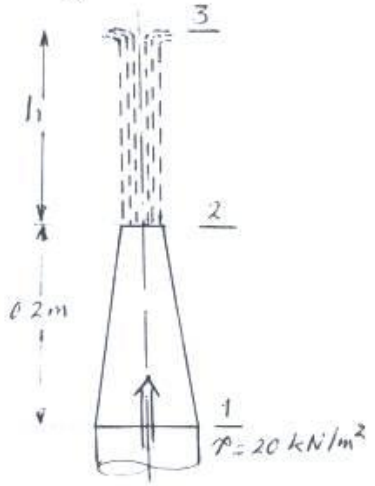
3-a) Using the control volume concept derive the angular impulse momentum principle in a form to calculate the delivered work to the flowing fluid on a compressor shaft.
b) Derive the relation for the vorticity ζ considering the square differential element in x-y plane, then derive the relation between vorticity ζ and rotation ω.
c) Show and explain that the pressure at a point in a fluid at rest is a scalar quantity.

PTO

4) The gauge reading at A in the next figure is $-2\ kN/m^2$
Determine:
a) the elevations from datum of the liquids in the open piezometer tubes E, F and G
b) The difference h between the mercury levels in the U tube manometer.
given: for mercury $S = 13.57$; $\gamma_w = 1000\ kg/m^3$; $g = 9.81\ m/s^2$



5) A jet water issues vertically upward from a 2 m height nozzle whose inlet and outlet diameter are 100 mm and 40 mm respectively If the pressure at the inlet is $20\ kN/m^2$ above the atmospheric pressure, determine the discharge and the height which the jet will rise as shown in figure, mention all considered assumptions



بسم الله الرحمن الرحيم

جامعة طنطا		المادة: تصميم ماكينات
كلية الهندسة	الفصل الدراسي الأول ٢٠٠٦/٢٠٠٧	التاريخ: ١٥/١/٢٠٠٧
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 fixed 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 and 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 0.56 calculate the percentage change in the member weight.

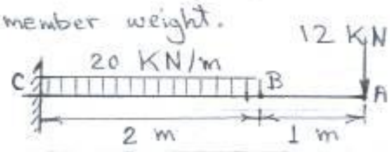


Fig. (1)

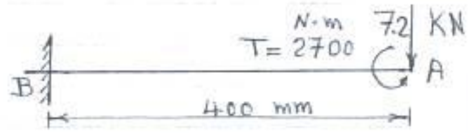
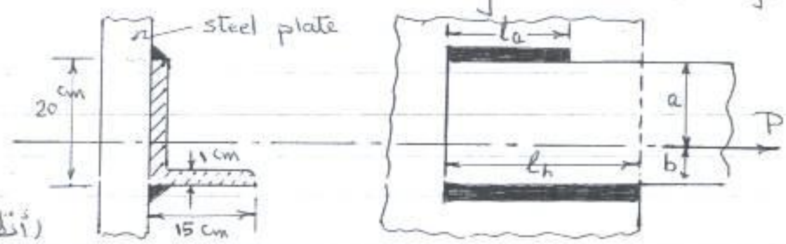


Fig. (2)

(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 خلفه)

(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.

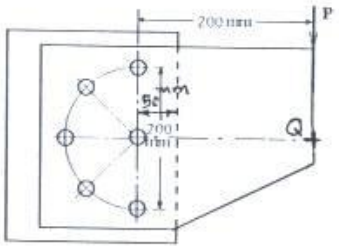


Fig. (4)

End of Questions

Good Luck

Dr. H. M. Hendawy

جامعة طنطا - كلية الهندسة
قسم هندسة القوى الميكانيكية

العام الجامعي ٢٠٠٦ / ٢٠٠٧
الفصل الدراسي الأول
السنة الدراسية الثانية
الزمن : ٣ ساعات

التخصص : هندسة القوى الميكانيكية (لائحة جديدة)
المادة : ميكانيكا موائع (٢)

عدد الصفحات : ٢ | عدد الأسئلة : ٥ | أجب على جميع الأسئلة

1.a) Using the control volume concept, derive the law of mass conservation (continuity equation) for two dimensional flow in the differential form $\left[\frac{\partial}{\partial x}(\rho u) + \frac{\partial}{\partial y}(\rho v) = 0\right]$.

b) Derive and explain with drawing the Bernoulli's equation for 1-D flow.

c) Derive the fundamental equation of fluid statics relates pressure, density and vertical position in a fluid.

2.a) Define with help of drawing : the stream function and velocity potential in both cartesian and polar coordinates, then express and analyze the continuity equation and equation of vorticity in terms of stream function and velocity potential.

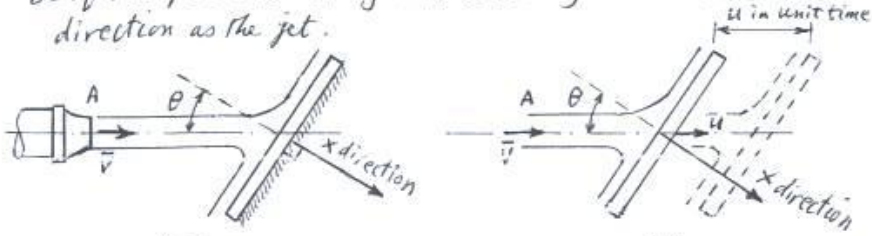
b) Derive the work energy equation using the control volume concept

c) Derive the linear impulse momentum equation.

3) A jet of water from a fixed nozzle has a diameter d of 25 mm and strikes a flat plate at an angle θ of 30° to the normal to the plate, The velocity of the jet $\bar{V}$ is 5 m/s, and assume smooth plate surface. Calculate the force exerted by the jet normal to the plate for the two cases :

a- if the plate is stationary.

b- If the plate is moving with a velocity $u = 2$ m/s in the same direction as the jet.



(a) (b)

PTO

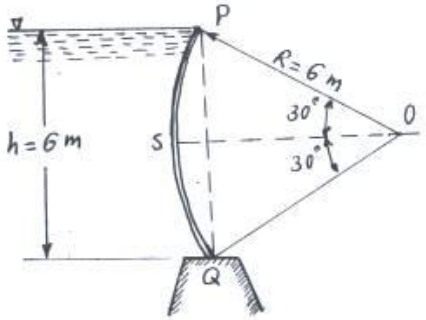
4-a) For a fluid element subjected to constant acceleration $\bar{a}$, where $\bar{a} = \bar{a}_x + \bar{a}_z$, derive:

- the pressure variation in x and z directions
- the relation for the differential pressure dp.
- the relation for the constant pressure curves.
- the modified law of fluid statics.

b) Draw and assign velocity and acceleration in 3-D flow using cartesian coordinates.

c) Define with help of drawing:
steady and unsteady flow; pathline, streamline and streakline; streamtube; 1D, 2D and 3D flows.

5) A gate is in the form of a circular arc of radius 6 m as shown in figure. Calculate the magnitude and direction of the resultant pressure force on the gate, and the location with respect to O of a point on its line of action. Consider the force acts on unit width 1 m.



أ.م.د/ [illegible]

جامعة طنطا ـ كلية الهندسة | الزمن : ساعتين

قسم هندسة القوى الميكانيكية

الاقتصاد الهندسي ـ ثانية ميكانيكا قوى | دور يناير 2005-2006

يسمح باستعمال جداول الفائدة

اجب على الأسئلة التالية

السؤال الأول

أ- عرف ماهو الاقتصاد الهندسي ؟ ومالفرق بينه وبين الاقتصاد العادي؟

ب- ماهى التكاليف الثابتة والمتغيرة لمشروع ما وفيما تستخدم نقطة التعادل؟ مع توضيح ذلك بالرسم؟

ج- ماهو الغرض من دراسة الاقتصاد الهندسي مع الشرح؟

السؤال الثاني

ثلاث مواقع لبناء منشأة صناعية A, B, C . الجدول التالي يوضح التكاليف الثابتة والمتغيرة لكل موقع والمطلوب تحديد الموقع المناسب اذا كان حجم الإنتاج 10000 وحدة وحساب حجم الإنتاج المناسب لكل موقع اذا كان الربح السنوي المطلوب هو 50000 جنيه وكان سعر بيع الوحدة 5 جنيهات

الموقع	التكاليف الثابتة / السنة	التكاليف المتغيرة لكل وحدة
A	200000	3
B	800000	5
C	700000	6

السؤال الثالث

إذا أعطيت البيانات التالية لعناصر التكاليف لمعدة ما فاحسب التكاليف الكلية المتجمعة لكل ساعة تشغيل وكذلك احسب العمر الامثل للاحلال لهذه المعدة .

البيانات هى :-

-ثمن الشراء $I = 100000 \quad (L.E.)$

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

-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% سنوياً بتقادم هذه المعدة

-نسبة الفائدة المركبة المطبقة $r = 11\%$

-ضريبة الملكية $r = 3\%$

-التأمين $r = 1\%$

وذلك تبعا للمتوسط السنوى المتبع

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

جامعة طنطا - كلية الهندسة
قسم هندسة القوى الميكانيكية

التوصيف: هندسة القوى الميكانيكية

العام الجامعي ٢٠٠٥/٢٠٠٦
الفصل الدراسي الأول
الفرقة الدراسية: الثانية
الزمن: ثلاث ساعات

المادة: ميكانيكا موائع (٢)

م. د. على فرحات

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

1-a) Use the control volume concept to derive the law of mass conservation (continuity equation) for 2-D steady flow in the differential form.

b) Derive the Euler equation for 2-D steady flow in vertical plane.

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

2-a) Derive the fundamental equation of fluid statics relates pressure, density and vertical position in a Fluid.

b) State and derive both laws of buoyancy and floating.

c) Using the control volume concept, derive the angular impulse momentum principle in a form to calculate the delivered work to the flowing air on a compressor shaft.

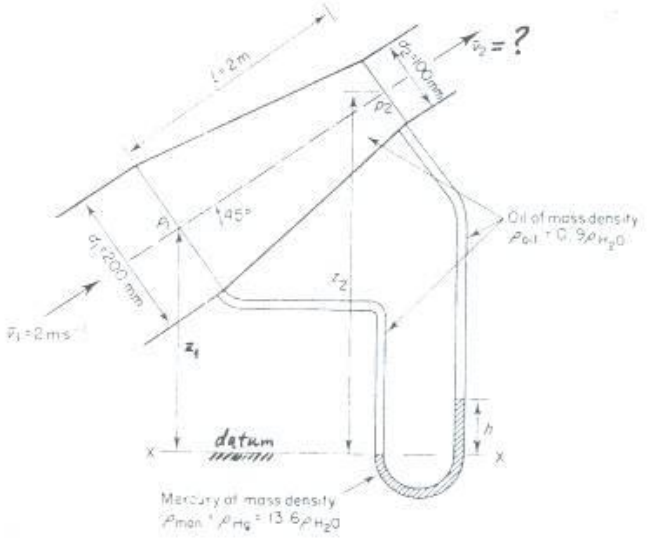
3-a) Draw and assign the velocity and acceleration in three dimensional flow using cartesian coordinates.

b) The stream function for the two-dimensional flow of a liquid is given by $\psi = 2xy$ in the range of values of $x, y = 0$ and 5, plot the streamlines passing through points (1,1); (1,2) and (2,2). And check if the flow is potential, then obtain the expression for velocity potential, and draw also the equipotential lines [ϕ = const] passing throug the points (1,1); (1,2) and (2,1). Also determine the velocity in

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

- fluid density, specific gravity.
- absolute pressure, gauge pressure and vacuum.
- steady and unsteady flow, path line, streamline and streake line, Streamtube.
- 1-D, 2-D and 3-D flow.

4-b) A pipe inclined at 45° to the horizontal, as shown in Figure below, converges over a length l of 2 m from a diameter $d_1 = 200$ mm to a diameter $d_2 = 100$ mm at the upper end. Oil of specific gravity 0.9 flows through the pipe at a mean velocity $\bar{v}_1$ at the lower end of 2 m/s. Find the pressure difference across the 2 m length supposing ideal fluid flow, and the difference in level that would be shown on a mercury manometer connected across this length. The specific gravity of mercury is 13.6, and $\rho_{H_2O} = 1000\ kg/m^3$.



جامعة طنطا - كلية الهندسة
قسم هندسة القوى الميكانيكية

التخصص: هندسة الانتاج والتصميم الميكانيكي

المادة: ميكانيكا وآلات موائع

العام الجامعي ٢٠٠٥ / ٢٠٠٦
الفصل الدراسي الأول
السنة الدراسية: الثانية
الزمن: ثلاث ساعات

أ.د. علي إبراهيم

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

1-a) Use the control volume concept to derive the law of mass conservation (continuity equation) for 1-D steady flow.

b) Derive and explain with drawing the Bernoulli's equation for one dimensional incompressible ideal fluid.

c) 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.

2-a) Derive the fundamental equation of fluid statics relates pressure, density and vertical position in a fluid.

b) Determine the resultant liquid pressure force (magnitude, direction and point of action) acting on an inclined plane surface submerged in liquid.

c) State and derive both laws of buoyancy and floating

3-a) Draw and assign the velocity and acceleration in three dimensional flow using cartesian coordinates.

b) Draw the scheme and explain the principle of operation of centrifugal pump.

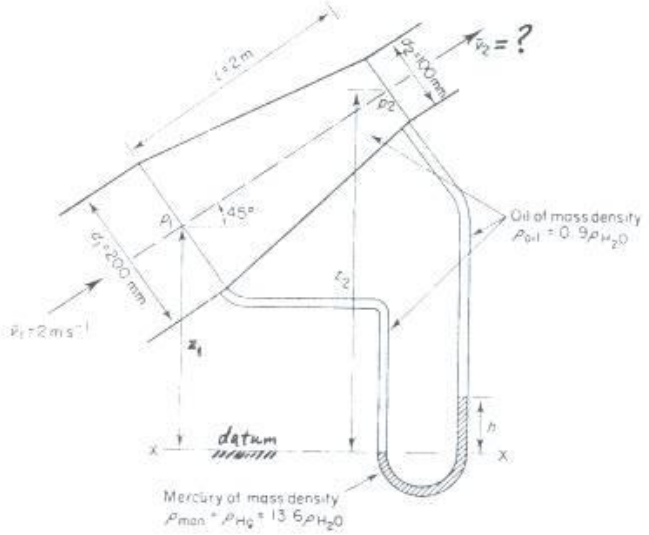
c) Draw the scheme and explain the principle of operation of one stage axial flow compressor.

d) Draw and explain the principle of operation of one stage axial flow turbine considering impulse type.

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

- fluid density, specific gravity.
- absolute pressure, gauge pressure and vacuum.
- steady and unsteady flow, path line, streamline and streake line, Streamtube.
- 1-D, 2-D and 3-D flow.

4-b) A pipe inclined at 45° to the horizontal, as shown in Figure below, converges over a length l of 2 m from a diameter $d_1 = 200$ mm to a diameter $d_2 = 100$ mm at the upper end. Oil of specific gravity 0.9 flows through the pipe at a mean velocity $\bar{v}_1$ at the lower end of 2 m/s. Find the pressure difference across the 2 m length supposing ideal fluid flow, and the difference in level that would be shown on a mercury manometer connected across this length. The specific gravity of mercury is 13.6, and $\rho_{H_2O} = 1000\ kg/m^3$



Tanta University
Faculty of Engineering
Production Engineering and Mech Design Dept

Course: Engineering Economy
Second Year Students (Elec. Dept's)
Final Examination

Answer All The Following Questions !

Time : 2 Hours

Question ONE:- (12)

A company is considering the advantages of automating a part of their production line. The company's financial statement is shown below:-

Total Sales	$\$ 40 \times 10^6$
Direct labor	$\$ 12 \times 10^6$
Indirect labor	$\$ 2 \times 10^6$
Direct material	$\$ 8 \times 10^6$
Depreciation	$\$ 1 \times 10^6$
Taxes	$\$ 0.5 \times 10^6$
Insurance	$\$ 0.4 \times 10^6$
Sales cost	$\$ 1.5 \times 10^6$

The above report is based on the production and sales of 100000 units. The production manager believes that with and additional investments of $\$ 5 \times 10^6$, he can reduce variable cost by 30%. The same production volume would be maintained. Using of five-years, straight line depreciation (that is $\$ 1 \times 10^6$ per year), construct a break-even chart.

If the company inserts an a 20% return on its investments, should they automate ?

Question TWO:- (8)

a- It is required to establish the production range for the following data:-

Set up costs ——— $S = \$ 12500$
Carrying charges factor ——— $k = \$ 0.5 \times 10^{-3}$ / unit / day
Constant cost per piece ——— $c = \$ 5$
Allowable increase in costs per piece $= 3.75\%$

b- When the minimum-cost batch size is produced, it is known that the variable costs constitute 20% of the total production costs. If "Q_m" is increased by 25%, what increase in production costs can expected ?.

(V2)

Question THREE:- (12)

Consider the cash flows given below and assume that : $i = 10\%$.

	End of Year				
	0	1	2	3	4
Cash Flow					
A	$-100	$40	$40	$40	$40
B	$-100	20	20	60	60

- Calculate: (i) the present-worth amounts,
  (ii) the annual equivalents, and
  (iii) future-worth amounts for these two cash flows.
- Next calculate PW_A / PW_B, AE_A / AE_B and FW_A / FW_B, then compare these ratios.
- What important implication can be drawn from this comparisons?.

Note that: $(P/A\ 10,4)$ (3.1699) , $(P/F\ 10,1)$ (0.9091) , $(F/P\ 10,4)$ (1.464)

Question FOUR:- (8)

- A product is sold at a rate of 500 pieces a day and is manufactured at a rate of 2500 pieces a day. The setup costs of the machines are L.E. 1000 and the storage costs found to be 1.5×10^{-3} L.E. per piece.

If the interest charge are 8 per cent, find the minimum-cost batch size and the costs of the production run?

Best Wishes