Tanta University

Faculty of Engineering

Production and Mech. Design Dep.

Metrology

Date: 16/06/ 2012

Time allowed: 3 Hours

Attempts all questions:

1-a Explain the following terms:

- Static error
- Static correction
- Relative error

b- Differentiate between unilateral and bilateral.

2- a- What is gauge blocks: classes and uses.
    b- State the concept of interchangeability, and what its importance?

3- State the advantages and disadvantages of mechanical instruments, electrical instruments, and electronic instruments.

4- Use only neat sketch showing the major components of the simple Burdon Tube Pressure Gauge.

5- A pressure gauge is calibrated 5 bars to 60 bars. The accuracy is specified within +/- 0.2 percent of instrument span, what is the maximum static error?

Tanta University

Faculty of Engineering

Production and Mechanical Design Department.

Refractories and Heat treatment

Date: 18/06/ 2012

Time allowed: 3 Hours

Attempts all questions:

1- Use only neat sketches differentiating between the following:
  - Heat treatment processes
  - Steps in heat treatment processes

2- State the commonly used equipments for heat treating operations, and what are the types of heat treating furnaces?

3- What is the importance of using protective atmospheres in heat treating processes, and what are the commonly used atmospheres in heat treating?

4- State the advantages and disadvantages claimed by electric heating furnaces, and what are the major components of an electrical heating system?

5- Draw sketch for the main components of gas heat treating furnaces, and what are the properties of refractories used in heat treating operations.

6- Combustion furnaces are usually classified to type and mode, explain with a representative examples.
  What are the types of furnaces and refractories used in the following manufacturing products?
  - Steel forgings
  - Steel bars for concrete reinforcement
 - Steel castings

The fourth question (17 marks)	
A	Discuss briefly the various methods of speed control of a three-phase induction motor.
B	The full load power input to 4 pole, 50 Hz three-phase induction motor is 50 kW, running at 1440 r.p.m. calculate its full load efficiency if stator losses are 1000 W and frictional losses are 650 W.

The fifth question (17 marks)	
A	Discuss the methods used for starting single-phase induction motors.
B	A three-phase, 2300 V, 60 Hz, 12-pole, star-connected synchronous motor has a synchronous reactance of Xs = 4.5 ohm per phase. The resistance of the stator winding is negligible. The motor is connected to an infinite bus and draws 250 A at 0.8 power factor lagging. Neglect rotational losses. a) Determine the output power. b) Determine the power to which the motor can be loaded slowly without losing synchronism. Determine the torque, stator current, and supply power factor for this condition.

Good Luck and best wishes
Dr. Abd El-Wahab Hassan
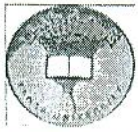
Final EXAM 2011/2012 - Second Term

Course	Electrical Machines (EPM2244)	Time Allowed	3 hours
Students	2nd Year (Production Engineering and Mechanical Design)	Total Mark	85
Date	2 / 6 / 2012	Number of pages	2

Answer ALL the following questions:

The first question (17 marks)

A	Draw the power flow diagram for d.c motor.
B	A wave wound, 6 pole long shunt compound d.c generator has 600 armature conductors. The generator is driven at 300 r.p.m. calculate the e.m.f. generated if the flux per pole is 0.06Wb. If now, the generator is required to produce e.m.f of 550 V at reduced value of flux per pole of 0.055 Wb, calculate the speed at which the armature of the generator must be driven.

The second question (17 marks)

A	Explain the various methods of speed control of d.c series motor.
B	A 220 V d.c. shunt motor has an armature resistance of 0.5 ohm and is excited to produce constant flux. At full load the motor runs at 1000 r.p.m. taking an armature current of 40 A. if a resistance of 0.8 ohm is inserted in series with the armature, determine the speed at full load.

The third question (17 marks)

A	Explain the short circuit test and open circuit test on transformer. Why these tests are to be performed?

B	A 10KVA, 125/250 V, 50 Hz, single-phase transformer gave the following readings,
	 Open circuit test : 250 V, 0.6 A, 50 W (L.V. side open)
	 Short circuit test : 15 V, 40 A, 100 W (L.V. side shorted)
	 Determine
	     a- The efficiency on full load, 0.8 lagging power factor.
	     b- The voltage regulation on full load, 0.8 leading power factor.
	     c- The efficiency on 50% full load, 0.6 leading power factor.
	     d- Draw the equivalent circuit referred to primary and insert all the values in it.

b) A long aluminum cylinder 5 .0 cm in diameter and intially at 200 ºC is suddenly exposed to a convection environment at 70 ºC and h= 525 W/m². ºC. Determine the temperature at a reduis of 1.25 cm and the heat lost by unit length 1 min after the cylinder is exposedto the invironment.

(9 Marks)

Problem number (5)   **(15 Marks)**

a) Define irradiation, gray body and radiosity.   (6 Marks)

b) Two rectangles 50 by 50 cm are placed perpendicularly with a common edge. One surface has a temperature of 1000 K, and $\varepsilon = 0.9$, while the other surface is insulated and in radiant balance with a large surrounding room at 300 K. Determine the temperature of the insulated surface and the heat lost by the surface at 1000 K.

(9 Marks)

With my best wishes

Page: 2/2

Remarks: (answer the following questions; assume any missing data, steam and heat tables and charts are allowed)

Problem number (1) (15 Marks)

a) What are the thermal contact resistance, critical radius of insulation, and fin effectiveness?

(6 Marks)

b) A furnace wall is made of three layers, one of fire brick, one of insulating brick and one of red brick the inner and outer surfaces are at 870 °C and 40 °C respectively, the respective coefficients of thermal conductivities of the layers are 1, 0.12 and 0.75 W/m.K and the thicknesses are 22 cm, 7.5 and 11 cm. Assuming close bonding of the layer at their interfaces, find the rate of the heat loss per square meter per hour and the interface temperatures. (9 Marks)

Problem number (2) (15 Marks)

a) What are the types of heat exchangers? (6 Marks)

b) A very long copper rod 2.5 cm diameter (k = 372 W/m.°C) has one end maintained at 93 °C. The rod is exposed to a fluid whose temperature is 38 °C. The heat transfer coefficient is 3.5 $W/m^2.°C$. How much the heat lost by the rod? (9 Marks)

Problem number (3) (15 Marks)

a) What are the heat exchanger effectiveness, Reynolds number and the fouling factor? (6 Marks)

b) A plate having a thickness of 4 mm has internal heat generation of 200 Mw/m^3 and a thermal conductivity of 25 W/m.°C. One side of the plate is insulated and the other side is maintained at 100 °C. Calculate the maximum temperature in the plate. (9 Marks)

Problem number (4) (15 Marks)

a) What is meant by a lumped capacity? What are the physical assumptions necessary for a lumped-capacity unsteady-state analysis to apply? (6 Marks)
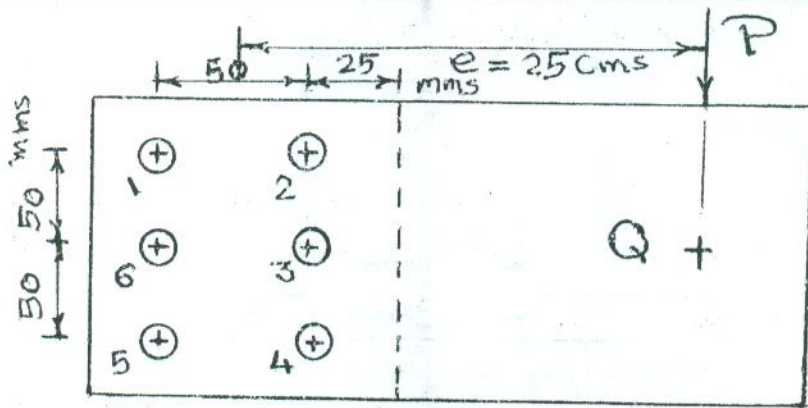
Fig. (2)

Determine the size of the rivets to be used for the joint where the permissble stresses are as follows :

$\tau_{all.} = 1400 \ Kgs/cm^2$ & $\sigma_{all.} = 3400 \ Kgs/cm^2$.

(4)– A pulley bracket as shown in Fig. (3) is supported by 4 bolts, two at A–A and two at B–B. Find the size of bolts using an allowable shear stress of 250 Kgs/cm^2 for the material of bolts.
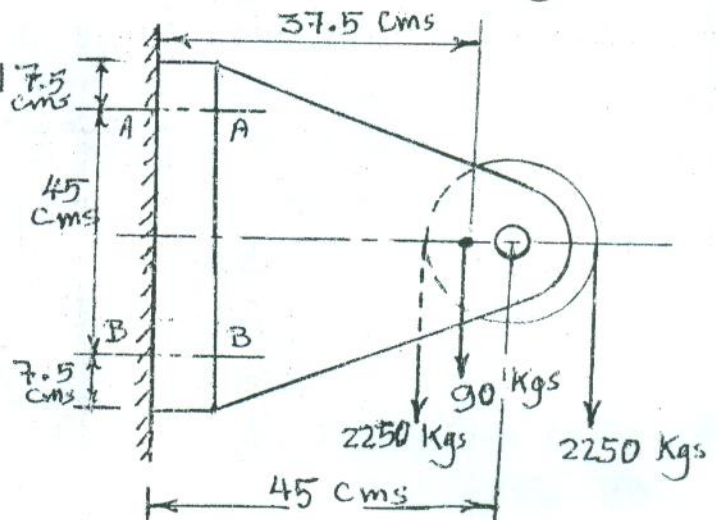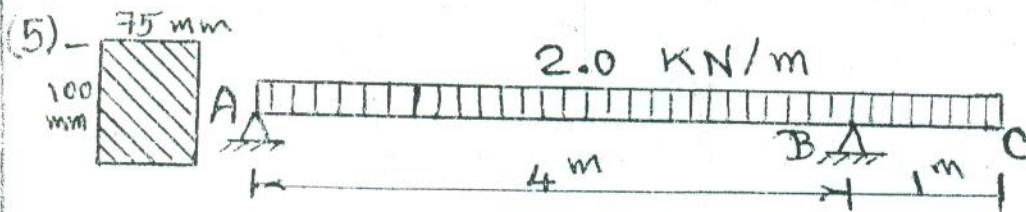

Fig. (3)

(5)–

2.0 KN/m

Fig. (4)

A contenious beam ABC 75 mms width and 100 mms depth as shown in Fig. (4). It carries a uniformly distributed load of 2.0 KN/m. Find the deflection at the free end C. (E = 200 GPa).

انتهت الاسئلة -- مع اطيب التمنيات بالنجاح ... د.عادل السعودي

2/2

بسم الله الرحمن الرحيم

المادة: تصميم ماكينات   جامعة طنطا
التاريخ: يوليو ٢٠١٢   كلية الهندسة   الفصل الدراسي الثاني ٢٠١٢/٢٠١٢
الزمن: ٣ ساعات   الفرقة الثانية   ميكانيكا إنتاج

Answer all the following questions:

(1) - a - State the advantages and disadvantages of belts use.

b - A flat belt has an elastower envelope is 200 mm wide, and transmits 60 KW at a belt speed of 5 m/s. The belt is used crossed configuration to connect a 300 mm driving pulley to a 900 mm diameter driven pulley at a shaft spacing of 6 m.

1 - Calculate the belt length and the angles of wrap.

2 - Compute the belt tension based on a coefficient of friction of 0.38.

3 - Calculate the minimum belt thick, if the allowable stress on the belt is 16 Kgs/cm^2.

(2) - a - What are the types of welding?

b - A bracket as shown in figure carries a load of 10 KN. Find the size of the weld if the allowable shear stress is not exceed 80 N/mm².

Fig. (1)

60 mm
b = 100 mm
G +
150 mm
t
10 KN
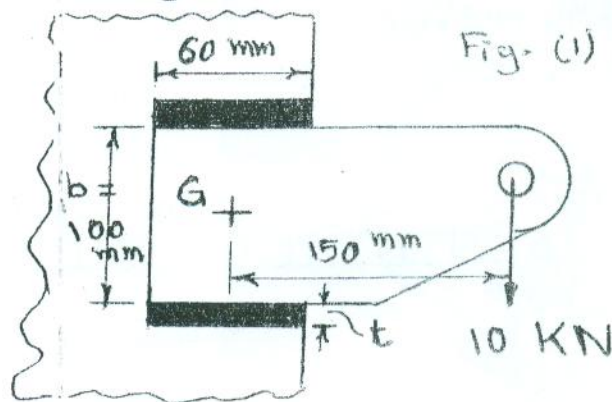
(3) - An eccentrically load lap riveted joint is to be designed for a steel bracket as shown in Fig. (2). The bracket is 10 mms thick. All rivets are to be the same size. The loads on the bracket are P = 1250 Kgs and Q = -1000 Kgs. The rivets spacing is c = 50 mms, load arm e = 25 cms

جامعة طنطا
بسم الله الرحمن الرحيم
كلية الهندسة
المادة / وصل المواد (MPD2211)
التاريخ : ٩ /٦/ ٢٠١٢
قسم هندسة الإنتاج والتصميم الميكانيكي
الفرقة الثانية(إنتاج)
الزمن : ٣ ساعات

أجب عن الأسئلة الآتية:- (٧٥ درجة)

السؤال الأول :-

١- مما يتكون سيخ اللحام (الالكترود) مع شرح لأهم فوائد مساعدات الصهر المستخدمة فى اللحام.

٢- لماذا يعتبر وجود كبريتيد الهيدروجين ضار فى الاستلين إذا استخدم الغاز في اللحام.

٣- أذكر مع الرسم أشكال الوصلات الملحومة ورموزها.

السؤال الثاني :-

١- تكلم بالتفصيل عن مميزات وعيوب القطع الحراري.

٢- تكلم عن أهم العدد والأدوات المستخدمة في اللحام تحت سطح الماء.

٣- تكلم عن أهم العوامل المؤثرة على جودة اللحام.

السؤال الثالث :-

١- تكلم بالتفصيل عن آلية انتقال المعدن من الالكترود إلى الوصلة .

٢- تكلم بالتفصيل عن اللحام بالاحتكاك مع التوضيح بالرسم لكل نوع.

٣- اذكر أهم مميزات وعيوب اللحام بالقوس الكهربي (مع الرسم).

السؤال الرابع :-

١- أذكر مزايا الاختبارات الغير متلفة- مع ذكر أهم العيوب التي يمكن معرفتها بالاختبارات غير المتلفة .

٢- احسب ثمن التيار الكهربي اللازم للحام خط طوله ٦١٢مم وسرعة الانجاز ٥متر/ساعة وشدة التيار ٢١٠ أمبير وجهد ٣٥ فولت والفقد في التيار ٤٤% وسعر الكيلوووات ساعة ٥٦ فرشا ومعامل الجودة ٧٥ %.

مع أطيب التمنيات بالنجاح

ا.د/عبد الفتاح مصطفى خورشد