السؤال الرابع

١. اشرح بالتفصيل فكرة عمل كلا من:-

1. Hot Wire Anemometer  2. Laser Doppler Anemometer

٢. اشرح بالتفصيل فكرة عمل جهاز Particle Image Velocimetry (PIV) مع الرسم التخطيطي لمكونات الجهاز.

٣. ما هو دور كلا من : Laser Arm , Seading , Light sheet optics في جهاز قياس السرعات بتتبع الجسيمات (PIV).

٤. اشرح كيفية معايرة سلك الازدواج الحراري في قياس درجات الحرارة.

٥. اشرح كيفية إيجاد الرطوبة معمليا وكذلك نقطة الندى.

(25 درجة)

*مع التمنيات بالنجاح ..... د./عبدالقادر سعد واللجنة*

جامعة طنطا-كلية الهندسة
قسم هندسة القوى الميكانيكية
الفرقة الثانية (لائحة حديثة)
المادة : أجهزة القياس MEP 2205

التاريخ: 2011/6/15
الزمن : ثلاث ساعات
الدرجة العظمى : ٧٥ درجة
الامتحان النهائي في ورقتين

أجب عن الأسئلة الآتية:

**السؤال الأول** **اشرح بالتفصيل كلا من:**

١. مدى القياس - التكرارية – الخطأ العشوائي – الخطأ البيئي.

٢. عناصر الإيضاح والتسجيل بالحركة الميكانيكية.

٣. طرق قياس الضغوط المنخفضة.

**(10 درجات)**

**السؤال الثاني**

١. اشرح كيفية قياس معدل التدفق بالطريقة المباشرة وطريقة فرق الضغط.

٢. **أذكر** الطرق الكهربية لقياس الإزاحات ، ثم **اشرح مع الرسم** مقاييس فرق الجهد ذات المقاومة ، **واشرح** تطبيقا عمليا لهذه الطريقة.

٣. أوجد نسبة الخطأ في قياس التيار لسخان مقاومته الكهربية 200 أوم يستخدم لتسخين 0.5 kg/sec من الماء من 20 °C إلى 85 °C ، إذا علمت أن الحرارة النوعية للماء 4.2 kJ/kg.°C وان نسبة الخطأ في قياس الكتلة هو 1% وأن نسبة الخطأ في قياس درجة الحرارة 0.5 % والخطأ في قياس الطاقة 2 % ونسبة الخطأ في قياس المقاومة 1.5 %.

**(20 درجة)**

**السؤال الثالث**

١. **اشرح مع الرسم عناصر الإحساس لقياس كلا من:**

١ – درجة الحرارة ٢ – عزم الالتواء

٢. **اشرح مع الرسم** التكبير الضوئي والتكبير بالموائع في أجهزة القياس.

٣. **اشرح مع الرسم** طريقة قياس القوة باتزانها مع قوة مغناطيسية معلومة، واذكر مميزات هذه الطريقة عن الطرق الميكانيكية.

**(20 درجة)**

***Question (4***

a) Describe with simple drawings the construction and the principle of operation for induction motor.

b) Draw the speed torque characteristics for 3-phase induction motor and list its advantages.

C) A 3-phase induction motor its wound for 4-poles and is supplied from a 50 Hz system. Calculate (i) synchronous speed

(ii) speed of rotor when slip is 4%

Good luck

**Tanta University**
**Faculty of Engineering**
**Final Examination**
**Academic Year: 2010-2011**

**Department: Mechnical Power Eng.**
**Year: Second**
**Subject/Code: Power Electronics**
**Time Allowed: 3hours**
**Date:** 22/6/2011

***Answer all the following questions***

***Question (1)***

a) Draw the power stages (diagram) for d.c generator and d.c motor

b) A 30 kw, 300V, d.c shunt generator has armature and field resistances of 0.05 Ω and 100 Ω respectively. Calculate the total power developed by the armature when delivers full output power.

c) A 440 shunt motor has an armature resistance of 0.08 Ω and field resistance of 200 Ω. Determine the back e.m.f when giving an output of 7.46 kw at 85% efficiency.

***Question (2)***

a) show that the E.M.F equation of the transformer is

$$E_1 = 4.44 f N_1 \phi_m$$

$$E_2 = 4.44 f N_2 \phi_m$$

b) A 300 KVA transformer has core losses of 1.5 kw and full load copper loss of 4.5 kw. Calculate its efficiency for 75% and 125% of full load output at unity power factor.

c) A 100 KVA lighting transformer has a full load loss of 3 kw, the losses equally divided between iron and copper. During a day, the transformer operates on full-load for 3 hours, one half load for 4 hours, the output being negligible for the reminder of the day, calculate the all-day efficiency.

***Question (3***

a- Describe with simple drawings the construction and the principle of operation for synchronous generator (alternator).

b- Draw the phasor diagrams of a loaded alternator for unity and lag power factor.

c- A 500 KVA, 1100V, 50 Hz, Y connected, 3phase alternator has armature resistance /phase of 0.1 Ω and synchronous reactance/phase of 1.5 Ω. Find its voltage regulation for unity power factor.

انظر باقى الاسئلة

| كلية الهندسة | | قسم هندسة القوى الميكانيكية<br>اسم المادة: الأمن الصناعى و التشريعات<br>MEP22H6 | | جامعة طنطا |
|---|---|---|---|---|

| | | | |
|---|---|---|---|
| قسم | قسم هندسة القوى الميكانيكية | تاريخ الاختبار | 2011/6/29 |
| الفرقة | الثانية لائحة 2005 | زمن الاختبار | ساعتين |
| اختبار نهاية العام | يونيو (الفصل الدراسى الثانى) | الدرجة العظمى | 50 درجة |
| العام الجامعى | 2011/2010 | | |

اجب على الاسئلة الاتية:

**السـؤال الاول** (14 درجة)

(a) اذكر مع الشرح اهم الاثار الناتجه عن وقوع حادثه ما فى مصنع ؟
(b) اذكر مع الشرح اهم مسببات الحوادث الكهربائيه
(c) اذكر مع الشرح ما تعرفه عن: بطاقات تعريف المواد الكيمائية- مخاطر الحمل اليدوى – قيمه حد الاحتمال - مخاطر المعدات الميكانيكية
(d) اذكر مع الشرح اهم طرق اطفاء الحريق؟

**السـؤال الثانى** (10 درجة)

(a) فى مشروع ما كان عدد الحوادث خلال شهر يناير 30 حادثة وكان متوسط عدد العمال فى نفس الفترة 6500 عامل، وكانت ايام العمل المفقودة نتيجة الحوادث مقدرة بحوالى 310 يوم. فاذا كان اجر العامل حوالى 6 حنية/ ساعة فاوجد ما يلى:

i- معامل تردد الحوادث
ii- معامل خطورة الحوادث
iii- معامل الخطورة النوعية للحادث

(b) اذكر مع الشرح أهم الشروط الواجب توافرها بمهمات الوقاية الشخصية ؟

**السـؤال الثالث** (14 درجة)

(a) اذا كان مستوى ضوضاء ماكينة هو 100 ديسبل فعلى اى بعد من هذه الماكينة يمكن لعامل ان يعمل عند مستوى ضوضاء مقدارها 60 ديسبل؟
(b) لأسباب كثيرة تعتبر المواد الكيميائية من أشد وأخطر ما يواجه الإنسان، اذكر اهم أسباب خطورة تداول المواد الكيميائية؟
(c) من باب مخاطر التلوث، اذكر اهم مصادر التلوث الصناعية على العمال؟
(d) للجهاز الادارى بأى منشاءه دور حيوى هام للحد من الحوادث، اشرح هذه العباره موضحا مع الشرح اهم الخصائص التنظيمية لهذا الجهاز للحد من الحوادث؟

**السـؤال الرابع** (12 درجة)

**(a)** أذكر اهم المواصفات اللازمة فى ممرات ومخارج الهروب؟
(b) اذا كان الزمن المصرح به في اليوم بالديسبل لتحمل مستوى ضوضاء وكذلك الزمن الفعلى الذى تعرض له عامل كالتالي

| | | | | |
|---|---|---|---|---|
| مستوى ضوضاء | 87 ديسبل | 95 ديسبل | 105 ديسبل | 110 ديسبل |
| الزمن المصرح | 12 ساعه | 4 ساعه | 1 ساعه | 24 دقيقه |
| زمن المعرض له | 3 ساعه | 45 دقيقه | 15 دقيقه | 10 دقائق |

: فأحسب مقدار الجرعة الضوضائية وناقش قيمتها؟

خالص تمنياتى بالنجاح

د/ ياسر السمدونى

| كلية الهندسة | | قسم هندسة القوى الميكانيكية<br>اسم المادة: الأمن الصناعى و التشريعات<br>MEP22H6 | | جامعة طنطا |
|---|---|---|---|---|

قسم: قسم هندسة القوى الميكانيكية
الفرقة: الثانية لائحة 2005
اختبار نهاية العام: يونيو (الفصل الدراسى الثانى)
العام الجامعى: 2011/2010

تاريخ الاختبار: 2011/6/29
زمن الاختبار: ساعتين
الدرجة العظمى: 50 درجة

أجب على الاسئلة الاتية:

**السـؤال الاول** (14 درجة)

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| مستوى ضوضاء | 87 ديسبل | 95 ديسبل | 105 ديسبل | ديسبل 110 |
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| الزمن المصرح | 12 ساعه | 4 ساعه | 1 ساعه | 24 دقيقه |
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: فأحسب مقدار الجرعة الضوضائية وناقش قيمتها؟

خالص تمنياتى بالنجاح

د/ ياسر السمدونى

°C. The rod is exposed to an environment at 16 °C. The convective heat transfer coefficient is 15 $W/m^2.°C$. If the thermal conductivity of aluminum is 200 W/m.K. Calculate the heat loss by the rod. (8 Marks)

**Problem number (3) (18 Marks)**

a) A furnace is shaped like a long equilateral triangular duct which its each side width is 1m. The base surface has an emissivity of 0.7 and is maintained at a uniform temperature of 600 K. The heated left side surface is closely approximated as a black surface at 1000 K. The right side surface is well insulated. Determine the rate at which energy must be supplied to the heated side externally per unit length of the duct in order to maintain these operating conditions. (12 Marks)

b) A horizontal pipe 15 cm in diameter and 4 m long is buried in the earth at a depth of 20 cm. The pipe wall temperature is 70 °C, and the earth surface temperature is 5 °C. Assuming that the thermal conductivity of the earth is 0.8 W/m. °C. Calculate heat lost by the pipe. (6 Marks)

**Problem number (4) (20 Marks)**

a) What is meant by a lumped capacity? What are the physical assumptions necessary for a lumped-capacity unsteady-state analysis to apply? (4 Marks)

b) Define the Biot and Fourier numbers. (4 Marks)

c) A cube of aluminium 10 cm on each side is initially at a temperature of 300 °C and is immersed in a fluid at 100 °C. The heat transfer coefficient is 900 $W/m^2$. °C. Calculate the temperature at the center of one face after 1 min, and the heat loss for the cube. (12 Marks)

**Problem number (5) (20 Marks)**

a) Define irradiation and radiosity. (4 Marks)

b) What is a black body? (4 Marks)

c) A mercury-in-class thermometer having $\epsilon = 0.9$ hangs in a metal building and indicates a temperature of 20 °C. The walls of the building are poorly 5 °C. The value of h for the thermometer may be taken as 8.3 $W/m^2$. °C. Calculate the true air temperature. (12 Marks)

| Tanta University | Department: Mechanical power Engineering<br>Total Marks: 90 Marks | Faculty of Engineering |
|---|---|---|

| Course Title: Heat transfer (1) | Course Code: MEP2206 | Year: 2nd |
|---|---|---|
| Date: June 12nd 2011 (Second term) | Allowed time: 3 hrs | No. of Pages: (2) |

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

**Problem number (1)** **(18 Marks)**

a) Heat is uniformly generated inside a hollow circular cylinder by the rate of qv ($W/m^3$). The cylinder has an inner radius R1, outer radius R2, thermal conductivity k and enough long length such that all of the generated heat is considered to diffuse in the radial direction. The outer surface of the cylinder is perfectly insulated while the inner surface is always under a uniform temperature Tw1 due to presence of fluid flow inside the cylinder. Starting from the general equation of heat conduction in cylindrical coordinates:

$$\frac{\partial^2 T}{\partial r^2}+\frac{1}{r}\frac{\partial T}{\partial r}+\frac{1}{r^2}\frac{\partial^2 T}{\partial \Phi^2}+\frac{\partial^2 T}{\partial z^2}+\frac{q_v}{k}=\frac{1}{\alpha}\frac{\partial T}{\partial \tau}$$

Deduce an expression for the temperature distribution inside the wall of the cylinder and show that the maximum temperature inside the wall is expressed as the following:

$$T_{max}=T_{w1}+\frac{q_v R_1^2}{4k}\left[1-\left(\frac{R_2}{R_1}\right)^2\right]+\frac{q_v R_2^2}{2k}\,Ln\left(\frac{R_2}{R_1}\right)$$

(9 Marks)

b) The suction line of a refrigerator carries a refrigerant at -20 °C and surrounded by air at 20 °C, the pipe line is made of a steel tube of 50 mm inner diameter, 5 mm wall thickness and thermal conductivity of 58 W/m.K. If the inside and outside convective heat transfer coefficient is 2300 and 6 $W/m^2.k$ respectively and kins = 0.042 W/m.K, calculate:

a) The thickness of insulation which prevent water vapor to be condensed at the outer side, considering that the dew point of air is 15 °C.

b) The rate of heat transfer from air to the pipe per unit length. (9 Marks)

**Problem number (2)** **(14 Marks)**

a) What are the thermal contact resistance, critical radius of insulation, superinsulation, and fin effectiveness? (6 Marks)

b) An aluminum rod of 2.5 cm diameter and 15 cm long is protrudes from a wall maintained at 260

1.12) *The zone through which a gradual transition from laminar to turbulent zones occurs in case of turbulent flow through pipes.*

1.13) *The zone, which is reached at about the same point for both uniform sand grain roughness and commercial roughness.*

1.14) *One-dimensional, fully developed laminar flow without body forces between two parallel flat plates, one of which is at rest and the other is moving parallel to the fixed plate.*

1.15) *The length of a pipe in which the velocity profile is developing.*

1.16) *Flow of a compressible fluid with a Mach number between 0.8 and 1.2.*

1.17) *A model testing standard equipment for the design of aircrafts.*

1.18) *A model, which does not have complete geometrical similarity with the prototype.*

1.19) *A dimensional analysis method that is applied when a small number of variables are involved.*

1.20) *A type of similarity taking place when geometric, kinematic and dynamic similarities are coexisting between the prototype and its scale model.*

2) *For the steady flow of viscous incompressible fluid between two parallel fixed flat plates, the Navier-Stokes equations combined with the continuity equation are reduced to*

$$\mu \frac{d^2 u}{dy^2} = \frac{dp}{dx}$$

*where u = u (y) is the flow velocity component in x-direction that is a function of y only. Find relations for the followings:*

a) *velocity distribution,* b) *maximum velocity,* c) *average velocity,* d) *pressure gradient,* e) *wall shear stress,* f) *skin friction coefficient.*

**(20 Marks)**

3) *The mean velocity in a 30.5 cm diameter pipe line is 3 m/s. The relative roughness of the pipe is 0.002 and the kinematic viscosity of water is $9.15 \times 10^{-7}$ $m^2/s$. Determine the friction factor, the frictional velocity, the wall shear stress, the center line velocity, the thickness of the laminar sub-layer, the velocity and the shear stress at 5 cm from the pipe wall and the head lost in 300 m length of this pipe.*

**(15 Marks)**

4) *The force (F) on the propeller of an aircraft depends upon the forward speed of the aircraft (U), the density of air ($\rho$), the viscosity of air ($\mu$), diameter of the propeller (D), and the speed of rotation of the propeller (N). Express (F) in terms of dimensionless groups using the Buckingham $\pi$ - method.*

**(15 Marks)**

5) *A model of ship of 1/12 size is tested in fresh water for the prediction of its performance. Find the ratio of speed of the model to the speed of the prototype operating in sea water for geometrical similar free surface condition. Also calculate the ratio of h.p. of the model with that of prototype.*
*Assume the specific weight of fresh water as 1000 kg/m$^3$ and that of sea water 1030 kg/m$^3$.*

**(10 Marks)**

6) *A gas with a molar mass of 4 and a specific heat ratio of 1.3 flows through a variable area duct. At some point in the flow, the velocity is 150 m/s, the pressure is 100 kPa and the temperature is 15°C. Find the Mach number at this point in the flow. At some other point in the flow the temperature is found to be –10°C. Find the Mach number, pressure, and velocity at this second point in the flow assuming the flow to be isentropic, steady and one-dimensional.*

**(10 Marks)**

TANTA UNIVERSITY
FACULTY OF ENGINEERING
MECH. POWER Eng. DEPART.
SECOND YEAR

FLUID MECHANICS (1)(b)
Time allowed: 3 hours
Date: June 2011
ميكانيكا موائع (١ ب)

## Please, answer the following questions: (Total Marks 90)

1) *Identify the following statement as true or false with correcting the false parts:*

**(10 Marks)**

1.1) *The eddy viscosity is a property of the fluid, while the dynamic viscosity is a property of the flow.*

1.2) *The mixing length in a turbulent flow is a local function and depends on the velocity distribution in the neighborhood of a particular point.*

1.3) *The kinematic viscosity in turbulent flow through a pipe is proportional to the frictional velocity and consequently the mean axial velocity gradient*

1.4) *The internal surface roughness for turbulent flow through pipes is higher than sixfold the laminar sub-layer thickness in case of smooth pipes.*

1.5) *The ratio of the mean flow velocity to the maximum velocity for turbulent flow in a smooth or rough pipe depends only on the Darcy friction coefficient.*

1.6) *Hagen-Poiseuille flow is one-dimensional, fully developed laminar flow without body forces between two fixed parallel flat plates.*

1.7) *In turbulent flow through a pipe, the shearing stress in the laminar sub-layer is linear, while that in the turbulent core is constant.*

1.8) *Undistorted model is the model which is dynamically similar to the prototype.*

1.9) *The repeating variables in Buckingham $\pi$-theorem should be such that none of them is dimensionless.*

1.10) *Kinematic similarity is said to exist between the model and the prototype, if both of them have identical forces.*

*Give a scientific expression for each of the following statements:*

**(10 Marks)**

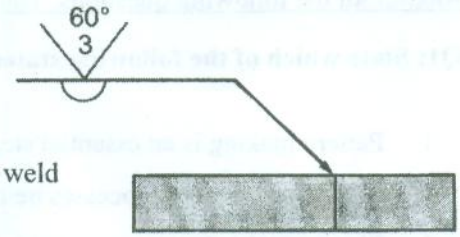
1.11) *The concept which states that the apparent shear stress is directly proportional to the velocity gradient and the constant of proportionality is the eddy viscosity.*

10. In EDM, better surface finish is obtained at:

a. low discharge frequency and low current intensity
b. low discharge frequency and high current intensity
c. high discharge frequency and low current intensity
d. high discharge frequency and high current intensity

---

**Q3:** **(6+6+3= 15 marks)**




a- Differentiate between the following:
   i. SMAW and SAW
   ii. GMAW and GTAW.

b- List the all information given in the shown weld symbol. Draw the weld joint based on this information.

c- Give short notes about the term "weldability" and the factors affecting on.

---

**Q4:** **(3*6 =18 marks)**

a- Differentiat between hot and cold chamber die casting in terms of: principle, applications, advantages and disadvantages.

b- A sample of foundry sand weighs 50 g was dried for 15 min at 100°C and the clay is separated after that. The weights after drying and after clay separation were 48 g and 44.5 g respectively.

   i. Find the moisture and the clay content.
   ii. Using the chart shown below, estimate the compressive strength of this sand mixture.

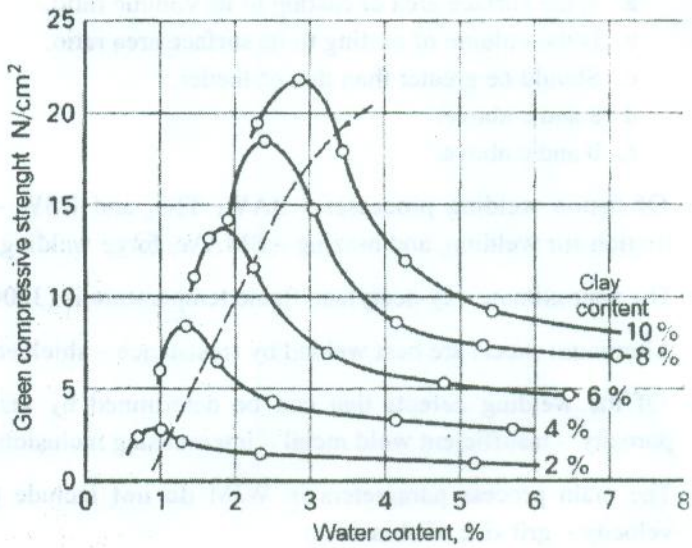
c- A 10 cm copper ring was made by centrifugal casting with 15 outside diameter and 12 inside diameter and a G-factor of 70. Determine the necessary rotational speed (rpm), the centrifugal force (N) exerted on mold walls by the molten metal, and the required amount of molten metal ($cm^3$) to be poured.

---

**Q5: In ECM process** **(3+3+6= 12 marks)**

a. Explain with the aid of sketches the principle of the process.
b. Considering the efficiency of the electrical circuit, derive a relationship to calculate the tool feed rate.
c. Given the information below, calculate; the amount of Ti removed in grams, the required feed rate and the expected gap thickness.

| | |
|---|---|
| Atomic weight of Ti | $M = 47.9$ g / mol |
| Valance | $n = 4$ |
| Density of Ti | 4.56 g / $cm^3$ |
| Machining time | $t = 2$ min |
| Current density | 250 Amp / $cm^2$ |
| Tool area | 12 $cm^2$ |
| Gap voltage | 12 V |
| Faraday's constant | 96500 Coulomb |
| Electrolyte resistivity | 4 Ω · cm |




*Best wishes.*
*Dr. Eng. Mahmoud Ahmadein*

Course Title: Production Engineering
Course Code: MPD 2252
Year: 2nd – Mechanical Power Engineering
2nd Term, Final Exam

Date: 26 Jun 2011
Total Marks: 75 Marks
Time allowed: 3 hrs
No. of pages: 2

Answer all the following questions. The neat sketches are considered a part of your answer

**Q1: State which of the following statements is true ( ✓ ) and which is false ( ✗ ): (10 marks)**

1. Pattern making is an essential step in all casting processes.
2. In friction welding processes neither filler metals nor external heat sources are required.
3. Slag inclusion is a common defect in TIG welding.
4. Qualification of welders guarantees يضمن defect-free welds.
5. In USM, as the hardness of workpiece material increases, the rate of tool wear increases.

**Q2: Select only the most correct answer (20 marks)**

1. The strength of molding green sand can be improved by using:
   a. Sand grains with uniform size and angular shape.
   b. Sand grains with non-uniform size and angular shape.
   c. Sand grains with uniform size and round shape.
   d. Excessive amount of bentonite.
   e. a and d above.
   f. b and d above.
   g. c and d above
2. The time t in the permeability relationship, $P = \frac{VH}{pat}$, represents the time necessary for:

   (Sand sample preparation – Escaping of air through the sand sample – Stabilizing the manometer pressure – Filling the air tank)
3. In sand casting, sand inclusion defects are mainly caused by (lack of feeding – moisture in sand – turbulence flow of molten metal – low permeability of sand).
4. The geometrical module of a casting:
   a. Is the surface area of casting to its volume ratio.
   b. Is the volume of casting to its surface area ratio.
   c. Should be greater than that of feeder.
   d. a and c above.
   e. b and c above.
5. Of fusion welding processes ( SAW, TIG, and RSW – MIG, friction welding, and brazing – MIG, friction stir welding, and brazing – SMAW, forge welding, and soldering).
6. The approximate oxy-acetylene flame temperature is (3200°C – 2500°C – 5000°C – 2500K).
7. Aluminum sheets are best welded by (resistance – shielded metal arc – submerged arc –TIG) welding.
8. Of the welding defects that can be determined by visual examination (subsurface cracks – internal porosity – insufficient weld metal – internal slag inclusions).
9. The main process parameters in WJM **do not** include (nozzle diameter – standoff distance – stream velocity – grit size of abrasives)