


 Course Title: **Technical Writing**  
 Date: June 24<sup>th</sup> 2010 (Second term)

 Course Code: **MEP12H4**  
 Allowed time: 3hrs

 Year: 1<sup>st</sup>  
 No. of Pages: (1)

**Remarks:** (Answer the following questions, answers may be supported by sketches)

**Question one (12 Marks)**

- a) Give an accurate definition of technical communication. (2 Marks)
- b) Mention briefly the general procedure to create an effective technical and scientific writing. (5 Marks)
- c) Good technical writing (communication) is **accurate, clear, concise, coherent, and appropriate**. Discuss this for the following example: (5 Marks)

"The flow of electrical current can induce the migration of impurities or other defects through the bulk of a solid. This process is called electromigration. In simple electromigration, the force on the defect is thought to have two components. The first component is the force created by direct interaction between the effective charge of the defect and the electric field that drives the current. The second component, called the "wind force," is the force caused by the scattering of electrons at the defect".

**Question two (6 Marks)**

- a) What are the explicit and implicit purposes of documents? (3 Marks)
- b) Managers read technical and scientific documents for variety of purposes. State these purposes. (1.5 Marks)
- c) What is the document density? (1.5 Marks)

**Question three (6 Marks)**

- a) State the standard document types. (1.5 Marks)
- b) Define extensively the agenda and minutes. (1.5 Marks)
- c) What is the job application letter? (1.5 Marks)
- d) Compare between the written communication and oral presentation. (1.5 Marks)

**Question four (6 Marks)**

- a) What are reports? Mention their types. (1.5 Marks)
- b) What is the acceptance letter? (1.5 Marks)
- c) What do you know about meetings? (1.5 Marks)
- d) What is the resume (C.V)? (1.5 Marks)

**Question five (10 Marks)**

- a) Describe extensively the reasons for using graphics in the documents. (1 Marks)
- b) What are the types of common graphics? (1 Marks)
- c) Mention the different parts of the table. (1 Marks)
- d) What are bar graphs? Mention their types. (1 Marks)
- e) Mention the guidelines to use line graph effectively. (1 Marks)
- f) Mention the guidelines to use diagrams effectively. (1 Marks)
- g) What are the exploded views? (1 Marks)
- h) What are time tables and flowcharts? (1 Marks)
- i) Describe the general guidelines to use graphics effectively. (2 Marks)

With the best wishes  
 Dr. Mohamed Mahgoub Bassuni

السؤال الثاني 7/5

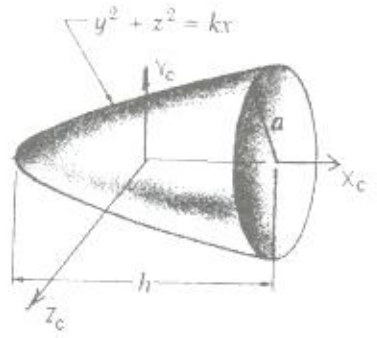
Tanta University		<b>Mechanical Power Engineering Department</b> Course Title: Applied Mechanics MEP 1201		Faculty Of Engineering
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Dept	Mechanical Engineering	Date	20/06/2010
Year	1 <sup>st</sup> , (new curriculum) 2005	Allowed time	3 hrs
Final exam	June (second term)	Total marks	85 Marks
		Academic Number	2009/2010

Close book exam. All questions must be answered. Draw schematic whenever applicable, and clearly state your assumptions

**Question (1) (20 marks)**

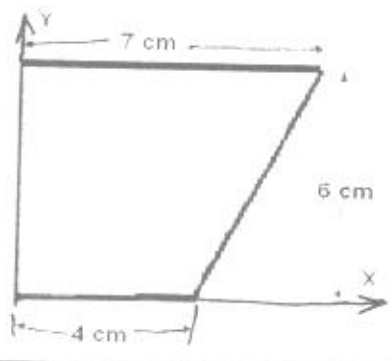
Determine the mass moment inertia with respect to the centroidal axis  $X_c$ , and  $Y_c$  of the paraboloid shown, assuming a uniform density,  $\rho$ .



**Question (2) (20 marks)**

For the shape and the axis shown, Determine:

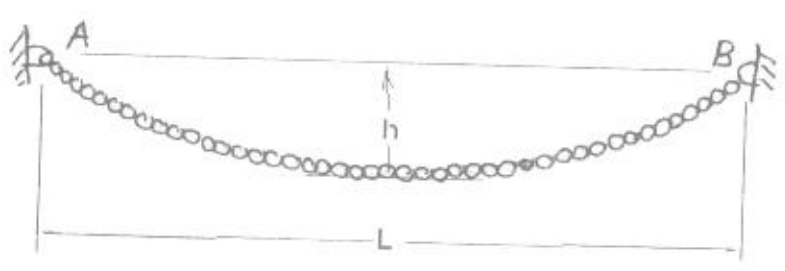
- The principal axes
- The principal second moments of inertia. Check your results graphically



**Question (3) (17 marks)**

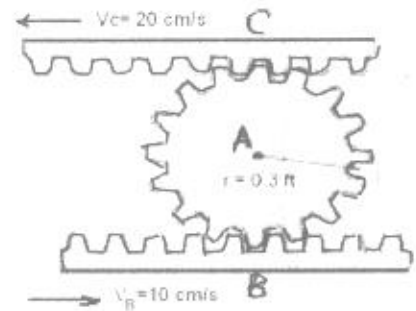
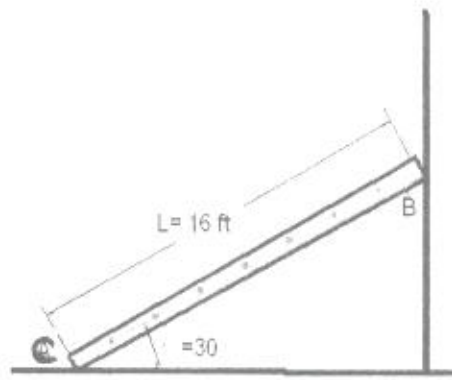
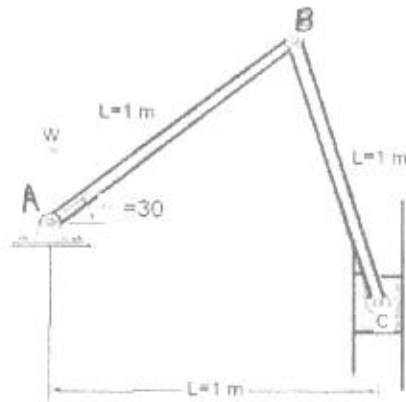
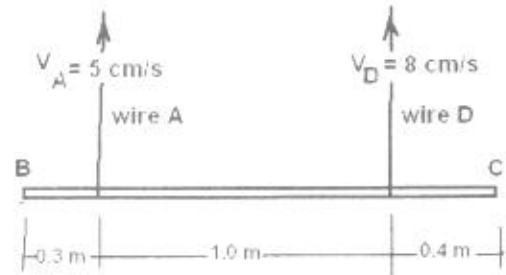
The chain is suspended between points A and B. If it has a weight per unit length  $w$  and the sag is  $h$ , determine: (a) the length of the chain, (b) the maximum tension in the chain.

Given:  $W = 0.5 \text{ lb/ft}$      $L = 60 \text{ ft}$      $h = 3 \text{ ft}$



**Question (3) (10 marks)**

Obtain graphically (free hand sketch) the location of the instantaneous centre of rotation for each of the showed beam BC and gear A

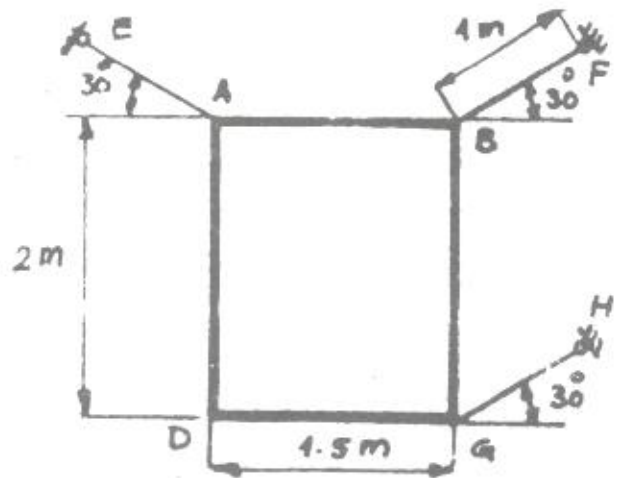


**Question (5) (18 marks)**

A thin plate ABGD has a mass of 50 kg and is hold in position shown by three inextensible wires AE, BF and GH. Wire AE is then cut. Determine the following:

- The acceleration of the plate
- The tension in the wire BF and GH

immediately after wire AE has been cut



All the best

Dr. Yasser EL-Samadony

<p>Tanta University</p>		<p><b>Mechanical Power Engineering Department</b> Course Title: Thermodynamic</p>		<p>Faculty Of Engineering</p>
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<p>Dept Year</p>	<p>Mechanical Power Engineering 1<sup>st</sup> Year Mechanical</p>	<p>Date Allowed time Academic Number</p>	<p>17/6/2010 3 hours 2009/2010</p>
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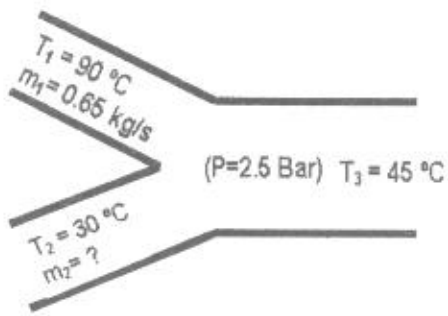
يسمح للطالب باستخدام الجداول والخرائط

**Question (1)**

- a- What is the difference between intensive and extensive properties?
- b- Define the isothermal, isobaric, and isochoric processes.
- c- What is the difference between the critical point and the triple point?
- d- A heat exchanger is used to cool oil ( $c_p = 2.20 \text{ kJ/kg}\cdot^\circ\text{C}$ ) from  $150$  to  $40^\circ\text{C}$  at a rate of  $2 \text{ kg/s}$  by water ( $c_p = 4.18 \text{ kJ/kg}\cdot^\circ\text{C}$ ) that enters at  $22^\circ\text{C}$  at a rate of  $1.5 \text{ kg/s}$ . Determine the rate of heat transfer in the heat exchanger and the exit temperature of water.

**Question (2)**

- a- What is total energy? Identify the different forms of energy that constitute the total energy.
- b- What is an adiabatic process and what is an adiabatic system?
- c- A hot-water stream at  $90^\circ\text{C}$  enters a mixing chamber with a mass flow rate of  $0.65 \text{ kg/s}$  where it is mixed with a stream of cold water at  $30^\circ\text{C}$ . If it is desired that the mixture leave the chamber at  $45^\circ\text{C}$ , determine the mass flow rate of the cold-water stream. Assume all the streams are at a pressure of  $2.5 \text{ bar}$ .



**Question (3)**

- a- Derive an expression for the work done during a polytropic process.
- b- Define the isothermal, isobaric and isochoric processes.
- c- A frictionless piston–cylinder device contains  $2 \text{ kg}$  of nitrogen at  $100 \text{ kPa}$  and  $300 \text{ K}$ . Nitrogen is now compressed slowly according to the relation  $PV^{1.35} = \text{constant}$  until it reaches a final temperature of  $360 \text{ K}$ . Calculate the work input during this process.

**Question (4)**

a- Using the definitions of mass and mole fractions derive a relation between them.

b- Octane  $C_8H_{18}$  burned completely with air during a combustion process. Assuming a total pressure of 100 kpa, determine:

- i. The mole fraction of the exhaust gases
- ii. The amount of air (kg) for complete combustion
- iii. The dew-point temperature of the products.

**Question (5)**

a- Explain the theory of operation of the reciprocating air compressor.

b- Derive a relation for the volumetric efficiency of the reciprocating air compressor

c- A reciprocating air compressor cylinder has 10 cm bore and 15 cm stroke and the clearance is 5 %. The compressor operates between 1 bar, 30 °C and 5 bar. The polytropic exponent is 1.32. If the compressor speed is 900 rpm:

- i. Calculate the clearance volume, and the volumetric efficiency.
- ii. Determine the mass flow rate of air.
- iii. Calculate the power consumption by the compressor.



Course Title: Engineering Mathematics (2)B

Course Code: PME1207

Year: First Year Mechanics

Date: 15/6/2010 (Final Second Term Exam)

Allowed time: 3 Hours

No. of Pages: (2)

Answer all the following questions:

## Question 1

25 Marks

a- Expand the following function in Fourier series

$$f(x) = |\cos x|, \quad -\pi < x < \pi$$

b- Find the Fourier series of the function

$$f(x) = x(\pi - x), \quad 0 < x < \frac{\pi}{2} \text{ such that } f(-x) = -f(x) \text{ and } f(x + \pi) = -f(x)$$

Then find the sum of the series:

$$\text{i) } \sum_{n=1}^{\infty} \frac{(-1)^{n+1}}{(2n-1)^3}$$

$$\text{ii) } \sum_{n=1}^{\infty} \frac{1}{(2n-1)^6}$$

c- By using the exponential form of Fourier series prove that the expansion of the function

$$f(x) = \cosh x, \quad -\pi < x < \pi \text{ is given by } \sum_{-\infty}^{\infty} \frac{(-1)^n \sinh \pi}{\pi(1+n^2)} e^{inx}$$

## Question 2

25 Mark

a- Solve the following O.D.E. using Laplace Transform

$$y''(t) + 9y(t) = \cos 2t, \quad y(0) = 1 \text{ and } y\left(\frac{\pi}{2}\right) = -1$$

b- Solve the following system of O.D.E.s using Laplace Transform

$$x''(t) + y'(t) + 3x(t) = 15e^{-t} \quad \text{and} \quad y''(t) - 4x'(t) + y(t) = 15 \sin 2t$$

Subject to  $x(0) = 35$ ,  $x'(0) = -48$ ,  $y(0) = 27$  and  $y'(0) = -55$ 

c- Solve the following integro-differential equation using Laplace Transform

$$y'(t) + 5 \int_0^t \cos 2(t-u)y(u)du = 10, \quad \text{given } y(0) = 2$$

**Question 3****25 Mark**a- Obtain the P.D.E whose solution is  $U(x, y) = F(2x - 3iy) + G(y)$ 

b- Solve the following P.D.Es:

i)  $U_{yy} = \frac{y \cdot \sinh(y)}{x+1} + \frac{1}{y} + 2$

ii)  $U_{xx} + U_{yy} = 0$

iii)  $U_{xx} = U_{tt}$ , where  $U(x, 0) = 0$ ,  $U_t(x, 0) = \frac{1}{1+x^2}$

iv)  $U_{xx} = U_{tt}$ , where  $U(x, 0) = 0$ ,  $U_t(x, 0) = 2 \sinh(4\pi x)$

$$U(0, t) = U(3, t) = 0, 0 \leq x \leq 3, t \geq 0$$

**Question 4****25 Mark**a- Solve the following system of O.D.Es:  $X' = \begin{pmatrix} 2 & -1 \\ -2 & 1 \end{pmatrix} X + \begin{pmatrix} 1 \\ 0 \end{pmatrix}$ 

b- Discuss the convergence of the following infinite series:

i)  $\sum_2^{\infty} \frac{1}{n \cdot [\ln(n)]^{1.1}}$

ii)  $\sum_1^{\infty} \frac{5n}{n^3 + 2}$

iii)  $\sum_1^{\infty} \frac{5^n \cdot n!}{n^n}$

Course Examination Committee

Dr. Faheem Abd-Elahameed

Dr. Tamer El-Sayed

**Final Exam**

**Solve all of the following questions – You may answer in english as well as in arabic:**

**Question 1 : ( 25 marks )**

- Find the inclined angle of failure plane in compression.
- Explain the method of work for one of the mechanical strain gauges.
- A compression test is performed on cast iron specimen with a circular cross-section of diameter 35 cm. The readings of load and associated contraction were as following:

load ( ton )	0	2.7	6.8	10.2	13.6	20.3	27.2
contraction ( mm )	0	0.056	0.14	0.208	0.28	0.457	0.71

The gauge length was 250 mm.

Draw the stress-strain diagram and hence identify:

fracture stress – initial tangent modulus – the tangent modulus at stress of  $2100 \text{ kg/cm}^2$  – the secant modulus at stress of  $2100 \text{ kg/cm}^2$  – modulus of toughness

**Question 2 : ( 25 marks )**

- Explain the indirect shear test. Explain why was it called this name?
- What are the difficulties that show upon performing a compression test? How can we overcome these difficulties?
- A hollow shaft with 15 cm external diameter and 10 cm internal diameter. The shaft is loaded with torsion moment. What is the maximum moment that can be applied if the allowable shear stress is  $8 \text{ kg/mm}^2$ ? And what is the twist angle between two sections if the distance between the two sections is 4 m?  
Take the modulus of rigidity to be  $0.3 \times 10^4 \text{ kg/mm}^2$ .  
If the shaft is solid and loaded with the same moment and the allowable shear stress is  $8 \text{ kg/mm}^2$ , determine the diameter of the solid shaft.



**Question 3 : ( 25 marks )**

- a) What is the effect of the following factors on the fatigue strength:  
speed – thermal stresses – shape and size
- b) A Brinell hardness test is performed on a steel specimen with a ball of diameter 10 mm. The diameter of indentation is 3.84 mm.
- What are the minimum dimensions of the specimen?
  - What is the BHN for the specimen?
  - Calculate the approximate values of the ultimate tensile strength and endurance limit.
  - Using Smith fatigue strength diagram calculate the diameter of a cantilever made from the same tested material and subjected to a vertical load at its free end ranges from -100 kg to 300 kg. Assume a factor of safety of 3 and the yield stress is 0.7 of the ultimate tensile strength.
- c) What are the advantages of Rockwell hardness test?

**Question 4 : ( 25 marks )**

- a) What are the differences between a Charpy test and Izod test?  
( Use sketches to explain your answer)
- b) A cantilever of length “L” with a circular cross-section is subjected to an impact load at its free end by falling a weight of 18 kg from 65 cm height. The yield stress of the cantilever material is 14 kg/mm<sup>2</sup> . The modulus of elasticity is 21 ton/mm<sup>2</sup> . The maximum deflection must not exceed 1/360 from the cantilever length. What are the diameter and length values of the cantilever?  
( for a cantilever  $y_{\max} = \frac{PL^3}{3EI}$  )
- c) Draw a schematic of a creep testing machine and explain with aid of graph the effect of stress on the creep behavior of metals.

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مع تمنياتنا بالتوفيق و النجاح

د. نادر الليثي

د. حنفى هنداوى