Tanta University
Faculty of Engineering
Production Engineering & Design Dept.
1st Year Mecanical 2012/2013

strength & Materials Testing
Time allowed: 3 H
Final Grade: 90 M

Final Exam

Solve all the following questions:

(1)- a)- Discuss the effect of the following factors on the tensile mechical properties of steel:
Heat treatment - Alloying - Mechanical working

b)- A tension test is performed on metal (A) with a circular-section with 1.2 cm diameter. The percent elongation for 6.0 cm & 12 cm gauge length were 34% & 30% respectively. Another tension test is performed on metal (B) with 1.2 cm diameter. The percent elongation for 4.8 cm was 39%. Which metal (A) or (B) is more ductile.

c)- A tension test is carried on Aluminium specimen with 1.0 cm diameter and 5.0 cm gauge length. The loads and elongations were as following:

load Kgs	0	200	400	600	800	900	1000	1100	1150
Elong. mm	0	0.018	0.036	0.054	0.072	0.083	0.105	0.160	0.270

Draw the load-deformation diagram and the determine 0.2% proof stress - modulus of elasticity - modulus of resilience - moduls of toughness.

(2)- a)- Discuss and calculate the effect of grains volume of materials on the failure of materials in compression

b)- Explain one of mechanical strain gauges.

C)- A Flexural beam Test is carried on a specimen with $\frac{1}{2}$ inch width and $1\frac{1}{8}$ inch depth and 8.0 inch span. The load was in mid-span load. Load P

and deflections Δ at the midspan were as following

Load P (ton)	0	0.6	1.0	1.4	1.8	2.2	2.6	2.74	2.8
defl. Δ (mm)	0	0.5	0.8	1.2	1.5	2.0	3.0	4.0	5.0

Draw the load deformation diagram and then determine Johnson elastic strength – modulus of rupture – modulus of toughness – modulus of elasticity in bending

(3)-a)- State the Brinell hardness test precautions.

b)- A Brinell hardness Test is carried with use a ball of 10 mm diameter on steel specimen. The impression diameter was 3.84 mm. Calculate the Brinell hardness number (BHN) and the approximate tensile strength for Tested Steel determine the minimum dimensions for test specimen.

c)- Calculate the diameter of cantilever beam from the same steel of the part (b) which subjected to free end load varries from – 100 Kgs to 300 Kgs. The span L = 100 cm. Use smith fatigue diagram and safty factor 3.0 , assume that yield strength = 0.7 Ultimate strength.

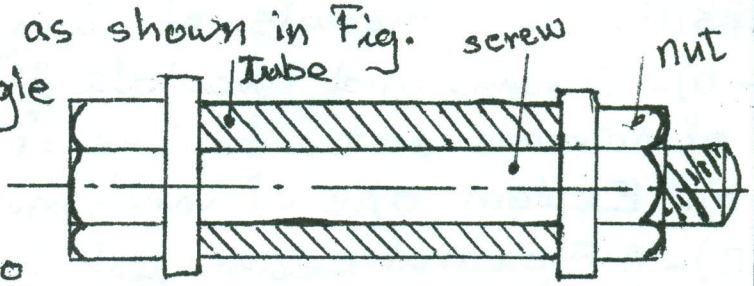
(4)-a)- Explain the indirect shear test for metals.

b) Define the beam of constant strength.

c)- A steel nut screw with diameter 32 mm and helical pitch 3.6 mm. The screw is put in brass Tube with inner diameter 32 mm and external diameter 50 mm and length 38 as shown in Fig. calculate the nut tight angle where the Tensile stress of screw is not exceed 1000 Kg/Cm^2. calculate also the stress in Tube where:

E of steel = 2×10^6 Kg/cm^2

E of cupper = 1×10^6 Kg/cm^2



Tanta University

Department: Mechanical Engineering
Total Marks: 40 Marks

Faculty of Engineering

Course Title: **Technical Writing**	Course Code: **MEP12H4**	Year: 1st
Date: June 11 th 2013	Allowed time: 2hrs	No. of Pages: (1)

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

Question one (12 Marks)

a) Define the technical writing. Who can write it and why?
b) Describe the general procedure to create an effective technical writing.

c) Good technical writing (communication) is **accurate, clear, concise, coherent,** and **appropriate.** Discuss this for the following example:

"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".

d) Problem statement often have three elements. State these elements accurately.

Question two (6 Marks)

a) Mention explicit and implicit purposes of documents.
b) Experts read technical and scientific documents for variety of purposes. State these purposes.
c) How could you target your audiences?
d) Explain how the effective technical writing can create trust and establish credibility.

Question three (6 Marks)

a) State the standard document types.
b) Define extensively the meeting documents.
c) What are the job application and acceptance letter?
d) Mention the difference between written communication and oral presentation.

Question four (6 Marks)

a) What are reports? Mention their types.
b) What is the trip report?
c) What are the main elements of research article?
d) How could you write a memoranda for requesting a financial support?

Question five (10 Marks)

a) What do you know about design and feasibility reports?
b) Describe in details the meaning of letters and its types.
c) Define document density and its guidelines.
d) How could you target your audience.
e) The discipline of modern technical writing came of age during world ware II. describe

With the best wishes
Dr. Mohamed Mahgoub Bassuoni

TANTA UNIVERSITY

FACULTY of ENGINEERING

Mechanical Engineering Department

EXAMINATION (FIRST YEAR) STUDENTS OF ELECTRICAL ENGINEERING

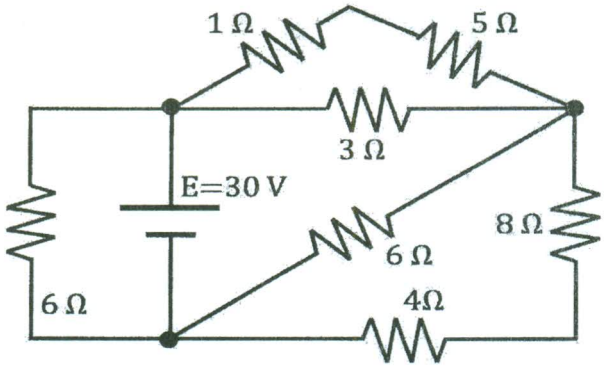
COURSE TITLE: ELECTRICAL AND ELECTRONIC ENGINEERING			Cource CODE: EPM1241
DATE: 06/06/2013	TERM: SECOND	TOTAL ASSESSMENT MARKS: 75	TIME ALLOWED: 3 HOURS

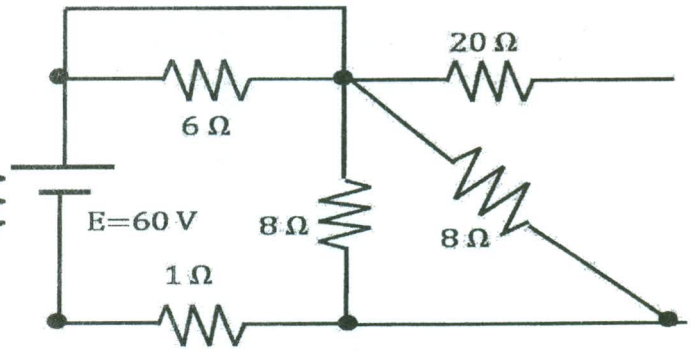
Notes: *Systematic arrangement of calculations and drawings are essential.* **ANSWER THE FOLLOWING QUESTION**

Q1/2: (15 Marks)

For each circuit shown:

a. **Find** the total resistance
b. **Determine** the source current
c. **Find** the power dissipated in 1 ohm resistance





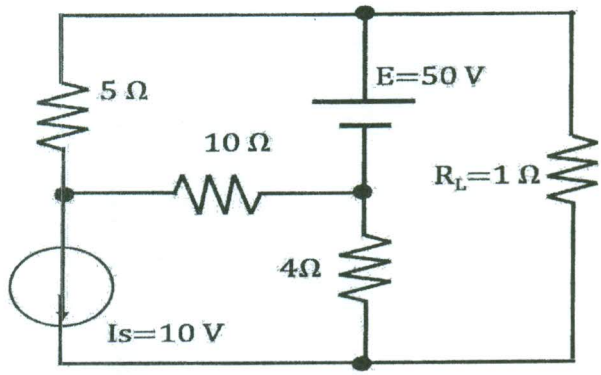
Q2/2: (10 Marks)

For the circuit shown:

i. **Determine** the Thévenin equivalent circuit external to the resistance R_L.

ii. **Find** the current in R_L = 1 ohm resistance.

iii. **What** is RL for maximum power to R_L?

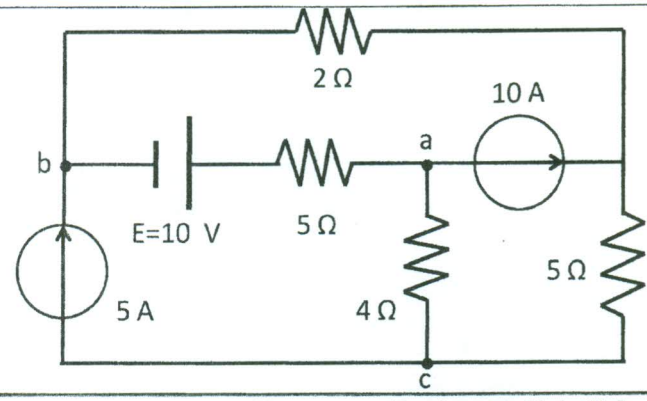


Q3/2: (12 Marks)

For the circuit shown,

i. **Calculate** the current in 4 ohm resistor

ii. **Calculate** the potential difference between points a and b.



WISH YOU ALL THE BEST

Dr. Ayman Hoballah

الاسئلة في ورقتين

Department: Electrical Power and Machines Engineering

Tanta University Total Marks: Marks **Faculty of Engineering**

Course Title: Electric and Electronic Engineering	Course Code: EPM12	Year: 1st Mec
Date: June 2013 (Second term)	Allowed time: 3 hrs	

Answer the following questions

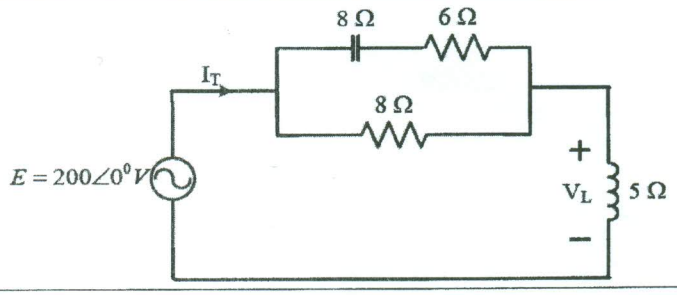
Problem No (1)

A) For the circuit shown in Fig. 1, find:

(i) V_L using voltage divider rule.

(ii) Calculate I_T.

Fig 1 ➔

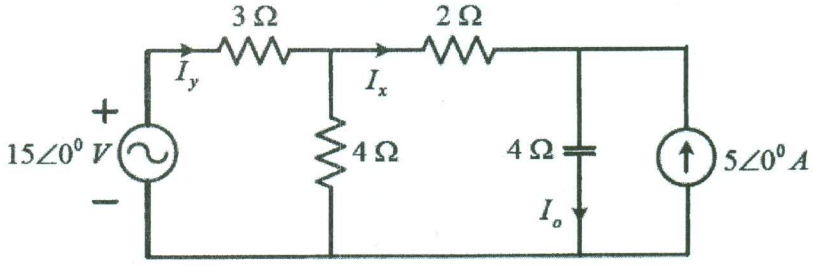


B) For the circuit shown in Fig. 2,

(i) Apply node voltage method to the circuit.

(ii) Determine branch currents I_o, I_x and I_y.

Fig 2 ➔

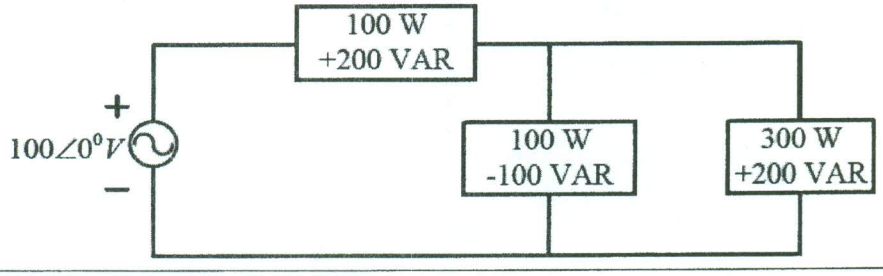


Problem No (2)

A) What is meaning by semiconductor material? Explain how to use this material to get full-wave rectification?

B) For the circuit shown in Fig. 3, Find: (i) the total active power, the total reactive power, the total apparent power and input power factor; (ii) sketch the power triangle.

Fig 3 ➔



Good Luck

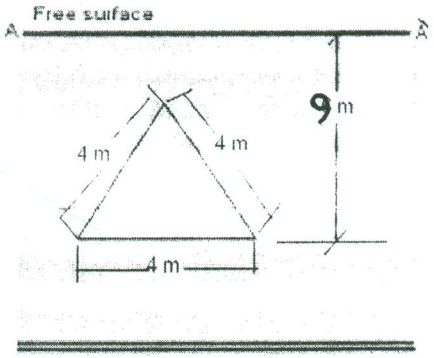
Course Examination Committee: Dr. Mohamed Abo Elazm

Tanta University		Mechanical Power Engineering Department Course Title: Applied Mechanics MEP 1201		Faculty Of Engineering

Dept	**Mechanical Engineering**	**Date**	**2/06/2013**
Year	**1st, (new curriculum) 2005**	**Allowed time**	**3 hrs**
Final exam	**June (second term)**	**Total marks**	**85 Marks**
		Academic Number	**2012/2013**

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

Question (1) (15 marks)

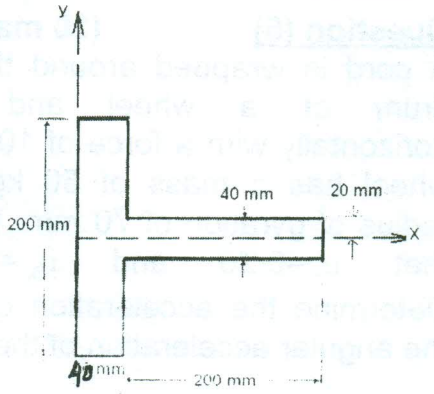


For the shown below, vertical triangle gate in water, obtain:

i)- The value resultant hydrostatic forces

ii)- The location of the resultant hydrostatic forces from the free surface

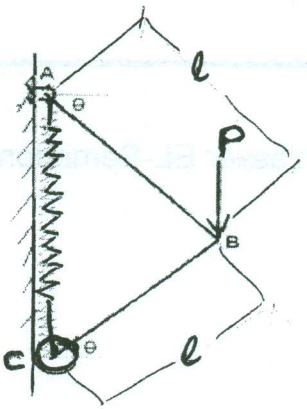
Question (2) (15 marks)



For the following T section shape and the axis shown, Determine:

a. The principal axes
b. The principal second moments of inertia, and check your results graphically

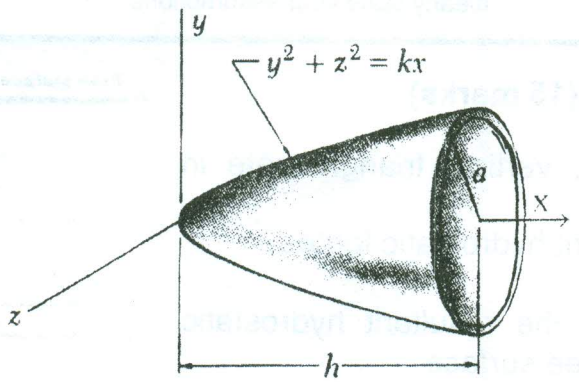
Question (3) (17 marks)



Determine the expression "θ" and the tension in the spring which correspond to the equilibrium position of the mechanism. The unstreched length of the spring is "h", and the constant of the spring is "K", neglect the weight of the mechanism

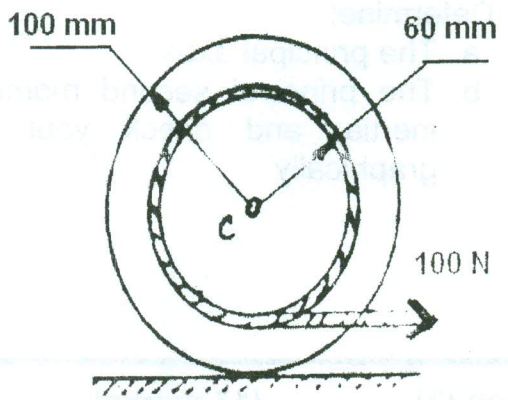
Question (4) **(18 marks)**

Determine the mass moment inertia and radius of gyration with respect to x-axis of the hollow paraboloid shown, assuming a uniform density, ρ.



Question (5) **(20 marks)**

A cord is wrapped around the inner drum of a wheel and pulled horizontally with a force of 100 N. the wheel has a mass of 50 kg and a radius of gyration of 70 mm. Knowing that μ_s=0.20 and μ_k = 0.15. Determine the acceleration of C and the angular acceleration of the wheel.



All the best

Dr. Yasser EL-Samadony

Tanta University
Faculty of Engineering
1st power Mech Engineering Dept.
Assoc. Prof. Ayman Bakry

Thermodynamics (1)-MEP1202
Date:26/05/2013
Time: 3 hours
Total Marks: 90

Please, answer the following questions (assume any missing data):-

1)

a- Sketch the various energy sources (organized and disorganized) on the earth showing the possible conversion paths among these sources.

b- A vertical piston–cylinder device contains a gas at a pressure of 100 kPa. The piston has a mass of 5 kg and a diameter of 12 cm. Pressure of the gas is to be increased by placing some weights on the piston. Determine the local atmospheric pressure and the mass of the weights that will double the pressure of the gas inside the cylinder.

c- A student living in a 4 m* 6 m* 6 m dormitory room turns on his 150 W fan before he leaves the room on a summer day, hoping that the room will be cooler when he comes back in the evening. Assuming all the doors and windows are tightly closed and disregarding any heat transfer through the walls and the windows, determine the temperature in the room when he comes back 10 h later. Use a constant specific heat value at initial room temperature, and assume the room to be at 100 kPa and 15°C in the morning when he leaves.

[*16 marks*]

2)

a- An insulated rigid tank is divided into two equal parts by a partition. Initially, one part contains 4 kg of an ideal gas at 800 kPa and 50°C, and the other part is evacuated. The partition is now removed, and the gas expands into the entire tank. Determine the final temperature and pressure in the tank.

b- An air cycle is executed in a closed system and is composed of the following four processes:
1-2 reversible adiabatic compression, from 100 kPa and 27°C to 1 MPa
2-3 P = *constant,* heat addition in amount of 2800 kJ/kg
3-4 V = *constant,* heat rejection to 100 kPa
4-1 P = *constant,* heat rejection to initial state
(*a*) Show the cycle on a P-v diagram.
(*b*) Calculate the maximum temperature in the cycle.
(*c*) Determine the thermal efficiency.
Assume constant specific heats at room temperature. (R = 0.287 kJ/kg K, c_p = 1.005 kJ/kg K).

[*20 marks*]

3)

a- A nozzle is a device for increasing the velocity of a steadily flowing fluid. Steam enters a nozzle at 400°C and 800 kPa with a velocity of 10 m/s, and leaves at 300°C and 200 kPa while losing heat at a rate of 25 kW. For an inlet area of 800 cm^2, determine the velocity and the volume flow rate of the steam at the nozzle exit.

b- Steam flows steadily through an adiabatic turbine. The inlet conditions of the steam are 10 MPa, 450°C, and 80 m/s, and the exit conditions are 10 kPa, 92 percent quality, and 50 m/s. The mass flow rate of the steam is 12 kg/s. Determine (*i*) the change in kinetic energy, (*ii*) the power output, and (*iii*) the turbine inlet area.

[*16 marks*]

4)

Define both the critical point and the triple point of pure substances. Show the location of both of them on a (T-P) diagram, denoting the various lines and regions for both substances that expanding and contracting on freezing process.

Copy the following table into your answer sheet and then use the steam tables to complete the blank cells for the properties of H_2O.

P (bar)	*T (°C)*	*v (m^3/kg)*	*h (kJ/kg)*	*x quality*	*Phase description*
	90	2.361			
	81.3			0.85	
15		0.152			
130			3335		

[18 marks]

5)

a- **Describe Dalton's law and Amagat's law, both schematically and mathematically.**

b- **A mixture is made up of 25% N_2, 35% O_2, 20% CO_2, and 20% CO by volume. Calculate:**

(i) **The corresponding gravimetric analysis**

(ii) **The molar mass (molecular weight) of the mixture M_m**

(iii) **The mass and molar specific heats at constant volume and pressure for the mixture**

(iv) **The adiabatic constant (specific heat ratios) for the mixture γ_m**

(v) **The partial pressure of each constituent when the total pressure is 1.5 bar**

(vi) **The density of the mixture at 1.5 bar and 15 °C.**

(c_p for (N_2), (O_2), (CO_2), and (CO) are 1.04, 0.918, 0.846, and 1.041 kJ/kg K, respectively)

[20 marks]

Course Title: Engineering Mathematics (2) b — First Year (Mechanical Engineering)
Course Code: PME1206 — Date:30 / 5 / 2013 (Second term) — Allowed time: 3 hrs — No. of Pages: (2)

Remarks: (Answer the following questions. Assume any missing data…)

Problem number 1 (20 Mark)

a) Plot the function $f(x) = \begin{cases} 0 & , -\pi<x<0 \\ x/2 & , 0<x<\pi \end{cases}$, where $f(x+2\pi) = f(x)$

and then find its corresponding Fourier series. [10 Mark]

b) Find the Fourier sine series of the function

$f(x) = x + \sin(2x)$, $-\pi < x < \pi$ [10 Mark]

Problem number 2 (30 Mark)

a) For Laplace transform of $f(t)$, $F(s) = \int_0^\infty e^{-st} f(t)\, dt$ [5 Mark]

If (s) is a real number, what is the condition for this Laplace transform to exist (to be convergence)?

b) Find Laplace transform of the function: [10 Mark]

$$f(t) = \begin{cases} 0 & , 0 \le t < 4 \\ t^2 & , t \gg 4 \end{cases}$$

c) Find Inverse Laplace transform: $L^{-1}[1/(s^2+6s+25)]$ [5 Mark]

d) Solve the following O.D.E. using Laplace : [10 Mark]

$y' - 2y = 5e^{2t}$, $y(0) = 1$

Problem number 3 (20 Mark)

a) Obtain the P.D.E whose solution is

$U(x,y)=F(8x-4iy)+G(y)$
$U(x,y)=e^x \cdot F(2x-3y)+ 3xy^2-7$

b) Solve the following P.D.Es:

- $u_{yy} = \frac{y \sinh(y)}{x+1} + \frac{1}{y} + 6$
- $u_{xy} + 3u_x = 2x+y$
- $u_{xx} + u_{yy} = 0$
- $u_{xx} = u_{tt}$ where $u(x,0) = 0$, $u_t(x,0) = \frac{1}{x^2+1}$

Problem number 4 (30 Mark)

a) Derive the solution of the following B.V.P. (Wave equation):

$u_{xx} = \frac{1}{c^2} u_{tt}$, $0 \le x \le a$, $t \ge 0$, $u(x,0) = f(x)$, $u_t(x,0) = g(x)\ \forall x$,

$u(0,t) = u(a,t) = 0$, $\forall\ t$, where $f(x)$ and $g(x)$ are given functions and a is a given constant.

b) Solve the wave equation $u_{xx} = u_{tt}$,

$0 \le x \le 3$, $t \ge 0$, $u(x,0) = 0$, $u_t(x,0) = 2sinsh(4\pi x)$, $u(0,t) = u(3,t) = 0$.

c) Solve the following system of O.D.Es: $x' = \begin{pmatrix} 2 & -1 \\ -2 & 1 \end{pmatrix} x + \begin{pmatrix} 1 \\ 0 \end{pmatrix}$

All best wishes

Dr .Mohammed Ali, Dr. Yasser Gamiel

and Examination Committee