TANTA UNIVERSITY
FACULTY of ENGINEERING
Department of ELECTRICAL POWER AND MACHINES ENGINEERING
EXAMINATION (1ST YEAR) STUDENTS OF MECHANICAL ENGINEERING

COURSE TITLE: ELECTRICAL AND ELECTRONIC ENG.			COURSE CODE: EPM1241
DATE: 12/06/2016	TERM: SECOUND	TOTAL ASSESSMENT MARKS: 75	TIME ALLOWED: 3 HOURS

*Notes: Any data not given is to be assumed – **Answer ALL the following questions***

Problem number (1) (20 Marks)

1- A For the circuit shown in Fig. 1,
i. Write the nodal voltage equations,
ii. Write the mesh current equations,
iii. Solve for mesh current then determine the power dissipated in each resistor.

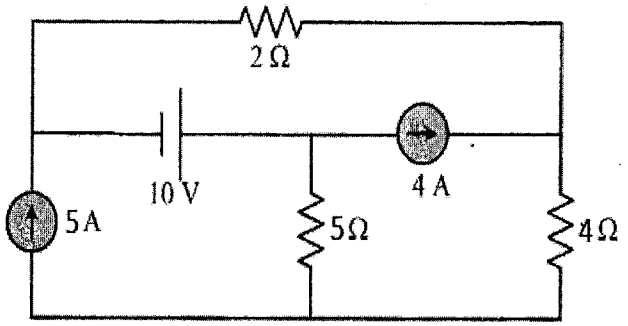

Fig. 1

1- B Determine the voltage V for the circuit shown in Fig. 2 using the source transformation. How much power does the 36A source deliver to the circuit?

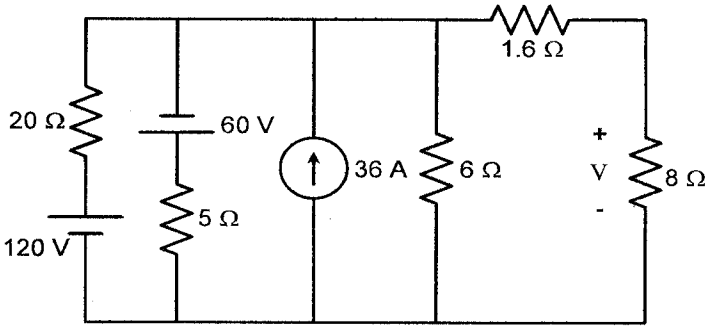

Fig. 2

Problem number (2) (20 Marks)

2- A For the circuit shown in Figure (3), use superposition to find the sinusoidal expression of inductor current. (Take frequency with 50Hz)

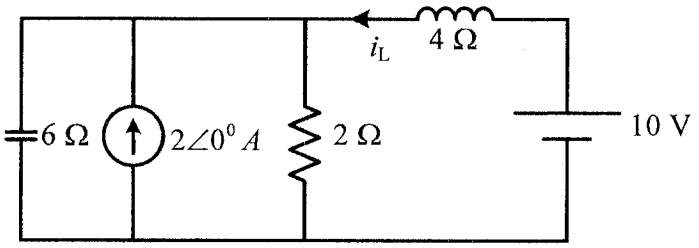

Fig. 3

2- B For the circuit shown in Fig. 4, find the Thévenin and Norton equivalent circuits to circuit external 6 Ω resistor, then calculate the power dissipated through it.

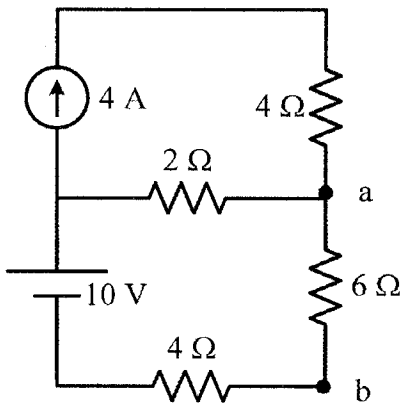

Fig. 4

Problem number (3) **(20 Marks)**

3-A For the circuit shown in Fig. 5, find Z_T, I_T, I_2 and I_3.

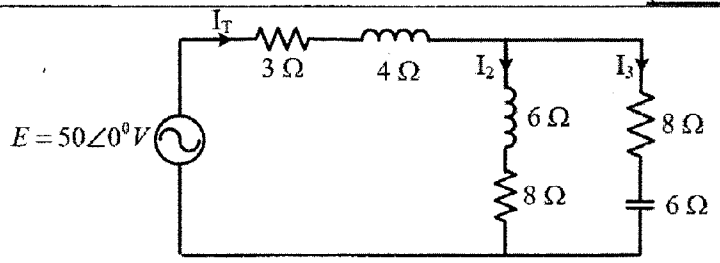

Fig. 5

3-B Apply node voltage method to the circuit shown in Fig. 6; and determine branch currents I_o, I_x and I_y.

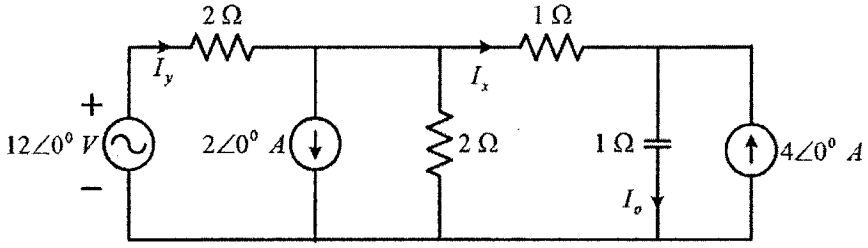

Fig. 6

3-C Write down the mesh current equations for the circuit shown in Fig. 7. Solve for mesh current and determine the power loss in 4 W resistor.

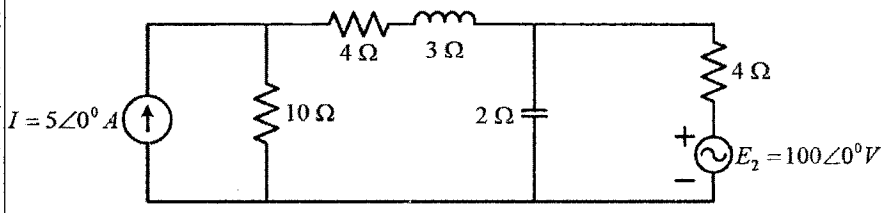

Fig. 7

Problem number (4) **(15 Marks)**

4-A For the circuit shown in Fig. 8, (a) sketch the waveforms of v_p, v_s, v_o, and i_o; (b) calculate the average value and the RMS of output voltage. Considering that:

$v_p\ (t) = 100 \sin (wt)$;

the transformer turns ratio is 1:2 and the value of output resistance is 10 Ω.

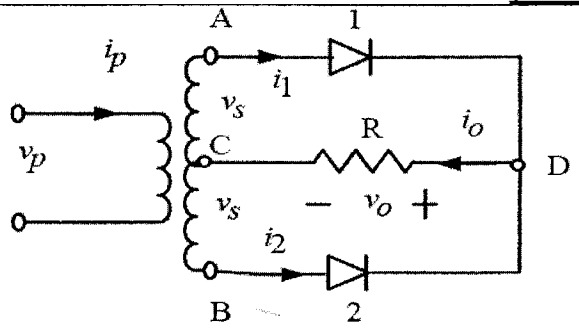

Fig. 8

4-B For the circuit shown in Fig. 9. Find the total number of watts, the total number of VAR, the total number of VA and input power factor.

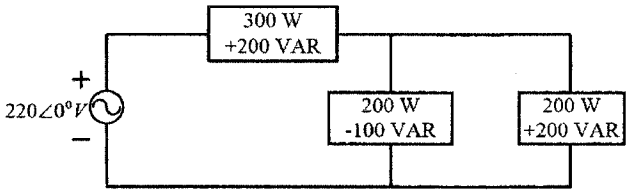

Fig. 9

Good Luck

Course Examination Committee:

1. Dr. Mohamed Abo Elazm
2. Dr. Hossam A. Saleh

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Tanta University | Department: Mechanical Power Engineering | Faculty of Engineering

Final Exam
Total Marks 40

Course Title: Technical Reports	Course Code : MEP 12H4	Year : 1st
Date: June 5th 2016 (Second Term)	Allowed Time : 2 Hours	No. of Pages: (2)

Question Number (1) (20 Marks/ 2 Mark for each term)

Compare between each pair of the following expressions:

1. Technical writing	Academic writing
2. CV, curriculum vitae	Resume
3. Pie chart	Histograms
4. Writing the rough draft	Revising the rough draft
5. Summary	Abstract
6. Report Front Matter	Report Back Matter
7. Report checklist	Report outline
8. Laboratory report	Research Report
9. Chain communication network	Connected communication network
10. Chronological CV	Skills CV

Question Number (2) (10 Marks / 2 Mark for each Sub-question)

1. Enlighten the benefits of the written communication, and give examples for that type of communication.
2. When write your CV, you need to tailor your CV to each position you apply for. Explain with example.
3. "A picture is worth a thousand words". Comment on the previous statement by relating the role of illustrations in technical writing.
4. From your study for Technical writing course describe "how to make a great presentation"?
5. Define why the "outlining stage" in report writing is a natural progression from the "data analysis and sorting stage".

الامتحان مكون من ورقة واحدة ذات وجهين

Tanta University | Department: Mechanical Power Engineering | Faculty of Engineering

Final Exam
Total Marks 40

Select one question only from the following Questions:
(Select Question (3) or Question (4))

Question Number (3) (10 Marks/2 Marks for each statement)

Read carefully and mark the following statements with true or false (correct the faults in case of false statements)

1. Oral communication is necessary for legal and binding documentation.
2. When you write a report, write the front and back matter of the report first. Then write the body of the report.
3. The Appendixes section is the place where the author cites all of the research sources that were used in the report.
4. The purpose of the personal profile is to make sure that the CV arrives on the desk of the correct person.
5. In the chain communication network decision making may be slow and poor as it lacks coordination.

Question Number (4) (10 Marks/2 Marks for each statement)

Choose the correct answer to fill each space in the following statements:

1. In the chain communication network (one person – Two persons – all persons) passes information to others who then passes it on.
2. (Unsolicited – solicited -recommendation proposals), Have less chance of being accepted by organizations.
3. (Presentations – Proposals – Abstract) Are interpersonal performances in which concise technical information is provided to an attending audience.
4. (Feasibility reports – project reports – research reports) are objective documents that identify and evaluate solutions to problems.
5. During the (data gathering stage – sorting data – analyzing data) stage we consider how the data should be presented in the report and record the results in this manner.

انتهت الاسئلة

With my best wishes: *Dr. Eng. Hagar Alm ElDin Bastawissi*

الامتحان مكون من ورقة واحدة ذات وجهين

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

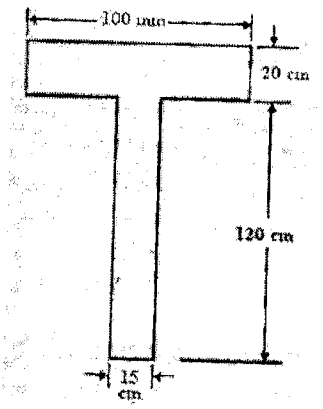
Dept	Mechanical Engineering	Date	9/6/2016
Year	1st, (new curriculum) 2005	Allowed time	3 hrs
Final exam	June (second term)	Total marks	85 Marks
		Academic Number	2015/2016

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

Question (1) (22 marks)

For T-section shown in Fig. Determine:

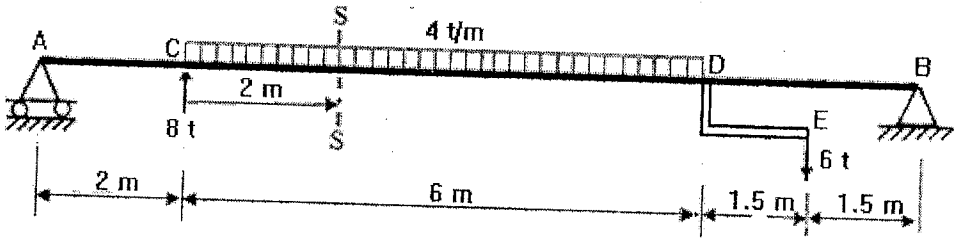
- The moment of inertia about the centroid axis.
- The principle moment of inertia about the centroid axis.
- Direction of principle axes about the centroid axis.
- The moment of inertia about an axes making 20° clock wise with respect to the centroid.
- Check by using Mohr's circle.



Question (2) (14 marks)

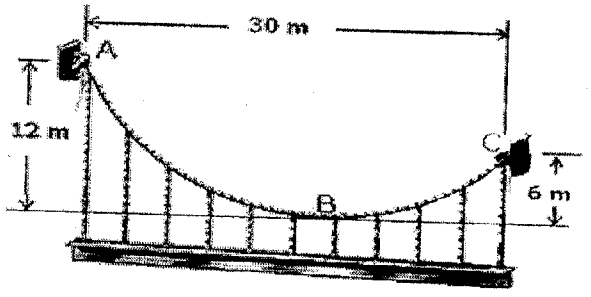
For the beam structure shown in Fig.

- Draw the diagram of internal forces (N.F.D, S.F.D and B.M.D).
- Calculate the shear force (Q) and bending moment (M) at section S-S.
- Find the magnitude and position of maximum values of the bending moments



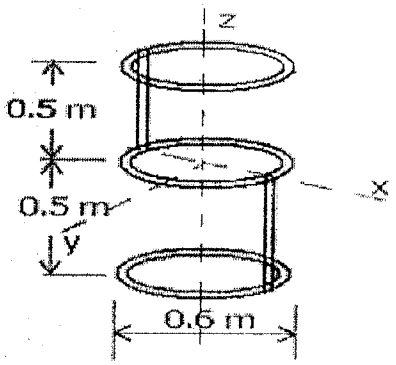
Question (3) (13 marks)

The cable supports a girder which weighs 12kN/m. Determine the tension in the cable at points A, B & C. Also find the length of the cable



Question (4) (13 marks)

Figure consists of two slender homogeneous rods and three homogeneous rings. If the density per unit length of both rods and rings are 1.5 kg/m. find the mass moment of inertia about: (a) x-axis, (b) y-axis, and (c) z-axis.



Question (5) (23 marks)

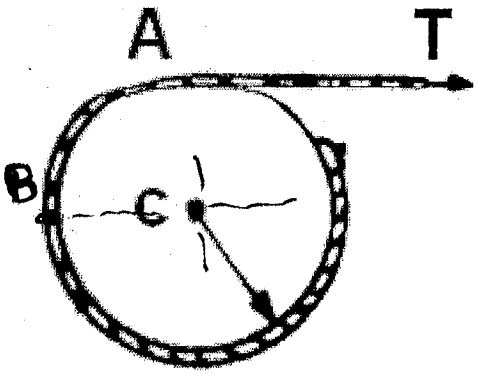
A cord is wrapped around a homogeneous sphere of radius r=0.5 m and mass m=15 kg. If the cord is pulled with a force T. if the magnitude of the angular acceleration of the sphere is 55 rad/s^2 , determine the following:

a- The acceleration of the centre of the sphere,

b- The magnitude of the force T,

c- The acceleration of the cord,

d- The velocity and acceleration of the point B.



All the best

Dr. Yasser EL-Samadony

Dr. Mohamed Abd Elgaied

Tanta University	Department: Mechanical Power Engineering	Faculty of Engineering
Course Title:Thermodynamic (1)	Course Code: MEP1202	1rd : years
Date: 2– 6 – 2015	Allowed time: 3hrs Full Marks: 90	No of Pages: 2
Name: Prof. Dr. AbdElnabyKabeel; Dr. Mohamed AbdElgaied Ahmed		Final Exam

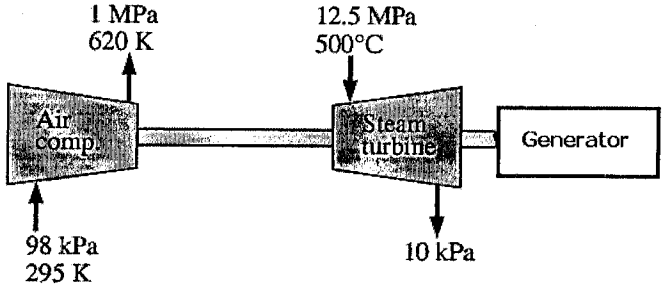
Answer the following questions: يسمح للطالب باستخدام جداول البخار و خريطة البخار

Marks

Question No. 1 (17)

a) Draw the P-v diagram of a substance that contracts on freezing.

b) An adiabatic air compressor is to be powered by a direct-coupled adiabatic steam turbine that is also driving a generator. Steam enters the turbine at 12.5 MPa and 500°C at a rate of 25 kg/s and exits at 10 kPa and a quality of 0.92. Air enters the compressor at 98 kPa and 295 K at a rate of 10 kg/s and exits at 1 MPa and 620 K. Determine the net power delivered to the generator by the turbine.

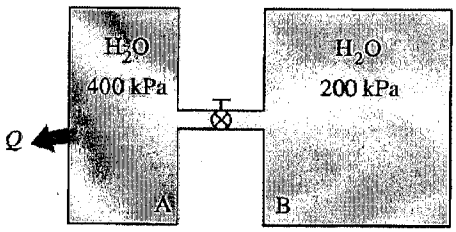


Question No. 2 (20)

a) For the polytropic process prove that:

$$Q = m(T_1 - T_2)\left[\frac{C_p - nC_v}{n-1}\right]$$

b) Two rigid tanks are connected by a valve. Tank A contains 0.2 m^3 of water at 400 kPa and 80 percent quality. Tank B contains 0.5 m^3 of water at 200 kPa and 250°C. The valve is now opened, and the two tanks eventually come to the same state. Determine the pressure and the amount of heat transfer when the system reaches thermal equilibrium with the surroundings at 25°C.



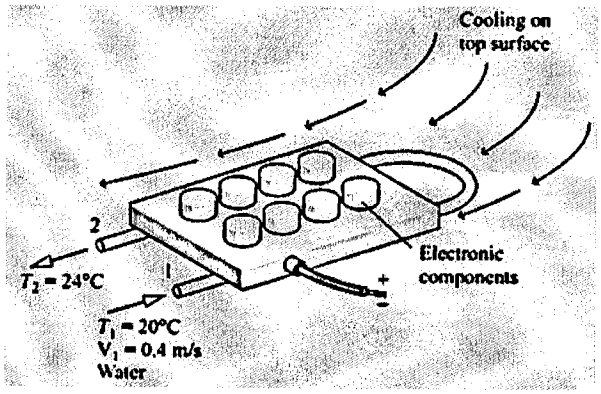
Question No. 3 (18)

a) For the adiabatic process prove that:

$$\frac{T_2}{T_1} = \left(\frac{P_2}{P_1}\right)^{\frac{\gamma-1}{\gamma}} = \left(\frac{V_1}{V_2}\right)^{\gamma-1}$$

a) As shown in Fig., electronic components mounted on a flat plate are cooled by air

flowing over the top surface and by liquid water circulating through a U-tube bonded to the plate. At steady state, water enters the tube at 20 °C and a velocity of 0.4 m/s and exits at 24 °C with a negligible change in pressure. The electrical components receive 0.5 kW of electrical power. The rate of heat transfer from the top of the plate-mounted electronics is estimated to be 0.08 kW. Kinetic and potential energy effects can be ignored. Determine the tube diameter, in cm.



Question No. 4

a) For reciprocating compressor prove that volumetric efficiency (18)

$$\eta_{vd} = 1 + \frac{V_C}{V_s}\left(1 - \left(\frac{P_2}{P_1}\right)^{1/n}\right)$$

b) A quantity of gas occupying 0.14 m^3 at 9.65 bar and 371 °C is heated during a constant volume process until the pressure reaches 41.4 bar. The gas is then expanded adiabatically to a pressure of 2.76 bar. Given that R = 0.288 kJ/kg K and γ = 1.41 calculate:

(a) The temperature at the beginning of expansion.
(b) The temperature at the end of expansion.
(c) The heat energy supplied.
(d) The work energy transferred.

Question No. 5

The clearance volume of an air compressor is 6% of the stoke volume. The pressure and temperature of the air during the suction stroke is 0.965 bar and 32°C respectively, and delivery pressure is 6.2 bar. The compression and re-expansion curves follow the law $PV^{1.25}$ = constant, and the atmosphere air conditions are 1.013 bar and 15.5 °C.Take the cylinder diameter 250 mm and stroke length 300 mm. Determine: (17)

(a) The diagram volumetric efficiency.
(b) The volumetric efficiency referred to the atmospheric conditions.
(c) The work done per kg of air.

***Good luck. ***

Tanta University

Department: Engineering Physics and Mathematics
Total Marks: 100 Marks

Faculty of Engineering

Course Title: Engineering Mathematics(2B)	Course Code: PME1207	Year: 1st Mechanical Eng.
Date: JUNE. 16th 2016 (2nd term)	Allowed time: 3 Hrs	No. of Pages: (2)

Remarks: Answer All of The Following Questions

PART I (50 MARKS)

Question Number 1 (50 Marks)

i) Plot the following function, then find its Fourier sine series. [20 Marks]

$$f(x) = \begin{cases} cosx & 0 \le x < \frac{\pi}{2}, \\ 0 & \frac{\pi}{2} \le x < \pi. \end{cases} \quad , \; H.P. = \pi.$$

ii) Find Laplace transform of the following functions: [10 Marks]

a) $f(t) = \frac{1-e^{-t}}{t}$ *b)* $f(t) = sin^2 t$

iii) Find Inverse Laplace transform for: [10 Marks]

a) $\frac{1}{S^3(S+1)}$ *b)* $tan^{-1}(\frac{a}{S})$

iv) Solve the following O.D.E. using Laplace Transform: [10 Marks]

$$y'' - 3y = 5e^{2t}, \quad y(0) = 0, \quad y'(0) = 6.$$

PART II (50 MARKS)

Question Number (2) (every item has 10 marks)

i) Show that the problem $u_x{}^2 + u_y{}^2 = 1,\ u(x,0) = 2x + 1,$ *does not have a solution.*

ii) For the following linear PDE

$$u_{xx} - 3u_{xy} + u_{yy} - x = 0.$$

a) Determine the nature of the equation,
b) Reduce the equation to canonical form,
c) Find the general solution if it is possible.

P.T.O.

iii) Find the general solution of the system

$$\frac{dX}{dt} = \begin{bmatrix} 1 & -1 \\ 1 & 3 \end{bmatrix} X.$$

iv) Use the technique of separation of variables to solve the following initial-boundary value problem (the heat equation)

$$u_t - u_{xx} = 0, \quad 0 < x < 1, \quad t > 0,$$

subjected to the following initial-boundary conditions

$$u(0,t) = 0,$$
$$u(1,t) = 0,$$
$$u(x,0) = 1.$$

v) The one-dimensional adiabatic flow equations are governed by

$$\rho u_t + \rho u u_x + c^2 \rho_x = 0, \qquad c^2 = \frac{dp}{d\rho},$$

where, u is the velocity of the flow , ρ is the density and p is the pressure. Deduce the distribution of the flow velocity in x-t space if the pressure is assumed to be a constant value.

With Best Wishes

Course Examination Committee and Course Coordinators

Dr. Eng. Mohamed Elborhamy Dr. Eng. Yaser Gamiel

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Tanta University

Department: Production Engineering & Mechanical Design
Total marks: 90 Marks

Faculty of Engineering

Course Title: Strength and Testing Materials
Course Code: MPD1206
Year: 1st year Mechanics

Date: 29-5 -2016
Allowed time: 3 hrs.
No. Of pages: 2

Answer the following questions: (Assume any missing data)

Q1. **(15 marks)**

1. Explain the cold bending test. Which property is measured by this test?
2. A bending test was made on a metallic beam with span **90** cm and square-section. The beam was loaded with a concentrated load at its mid-span. If the modulus of elasticity of the beam material is **450** tons/cm^2 and the readings of load and deflection in the middle of the span beam mm as follows:

Load (**kg**)	0	24	48	72	108	144	192	216	240	264
Deflection (**mm**)	0	0.32	0.64	0.96	1.44	1.92	2.56	2.93	3.3	3.79

Appointed the following:

a) The load – deflection curve.
b) Dimensions of the beam section
c) Proportional limit stress.
d) Modulus of rupture.
e) Modulus of toughness.
f) Modulus of resilience.

Q2. **(20 marks)**

a. Draw a neat sketch of any universal testing machine, explaining how to measure the load.

b. A tension test is made on a sample of steel and the diameter of the sample was d = **1.2** cm. The maximum strain are **0.34** and **0.30** for lengths of **5 d** and **10 d** respectively were measured. In a tension test on a sample of another type of steel with the same diameter and a gauge length of **4 d** the maximum strain was **0.39**. Determine which type of steel is more ductile?

c. A steel rod of diameter **1.25** cm and **15** cm long is fit into a copper tube with outside diameter of **2** cm. The tube is longer than the bar by **0.002** cm and has an internal diameter of **1.25** cm. Both ends of the tube are closed with two rigid plates. Identify the axial stress in the rod when an axial load of capacity **2** tons is subjected to the panels, noting that:

- Modulus of elasticity of steel = **2100** tons/cm^2
- Modulus of elasticity of copper = **1100** tons/cm^2

Q3. **(15 marks)**

1) What are the types of shear tests? Explain two of these types in detail.
2) A hollow shaft has an inner diameter of **15** cm and outer diameter of **10** cm subjected to twisting moment.
   - What is the maximum twisting moment that can be applied on the shaft if the maximum allowable shear stress in the elastic region is **8** kg/mm^2?
   - What is the angle of twist between two sections in the shaft **4** m apart?
   - What is the diameter of a solid shaft subjected to same twisting moment and the maximum allowable shear stress in the elastic region is **8** kg/mm^2 .
   - What is the ratio between the weights of one meter length of the two shafts?

Q4. **(20 marks)**

a) What is wrong saying that the number of the Rockwell hardness equals 50?

b) Explain why the Brinell test is not suitable to test a cast iron sample with a ball indenter of **1** mm diameter.

c) A weight (W) falls from a height (h) = **40** in. on the free end of a cantilever having a length (L) of **5** ft. . The rectangular cross –section of the cantilever is 1 in. in width and 3 in. in height. The material made of the cantilever has a yield stress = **40** × **10**^{3} psi and modulus of elasticity (E) **30** × **10**^{6} psi. Identify the value of the weight W to cause yielding.

Q5. **(20 marks)**

a) Define endurance limit? indentify your answer with drawing?

b) A Brinell hardness test is applied on a steel sample using a **10** mm diameter ball. The indentation mark has a diameter of **4.96** cm. Get the Brinell number and the approximate values for the tensile resistance and endurance limit if the yield stress equals **36** kg/mm^2. Also, determine the least possible dimensions of the sample being tested. A part made of the same steel subjected to a fixed bending moment of **1000** kg.cm.. Get the diameter of that part if the factor of safety is **3** using Smith fatigue strength diagram.

Dr. Eng. Maher Rashad El-Sadaty