



Course Title: Engineering Mathematics(2B)
Date: MAY. 8th 2014 (Secondterm)

Course Code: PME1207
Allowed time: 3 Hrs No. of Pages: (2)

Year: 1st year of Mechanical Eng

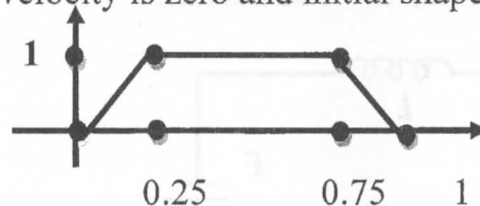
Remarks: Answer The Following Questions

Question Number (1) (24 Marks)

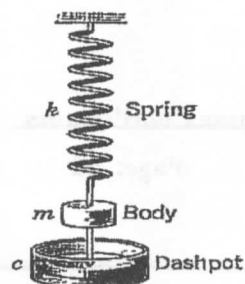
- (a) Solve $yu_{xy} + u = 3x + 7y$ with B.C $u(x,1) = x^2$, $u(0,y) = e^y$ (6 Marks)
- (b) Solve $u_{xx} - 6u_{xy} + 9u_{yy} = 0$ with B.C $u(x,0) = e^x$ and $u(0,y) = y^3 + e^y$ (6 Marks)
- (c) By use characteristic equation reduce the P.D.E to standard form and solve it $xu_{xx} - yu_{xy} + u_x = 0$ (6 Marks)
- (d) Solve by use separation of variable method for one dimension heat equation $u_t = 4u_{xx}$ of string with length $L = \pi$, and initial temperature $U(x,0) = x$ $0 \leq x \leq \pi$ (6 Marks)

Question Number (2) (24 Marks)

- (a) Show that the mathematical modeling of the deflection $u(x,t)$ for elastic vibrating string with end fixed is $u_{tt} = k^2 u_{xx}$ (6 Marks)
- (b) Find the deflection of vibrating string with length $L=1$ and $k^2 = 1$, When the initial velocity is zero and initial shape as in figure



- (c) Show that the mathematical modeling of the temperature distributions $u(x,t)$ for one dimension heat equation of string with length L , specific heat C , mass density ρ and thermal conductivity k_0 is $u_t = k^2 u_{xx}$ where $k^2 = \frac{k_0}{c\rho}$ (6 Marks)
- (d) Consider a mass-spring system as in figure. Use Hook's law to find the displacement $X(t)$ at any time by use matrix solution form if $K=90$ (spring constant), $C=100\text{kg/sec}$ (damping constant), $m=10$ (mass), initial velocity and displacement are $X'(0)=10$, $X(0)=1$ (6 Marks)

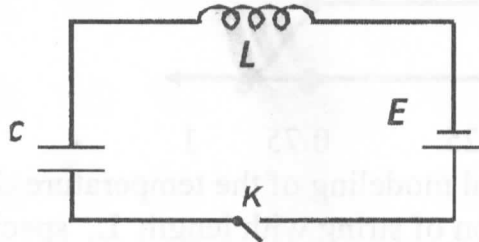


Question Number (3) (26 Marks)

- (a) Given: $f(x) = \begin{cases} -1, & -\pi < x < 0 \\ 1, & 0 < x < \pi \end{cases}$. Find the Fourier series of $f(x)$. (9 Marks)
- (b) Determine the Laplace transform: $\mathcal{L}\left\{t \cos(3t) + \frac{\sin(t)}{t} + t^3 e^{2t}\right\}$ (9 Marks)
- (c) Obtain the inverse Laplace transform: $\mathcal{L}^{-1}\left\{\frac{s+5}{s^2+6s+9} + \frac{1}{s-4} - \frac{1}{s+4}\right\}$. (8 Marks)

Question Number (4) (26 Marks)

- (a) Expand $f(x) = \sin x$, $0 < x < \pi$, in a cosine Fourier series. (9 Marks)
- (b) Given: $f(t) * g(t) = \int_{x=0}^t f(x) g(t-x) dx$. Prove that:
 $F(S) G(S) = \mathcal{L}\{f(t) * g(t)\}$. (9 Marks)
- (c) The charge on the capacitor in the circuit of the shown figure is 5 *Coulombs*. If the switch K is closed at time $t = 0$, find the charge and the current at any time by using Laplace transform. Given:
 $E = 2e^{-3t}$, $L = 2$ *Henries*, $c = 0.02$ *Farads*. (8Marks)



Course Examination Committee and Course Coordinators



Course Title: TECHNICAL WRITING
Date: June 2014 (Second Term)

Course Code : MEP 12H4
Allowed Time : 2 hrs

Year : 1st
No. of Pages: (2)

Remarks: (Answer all the following questions)

Open Book Exam (يصرح باستخدام الكتاب فقط داخل الامتحان)

Question Number (1)

(20 Marks)

- I. Mark the following sentences with True or False. (10 MARKS/ 1 Mark for each Sentence)
- In the analyzing and sorting stage of report writing attention is directed to how results should be presented.
 - Data gathering process in the report writing is a natural progression from the Analysis and sorting stage.
 - In the first version of the rough draft, writing style becomes important.
 - We use the term "figure" to refer to any type of format that can be typeset or presented with spreadsheet or tabular programs
 - The second review of the rough draft is of spelling and grammar, particularly punctuation and sentence structure.
 - Technical writers should inject personal bias into their reports.
 - Resumes generally used for academic positions as it includes publications, conferences, etc.
 - In the Chronological CV one should present skills necessary for the job are highlighted.
 - Technical writing is a type of expository writing this is used to invite differing interpretations.
 - The technical report back matter provides information that is needed to catalog the report for bibliographic databases.
- II. Explain with clear drawings when possible the difference between each of the following pair of expressions: (10 MARKS/ 2 Marks for each Pair of expressions)
- Feasibility Reports - Recommendation Reports
 - Technical report Appendixes - Technical report References.
 - Oral Communication - written communications.
 - Covering letters – Application Forums.
 - Wheel communication network- connected communication network



Question Number (2)

(20 Marks)

I. Match the expressions below with the empty spaces in the following sentences:

Hint: Each sentence empty space should match one expression, you need not to use all presented expressions. You can use one expression several times:

(15 MARKS / 1.5 Mark for each sentence)

- a) In the.....Communication cycle Decision making may be slow and poor as it lacks coordination.
- b) describe the various tasks that make up the project and analyze the progress that has been made toward completing each task.
- c)is defined as any unplanned interference in the communication environment which causes hindrance in the transmission of the message.
- d) Of the technical report indicates the extent and limits of the investigation
- e) Improving the Skills can be done by improving observing skills, and observing and interpreting nonverbal communications.
- f) Persons and organizations that write effectivewin grants, contracts, and jobs.
- g) In a you need to tell the reader three things: the problem you are solving, the solution you are implementing, and how well you are doing
- h)are research oriented documents, meaning that they start with a hypothesis or theory that needs to be applied and tested under highly controlled conditions.
- i) are words or phrases used in place of what really needs to be said.
- j) is imposing a personal opinion or proclivity in your writing.

CV – Subject - laboratory reports - Noise – Euphemisms - Scope – Bias – sender – communication – Wheel- Proposals – Cycle – Progress report – Recommendation report

II. Identify briefly the reasons of using Illustrations in technical writing. (2.5 MARKS)

III. Explain briefly how could you build your resume (C.V)? (2.5 MARKS)

انتهت الاسئلة

With my best wishes:

Dr. Eng. Hagar Am El Din Bastawissi and committee

الامتحان النهائي : 2013-2014

أحط الجواب النهائي لكل مطلوب بمستطيل ، واكتب الى جواره رقم السؤال ورقم الفرع .

السؤال الأول

1. أوجد المقاومة المكافئة. بين النقطتين a , b في دائرة الشكل 1- أ .
2. أوجد فرق الجهد بين النقطتين a , b في دائرة الشكل 1- أ باستخدام نظرية العقد .
3. أوجد التيار I في دائرة الشكل 1- ب باستخدام نظرية التراكب .
4. بعد تحويل مصدر الجهد الثابت في دائرة الشكل 1- ج الى مصدر تيار ثابت , أوجد التيار I_t .
5. مستفيدا من بعض او كل ما أوجدته فيما سبق أوجد التيار I_t في دائرة الشكل 1- ج , مرة باستخدام نظرية ثفنن وأخرى باستخدام نظرية نورتن وذلك بشرط ومن خلال كتابة معادلة واحدة في كل مرة .

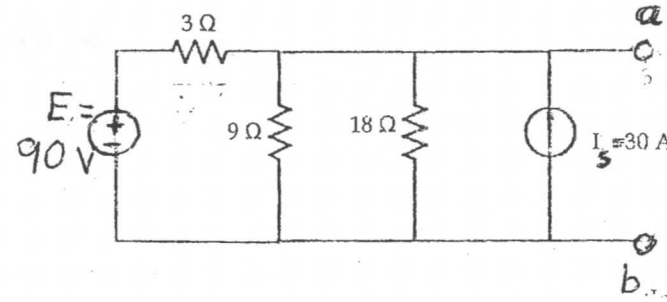
السؤال الثاني

- بأخذ جهد المصدر (الذي تردده 50 هيرتز) في دائرة الشكل 2 مرجعا حيث التيارات بالأمبير والممانعات بالأوم : $X_A = -j41.666$, $X_B = -j40$, $R_B = 30$, $I_A = 6$, $I_t = 9.898$ at 45°
1. كافة التيارات و الممانعة المجهولة .
 2. الممانعة المكافئة التي اذا وصلت عبر الدائرة الموضحة في الشكل 2 لأصبح تيار المصدر يعامل قدرة الوحدة . أوجد أيضا تيار المصدر في هذه الحالة .

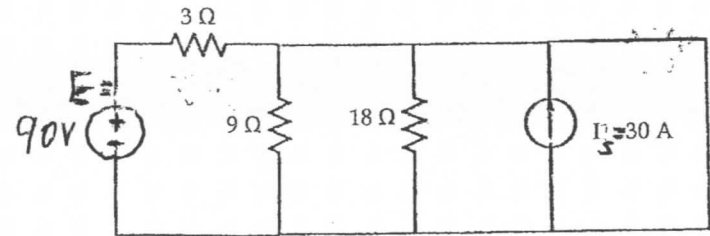
السؤال الثالث

1. ارسم دائرة مكبر ذى ترانزستور واحد في وضع الباعث المشترك شاملا المكثفات والمقاومات و مصدر التيار المستمر اللازم للتشغيل .
2. اكتب معادلات توضح كيفية حساب المقاومات في دائرة الفرع 1 على ان تكتب الرموز المستخدمة في المعادلات على الرسم .
3. اشرح فوائد المكثفات في دائرة الفرع 1 .
4. اكتب معادلة توضح تغير تيار القاعدة مع الزمن في دائرة الفرع 1 .

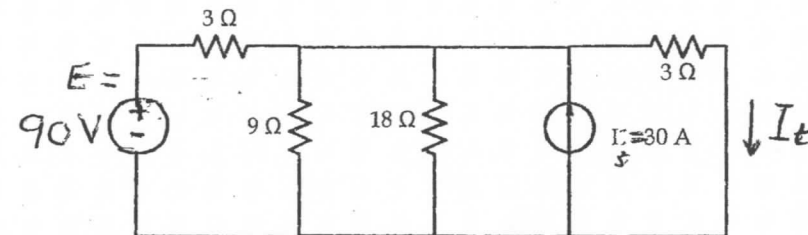
5. استخدمت 4 ثنائيات شبه موصلة في دائرة مقوم قنطري . يمكن اعتبارالمقاومة العكسية لكل ثنائي لا نهائية. والمقاومة الأمامية له 0.05 أوم . تجهز القنطرة تيارا قيمته المتوسطة 10 امبير الى حمل مقاومي من مصدر جهد متغير جيبييا مع الزمن بقيمة فعالة (ج.م.ت) 12 فولت . أرسم دالة تغير تيار الحمل مع الزمن ثم أوجد مقاومة الحمل وكفاءة الدائرة.



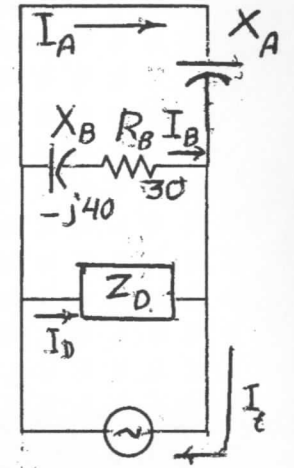
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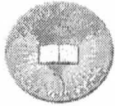

b



الشكل 1



الشكل 2

Tanta University		Mechanical Power Engineering Department Course Title: Applied Mechanics MEP 1201		Faculty Of Engineering
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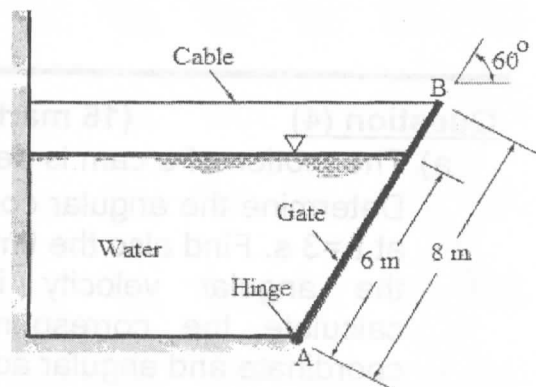
Dept **Mechanical Engineering**
Year **1st, (new curriculum) 2005**
Final exam **June (second term)**

Date **17/06/2014**
Allowed time **3 hrs**
Total marks **85 Marks**
Academic Number **2013/2014**

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

Question (1) (14 marks)

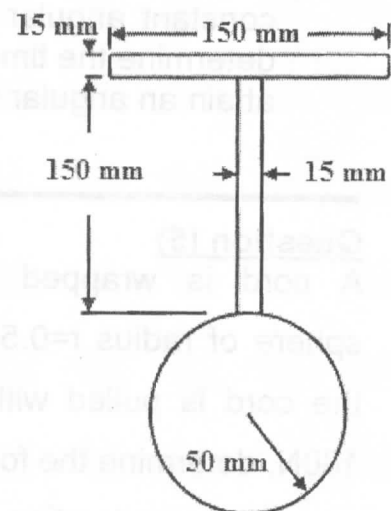
A homogeneous, 4 m wide, 8 m long rectangular gate is hinged at point A and held in place by a horizontal flexible cable through point B. Neglect the weight of the gate and friction in the hinge. Determine the tension in the cable.



Question (2) (20 marks)

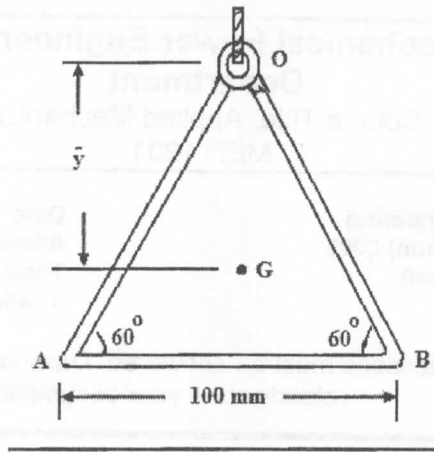
For the beam shown in Fig Determine:

- The moment of inertia about the centroid axis.
- The principal centroidal axes.
- The principal centroidal 2nd moment of inertia,
- The moment of inertia about an axes were made 20° clockwise with respect to the centroid.
- Check your results graphically by using Mohr's circle



Question (3) (16 marks)

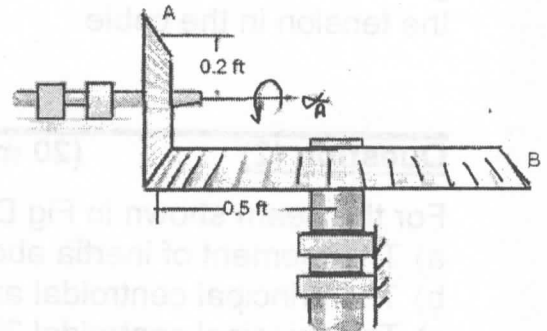
Determine the moment of inertia of the wire triangle about an axis perpendicular to the page and passing through point O. Also, locate the mass center G and determine the mass of inertia about an axis perpendicular to the page and passing through point G. The wire has a mass of 0.3 kg/m. Neglect the size of the ring at O.



Question (4) (16 marks)

a) The motion of a cam is defined by the relation, $\theta = 0.1t(12 - t^2)$ [rad, sec] Determine the angular coordinate, velocity and acceleration of the cam at $t_1=3$ s. Find also the time, t_2 , at which the angular velocity is zero and calculate the corresponding angular coordinate and angular acceleration

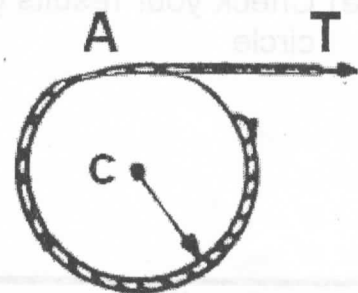
b) If gear A starts from rest and has a constant angular acceleration 2 rad/s^2 , determine the time needed for gear B to attain an angular velocity 50 rad/s



Question (5) (19 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 of magnitude 180N , determine the following:

- a- The acceleration of the centre of the disk
- b- The angular acceleration of the disk
- c- The acceleration of the cord



All the best

Dr. Yasser EL-Samadony

Dr. Mohamed Abd Elgaied

Final Exam of Strength and Materials Testing

Solve all of the following questions in the two pages

You may answer in english as well as in arabic

Question 1 : (25 marks)

- Discuss the effect of the following factors on the mechanical properties of steel:
Carbon content – Temperature – Test speed
- Explain how can we determine the Unwin's constants experimentally.
- A tension test is performed on a specimen of steel with a circular cross-section of diameter 12.625 mm and gauge length 5 cm. The readings of load and associated elongation were as following:

load (ton)	0	1.6	2.5	3.6	3.3	4	4.7	5.3	5.5	5.0	4
elongation (mm)	0	0.03	0.05	0.08	0.45	2.0	2.0	8.0	12	15	17

Draw the load-deformation curve and hence identify:

yield stress – tensile strength – elongation percentage – modulus of elasticity – modulus of resilience – modulus of toughness – percentage of area reduction if the fracture diameter was 7.15 mm.

Question 2 : (20 marks)

- Estimate the slope angle of fracture plane in compression.
- Explain the different of bend tests and the reason for each test.
- A bending test is done on a sample of simply supported beam of metallic material of rectangular cross-section with width 2 cm and depth of 6 cm. The span was 100 cm. The beam was loaded at its midspan with a concentrated load till the fracture. The loads and deflections at the midspan were as following:

load (kg)	0	20	40	60	90	120	160	180	200	220
deflection (mm)	0	0.8	1.6	2.4	3.6	4.8	6.4	7.33	8.27	9.47

Draw the load-deflection curve and then identify:

proportional limit stress – modulus of rupture – modulus of elasticity in bending – modulus of resilience – modulus of toughness.

Question 3 : (25 marks)

- a) Define the following:
Fatigue strength – Fatigue limit – Endurance limit
- b) A Brinell hardness test is performed on a sample of steel using a ball of diameter 10 mm. The diameter of the indentation mark was 4.5 mm.
- What are the minimum dimensions of the specimen?
 - What is the Brinell number of the specimen?
 - Identify the approximate value of the ultimate strength and the endurance limit of the tested material. (take $\sigma_e \approx 0.5 \sigma_u$)
 - A machine part made of the same material is designed to withstand fluctuating axial load with a mean stress value of 10 kg/mm^2 . Identify the approximate value of the maximum and minimum allowable stress for this part using Noll and Lipson diagram, if the yield limit for the material was taken as 0.7 times the ultimate strength of the tested material.
 - Draw the fractured cross-section of the part.
- c) Differentiate between Charpy and Izod impact testing machines in terms of:
- Maximum machine capacity
 - Specimen dimension
 - Specimen fixation



Question 4 : (20 marks)

- a) What are the definitions of hardness? Why are the use of hardness tests preferred in the industry?
- b) Aluminum rod is 150 cm long with a 5 cm diameter circular cross-section is subjected to an axial shocked load moving with a speed of 12 m/s . What is the mass of the moving load necessary to cause yielding in the rod knowing that the yield stress is equivalent to 210 N/mm^2 , and modulus of elasticity $E = 7.25 \times 10^4 \text{ N/mm}^2$. Also get the equivalent static load and the corresponding contraction in the rod.

مع تمنياتنا بالتوفيق و النجاح

د. نادر الليثي

د. حنفى هنداوى

Tanta University		Department: Mechanical Power Engineering		Faculty of Engineering
Course Title: Thermodynamic (1)		Course Code: MEP 1202	1 st : years	
Date: - 6 - 2014	Allowed time: 3 hrs Full Marks: 90		No of Pages: 2	
Name: Prof. Dr. Abd Elnaby Kabeel; Dr. Mohamed Abd Elgaied Ahmed			Final Exam	

Answer the following questions:

يسمح للطلاب باستخدام جداول البخار

Marks

Question No. 1

(17)

- a) What the difference between:
- Intensive and extensive properties.
 - Critical and triple point.
 - Open and closed system.
- b) A piston-cylinder device contains 0.1 m³ of liquid water and 0.9 m³ of water vapor in equilibrium at 800 kPa. Heat is transferred at constant pressure until the temperature reaches 350°C.
- (a) What is the initial temperature of the water?
- (b) Determine the total mass of the water.
- (c) Calculate the final volume.
- (d) Show the process on a P-v and T-v diagrams with respect to saturation lines.

Question No. 2

(17)

- a) Draw the P-v diagram of a substance that contracts on freezing.
- b) A piston-cylinder device initially contains steam at 200 kPa, 200°C, and 0.5 m³. At this state, a linear spring ($F \propto x$) is touching the piston but exerts no force on it. Heat is now slowly transferred to the steam, causing the pressure and the volume to rise to 500 kPa and 0.6 m³, respectively. Show the process on a P-v diagram with respect to saturation lines and determine (a) the final temperature, (b) the work done by the steam, and (c) the total heat transferred.

Question No. 3

(18)

- a) For the adiabatic process prove that:

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

b) A well-insulated rigid tank contains 5 kg of a saturated liquid–vapor mixture of water at 100 kPa. Initially, three-quarters of the mass is in the liquid phase. An electric resistor placed in the tank is connected to a 110-V source and a current of 8 A flows through the resistor when the switch is turned on. Determine how long it will take to vaporize all the liquid in the tank. Also, show the process on a T-v diagram with respect to saturation lines.

Question No. 4

(20)

Consider a steam power plant that operates on a simple ideal cycle, and the mass flow rate of steam through the cycle is 35 kg/s. The operating conditions are shown in table.

Component	Inlet condition	Exit condition
Turbine	Pressure 10 MPa, Temperature 500 °C	Pressure 10 kPa, Quality 90 percent
Condenser	Pressure 10 kPa, Quality 90 percent	Pressure 10 kPa, Saturated liquid
Pump	Pressure 10 kPa, Saturated liquid	Pressure 10 MPa, Temperature 180 °C
Boiler	Pressure 10 MPa, Temperature 180 °C	Pressure 10 MPa, Temperature 500 °C

Determine: (a) turbine output power, (b) heat rejected from the condenser, (c) pump input power, and (d) heat added to the boiler.

Question No. 5

(18)

a) For the Polytropic process prove that:

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

b) A quantity of gas occupying 0.14 m³ 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 $\gamma = 1.41$ calculate:

- The temperature at the beginning of expansion.
- The temperature at the end of expansion.
- The heat energy supplied.
- The work energy transferred.

*****Good luck.*****