



جمهورية العراق
وزارة التعليم العالي والبحث العلمي
جامعة الفرات الأوسط التقنية
الكلية التقنية الهندسية / النجف



قسم هندسة تقنيات الطيران

المرحلة الأولى

أسئلة الامتحان النهائي للعام الدراسي

٢٠١٥-٢٠١٦

الدور الثاني

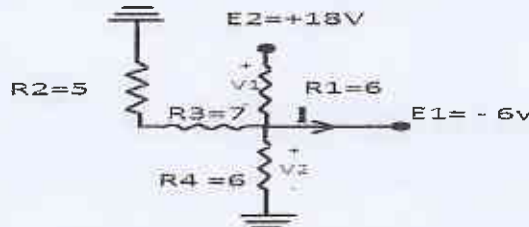
شعبة ضمان الجودة والإدارة الجامعية



Final examination 2015-2016

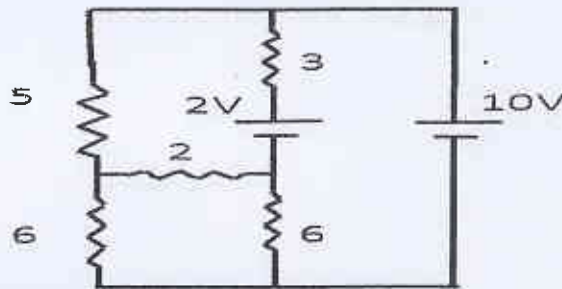
Note : Answer only four questions

Q1/ For the network shown ,determine the voltages v_1 , v_2 and the current I (25)

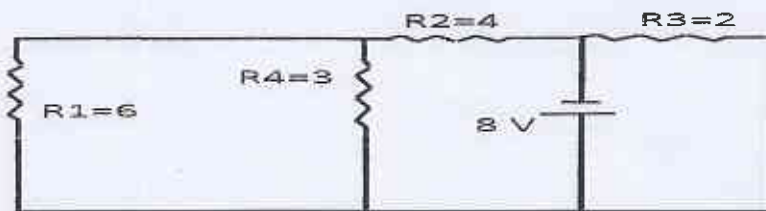


Q2/ a/ How much energy does a 100 watt electric bulb consume in 2 hours . (10)

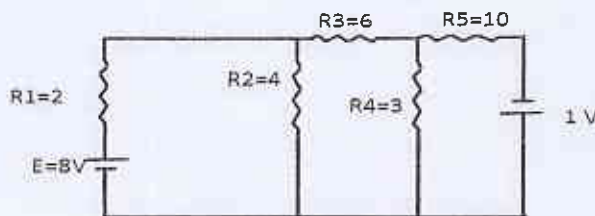
b/ determine the number of branches , nodes and independent loops in the circuit shown . (15)



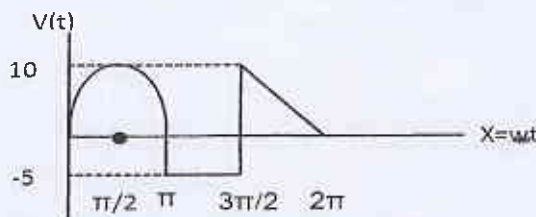
Q3 / Using Thevenin's theorem , find the current in the 3Ω resistor (25)



Q4/ Using Nodal's voltage method , find the voltage across the 3Ω resistor . (25)



Q5/ find the average value for the waveform shown (25)



مدرس القسم
 أ.م.د علي شاکر

الأستاذ المساعد الدكتور
 علي عبد العباس البكري

مدرس المادة
 محمد علي كريم

Technical College of Najaf

Subject: Properties of materials

Airplane Department

Class level: 1st Stage

Examiner: Oras khudayer

Second Attempt (2015-2016)

Time : 3 hrs.



Q1/ (A) Describe the meaning of Dislocations ? What are the factors that effects on the moving of the dislocations ? (7 D)

(B) What are some common point defects in a crystal lattice structure ? (6 D)

(C) Discuss the importance of control of graphite formation in cast irons ? (6D)

(D) Choose one only :-

(1) Explain briefly the difference between malleable and spheroidal graphite cast irons ? (7D)

(2) Choose an application for which either material might be suitable and put line the factors which would be considered in making a decision which to use ? (7 D)

(E) What considerations must be taken into account when choosing a tool material? How do carbon tool steel satisfy these requirements ? (14 D)

Q2/ Chromium and nickel , either singly or in combination , are added to steel in varying proportions to produce a range of now well established alloys .

Enumerate the most important of these alloys and discuss their properties and applications ? (20 D)

Q3/ (A) Write an essay on " The Joining of Metals" indicating clearly the essential differences between welded joints? (20 D)

Choose one only :-

(B) Describe the pressure – welding processes? (20 D)

(C) Which metals are normally pressure die cast? Describe one method of pressure die casting? (20 D)


Lecturer


Assist. Prof. Dr. Ali Sh. Baqir



Q1 \ Use MATLAB to evaluate (4 only):

(20 marks)

1. $A = (2\sqrt[3]{e^5} + 6 \log(\cos(3\pi)))^4$

2. $B = \sqrt[5]{\ln\left(\frac{\cot\left(\frac{3\pi}{2}\right)}{1+\cot\left(\frac{3\pi}{2}\right)}\right) + \sec\left(\frac{3\pi}{2}\right)}$

3. $Z = x^3y + y^3x + \left(\frac{x}{y}\right)^3$ at $x = 4, y = 3$

4. $S = [e^{2t} + t^3 \tan(4t)]\cos^2(3t)$ at $t = \pi$

5. $Y = \sqrt[3]{e^{2x} + e^{-3x}}$ at $x = -j\pi$

Q2 \ Write a program in MATLAB to plot the function $y(x)$ which is given by:

(20 marks)

$$y(x) = \begin{cases} \cos(x), & y > 0 \\ 0, & \text{otherwise} \end{cases} \quad x = 0: \frac{\pi}{2}: 3\pi$$

Q3 Write a program in the MATLAB to create matrix (F) 5-by-5 by using nested loops.

Each element of matrix can be found using the following expression:

(20 marks)

$$F(i,j) = \frac{3}{i^2 + j^2 - 2}$$

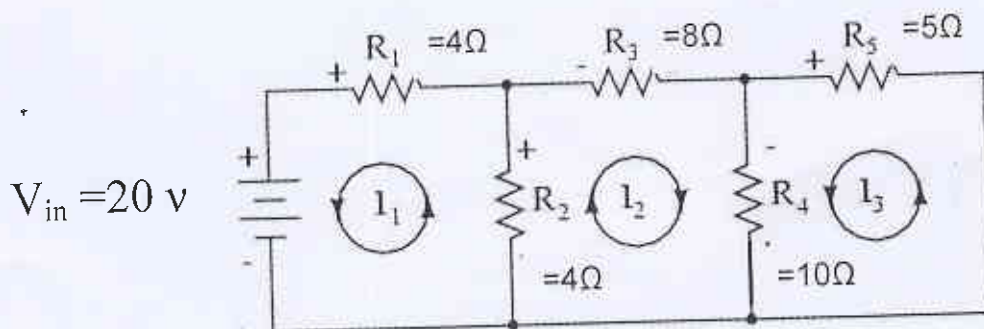
Q4\ For the electric circuit of figure below, the mesh equations are:

(20 marks)

$$8I_1 - 4I_2 = 20$$

$$22I_2 - 4I_1 - 10I_3 = 0$$

$$15I_3 - 10I_2 = 0$$



1. Use the inverse matrix method to compute the currents I_1 , I_2 and I_3 .
2. Calculate P_{in} & P_{out} . The formula of power is $P_{in} = V_{in} \cdot I_1$ & $P_{out} = I_3^2 \cdot R_5$

Q5 \ Plot the functions $y_1 = \sqrt{\ln(x)}$, $y_2 = \log x$ for $x = 0:0.1:100$ in one figure. (20 marks)

Use different colors and style, add label for both axes and title for your figure.

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Examiner

م.م. محمد جليل

Good Luck

Head of dept.

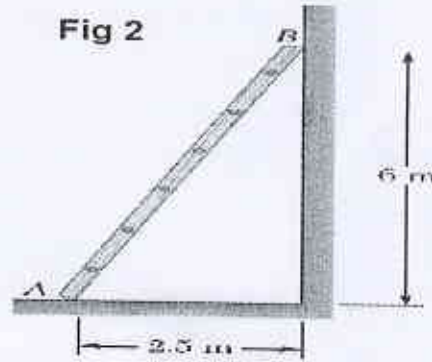
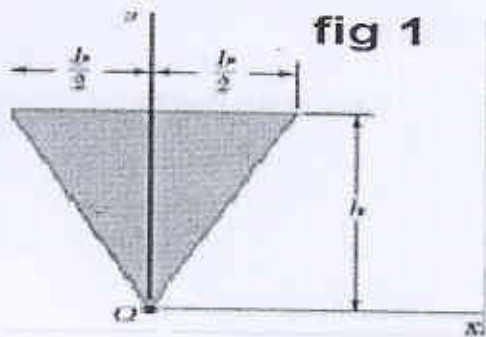
ا.م.د. علي شاكر



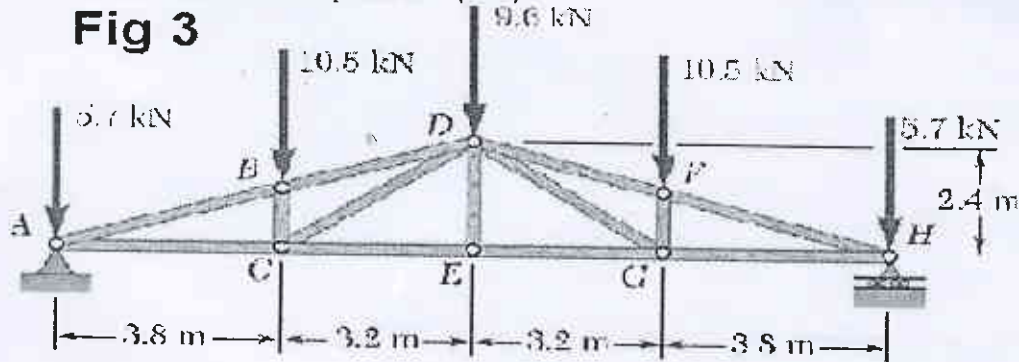
Attempt all questions

Q1) Determine the center and the polar moment of inertia of the isosceles triangle shown in Figure 1 with respect to Point O. (25D)

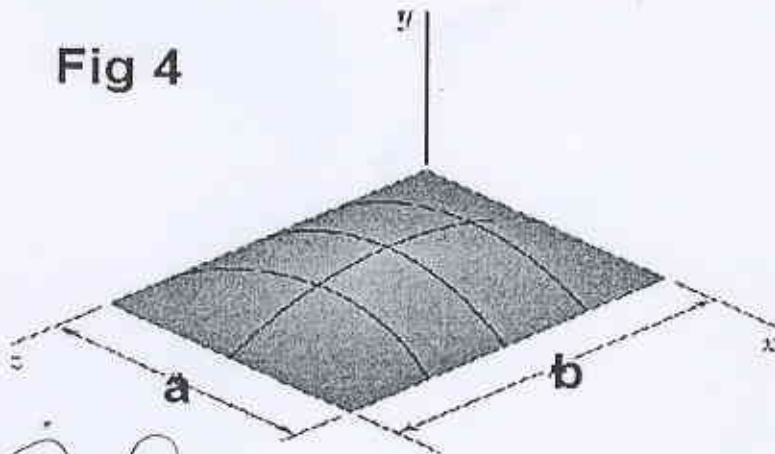
Q2) A 6.5-m ladder AB leans against a wall as shown in Figure 2. Assuming that the coefficient of static friction μ_s is the same at A and B, determine the smallest value of μ_s for which equilibrium is maintained. (25D)



Q3) Determine the force in each member of the Pratt roof truss shown in Figure 3. State whether each member is in tension or compression. (25D)



Q4) Determine by direct integration the location of the centroid of the volume between the xz plane and the portion shown in Figure 4 of the surface $y = 16h(ax - x^2)(bz - z^2)/a^2b^2$. (25D)



Dr. H. H. B.

Assist. Prof. Dr. Alish.



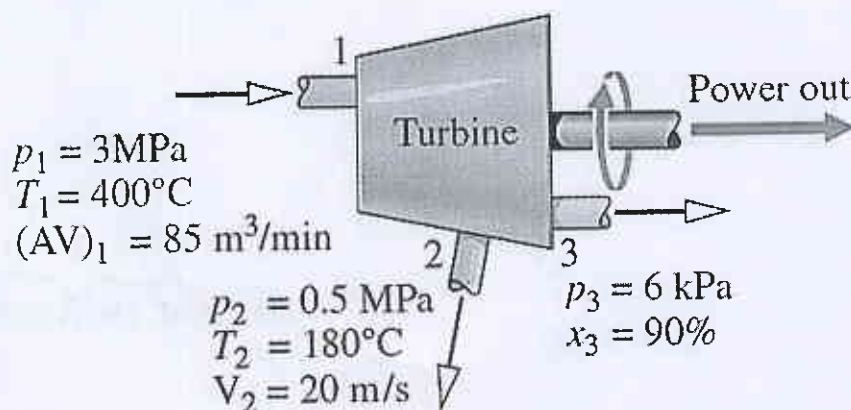
Each question carries 20 Marks

Q1: A closed, rigid tank contains 2 kg of water initially at 80 C and a quality of 0.6. Heat transfer occurs until the tank contains only saturated vapor. Kinetic and potential energy effects are negligible. For the water as the system, determine the amount of energy transfer by heat, in kJ.

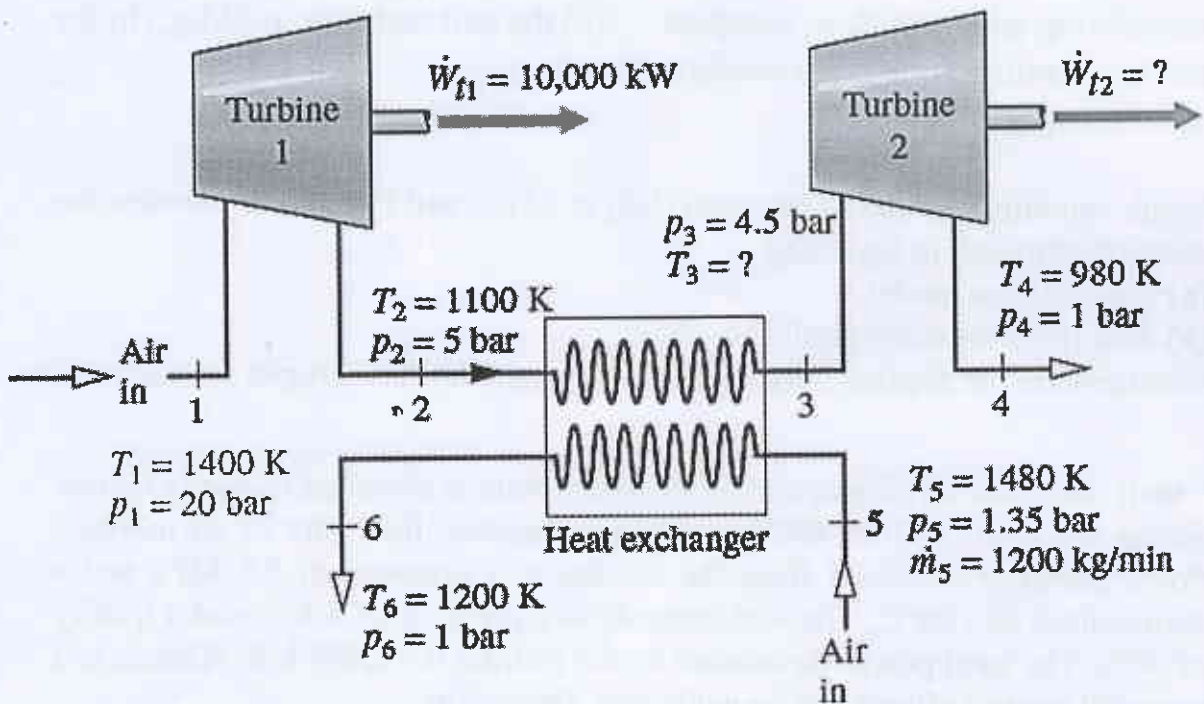
Q2: Steam enters a nozzle at 3MPa and 325oC and leaves at 1.4MPa with a velocity of 535m/sec. The mass flow rate is 8000kg/h. neglecting the inlet velocity and considering adiabatic flow, compute (a) the exit enthalpy in kJ/kg, (b) the exit temperature and (c) the nozzle exit area.

Q3: A tank contains 0.05 m³ of nitrogen (N₂) at -21 C and 10 MPa. Determine the mass of nitrogen, in kg, using
(a) the ideal gas model.
(b) data from the compressibility chart.
Comment on the applicability of the ideal gas model for nitrogen at this state..

Q4: A well-insulated turbine operating at steady state is sketched in figure bellow
Steam enters at 3 MPa, 400°C, with a volumetric flow rate of 85 m³/min. Some steam is extracted from the turbine at a pressure of 0.5 MPa and a temperature of 180°C. The rest expands to a pressure of 6 kPa and a quality of 90%. The total power developed by the turbine is 11,400 kW. Kinetic and potential energy effects can be neglected. Determine
(a) the mass flow rate of the steam at each of the two exits, in kg/h.
(b) the diameter, in m, of the duct through which steam is extracted, if the velocity there is 20 m/s.



Q5: Air as an ideal gas flows through the turbine and heat exchanger arrangement. Data for the two flow streams are shown on the figure. Heat transfer to the surroundings can be neglected, as can all kinetic and potential energy effects. Determine T_3 , in K, and the power output of the second turbine, in kW, at steady state.



Good luck

Assist. Prof. Dr. Ali Sh. Baqir



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الكلية التقنية الهندسية / النجف



قسم هندسة تقنيات الطيران

المرحلة الأولى

أسئلة الفصل الأول للعام الدراسي

٢٠١٦-٢٠١٥

شعبة ضمان الجودة والإدارة الجامعية

مسألة الطيران
1/5



Note: Answer all questions.

Q1: Answer the following branches:

A. Separate the list $P, F, V, v, \rho, T, a, m, L, t,$ and V into intensive properties, extensive properties, and non-properties. 10 M

B- A steel cylinder of mass 2 kg contains 4 L of water at 25°C at 200 kPa. Find the total mass and volume of the system. List two extensive and three intensive properties of the water. 10 M

Q2: Determine whether refrigerant R-410a in each of the following states is a compressed liquid, a superheated vapor, or a mixture of saturated liquid and vapor.

- a. 50°C, 0.05 m³/kg c. 0.1 MPa, 0.1 m³/kg
b. 1.0 MPa, 20°C d. -20°C, 200 kPa

20 M

Q3: A sealed, rigid vessel of 2 m³ contains a saturated mixture of liquid and vapor R-134a at 10°C. If it is heated to 50°C, the liquid phase disappears. Find the pressure at 50°C and the initial mass of the liquid.

20 M

Q4: What is the percent error in specific volume if the ideal-gas model is used to represent the behavior of superheated ammonia at 40°C and 500 kPa? What if the generalized compressibility chart is used instead?

20 M

Q5: Answer the following branches:

A- Drive the equation of the work in a polytropic process.

10 M

B- Helium gas expands from 125 kPa, 350 K, and 0.25 m³ to 100 kPa in a polytropic process with $n = 1.667$. How much work does it give out?

10 M

Note: All tables and charts are available from the examination committee.

Best wishes, Assist. Prof. Dr. Eng. Ali Shakir B. Al-Jaberi



Aeronautical Eng. Tech. Department

Attempt All Questions

Q1 Solve the following set of equations:

$$x - 2y + z = 1$$

$$2x + y - 2z = 3$$

$$-x + 3y + z = -2$$

(20 Marks)

Q2 A Write an equation for the line that passes through point: (10 Marks)

(a) $P_1(-1, 3)$ with slope $m = -2$

(b) $P_1(-2, 1)$ and $P_2(2, -2)$

B Graph the equation $y = x^2 + 121$

(10 Marks)

Q3 Let $Z_1 = 1 + i$ and $Z_2 = \sqrt{3} - i$

(20 Marks)

(a) Find the exponential representation for Z_1 and Z_2

(b) Find the values of $Z_1 Z_2$ and $\frac{Z_1}{Z_2}$ in exponential and polar representations.

Q4 Solve the following:

(25 Marks)

(1) $\lim_{x \rightarrow 0} (x^2 - 4x + 1)$

(2) $\lim_{x \rightarrow 2} \frac{1-x+27}{x-2}$

(3) $\lim_{x \rightarrow 0} \frac{\sin 5x}{\sin 3x}$

(4) $\ln x - \ln(x-1) = \ln 2$

(5) $4 = e^{2x}$

Q5 Determine the values of constant k that will make the following function continuous for all values of x . (15 Marks)

$$f(x) = \begin{cases} 2x - 7 & \text{if } x < 3 \\ x^2 - 3x - 8 & \text{if } x \geq 3 \end{cases}$$

Good Luck

Examiner
Assist. Lec / Hussein Al-Abidi

Head of Department
Assist. Prof. Dr. Ali Al-Jaberi



Q1 \ Use MATLAB to evaluate:

(20 marks)

1. $N = 25 \left(\sqrt[3]{\frac{64}{125}} \right)^2 + 21 \left(\sqrt[3]{8} \right)^2$

2. $Y = \sin \frac{x\pi}{2} + 4e^{x^3} + \ln \sqrt{x}$

Q2 \ $r = \{1, -2, 4, 5, 7\}$ row vector

(20 marks)

$c = \{3, 8, -9, 11, 2\}$ column vector

- 1. Refer to 3rd element in the row vector (r) and 4th in the column vector (c).
- 2. Add row vector (r) to transpose of column vector (c^T).
- 3. Find the magnitude of a row vector |r|.
- 4. Calculate dot product of the row vector (r) and the transpose of column vector (c^T).

Q3 \ Use MATLAB to find the result of the equation $y = \sqrt{x} \tan x\pi$

(20 marks)

$x = \{0, \frac{1}{4}, \frac{1}{2}, \frac{3}{4}, 1\}$

Q4 \ $M = \begin{vmatrix} 1 & 2 & 3 & 4 & 5 \\ 2 & 7 & 1 & 8 & 9 \\ 3 & 4 & 5 & 6 & 2 \\ 4 & 9 & 7 & 2 & 1 \end{vmatrix}$

(20 marks)

- 1. Refer to the element in the 3rd row and 5th column.
- 2. Create a row vector (v), from the elements of 1st row of (M).
- 3. Create a 4-by-4 matrix (W) from (M) by copy the 1st and 4th columns of (M) twice.
- 4. Calculate the determinant and inverse of (M).

Q5 \ $P1 = x^5 + 5x^2 - 3x^4 + 7x + 9$

(20 marks)

$P2 = 2x^6 + 4x^2 - 8x^4 + 10x + 12$

- 1. Find the roots of the polynomials P1&P2.
- 2. Evaluate the polynomial P1 at x= -2.
- 3. Compute the quotient P1/P2.
- 4. Compute the derivative dp2/dx.

Good Luck



Answer four questions only

- Q1) Determine the force acting along the axis of each of the three struts needed to support the 500-kg block. (25 degree)
- Q2) A vertical force $p=20\text{KN}$ is applied to the ends of the 2-ft cord AB and spring AC. If the spring has an unstretched length of 2 ft, determine the angle θ for equilibrium. Take $k = 15 \text{ KN/m}$. (25 degree).
- Q3) Blocks A and B have a mass of 100kg and 150kg, respectively. If the coefficient of static friction between A and B and C is $\mu_s=0.25$, and between the ropes and the pegs D and E $\mu_s=0.5$, determine the smallest force F needed to cause motion of block B if $P=30\text{N}$. (25 degree).
- Q4) Replace the force system in Figure 4 by a resultant force and couple moment at point O. (25 degree)
- Q5) The uniform thin pole has a weight of 30 lb and a length of 26 ft. If it is placed against the smooth wall and on the rough floor in the position $d=10\text{ft}$, will it remain in this position when it is released? The coefficient of static friction is $\mu_s = 0.3$. (25 degree)

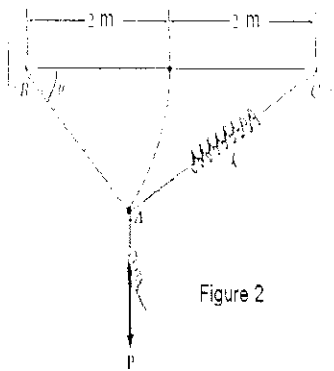
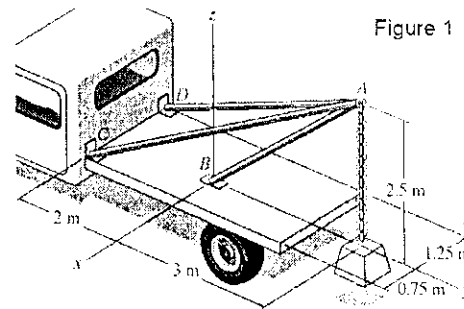
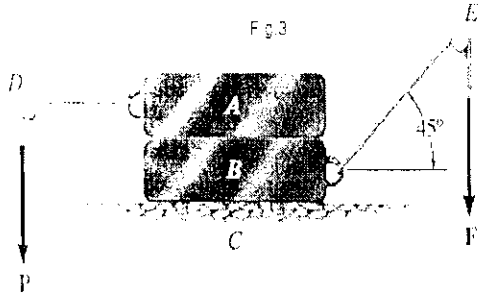


Figure 4

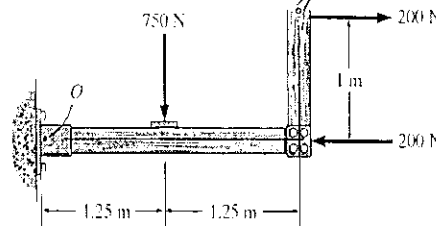
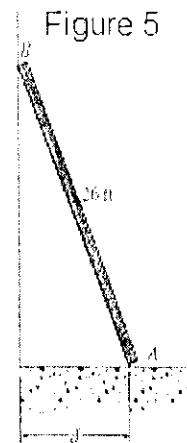


Figure 5



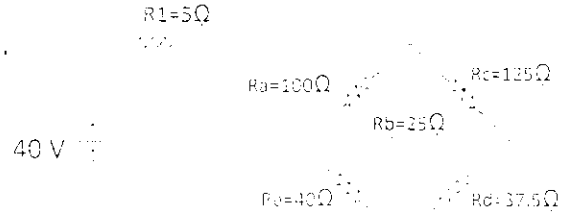
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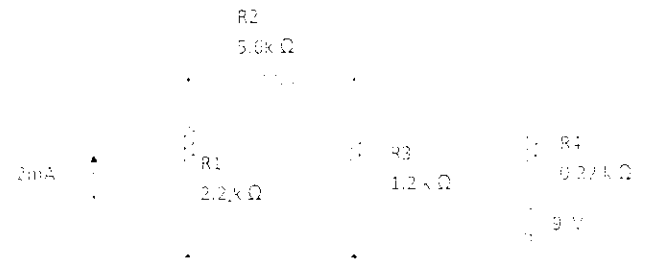
Aeronautical Eng. Tech. Department

Note : answer all questions, all questions have equal marks

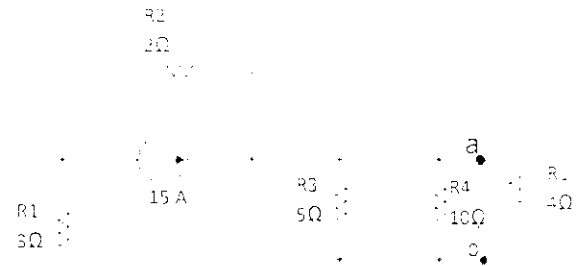
Q1/ Find the current and power supplied by the (40 V) source in the circuit shown .



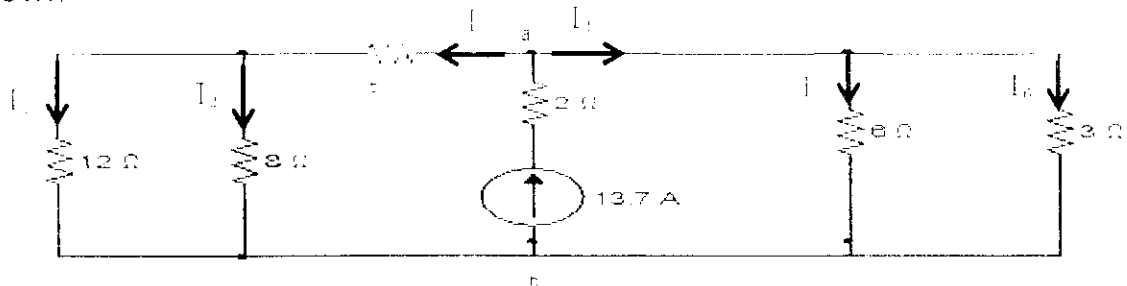
Q2/ Using the mesh analysis , determine the current through the (9V) battery for the network shown .



Q3/ Using NORTONs theorem , find the current through the load resistor R_L in the network shown .



Q4 / Find all branch currents (I_1, I_2, I_3, I_4, I_5 and I_6) in the network shown



مدرس المادة
محمد علي كريم

مدرس المادة
محمد علي كريم

-
- Q1/(A)** Describe the meaning of Dislocations ? What are the factors that effects on the moving of the dislocations ? (7 D)
- (B)** What are some common point defects in a crystal lattice structure? (6 D)
- (C)** Discuss the importance of control of graphite formation in cast irons ?(6D)
- (D)** (1) Explain briefly the difference between malleable and spheroidal graphite cast irons ? (7D)
- (2) Choose an application for which either material might be suitable and putline the factors which would be considered in making a decision which to use ? (7 D)
- (E)** What considerations must be taken into account when choosing a tool material? How do carbon tool steel satisfy these requirements ? (7 D)

-
- Q2/(A)** Why must aluminum be obtained from its ore by electrolysis instead of by the more useful method of reduction by coke ?(10D)
- (B)** Without reference to any table , draw a diagram representing the structure of an atom
- (c)** (1) Give a typical analysis of a _____ which contains fourteen protons ? (10D)
hematite pig iron ?
- (2) Outline a process used for the production of pig iron from an ore in which the metal occurs as an oxide ? (15 D)

-
- Q3/(a)** What do you understand by the term tool steel ?(5 D)
- (b) Give typical approximate chemical compositions for tool steels suitable for any components that need great resistance to wear and abrasion ? (10 D)
- (c) Describe how you would heat treat such a tool , mentioning the precautions that would be necessary to produce a satisfactory article ?(10 D)

11/5/2008
اسم الطالب
42005 B

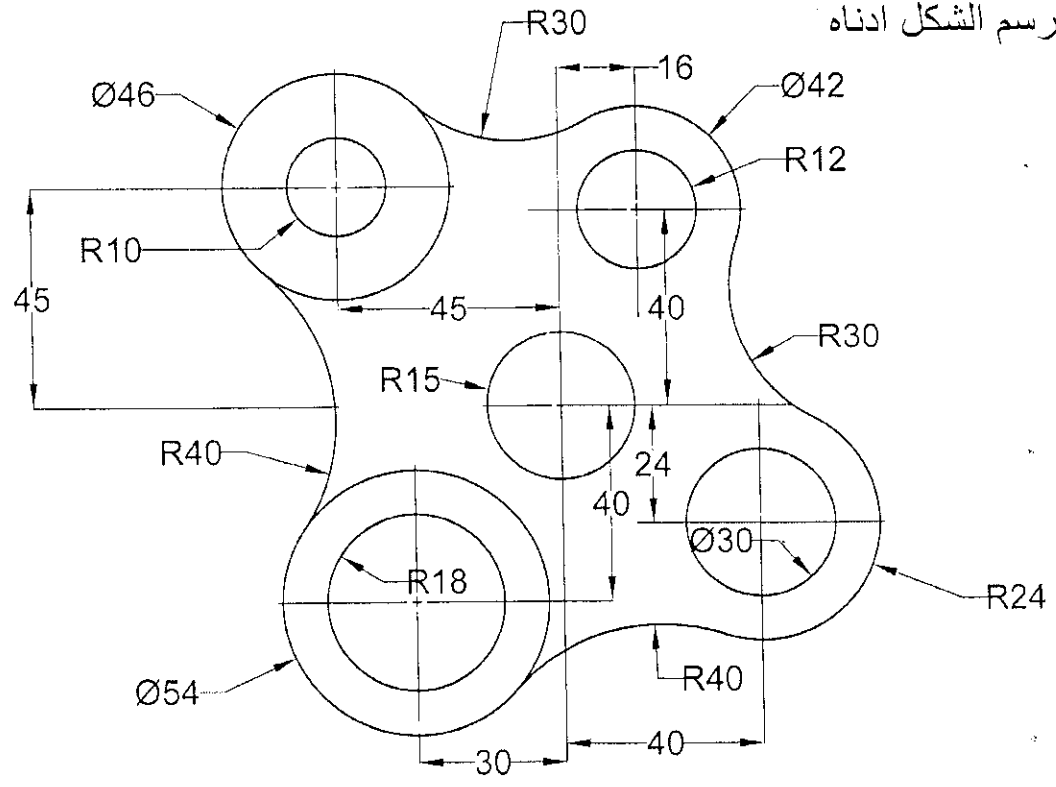
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امتحان الرسم الهندسي
الفصل الأول 2015-2016

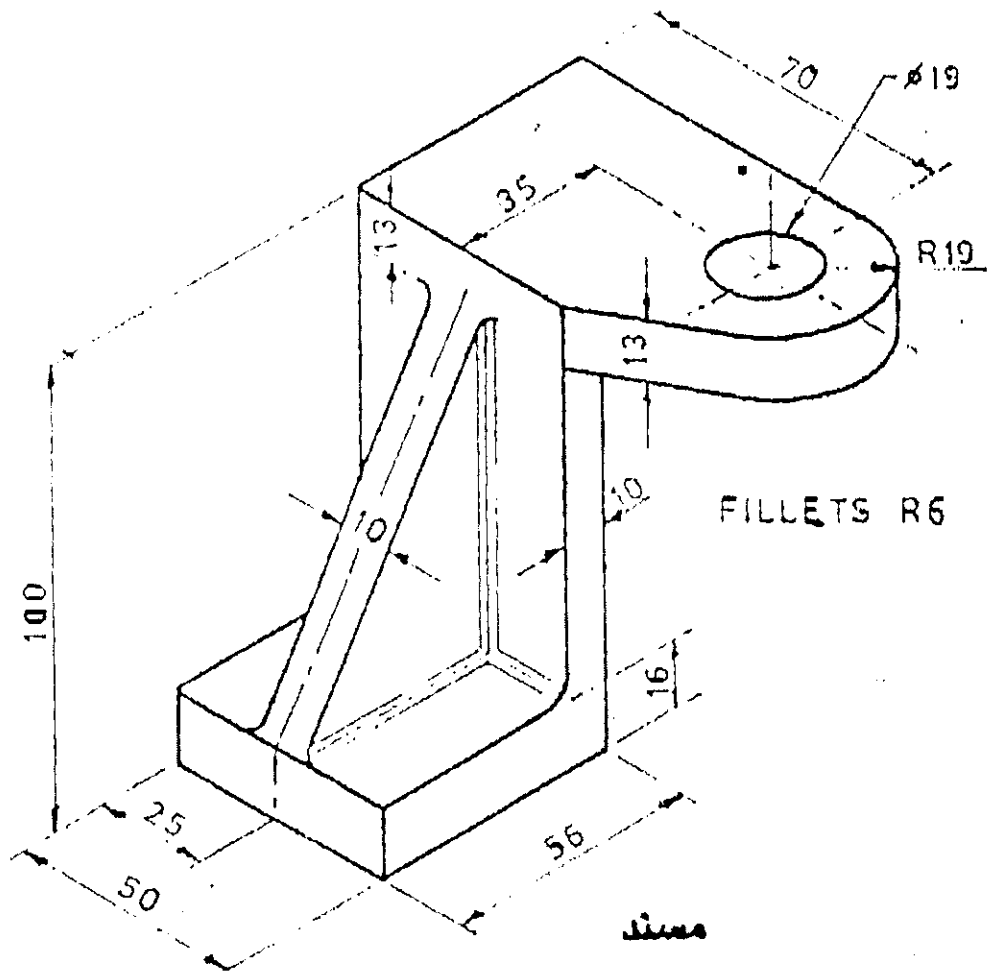
50 درجة

س1: ارسم الشكل ادناه



50 درجة

س2: ارسم المساقط الثلاث للشكل ادناه



القسم : هندسة تقنيات الطيران و السيارات
المرحلة : الاولى
المادة: حقوق الانسان
زمن الامتحان: ساعتان
التاريخ: 2016/ 02/



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جامعة الفرات الأوسط التقنية
الكلية التقنية الهندسية / نجف

امتحان الفصل الأول- العام الدراسي ٢٠١٥/٢٠١٦

الاجابة عن اربع اسئلة فقط

- س١) الاجابة عن احد الفرعين:
ا- الاتفاقية الامريكية لحقوق الانسان لها اهمية خاصة في ما تعلق بحرية الرأي والتعبير.
ناقش ذلك و باسهاب.
ب- عرف حقوق الانسان تعريفا شاملا ثم صنفها ميينا اهم خصائصها.
س٢) تحدث عن نشأة اللجنة الدولية للصليب الاحمر. وما هي اهم مصادر تمويلها؟ ثم بين اهم أعمالها؟
س٣) للحضارة العراقية بصمات واضحة للعيان على المسيرة الانسانية بشكل واضح، ناقش هذه العبارة من خلال دور حضارة وادي الرافدين وأثرها في حقوق الانسان.
س٤) لمناظرات حقوق الانسان أهمية خاصة في تدريس مادة حقوق الانسان وكذلك في مشاركة الطالب في فهم فكرة حقوق الانسان عددها ثم اشرح اثنان منها.
س٥) الاجابة عن أحد الفرعين:
ا- ما مضمون ديباجة الاعلان العالمي لحقوق الانسان ثم اذكر اربع نقاط من مواد الاعلان العالمي لحقوق الانسان.
ب- ما هو مفهومك الخاص بالنسبة لحرية التعليم وحرية الفكر الجامعة.

الاستاذ الدكتور مويد الاعرجي
مدرس المادة

الدكتور حيدر حسن
رئيس قسم هندسة تقنيات السيارات

أ.م.ب. علي شلكر باقر
رئيس قسم هندسة تقنيات الطيران

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Q:

A-

B- F

F

Note:

Best w



جمهورية العراق
وزارة التعليم العالي و البحث العلمي
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قسم هندسة تقنيات الطيران

المرحلة الأولى

أسئلة الفصل الثاني للعام الدراسي

٢٠١٥-٢٠١٦

شعبة ضمان الجودة و الأمانة العامة

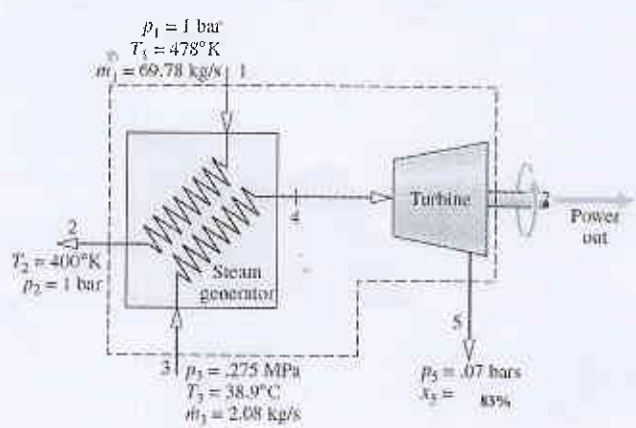


Q1: A cylinder fitted with a piston has a volume of 0.1 m³ and contains 0.5 kg of steam at 0.4 MPa. Heat is transferred to the steam until the temperature is 300°C, while the pressure remains constant.

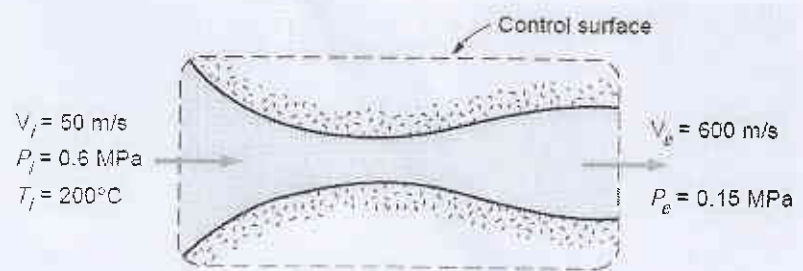
Determine the heat transfer and the work for this process. 30 M

Q2: An industrial process discharges gaseous combustion products at 478K, 1 bar with a mass flow rate of 69.78 kg/s. a proposed system for utilizing the combustion products combines a heat-recovery steam generator with a turbine. At steady state, combustion products exit the steam generator at 400K, 1 bar and a separate stream of water enters at .275 MPa, 38.9C with a mass flow rate of 2.079 kg/s. At the exit of the turbine, the pressure is 0.07 bars and the quality is 83%. Heat transfer from the outer surfaces of the steam generator and turbine can be ignored, as can the changes in kinetic and potential energies of the flowing streams. There is no significant pressure drop for the water flowing through the steam generator. The combustion products can be modeled as air as an ideal gas. 40 M

- (a) Determine the power developed by the turbine, in kJ/s.
- (b) Determine the turbine inlet temperature, in C.



Q3: Steam at 0.6 MPa and 200°C enters an insulated nozzle with a velocity of 50 m/s. It leaves at a pressure of 0.15 MPa and a velocity of 600 m/s. Determine the final temperature if the steam is superheated in the final state and the quality if it is saturated.



30 M

قسم الطيران
1/6

Ministry of Higher Education
& Scientific Research
Al-Furat Al-Awsat Technical University
Najaf Engineering Technical College



Subject: Mathematic 1
Date: 26/4/2016
Time: 2 hours
Class Level: 1st

Aeronautical Eng. Tech. Department

Attempt All Questions:

Q1\ A\ Solve the following equation, for values of θ from 0° to 360° inclusive: (10 Marks)

$$1 + \cos \theta = 2 \sin^2 \theta$$

B\ Prove the following identities: (10 Marks)

(1) $\csc \theta + \tan \theta \cdot \sec \theta = \csc \theta \cdot \sec^2 \theta$

(2) $\sin(A + B) + \sin(A - B) = 2 \sin A \cdot \cos B$

Q2\ A\ By using the definition of the derivative, calculate the derivative of (10 Marks)

$$f(x) = \sqrt{2x}$$

B\ Find $\frac{dy}{dx}$ by using chain rule for the following equation: (10 Marks)

$$y = \frac{1}{t^2+1} \quad \text{and} \quad x = \sqrt{4t+1}$$

Q3\ Find $\frac{dy}{dx}$ for the following equations: (30 Marks)

1) $y = e^{(x+e^{5x})}$

2) $y = \frac{x^2+1}{x-3}$

3) $y = \tan^2(\cos x)$

4) $y = x \cdot \ln(\sec^{-1} x)$

Q\ $x \cdot \sin y = y \cdot \sin x$ (use implicit differentiation)

Q4\ Evaluate the following integrals: (30 Marks)

1) $\int \frac{x^2 dx}{(x^3+4)^2}$

2) $\int \sqrt{(z^2 - z^{-2})^2 + 4} dz$


3) $\int \cos \theta \sin^6 \theta d\theta$

4) $\int \sec^3 x \cdot \tan x dx$

5) $\int \ln x dx$

Good Luck


Examiner
Assist. Lec. Hussein Al-Abidi


Head of Department
Assist. Prof. Dr. Ali Al-Jaberi

قسم الطيران
1/16



Q1 \ Write syntax (general form) of the following commands and give an example of each one: Input(), display(), fprintf(), plot() (20 marks)

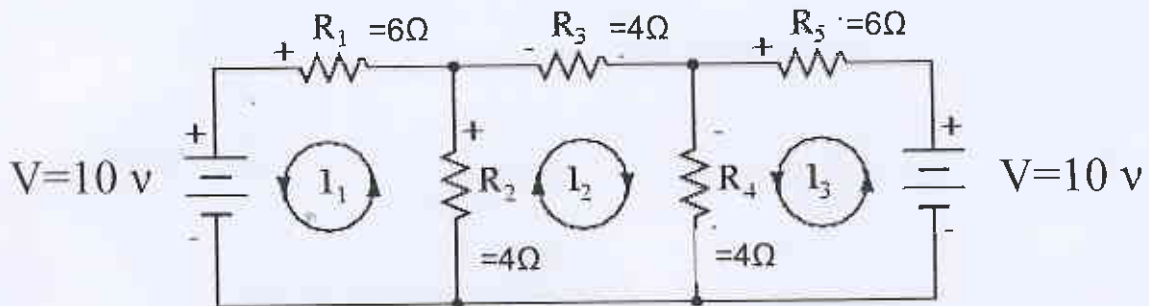
Q2 \ For the electric circuit of figure below, the mesh equation are: (20 marks)

$$10I_1 - 4I_2 = 10$$

$$12I_2 - 4I_1 - 4I_3 = 0$$

$$10I_3 - 4I_2 = -10$$

Use the inverse matrix method to compute the currents I_1, I_2 and I_3 .



Q3 \ Write a program in MATLAB to calculate the value of the following series:

$$y = \left(12 \sum_{n=1}^m \frac{(-1)^n}{n^2} \right)^{\frac{1}{2}}$$

(20 marks)

Q4 \ Write a program in MATLAB to calculate the value of y which is given by:

$$y(x) = \begin{cases} \sin(x), & y > 0 \\ 0, & \text{otherwise} \end{cases}$$

$$x = 0; \frac{\pi}{2}; 3\pi$$

(20 marks)

Q5 \ Write a program in the MATLAB to create Hilbert matrix 5-by-5 by using nested loops, each element of matrix can be found by using the following expression:

$$H(i,j) = \frac{1}{i+j-1}$$

(20 marks)

Examiner
م.م. محمد جليل

Good Luck

Head of dept.
أ.م.د. علي شاكر

الاجابة على اربعة اسئلة فقط



س١ عرف الديمقراطية تعريفاً شاملاً ثم بين اهم العناصر الاساسية للديمقراطية
س٢ الاجابة عن احد الفرعين:

- ا- عرف مفهوم حقوق الانسان وماهي اهم الخصائص والاجيال لتلك الحقوق .
- ب- للديمقراطية انواع عددها وشرح واحد منها
- س٣ يقوم الدستور الديمقراطي على خمس مبادئ عددها وشرح واحده منها
- س٤ الاجابة على احد الفرعين :

ا- لمناظرات حقوق الانسان اهمية خاصة في فهم فكرة ومفهوم حق الانسان عددها وشرح واحد منها وباسهاب

ب اشرح الديباجه الخاصه بالاعلان العالمي لحقوق الانسان ثم اذكر ثلاثة من اهم مواد الاعلان العالمي لحقوق الانسان .

س٥ لم يتخذ توسع الديمقراطية في القرن العشرين شكلا الانتقال البطيئ في كل بلد على حده بل بشكل ((موجات ديمقراطية)) ناقش ذلك

مدرس المادة
الدكتور مؤيد الاعرجي

رئيس القسم

Attempt all questions

Q1) Determine the force in members *EH* and *GI* of the truss shown in Figure 1. (20 degree)

Q2) Determine the force in each member of the Warren bridge truss shown in Figure 2. State whether each member is in tension or compression. (20 degree)

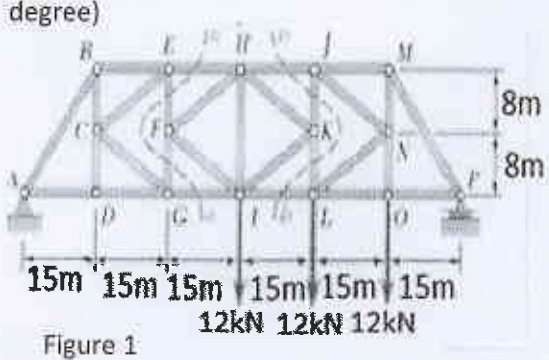


Figure 1

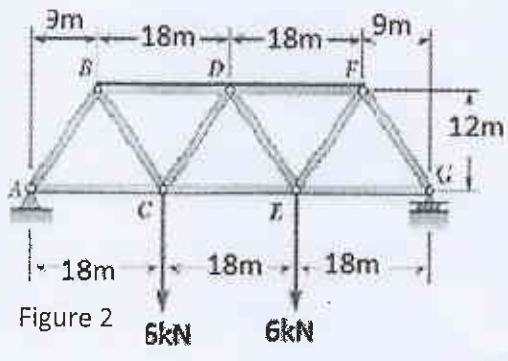


Figure 2

Q3) Determine by direct integration the moment of inertia of the shaded area with respect to the *y* and *x* axis as shown in Figure 2. (20 degree)

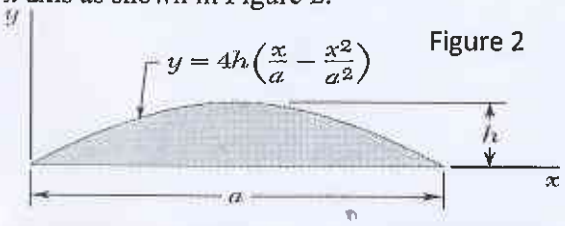


Figure 2

Q4) A homogeneous wire is bent into the shape shown in Figure 3. Determine by direct integration the *x* and *y* coordinate of its centroid. (20 degree)

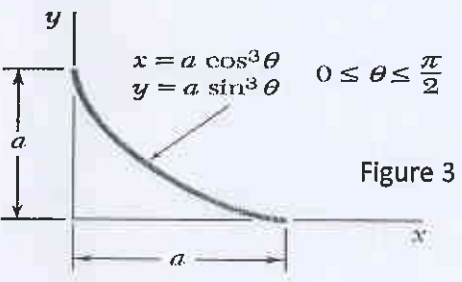


Figure 3

Q5) Locate the centroid of the plane area shown in Figure 4. (20 degree)

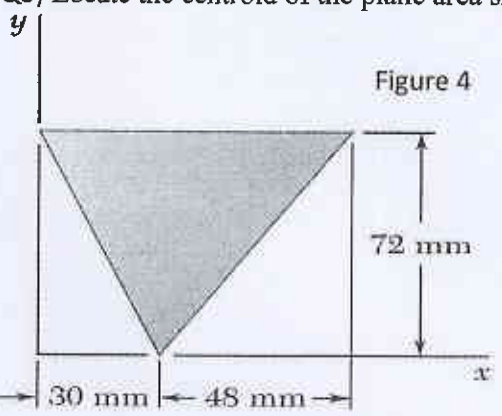


Figure 4



[Signature]
مدرس المادة

رئيس القسم
د. علي شاكر

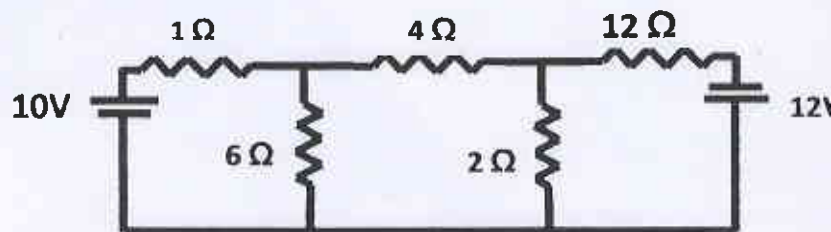
د. حيدر العبدلي



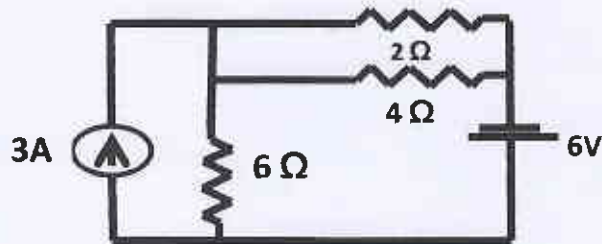
Second term examination 2015-2016

Note : answer all questions, all questions have equal marks

Q1/ Using the Nodal voltage method to find the voltage across the 2Ω resistor of the network shown .

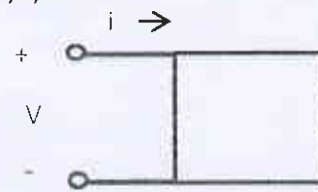


Q2/ using superposition theorem to determine the current flow in 6Ω resistor .

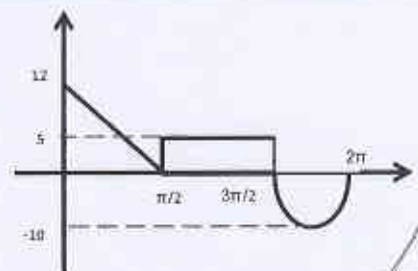


Q3/ for the following pairs of voltages and currents, find the phase difference then indicate whether the element involved is a capacitor , inductor or resistor , then determine the value of C, L, or R .

- A) $V = 30 \sin(200t + 60)$
 $i = 20 \cos(200t + 60)$
- B) $V = -50 \sin(300t + 20)$
 $i = +10 \sin(300t - 160)$
- C) $V = 20 \sin(100t + 120)$
 $i = 40 \cos(100t + 30)$
- D) $V = 60 \sin(210t + 90)$
 $i = 30 \sin(210t)$



Q4/ find the average value for the wave form shown



رئيس القسم
أ.م.د. علي شاکر



مدریس المادة
محمد علی کریم

Technical College of Najaf



Subject: Properties of materials

Craft Department

Class: 1nd Stage

Examiner: Oraskhudayer First Attempt (2015-2016);

Time :hrs

.....
Q1/(A) Show the Force- Extension diagram obtained for a material such as mild steel in the soft condition ?(20 D)

(B) Describe the non- destructive tests? (20 D)

.....

Q2/(A) Write an essay on " The Joining of Metals" indicating clearly the essential differences between welded joints?(10D)

(B) Describe the pressure – welding processes? (20 D)

.....

Q3/(A) Compare and contrast the effects of cold working and hot working on metals?(15 D)

(B) What are the advantages and limitations of sand casting and die casting ? Compare and contrast these processes , and the quality and the properties of the casting produces? (15 D)

.....

Ali Sh. Begi-



جمهورية العراق
وزارة التعليم العالي والبحث العلمي
جامعة الفرات الأوسط التقنية
الكلية التقنية الهندسية / النجف



قسم هندسة تقنيات الطيران

المرحلة الأولى

أسئلة الامتحان النهائي للعام الدراسي

٢٠١٥-٢٠١٦

الدور الأول

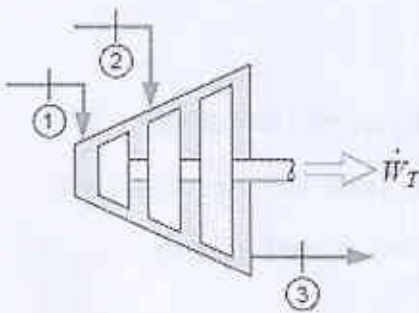
شعبة ضمان الجودة والإدارة الجامعية



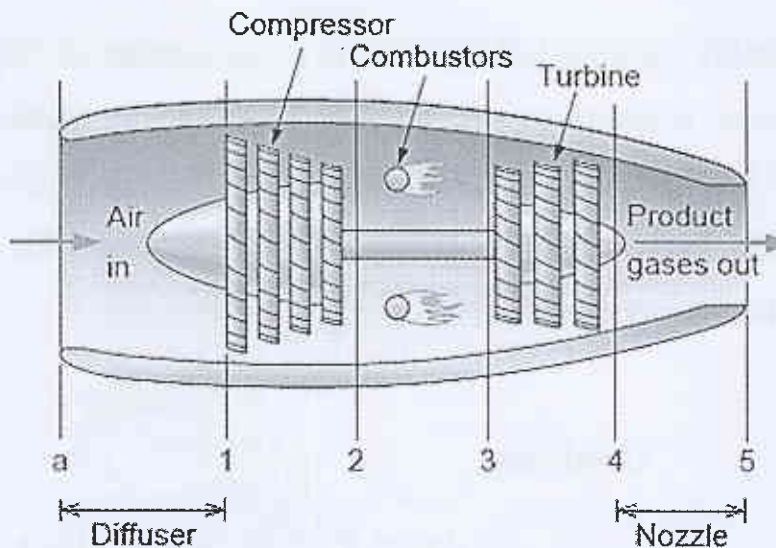
Note: Answer five (5) questions only/questions 1, 2 and 3 must be within the answers

Each question carries 20 Marks

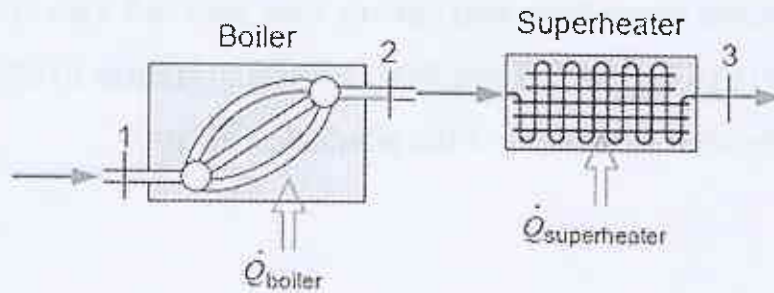
Q1: A steam turbine receives steam from two boilers. One flow is 5 kg/s at 3MPa, 700 C and the other flow is 15 kg/s at 800 kPa, 500 C. The exit state is 10 kPa, with a quality of 96%. Find the total power out of the adiabatic turbine.



Q2: A modern jet engine has a temperature after combustion of about 1500 K at 3200 kPa as it enters the turbine section (see state 3). The compressor inlet is at 80 kPa, 260 K (state 1) and the outlet (state 2) is at 3300 kPa, 780 K; the turbine outlet (state 4) into the nozzle is at 400 kPa, 900 K and the nozzle exit (state 5) is at 80 kPa, 640 K. Neglect any heat transfer and neglect kinetic energy except out of the nozzle. Find the compressor and turbine specific work terms and the nozzle exit velocity.



Q3: Saturated liquid nitrogen at 600 kPa enters a boiler at a rate of 0.005 kg/s and exits as saturated vapor. It then flows into a super heater also at 600 kPa, where it exits at 600 kPa, 280 K. Find the rate of heat transfer in the boiler and the super heater.



Q4: A gas in piston-cylinder assembly undergoes a polytropic expansion. The initial pressure is 3 bar, the initial volume is 0.1 m³, and the final volume is 0.2 m³. Determine the work for the process, in kJ, if a) $n=1.5$, b) $n=1.0$, and c) $n=0$.

Q5: A piston/cylinder assembly contains butane, C₄H₁₀, at 300 C and 100 kPa with a volume of 0.02 m³. The gas is now compressed slowly in an isothermal process to 300 kPa.

- Show that it is reasonable to assume that butane behaves as an ideal gas during this process.
- Determine the work done by the butane during the process.

Q6: A piston-cylinder assembly contains 0.9 kg of air at a temperature of 300 K and a pressure of 1 bar. The air is compressed to a state where the temperature is 470 K and the pressure is 6 bars. During the compression, there is a heat transfer from the air to the surroundings equal to 20 kJ. Using the ideal gas model for air, determine the work during the process, in kJ.

Good luck

Assist. Prof. Dr. Ali Sh. Baqir



.....Answer all questions.....

Q1/(A) Describe the meaning of Dislocations ? What are the factors that effects on the moving of the dislocations ? (7 D)

(B) What are some common point defects in a crystal lattice structure ? (6 D)

(C) Discuss the importance of control of graphite formation in cast irons ? (6D)

(D) (1) Explain briefly the difference between malleable and spheroidal graphite cast irons ? (7D)

(2) Choose an application for which either material might be suitable and put line the factors which would be considered in making a decision which to use ? (7 D)

(E) What considerations must be taken into account when choosing a tool material? How do carbon tool steel satisfy these requirements ? (7 D)

.....

Q2/ Chromium and nickel , either singly or in combination , are added to steel in varying proportions to produce a range of now well established alloys .

Enumerate the most important of these alloys and discuss their properties and applications ? (20D)

.....

Q3/(A) Write an essay on " The Joining of Metals" indicating clearly the essential differences between welded joints?(10 D)

(B) Describe the pressure – welding processes? (10 D)

Q4) Choose two branches only

(A) Indicate , with reason , whether or not the equipment you have described is also suitable for making alumimium die castings? (10 D)

(B) Draw the different types of flames used in gas welding. How would you identify these flames? What are the specific uses of each of these flames? (10 D)

(C) State the important functions of flux coatings of electrodes used in minual metal arc welding processes. Also, give the main ingredients of flux coatings used in arc welding processes. ? (10 D)

Shehri

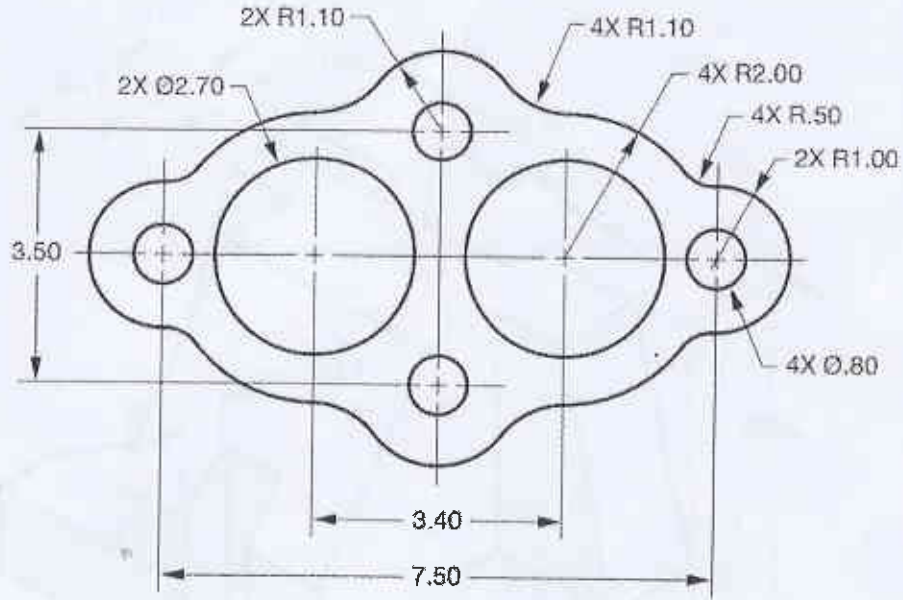
Orsk



امتحان الرسم الهندسي
امتحان النهائي الدور الاول 2015-2016

30 درجة

س1: ارسم الشكل ادناه



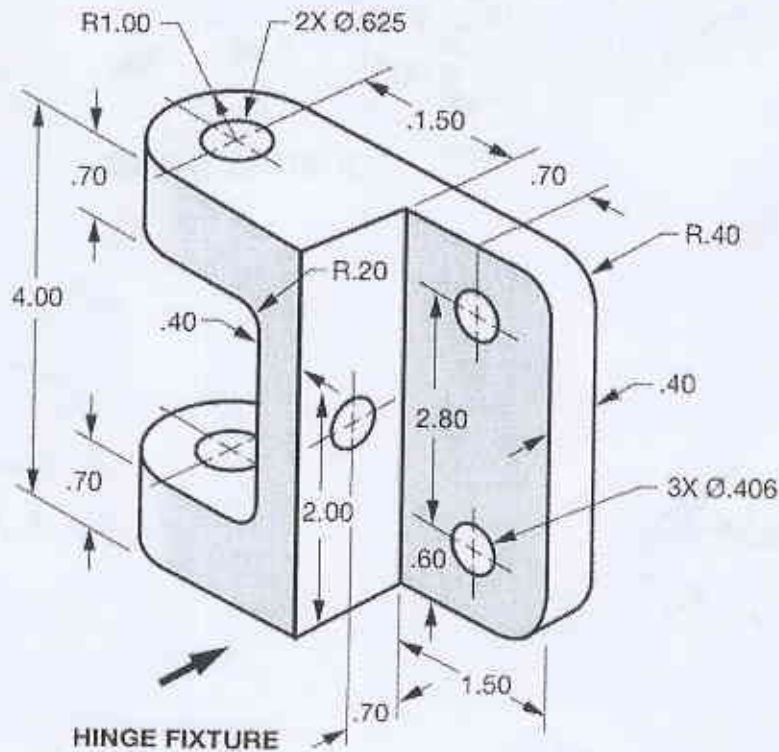
س2: ارسم مسقط الامامي

مسقط جانبي

مسقط افقي

للشكل ادناه

35 درجة



Ministry of Higher Education
& Scientific Research
Al-Furat Al-Awsat Technical
University
Najaf Engineering Technical College



Subject: Mathematic 1
Date: \6\2016
Time: 3 hours
Class Level: 1st

Final Exam for Aeronautical Eng. Tech. Department

Attempt All Questions

Q1: Solve the following set of equations by using **Gramer's rule**:

$$x - 2y + z = 1$$

(15 Marks)

$$2x + y - 2z = 3$$

$$-x + 3y + z = -2$$

Q2 : Let $Z_1 = 1 + i^n$ and $Z_2 = \sqrt{3} - 1$

(20 Marks)

Find: - (a) The exponential representation for Z_1 and Z_2

(b) The values of $Z_1 Z_2$ and $\frac{Z_1}{Z_2}$ In exponential and polar representations.

Q3: Find $\frac{dy}{dx}$ for the following equations: (25 Marks)

$$1. y = 2 \sin \frac{x}{2} - x \cdot \cos \frac{x}{2}$$

$$2. y = \frac{e^x}{\sin x}$$

$$3. y = \sin^{-1} \left(\frac{2x-1}{x+3} \right)$$

$$4. y = \frac{1}{r^2+1} \text{ and } x = (4r+1)^{\frac{1}{2}} \quad (\text{Use Chain Rule})$$

$$5. \frac{1}{x} + \ln y + (xy)^3 = 4x \quad (\text{Use Implicit Differentiation})$$

Q4: Prove the following identities: (15 Marks)

$$1 - \csc \theta + \tan \theta \cdot \sec \theta = \csc \theta \cdot \sec^2 \theta$$

$$2- \frac{\sin 2\theta + \cos 2\theta + 1}{\sin 2\theta - \cos 2\theta + 1} = \cot \theta$$

Q5: Evaluate the following integrals: (25 Marks)

$$1. \int x\sqrt{x^2 + 1} dx$$

$$2. \int \tan^3(5x) \cdot \sec^2(5x) dx$$

$$3. \int \sin^3 x \cos^2 x dx$$

$$4. \int 3x^3 \cdot e^{-2x^4} dx$$

$$5- \int e^\theta \cos \theta d\theta$$

Good Luck


Examiner
Assist. Lec. Hussein Al-Abidi


Head of Department
Assist. Prof. Dr. Ali Al-Jaberi

المرحلة: الاولى

المادة: الميكانيك

الزمن: ثلاث ساعات

الممتحن: د. حيدر حسن عبد



وزارة التعليم العالي و البحث العلمي

جامعة الفرات الاوسط التقنية

الكلية التقنية الهندسية النجف

قسم هندسة تقنية الطيران

الدور الاول 2015-2016

Note: Answer all questions.

Q1) Determine the magnitude of the force acting along the axis of each of three struts needed to support the 900kg block as shown in Figure 1. (20 degree)

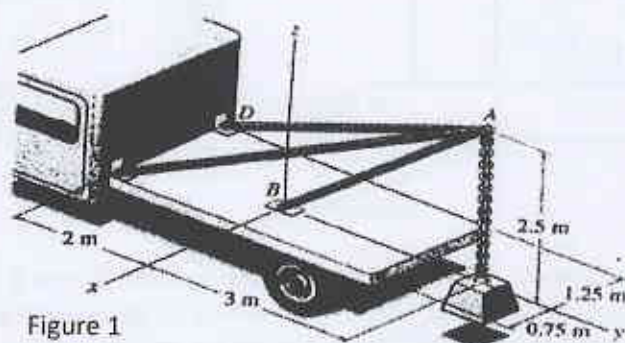


Figure 1

Q2) For the Figure 2 below, determine the force on all members for two of the structures a, b, and c. (20 degree)

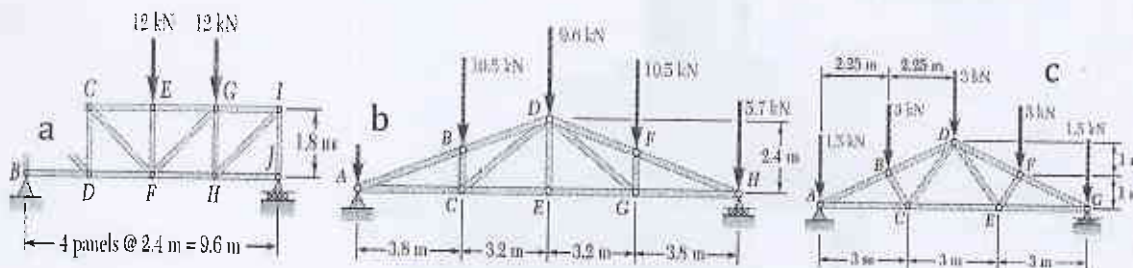


Figure 2(a, b, c)

Q3) The coefficients of friction are $\mu_s = 0.40$ and $\mu_k = 0.30$ between all surfaces of contact in Figure 3. Determine the smallest force **P** required to start the 30-kg block moving if cable **AB** (a) is attached as shown, (b) is removed (c) if the ground surface was inclined by 20° . (20 degree)

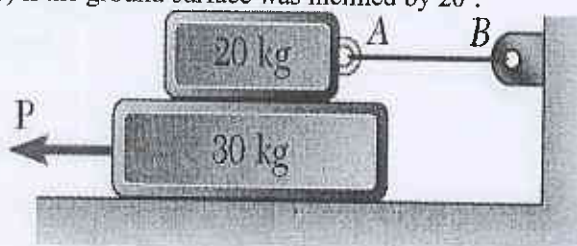


Figure 3



Q4) For the Figure 4 below, find the centroid and determine the moment of inertia about x, y axis for both shapes. (20 degree)

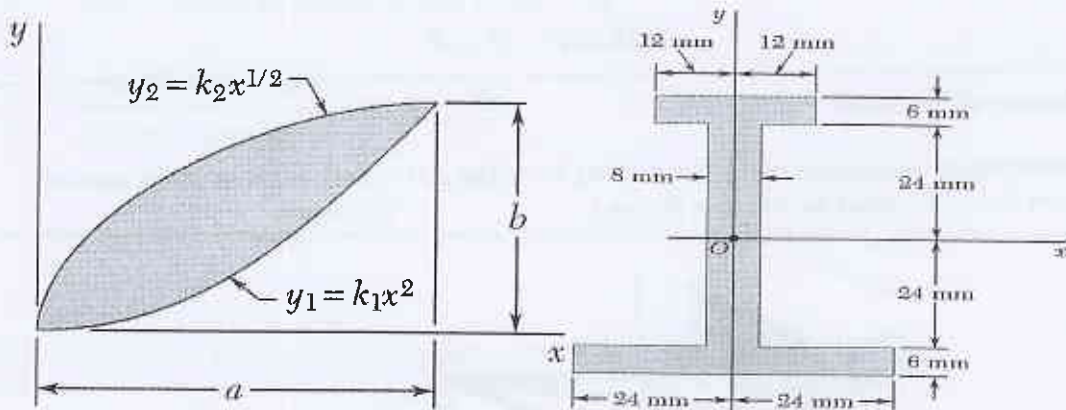


Figure 4

Q5) Block A supports a pipe column and rests as shown on wedge B in Figure 5. The coefficient of static friction at all surfaces of contact is 0.25. If $P = 0$, determine (a) the angle θ for which sliding is impending, (b) the corresponding force exerted on the block by the vertical wall.

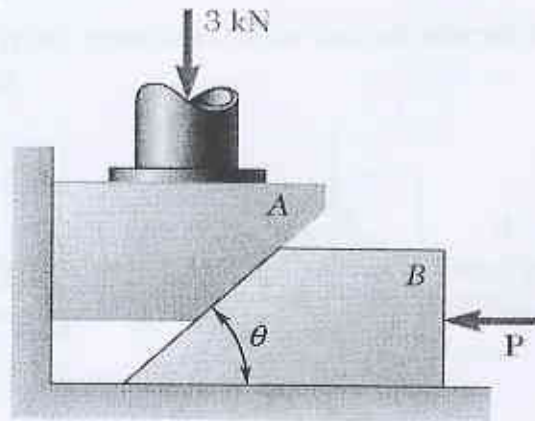


Figure 5

[Signature]
Lecturer

Dr. Hyder H. Balla

[Signature]
Head of department

Ass. Prof. Dr. Ali Shaker



Q4) For the Figure 4 below, find the centroid and determine the moment of inertia about x, y axis for both shapes. (20 degree)

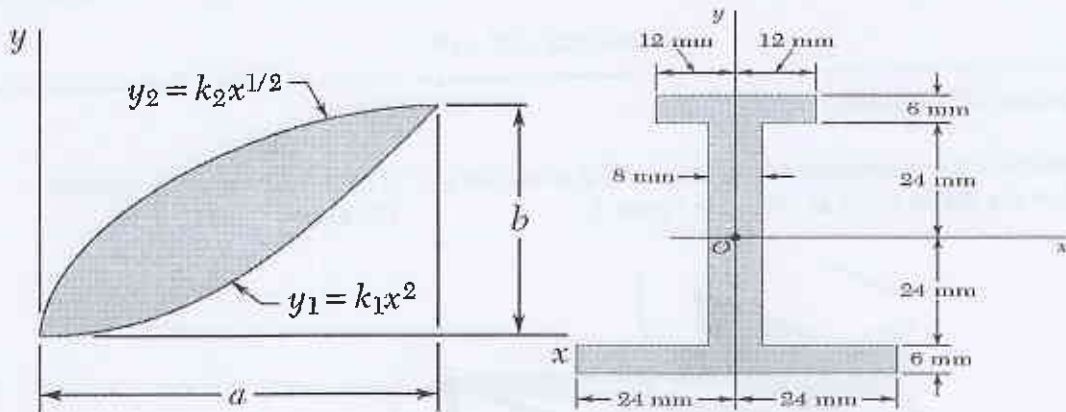


Figure 4

Q5) Block A supports a pipe column and rests as shown on wedge B in Figure 5. The coefficient of static friction at all surfaces of contact is 0.25. If $P = 0$, determine (a) the angle θ for which sliding is impending, (b) the corresponding force exerted on the block by the vertical wall.

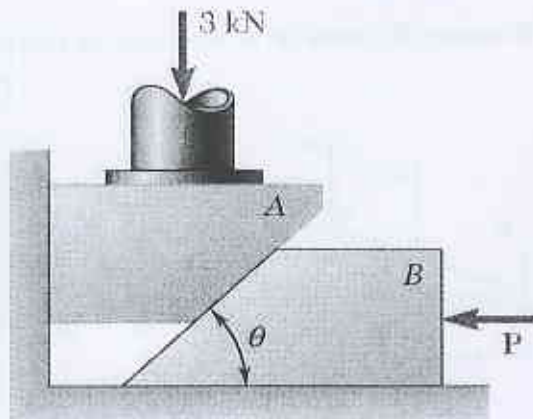


Figure 5

Dr. Hyder H. Balla

Lecturer

Dr. Hyder H. Balla

Ass. Prof. Dr. Ali Shaker

Head of department

Ass. Prof. Dr. Ali Shaker





(20 marks)

Q1 \ Use MATLAB to evaluate (4 only):

$$1. A = (7\sqrt[3]{e^4} + 5\ln(\sin(3\pi)))^5$$

$$2. B = \sqrt[3]{\log\left(\frac{\sin(\frac{\pi}{2})}{1+\sin(\frac{\pi}{2})}\right) + \tan\left(\frac{\pi}{2}\right)}$$

$$3. Z = x^2y + y^2x + \left(\frac{x}{y}\right)^2 \quad \text{at } x = 4, y = 3$$

$$4. S = [e^{3t} + t^2 \sin(4t)] \cos^2(3t) \quad \text{at } t = \pi$$

$$5. Y = \sqrt[5]{e^x + e^{-x}} \quad \text{at } x = -j\pi$$

(20 marks)

$$Q2 \setminus P_1 = 6x^5 + 3x^2 + 2x^4 + 15$$

$$P_2 = 2x^4 - 4x^3 + 10$$

Use MATLAB to find (4 only):

$$1. P_3 = P_1 * P_2.$$

2. The roots of P_1 & P_2 .

$$3. P_1 \quad \text{at } x = -3.$$

$$4. dP_3/dx.$$

$$5. \frac{dP_1/dx}{dP_2/dx}.$$

$$Q3 \setminus M = \begin{bmatrix} 1 & 2 & 3 & 4 & 5 \\ 2 & 8 & 2 & 9 & 3 \\ 3 & 7 & 1 & 5 & 8 \\ 4 & 3 & 6 & 5 & 2 \\ 5 & 9 & 2 & 1 & 7 \end{bmatrix}$$

(20 marks)

1. Create a row vector (V), from the elements of 3rd row of (M).

$$2. C = |V| * V^T.$$

3. Create a 5-by-6 matrix (W) by concatenate (C) to (M).

$$4. D = |M| * M^T * M^{-1}.$$

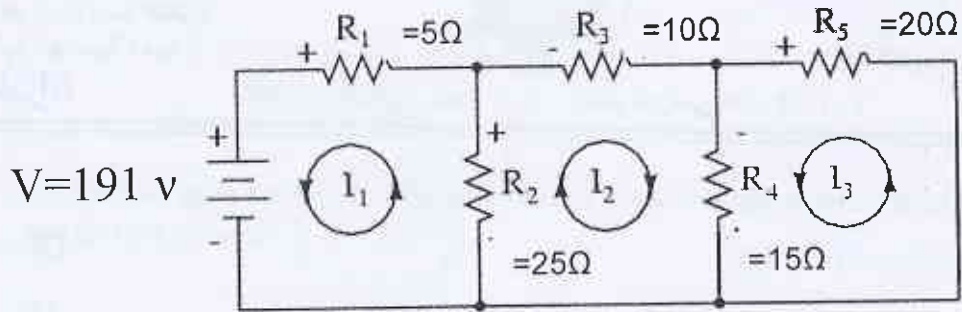
(20 marks)

Q4 \ For the electric circuit of figure below, the mesh equations are:

$$30I_1 - 25I_2 = 191$$

$$50I_2 - 25I_1 - 15I_3 = 0$$

$$35I_3 - 15I_2 = 0$$



1. Use the inverse matrix method to compute the currents I_1 , I_2 and I_3 .
2. Calculate P_{R1} , P_{R2} , P_{R3} , P_{R4} & P_{R5} . The formula of power is $P = I^2 \cdot R$

Q5 \ Plot the functions $y_1 = e^{-x}$, $y_2 = \sqrt{\cos(x)}$ for $x = 0; 0.1\pi; 3\pi$ in one figure. (20 marks)

Use different colors and style, add label for both axes and title for your figure.




 Examiner
 م.م. محمد جليل

Good Luck


 Head of dept.
 م.د. علي شاکر

قسم الطيران

١/٥

الاجابة عن اربعة اسئلة فقط

س١) اجب عن أحد الفرعين:

ا- عرف الديمقراطية تعريفا شاملا ثم بين اهم العناصر الاساسية للديمقراطية.

ب- تحدث عن الاتفاقية الامريكية لحقوق الانسان. بماذا تميزت وهل طبقت الاتفاقية على ارض الواقع.

س٢) الديانة الاسلامية جعلت الانسان المحور المركزي للمسيرة الانسانية. ناقش ذلك.

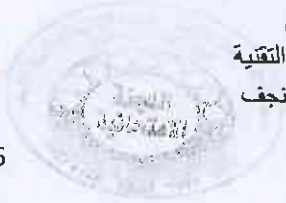
س٣) اجب عن احد الفرعين:

ا- عرف حقوق الانسان تعريفا شاملا وما أهم الخصائص والاجيال.

ب- للحريات العامة انواع عددها وشرح ما يخص العملية التعليمية.

س٤) م اهم مصادر تمويل اللجنة الدولية للصليب الاحمر الدولي وما اهم اعمال اللجنة الدولية للصليب الاحمر الدولي.

س٥) لمناظرات حقوق الانسان اهمية خاصة في فهم مادة حقوق الانسان عددها وشرح اثنتين منها.

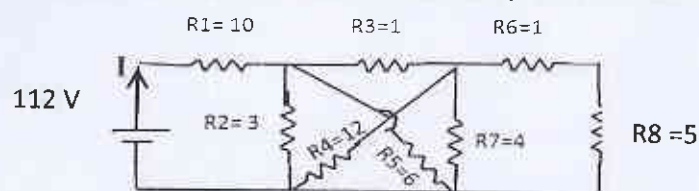


قسم : قسم هندسة تقنيات الطيران
المرحلة : الأولى
المعدة : تكنولوجيا كهرباء
وقت الامتحان : ثلاث ساعات
التاريخ : / / ٢٠١٦

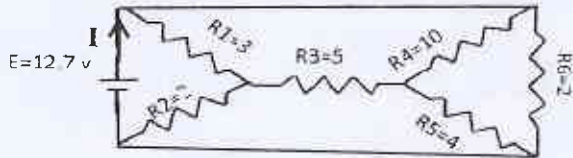
Final examination 2015-2016

Note : Answer only four questions

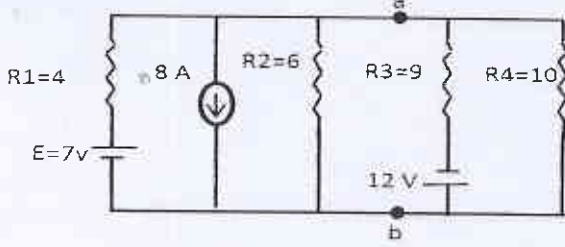
Q1/ calculate equivalent resistor ,total current , conductance G and power for the circuit shown (25)



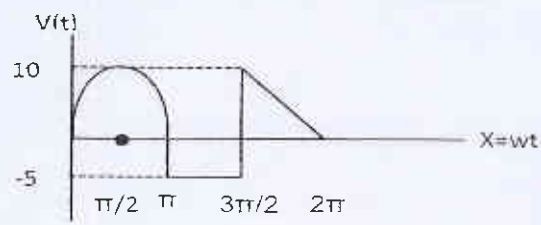
Q2/ for the circuit shown , determine the equivalent resistance then use it to find the current I (25)



Q3/ find NORTON's equivalent circuit for the portion of the network to the left of (a – b) in figure below (25)



Q4/ find the average value for the waveform shown (25)



Q5/ for the following pairs of voltages and currents , indicate whether the element is a capacitor , inductor or resistor and determine the value of C,L,or R (25)

a) $v = 600 \cos (100 t +30)$
 $i = 100 \sin (100 t +120)$

c) $v = 900 \sin (200t -20)$
 $i = 150 \sin (200t +90)$

b) $v = 330 \cos (200t -30)$
 $i = 30 \sin (200 t -180)$

d) $v = -8 \cos (300 t)$
 $i = 4 \sin (300 t +10)$

أ.م.د. علي شاذل



مدرس المادة
محمد علي كريم