University of Diyala
College of Engineering
Mechanical Engineering Dep.

Final Exam/2nd Attempt

Class:2nd year
Subject: mathematics
Year: 2011-2012
Time:3 hour

Note:-***attempt Ten questions only***

Q1	Find the radius and interval of convergence of the series $\Sigma\frac{(x-2)^n}{3^n \cdot n^4}$	10%
Q2	using series to find $\lim_{x\to 0}\frac{e^{3x}-1}{sinx}$?	10%
Q3	solve the differential equation $\frac{dy}{dx}+\frac{3}{x}y = x^3y^5$ (Bernoulli equation)	10%
Q4	find the value of $\int_0^1\int_x^1 e^{y^2}\,dydx$ By reversed the order of the integral?	10%
Q5	solve the differential equation: $\bar{\bar{y}}$-3$\bar{y} = e^{3x}$-12x	10%
Q6	Evaluate the line integral $\oint_c xydy - y^2\,dx$ Using green's theorem where c is the square cut from first quadrant by the lines X=1 and y=1	10%
Q7	Find the equation of the plane having the points A(2,3,5),B(7,2,1)and C (1,1,1) ?	10%
Q8	Find the directional derivative of the function f (x,y) = Ln$\sqrt{x^2+y^2}$ at Po (3,4) In the direction of the vector $\vec{A}$ =i + j	10%
Q9	Evaluate $\iint_R x^2dA$ on the region R in the first quadrant by xy=16 and x=8 , Y=0, y=x .	10%
Q10	use Cauchy's integral formula to evaluate the integral : $\oint_{\lvert z\rvert=2}\frac{sin(\pi z)}{(z-1)^2}\,dz$	10%
Q11	show that u(x,y)= x^2 - y^2 is harmonic function and the find a corresponding Function V(x,y) such that f(z)=u+iv is analytic .	10%
Q12	use series to evaluate $\int_0^1\frac{sinx}{x}\,dx$	10%

Good Luck

Head of Dep.: .....

Name: Zaid S. Hamoudi

Lecturer: Samir D. Ali

Name: .....

University of Diyala
College of Engineering
Dep. of Mech. Eng.
Final Exam/2nd Attempt

Class:4th stage
Subject: Mech. Design
Year: 2012-2013
Time:3.5 hours

Note:-Answer six questions only

Q1	Determine if a titanium ball of diameter 2 cm which is in contact with marble flat surface can safely withstand normal load of 3000 N. Given, S_y = 770 MPa (titanium), v_1 = 0.33 (titanium), E_1 = 105 GPa (titanium) v_2 = 0.3 (granite), E_2 = 70 GPa (granite)	10 Marks
Q2	What is the allowable compressive load for a 25 mm x 50 mm bar that is 0.5 m long for a factor of safety of 4? The yield point of the material is 275 MN/m^2. C=1. E = 200 GPa	10 Marks
Q3	A steel rod is subjected to a reversed axial load of 180 kN. Find the diameter of the rod for a factor of safety of 2. Neglect column action. The material has an ultimate tensile strength of 1070 MPa and yield strength of 910 MPa. The endurance limit in reversed bending may be assumed to be one-half of the ultimate tensile strength. Other correction factors may be taken as follows: For axial loading = 0.7; For machined surface = 0.8 ; For size = 0.85 ; For stress concentration = 1.0.	10 Marks
Q4	When a coil spring with a spring scale of18 kN/m is compressed 30 mm, the coils are closed. The allowable shear stress is 345 MN/m^2, the spring index C=8, the ends are squared and grounded, and G=83 GN/m^2. Calculate the required wire diameter d, the required coil diameter D, and the closed length of the spring.	10 Marks
Q5	A 75 mm diameter full journal bearing supports a radial load of 3500 N. The bearing is 75 mm long and the shaft operates at 400 rev/min. Assume a permissible minimum film thickness of 0.02 m and a diameteral clearance of 0.106 mm. Determine (a) the viscosity of a suitable oil, (b) the coefficient of friction, (c) the amount of oil Q pumped through the bearing.	10 Marks
Q6	A) For the problem shown in Fig. Q6 a, the permissible shear stress is 140 MPa. Find the load F that would cause such stress. B) For the problem shown in Fig. Q6 b, the plate subjected to the load is made of 1020 steel of 6 mm thickness, and welded with E70xx electrode. Estimate the maximum load F that can be applied.	10 Marks
Q7	Estimate a suitable face width for a 20◦ 20-tooth cast-iron spur pinion having a module of 4 mm drives a 32-tooth cast-iron gear. The pinion speed is 1000 rev/min, and 10 kW of power is transmitted. The contact stress should not exceed 620 MPa. Find also the resulting bending stress	10 Marks

Good Luck

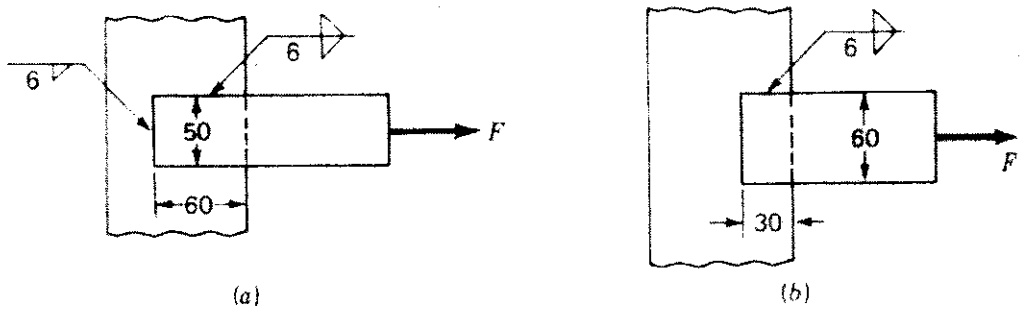
Head of Dep.: .....
Name: Zaid S. Hammoudi

Lecturer:.....
Name: Zaid S. Hammoudi

Attached Figures and Notes

Q6

FIG(Q6)



University of Diyala
College of Engineering
Mechanical department
Final Exam/2nd Attempt

Class: 4th stage
Subject: Control and Measurements
Year: 2011-2012
Time: 3 hour

Note:-Answer five questions only

Q1	Reduce the block diagram shown in Fig.(1) , and find the overall transfer function for this system.	20%
Q2	For the hydraulic amplifier shown in Fig.(2) , determine the block diagram for the walking beam linkage and also the block diagrams relating e to y and y to w.Combine these diagrams to determine the overall block diagram representation for this system.	20%
Q3	The differential equation of operation for a system is shown below, Determine the response when all the initial conditions are zero, and the input function $f(t) = 4t$. $(D^2 + 3D + 2)y(t) = f(t)$	20%
Q4	A system have the following characteristics , sketch the root locus plot and determine: 1-The gain K for stability. 2- The gain K when the damping ratio is $\xi = 0.5$. $G(S) = \frac{K}{S(S+4)(S+6)}$, $H(S) = 1$	20%
Q5	A system has an open loop transfer function given bellow, draw the polar plot and check the stability of this system . $G(S) = \frac{5}{S(S+1)(S+2)}$	20%
Q6	***A:*** Sketch the bourdon gage ,state the functional elements of this instrument . ***B:*** Define the passive and the active transducers.	20%

Good Luck

Head of Dep.:

Name: Zaid S.Hammoudi

Lecturer:

Name: Mohammed Ismael

Attached Figures

Q1

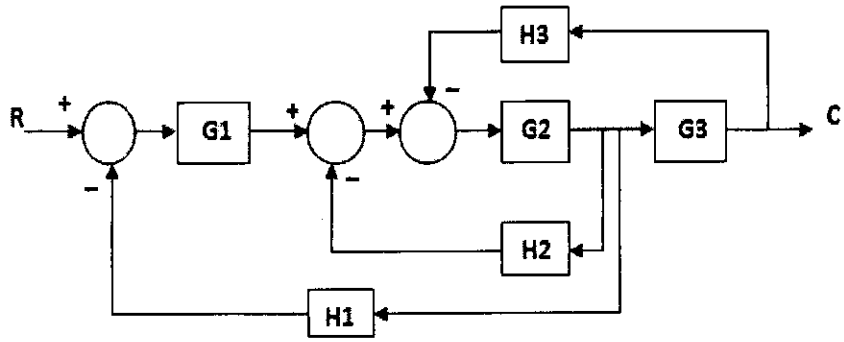
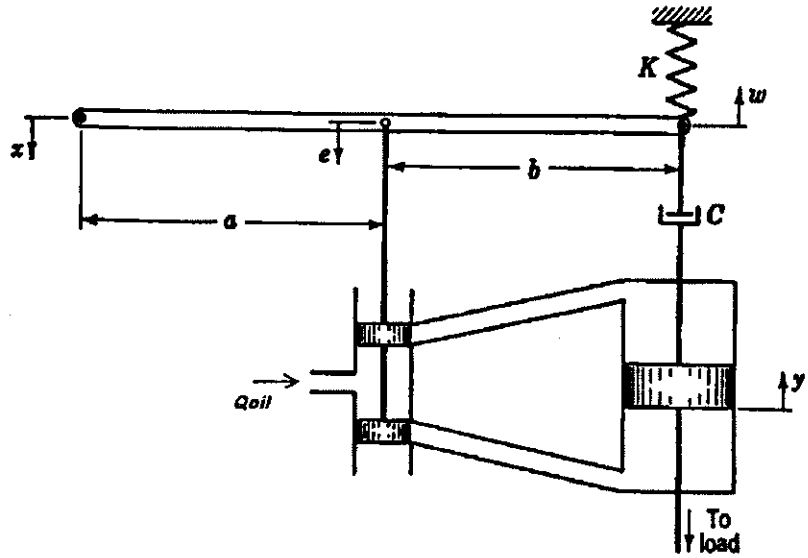


Figure (1)

Q2



Figure(2)

University of Diyala
College of Engineering
Dept. of Mechanical Engineering
Final Exam/ SecondAttempt

Class: 4th stage
Subject:- Engineering Materials
Year: 2011-2012
Time:3 hour

Note:-Answer Five Questions Only

Show All Your Work, Sketches, Be Neat& Organized

Q1	A- List the mechanical properties. Define each property and write the mathematical expression for it. Also show, what are the factors affecting mechanical properties of the metals? B- Tool steel specimen of 25mm diameter and 65mm guage length was tested in a standard test. Following observations were made during the test:- Yield Load = $80x10^3$N Maximum Load =$90.5x10^3$N Fracture Load = $60.5x10^3$N Gauge Length of Fracture = 85.5mm Determine: 1. Yield point stress, 2. Ultimate tensile strength 3. Percentage of Elongation, 4. Modulus of Elasticity, 5. Modulus of resilience, 6. Fracture Stress, 7. Percentage of reduction in area and 8. Modulus of toughness.	**20%**
Q2	A- Describe four methods of altering the environment to prevent or reduce corrosion and two methods by which cathodic protection can be used to protect a steel pipe from corroding. B- The wall of a low carbon tank containing aerated water is corroding at a rate of 100 mdd. How long will it take for the wall thickness to decrease by 0.25mm? If you know the density of Steel (7.87 g/cm^3).	**20%**
Q3	A- Classify Five only from the following Non-Ferrous Metals? Give its chemical composition and industrial applications. 1. Cu-Alloys, 3. Pb-Alloys, 4. Tin-Alloys, 5. Zn-Alloys, 6. Ni-Alloys, 7. Mg-Alloys, B- What are nanomaterials, ferroelectric and piezoelectric materials? Describe the use of such materials in an industrials applications and discuss ferroelectric and piezoelectric behavior with examples. And where are these materials used?	**20%**
Q4	A- What are Non-Destructive testing. List the methods of NDT? Giveoverview of each method, some uses and its common applications. B- Classify the following:- 1. Ceramic and advanced ceramic materials, 2. Composite and advanced composite materials.3. Thermoplastics materials, 4. Thermosetting plastics materials, 5. Liquid crystal polymers.Give their compositions, characteristics and engineering applications	**20%**

Q5	A- What is an aluminum alloy? How are aluminum alloys classified? List four important aluminumalloys and its industrial applications. B- Classify the tool steel and stainless steel? Give the chemical composition& industrial applications for each type.	**20%**
Q6	A- Define the creep, creep failure and creep rate. Then draw the typical creep curve. Also, show what are the major factors that affect the creep strength of a metallic materials? B- The following creep data were obtained for a titanium alloy at 60 Mpa and 700C°. Plot the creep strain versus time (hours) and determine the steady-state creep rate for these test conditions.	**20%**

Strian (mm/mm)	Time (hour)
20×10^{-2}	1
40×10^{-2}	2
60×10^{-2}	3
70×10^{-2}	4
80×10^{-2}	5
100×10^{-2}	6

Good Luck

Head of Mech. Eng. Dept.

Name:Dr. Ziad S. Mahmoud

Lecturer

Name: Assist. Prof. Dr. Eng. Adel K. M

اسئلة دكتور احمد دياب والمدرس المساعد د. منذر تكليف

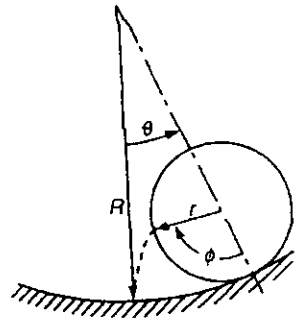
University of Diyala
College of Engineering
Dep:Mechanical Engineering.
Final Exam/2.st Attempt

Class:four.. stage
Subject: theory of vibration.
Year: 2012-2011
Time:3 hour

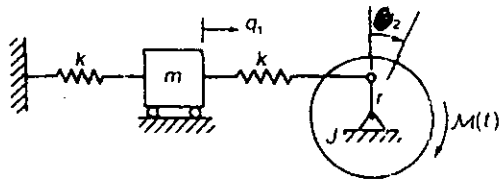
Note:-Answer five questions only

Q1	A cylinder of weight w and radius r rolls without slipping on a cylindrical surface of radius R, as shown in fig(1) Determine its differential equation of motion for small oscillations about the lowest point for no slipping we have $r\phi = Rv$.	20%
Q2	A machine of 100kg mass is supported on springs of total stiffness 700kN/m and has an unbalanced rotating element, which results in a disturbing force of 350 N at a speed of 3000rpm. Assuming a damping factor of ζ=0.20, determine (a) its amplitude of motion due to the unbalance , (b) the transmissibility , and (c) the transmitted force.	20%
Q3	Using Lagrange's method , set up the equations of motion for the system shown in fig(2) .	20%
Q4	Determine the kinetic energy of the system shown in the fig(3) in terms of $x^{\cdot}$, Determine the stiffness at mo and write the expression for the natural frequency.	20%
Q5	An airfoil section to be tested in a wind tunnel is supported by a linear spring k and a torsion spring K as shown in fig(4) . If the center of gravity of the section is a distance e ahead of the point of support, determine the differential equations of motion of the system.	20%
Q6	Write down the equation of motion and hence develop the frequency equation for the following system as shown in fig(5). Assume small displacement.	20%

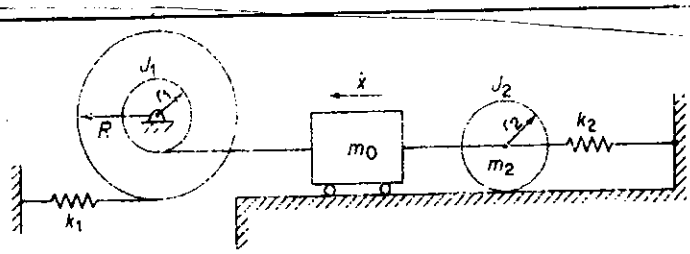
Fig(1)



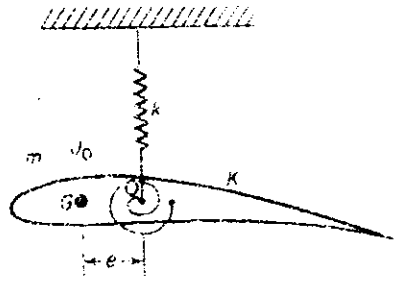
Fig(2)



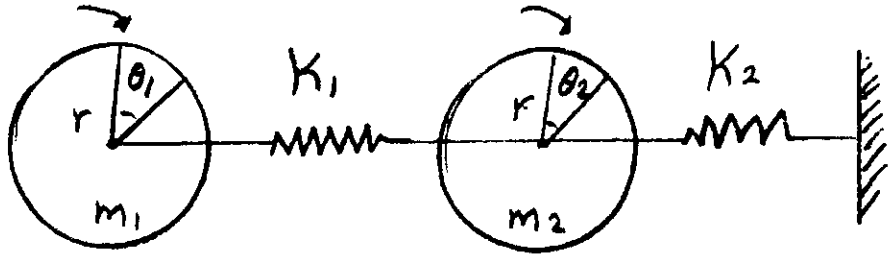
Fig(3)



Fig(4)



Fig(5)



Good Luck

Head of Dep.:

Name: zaid salim

Lecturer: Saad

Name: saad theeyab .

University of Diyala
College of Engineering
Dep.Of Mechanical Engineering
Final Exam/2nd Attempt

Class:4th stage
Subject: Ind. Engineering
Year: 2012-2013
Time:3 hour

س5:- فرع A- أمام إحدى المنشآت الصناعية المختصة بصناعة الهواتف النقالة ثلاث مواقع متاحة هي (الشمال– الوسط– الجنوب) والبيانات المتعلقة بكل موقع مبينة في الجدول التالي و فإذا علمت إن رأس المال المستثمر واللازم لإنشاء وإقامة المشروع قد بلغت (900) مليون دولار على افتراض ثبات كمية الإنتاج .

المطلوب :- 1- أي المواقع من وجهة نظرك الهندسية هي الأفضل ولماذا ؟ وضح ذلك بأسلوب هندسي مستخدما طريقة نقطة التعادل بالمفاضلة في اختيار الموقع.

2- احسب فترة استرداد رأس المال المستثمر لكل موقع ؟

البيانات المتوقعة خلال سنة	الشمال	الوسط	الجنوب
المبيعات خلال سنة	(120) مليون دولار	(130)مليون دولار	(125)مليون دولار
رواتب الموظفين	(12)مليون دولار	(13)مليون دولار	(14)مليون دولار
أجور العمال الوقتيين	(15)مليون دولار	(20)مليون دولار	(11)مليون دولار
كلفة المواد الأولية	(40)مليون دولار	(50)مليون دولار	(50)مليون دولار
مصاريف التسويق	(10)مليون دولار	(12)مليون دولار	(7)مليون دولار
تكاليف النقل	(10)مليون دولار	(15)مليون دولار	(14)مليون دولار
مساحة الموقع المقترح	$2(Km)^2$	$1.8(Km)^2$	$2.1(Km)^2$
أجور الماء والكهرباء	(8)مليون دولار	(6)مليون دولار	(5)مليون دولار

فرع B- التخطيط من أهم الأقسام المشاركة في نجاح العملية الإنتاجية ومن خلال التخطيط السليم يتم الارتقاء بسلم العملية الإنتاجية إلى أقصى درجات النجاح بين المزايا التي يحققه التخطيط الجيد للمصنع.

----------(12 درجة)

س6:- تتم الأنشطة التالية في إحدى المصانع الصغرى وفق البيانات التالية :-

Time(day)	No. start happen and end happen	happen name
20	(1-6)	A
25	(6-2)	B
30	(6-3)	C
16	(4-9)	D
50	(8-10)	E
22	(3-8)	F
17	(2-5)	G
15	(5-6)	H
7	(7-6)	I
9	(3-4)	J
23	(8-9)	K
40	(9-11)	L

المطلوب:-

1- إعداد شبكة تصور المشروع بطريقة النشاط على السهم وحساب النشاط أو الأنشطة الحرجة وتأشير ذلك.

2- احتساب الأوقات المبكرة والمتأخرة لبدايات الأنشطة ونهاياتها؟

----------(12 درجة)

Good Luck

Head of Dep.: .....
Name: Zaid S. Hammoudi

Lecturer: .....
Name: Sami Ali Nawi

University of Diyala
Collège of Engineering
Dep.Of Mechanical Engineering
Final Exam/2nd Attempt

Class:4th stage
Subject: Ind. Engineering
Year: 2012-2013
Time:3 hour

ملاحظة:- الإجابة عن خمسة أسئلة فقط.

س1 : - فرع A- خريطة أو مخطط باريتو (Pareto Chart) واحدة من أدوات الرقابة على الجودة أشرح هذا المبدأ.

فرع B- في سبيل بلوغ الأهداف التي يسعى إليها المصنع ينبغي حصر الفعاليات والأنشطة الضرورية ضمن أنشطة أو فعاليات أو أقسام محددة وبالتالي هنالك عدد من التنظيمات والأقسام والمستويات الإدارية بين هذه الأنواع مع شرح واحدة بالتفصيل مع ذكر المزايا والعيوب.

----------(12 درجة)

س2 :- فرع A- - تضم إحدى الشركات الهندسية مصنعين إنتاجيين لإنتاج نفس المنتج احدهما (المصنع A) طاقته القصوى (250000) منتج سنويا والآخر (المصنع B) طاقته السنوية (220000) منتج وتم إجراء توسعات بإضافة ماكينة للمصنع (A) طاقتها السنوية (1800) منتج وذلك بعد مرور خمسة أشهر وماكينة أخرى بنفس الطاقة الإنتاجية للمصنع (B) بعد مرور سبعة أشهر وقد تعرض المصنع (A) لعطل في إحدى مكائنه ذات الطاقة السنوية (800) وذلك بعد مرور ستة أشهر بينما تعطلت ماكينة في المصنع (B) طاقتها السنوية(5000) لمدة ثلاثة أشهر ' علما بان برنامج الإنتاج لكل مصنع هو (250000) سنويا ، المطلوب :-

1- حساب صافي الطاقة القصوى والطاقة القصوى المتاحة للتشغيل لكل مصنع.
2- حساب مستوى التشغيل على أساس كل مصنع لصافي الطاقة القصوى مرة ولصافي الطاقة المتاحة مرة أخرى.
3- نسبة استغلال الطاقة التصميمية لكل مصنع.

فرع B- عملية الترتيب الداخلي للمصنع واحة من المهام الكثيرة التي يكون للمهندس دور أساسي في وضعه ويعتمد ذلك على كثير من المتطلبات والمعطيات ومن الأنواع الشائعة الاستخدام الترتيب الخلوي(Cellular Layout)بين طبيعة هذا النوع من الترتيب وماهي ايجابياته وماهي سلبياته .

----------(12 درجة)

س3:-فرع A- السيطرة النوعية قسم مهم في إكمال العملية الإنتاجية وبالتالي يتطلب صرفيات(تكاليف) مختلفة منها تكاليف الضبط والفحص (تكاليف الوقاية) بين ذلك بالتفصيل

فرع B- إذا كانت الطاقة الإنتاجية لماكينة معينة هي (720) منتج في الساعة الواحدة وذلك طبقا لمواصفة ذلك المنتج ، فإذا علمت إن عدد ساعات العمل في اليوم الواحد هي (6) ساعات ، احسب كمية إنتاج الماكينة خلال ثلاثة أعوام إذا كانت الماكينة لاتتوقف إلا في الحالات المبينة في المطالب أدناه :-

1- الحالة لعامل ذو كفاءة جيدة ولا يؤخر العمل وهنالك توقف اضطراري للماكينة مقداره ساعة يوميا.
2- إذا كان العامل بكفاءة متوسطة حيث يؤدي إلى زيادة الوقت اللازم لإنتاج المنتج الواحد بمقدار(15) ثانية
3- إذا كانت الماكينة تتوقف لمدة (0.1) ساعة يوميا لغرض الصيانة وهو توقف مسموح به وتتوقف لمدة (7.5) دقيقة في كل ساعة لغرض التبريد مع بقاء كفاءة العامل حسب الخطوة (2).

----------(12 درجة)

س4:- فرع A- جمعت البيانات التالية عن الكلفة المتغيرة لمعمل يصنع منتج معين تباع الحدة الواحدة منه بمبلغ (80) $ ، المطلوب تحديد امثل مستوى للإنتاج والربح:

كمية الإنتاج Q	1	2	3	4	5	6	7	8
الكلفة المتغيرة.V.C	76	120	150	170	200	250	200	350

فرع B- واحدة من أهم طرق الفحص المستخدمة في عمليات الرقابة النوعية هي طريقة الفحص الشامل (100%)أشرحها وبين مزايا وعيوب تلك الطريقة مع ذكر بعض الأمثلة.

----------(12 درجة)

University of Diyala
College of Engineering
Mechanical Engineering Dep.
Exam/2nd Attempt

Class:3rd stage
Subject: gas dynamic
Year: 2011-2012
Time: 3 hour

Note:-Answer five questions only

Q1	A. proves that for compressible fluid, an increase in velocity is always associated with a decrease in pressure and vice versa. B. Show that propagation of pressure wave in compressible fluid is directly proportion with gas temperature and inversely with gas molecular	20%
Q2	A needle nose projectile traveling at a speed of M =3 passes 200m above an observer. Find the projectiles velocity and determine how far beyond the observer the projectile will first be heard.	20%
Q3	A uniform supersonic flow of a perfect gas with γ= 1.4, Mach number 3.0 and an upstream static pressure of 100kPa flows over a geometry as shown in figure (1). Determine the downstream static pressure for both profiles	20%
Q4	Consider the subsonic-supersonic flow through a convergent-divergent nozzle. The reservoir pressure and temperature are *10 atm* and *300 k*, respectively. There are two locations in the nozzle where $A/A^*=6$ one in the convergent section and the other in the divergent section. At each location, calculate M,P,T and V.	20%
Q5	Consider the flow of air through a pipe of inside diameter = 0.15 m and length = 30 m . The inlet flow conditions are $M_1 = 0.3$, $p_1 = 1$ atm and $T_1 = 273$ K. Assuming f = const = 0.005, calculate the flow conditions at the exit, M_2 ,P_2 ,T_2 ,and P_{o2}	20%
Q6	Air enters a constant duct at $M_1 = 3$, $p_1 = 1$ atm, and T_1=300 K. Inside the duct, the heat added per unit mass is $q = 3*10^5$ J/kg . Calculate the flow properties M_2, P_2, T_2, e_2, T_{o2}, and P_{o2} at the exit of the duct.	20%

Head of Dep.: .....

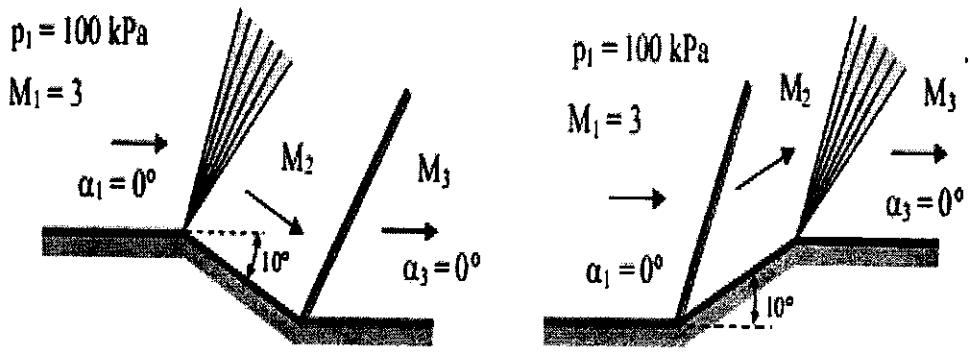
Name: .....

Lecturer:.....

Name:..Ahmed Abed Ali

Attached Figures and Notes

Q3



FIG(1)

University of Diyala
College of Engineering
Dept. of Mech. Eng.
Final Exam/2nd Attempt

Class:3rd stage
Subject: Heat Transfer
Year: 2012-2013
Time:3 hour

Note:-Answer Five questions only

Q1	Consider steady two-dimensional heat transfer in a long solid bar whose cross section is given in the fig (1). The measured temperatures at selected points of the outer surfaces are as shown. The thermal conductivity of the body is k=20W/m·°C, and there is no heat generation. Using the finite difference method with a mesh size of $\Delta x = \Delta y$ = 1.0 cm, determine the temperatures at the indicated points in the medium.	20%
Q2	Derive an expression for steady state temperature distribution in a long cylinder have a constant thermal conductivity (k) and outer radius (r_o) if heat is generated uniformly at a rate of ($\dot{q}$ W/m^3) per unit volume within the cylinder. Consider the outer surface temperature is constant at (T_o).	20%
Q3	A furnace is of cylindrical shape as shown in fig.(2), with $R = H = 2$ m. The base, top, and side surfaces of the furnace are all black and are maintained at uniform temperatures of 227, 427, and 927 °C, respectively. Determine the net rate of radiation heat transfer to or from the top surface during steady operation.	20%
Q4	Condensing steam at 150 °C is used on the inside of a bank of tubes to heat a cross-flow stream of CO_2 which enters at 3 atm, and 35 °C, and 5 m/s. The tube bank consists of 100 tubes of 1.25 cm OD in a square (10×10) in line array with $S_n = S_p$ = 1.875 cm. The tubes are 60 cm long. Assuming the outside tube wall temperature is constant at 150 °C, calculate the overall heat transfer to the CO_2 and its exit temperature. For CO_2 at 92.5°C: ρ=4.404 kg/m^3, C_p=291 J/kg·°C, μ=17.82×10^{-6} kg/m·s, k=0.0218 W/m·°C, While at 35°C: ρ=5.226 kg/m^3.	20%
Q5	A: Hot exhaust gases are used in a finned-tube cross-flow heat exchanger to heat 2.5 kg/s of water [C_p=4.175 kJ/kg·°C] from 35°C to 85°C. The gases [C_p=1.09 kJ/kg·°C] enter at 200°C and leaves at 93°C. The overall heat-transfer coefficient is 180 W/m^2·°C. Calculate the area of the heat exchanger. B: Explain briefly (with figures) the types of heat exchangers.	20%
Q6	A fused-quartz sphere has a thermal diffusivity of 9.5×10^{-7} m^2/s, a diameter of 2.5 cm, and thermal conductivity 1.52 W/m·°C. The sphere is initially at a uniform temperature of 25 °C and is suddenly subjected to a convection environment at 200 °C. The convection heat-transfer coefficient is 110 W/m^2·°C. Calculate the temperature at the center and at a radius of 6.4 mm after a time of 4 minutes.	20%

Good Luck

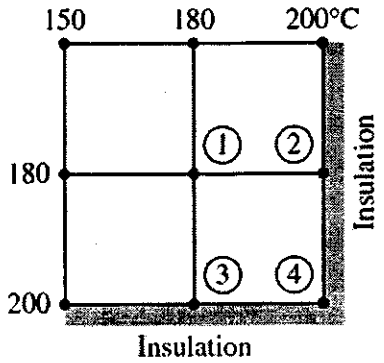
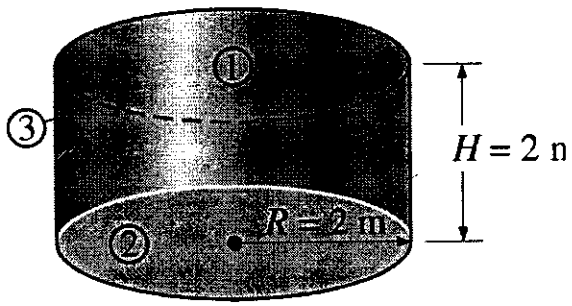
Head of Dep.: .....

Name: Zaid S. Hammoudi

Lecturer:.....

Name: Ali Z. Asker

Attached Figures and Notes

Q1	 FIG(1)
Q2	
Q3	 FIG(2)
Q4	
Q5	

University of Diyala College of Engineering Mechanical Engineering Dep.	Final - Year Examination Second attempt/ 2011-2012	Subject: Turbomachinery Class: Third class Date / 9 /2012 Time : 3 hrs

Note:-Answer only five questions

Q1		Complete the sentences ?(20M) 1. Turbomachines are .....(2M) 2. Cavitation is the boiling of .....(3M) 3. Centrifugal pump are a hydraulic ..... (3M) 4. Dimensional Analysis is a ..... (3M) 5. There are three types of similarities 1.....2.....3..... (1.5M) 6. The two isentropic efficiencies commonly used in axial flow turbine work are.....(2M) 7. Steam turbine are usually .....or a .....stages whereas gas turbine tend to be always of .... (1.5M) 8. The types of compounding or staging in steam turbine are 1.....2.....3..... (1.5M) 9. Symmetrical aerofoil is ..... (2.5M)
Q2	A	What are the losses in blade cascade of compressor and turbine ? (8M)
	B	What are the function of the diffuser that are installed at the end of the last stage of an axial flow compressor? (2M)
	C	How can be classify the hydraulic turbine ? (10M)
Q3		Compare between centrifugal compressor and axial flow compressor ?(20M)
Q4	A	Find the number of pumps required to take water from a deep well under a total head of 208 m ,the pumps are identical and run at 1000 rpm. The specific speed of each pump is given as 20 while the rated capacity of each pumps is 150 L/s? (8M)
	B	An aerofoil having a chord length of 2.25 m and span of 13.5 m moves at a velocity of 125 m/s through standard atmosphere at an elevation of 2500m. Calculate the lift and drag forces ,and power required to drive the aerofoil. Take C_L=0.465 and C_D=0.022, density of air =1.25 kg/m^3? (12M)
Q5		The three jet pelton wheel is required to generate 1x10^{7}W under a net head of 400 m. The blade angle at outlet is 15^o and the reduction in relative velocity while passing over the blade is 5%. If the overall efficiency of the wheel is 80%. C_v=0.98 and speed ratio =0.46. find(1) total flow (2)the diameter of the jet (3) the force exerted by a single jet on the buckets in the tangential direction?(20M)
Q6	A	A multistage axial flow compressor absorbs 4500W when delivering 20k/s of air from stagnation condition of 1 bar and 288 K. If polytropic efficiency of compression is 0.9 and if the stage stagnation pressure ratio is constant. Calculate (1)pressure at compressor outlet(2)the number of stage. take the temperature rise in the first stage as 20°C? (10M)
	B	Complete the sentences ?(10M) *1.* The blade camber angle in compressor cascade is .....(2M) *2.* Axial flow compressor is .....(2M) *3.* Priming of centrifugal pump is .....(3M) *4.* The breaking jet in pelton turbine is .....(3M)

With best wishes Mohammed al Mamory

University of Diyala
College of Engineering
Dep. Of Mechanical Eng.
Final Exam/2st Attempt

Class:3st stage
Subject: Engineering Analysis
Year: 2011-2012
Time:3 hour

Note:-Answer Five question only

Q1	**Using Exact Equation, Solve:** $2xydx + (x^2 + Cosy)\, dy = 0$	20%
Q2	**Find the general solution of:** $y(6y^2 - x - 1)dx + 2xdy = 0$ **Using the standard form of the Bernoulli equation**	20%
Q3	**:. Solve** $y'' - 4y = x\, e^x + \cos 2x$	20%
Q4	**Find the fourier series representation of** $F(x) = x/2 \qquad 0< x< 2\pi$ $F(x) = F(x + 2\pi)$	20%
Q5	**A solid as shown in fig. is maintained at zero temp. in the vertical direction. The bottom is heated. Discuss the steady state temp. distribution in the solid. The equation to be solved is two-dimensional Laplace equation.** $\frac{\partial^2 u}{\partial x^2} + \frac{\partial^2 u}{\partial y^2} = 0$ $U = u(x,y)$.	20%
Q6	**Solve by laplace Transform** $y'' + 4y = \text{Cos } 2t$, given $y_0 = -2$ $y_0' = 1$	20%

Good Luck

Head of Dep.: .....
Name: Zaid S. Hammoudi

Lecturer:.....
Name: Dr. Muzher

University of Diyala
College of Engineering
Dep. Of mechanical engineering
Final Exam/2nd Attempt

Class:3rd stage
Subject: Numerical Analysis
Year: 2011-2012
Time:3 hour

Note:-Answer five questions only

Q1 (20%)

by using ***Newton Raphson*** method, find the positive roots for equation:-

$$f(x) = sin(x) - \frac{x}{2}$$

Note: - put your scientific calculator on *Rad* system.

Q2 (20%)

Use **Simpson's and Trapezoidal** rules to find the integrals below, for $n = 4$

$$I = \int_4^8 \frac{dx}{\sqrt{16x + x^2}}$$

Q3 (20%)

From the table shown below, find the equation of interpolation by using ***Lagrange*** method, then find the value of ***f(x)*** when ***x= 2*** .

x	*1*	*3*	*6*
f(x)	*12*	*20*	*33*

Q4 (20%)

Guess the equation of velocity to the moving rocket according to the table shown below, by using ***Least-Squares fitting*** for ***quadratic " parabola"*** degree, then find the velocity at ***time (t) = 17 second (s).***

T(s)	0	5	10	13	22	30
V(m/s)	0	3	7	10	14	18

Note:- complete your solution by using Gauss Elimination

Q5	use ***Taylor series*** method with (h=0.1) to find (y= 0.1) to the equation $y'' + 3xy' - 6y = 0$ If you given the basic conditions: - $y(0) = 1, y'(0) = 0.1,$ and use the terms at (x^5).	**20%**
Q6	solve the following differential equation by using ***Runge-Kutta*** method $\frac{dx}{dy} = x + y$, and the basic condiotions are y(0)=1, x=0, h=0.1	**20%**

Good Luck

Head of Dep.: .....

Name: Zaid Salim Hamoody

Lecturer:.....

Name: Omar Ahmed Raheem

University of Diyala
College of Engineering
Mechanical Engineering Dep.
Exam/2nd Attempt

Class:2nd stage
Subject: Thermodynamic
Year: 2011-2012
Time: 3 hour

Note:-Answer five questions only

Q1	A. Derive an expression for work ratio and efficiency in Brayton cycle in terms of minimum and maximum cycle temperature and pressure ratio and draw the cycle on (T-s) and (p-v) diagrams. Discuss the effect of each parameter on the work ratio. B. Prove that the isentropic work of a pump in steam power plant is expressed in terms of saturated water specific volume and pressure rise.	20%
Q2	A 1 m^3 rigid tank has air at 1500 kPa and ambient 300 K connected by a valve to a piston cylinder. The piston of area 0.1 m^2 requires 250 kPa below it to float. The valve is opened and the piston moves slowly 2 m up and the valve is closed. During the process air temperature remains at 300 K. What is the final pressure in the tank?	20%
Q3	Find the missing properties (T, P, v, u, h,s and x if applicable) and give the phase of the substance a) H_2O u = 1000 kJ/ kg, P = 5000 kPa b) NH_3 T = 65°C, p= 600 kpa c) R-134a T = 40°C, h = 400 kJ/kg d) N_2 T = 100 K, x = 0.75 e) R-22 T= -25°C, P = 100 kp	20%
Q4	A rigid tank is divided into two rooms by a membrane, both containing water, shown in Figure (1). Room A is at 200 kPa, v = 0.5 m^3/kg, VA = 1 m^3, and room B contains 3.5 kg at 0.5 MPa, 400°C. The membrane now ruptures and heat transfer takes place so the water comes to a uniform state at 100°C. Find the heat transfer during the process.	20%
Q5	Consider the system shown in Figure (2). Tank A has a volume of 100 L and contains saturated vapor R-134a at 30°C. When the valve is cracked open, R-134a flows slowly into cylinder B. The piston mass requires a pressure of 200 kPa in cylinder B to raise the piston. The process ends when the pressure in tank A has fallen to 200 kPa. During this process heat is exchanged with the surroundings such that the R-134a always remains at 30°C. Calculate the heat transfer for the process.	20%
Q6	Consider an ideal steam reheat cycle where steam enters the high-pressure turbine at 3.0 MPa, 400°C, and then expands to 0.8 MPa. It is then reheated to 400°C and expands to 10 kPa in the low-pressure turbine. Calculate the cycle thermal efficiency and the moisture content of the steam leaving the low-pressure turbine.	20%

Head of Dep.: .....

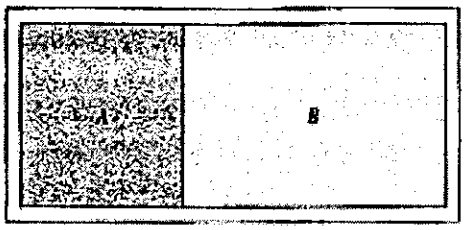
Name: .....

Lecturer:.....

Name:..Ahmed Abed Ali ghaidan

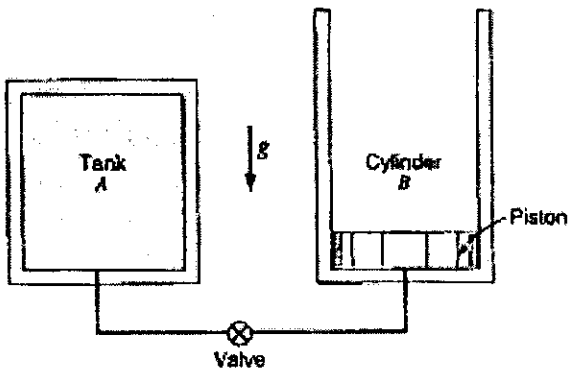
Attached Figures and Notes

Q4



FIG(1)

Q5



FIG(2)

University of Diyala
College of Engineering
Dep:Mechanical Engineering.
Final Exam/2.st Attempt

Class:.2nd stage
Subject: strength of material.
Year: 2012-2011
Time:3 hour

Note:-Answer five questions only

Q1	The coupling shown in the figure (1) is constructed from steel of rectangular cross section and is designed to transmit a tensile force of 50 kN . If the bolt is of 15 mm diameter. Calculate the shear stress in the bolt , the direct stress in the bolt and the direct stress in the forked end of the coupling .	20%
Q2	**. a load P is supported by two steel springs arranged in series .The upper spring has 20 turns of 20-mm - diameter wire on a mean diameter of 150 mm .The lower spring consists of 15 turns of 10-mm –diameter wire on a mean diameter of 130 mm. Determine the maximum shearing stress in each spring if the total deflection is 80 mm and G=83 GN/m²**	
Q3	A thin cylinder 75 mm internal diameter 250 mm long with walls 2.5 mm thick is subjected to an internal pressure of MN/m^2 .Determine the change in internal diameter and change in length . If in addition to the internal pressure ,the cylinder is subjected to a torque of 200 Nm , find the magnitude and nature of the principal stresses set up in the cylinder . E=200 GN/m^2 . γ =0.3. as shown in figure2	20%
Q4	Determine the dimensions of a hollow shaft with a diameter ratio of 3:4 which is to transmit 60 kW at 200 rev/min . The maximum shear stress in the shaft is limited to 70 MN/m^2 and the angle of to 3.8^0 in a length of 4m .For the shaft material G=80 GN/m^2.	20%
Q5	A a beam ABC is 9m long and supported at B and C 6m apart as shown in Figure (3). The beam carries a triangular distribution of load over the portion BC together with an applied counterclockwise couple of moment 80 KNM at B and a u. d. l . of 10 KN/m over AB, as shown . Draw the S.F. and B.M. diagrams for the beam .	20%
Q6	A 16-mm plate is lapped over and secured , by transverse fillet welds on the inside and outside to from a penstock 1.5 m in diameter .Determine the safe internal pressure ,assuming allowable stresses of σ_1 =160 $MN/m^2$for the plate and τ=120 MN/m^2 through the throats of the welds . Use the maximum size of welds permitted .	20%

Figure 1

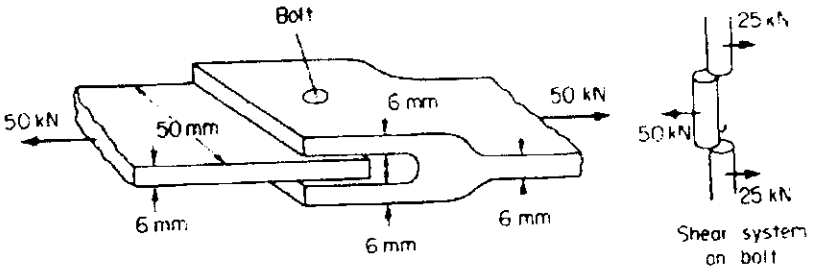


figure 2

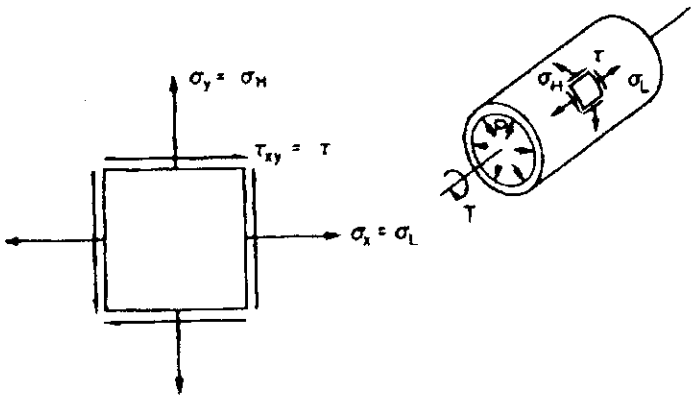
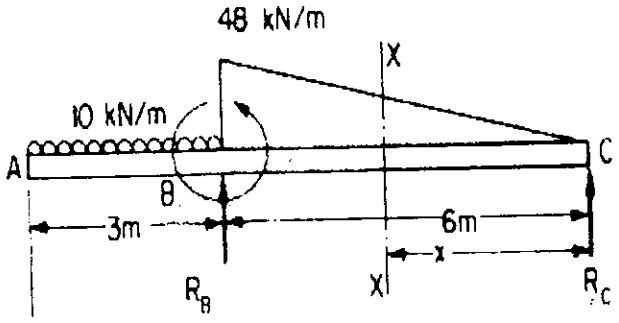


Figure 3



Good Luck

Head of Dep.:

Name: zaid salim

Lecturer:

Name: saad theeyab .

University of Diyala
College of Engineering
Dep. of Mechanical Eng.
Final Exam/2nd Attempt

Class:2nd stage
Subject:Fluid Mechanic
Year: 2011-2012
Time:3 hour

Note:-Answer Five questions only, 20 mark for each question

Q1	A vertical cylinder of diameter 180 mm rotates concentrically inside another cylinder of diameter 181.2 mm. Both the cylinders are 300 mm high. The space between the cylinders is filled with a liquid whose viscosity is unknown. Determine the viscosity of the fluid if a torque of 20Nm is required to rotate the inner cylinder at 120 r.p.m.
Q2	In the Fig. 1 find the gauge reading at A and B .
Q3	A 6m x 2m rectangular gate is hinged at the base and is inclined at on angle of 60o with the horizontal. The upper end of the gate is kept in position by a weight of 60kN acting at angle of 90o as shown in Fig. 2. Neglecting the weight of the gate, find the level of water when the gate begins to fall.
Q4	A cube 50 cm side is inserted in a two-layer fluid with specific gravity 1.2 and 0.9. The upper and lower halves of the cube are composed of materials with specific gravity 0.6 and 1.4 respectively. What is the distance of the top of cube above interface? See Fig. 3
Q5	Fig. 4 shows a pipes network in which Q and h_f refer to Discharges and pressure drops respectively. By sticking to the values given in the Fig. 5 Find the unknown values and give these computed values at their respective places on a neat sketch of the pipes network along with flow directions.
Q6	The water levels in the two reservoirs A and B are 104.5m and 100m respectively above the datum. A pipe joins each to a common point D , where pressure is 98.1kN/m2 gauge and height is 83.5m above datum. Another pipe connects D to another tank C . what will be the height of water level in C assuming the same value of 'f' for all pipes. Take friction co-efficient = 0.0075 .the diameters of the pipes AD ,, DB and CD are 300mm , 450mm, 600mm respectively and their lengths are 240m 270m 300m respectively, see Fig. 5

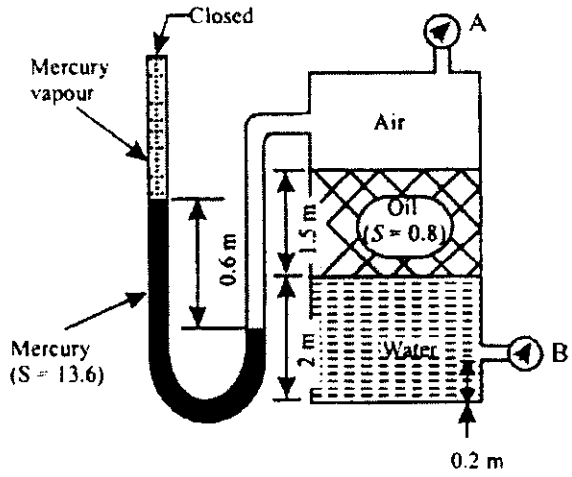


Fig.1

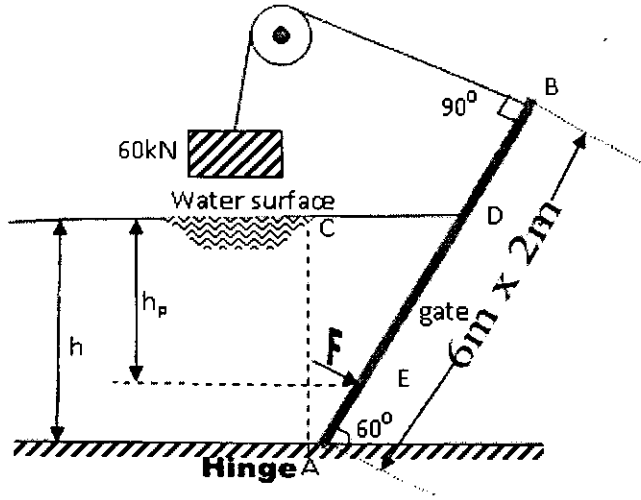


Fig.2

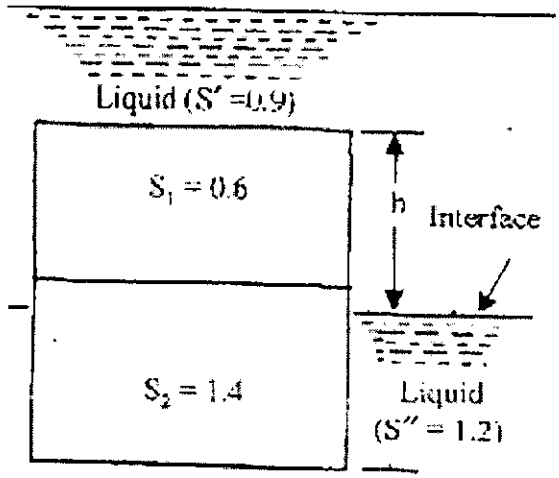


Fig.3

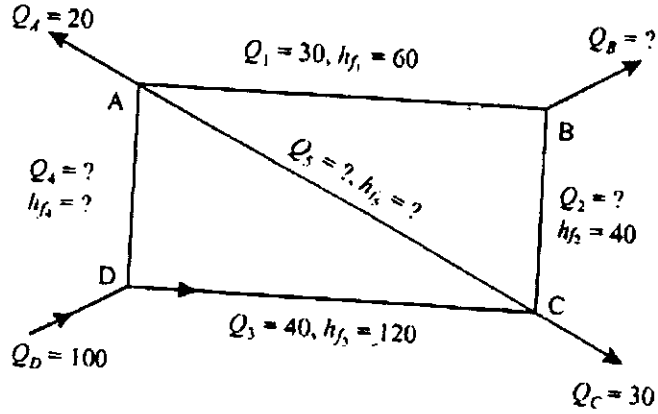


Fig.4

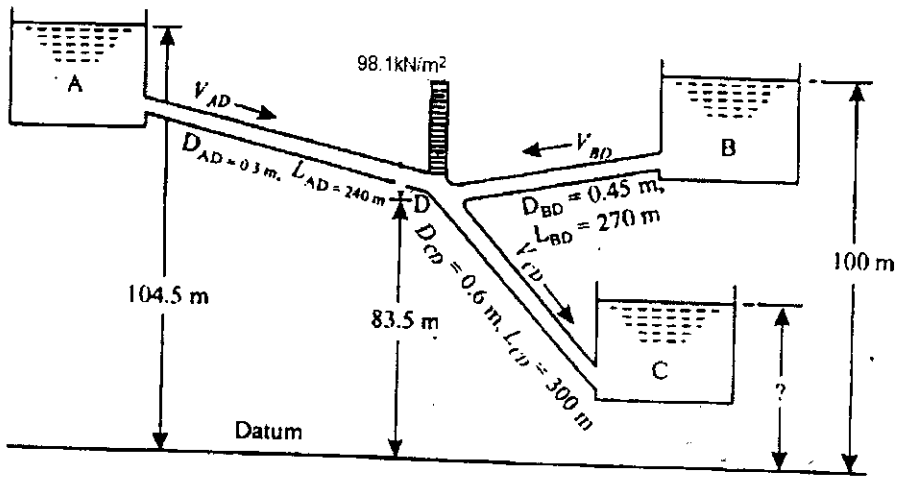


Fig.4

University of Diyala
College of Engineering
Dep. Mechanics
Final Examination /2nd

Class: 2nd stage
Subject:Dynamics
Year: 2011-2012
Time : 3 hours

Q1	**Answer A or B** **A.** What minimum horizontal velocity u can a boy throw a rock at A as shown in Fig (1.A) and have it just clear the obstruction at B ? **B.** The particle P moves along the space curve and has a velocity $v = 4i - 2j - k$ *m/s* as shown in Fig (1.B). The particle has an acceleration whose magnitude is *8* m/s^2.Calculat the radius of curvature ρ of the path and the rate of accelerationwhich the magnitude of velocity is increasing.	**10%**
Q2	Block *2kg* passes over the top B of the circular portion of the path with a speed of *3.5 m/s* as shown in Fig (2).Calculate the magnitude N_B of the normal force exerted by the path on the block. Determine the maximum speed v which the block can have at A without losing contact with the path.	**10%**
Q3	A pendulum consists of *two 3.2 kg* concentrated masses positioned as shown in Fig (3) on a light but rigid bar. The pendulum is swinging through the vertical position with a clockwise angular velocity ω= *6 rad/s* when a *50 g* bullet traveling with velocity v = *300 m/s* in the direction shown strikes the lower mass and becomes embedded in it. Calculate the angular velocity ω'which the pendulum has immediately after impact and find the maximum angular deflection θ of the pendulum.	**10%**
Q4	**Answer A or B** **A.** End A of the link has the velocity as shown in Fig (4.A) at the instant depicted. End B is confined to move in the slot. Calculate the velocity of B and the angular velocity of AB. **B.** A container for waste materials is dumed by the hydraulically-activated linkage. If the piston rod starts from rest in the position indicated and has an acceleration of *0.5 m/s^2* in the direction as shown in Fig (4.B). Calculate the initial angular acceleration of the container.	**10%**
Q5	The *2kg* plunger is released from rest in the position as shown in Fig (5). The spring of stiffness k = *500 N/m* has been compressed to *one-half* its uncompressed length of *200 mm.* Calculate the maximum height h above the starting position reached by the plunger.	**10%**
Q6	End A of the uniform *5kg* bar is pinned freely to the collar which has acceleration α =*4m/s^2* along the fixed horizontal shaft as shown in Fig (6). If the bar has a clockwise angular velocity ω = *2* rad/s as it swings past the vertical. Determine the components of the force on the bar at A for this instant.	**10%**

Good Luck

Head of Mechanical Dep
Dr. Zaid.S.Hammoudi

Associated Lecturer
Ammar Mohammed

Attached Figures and Notes

Q1

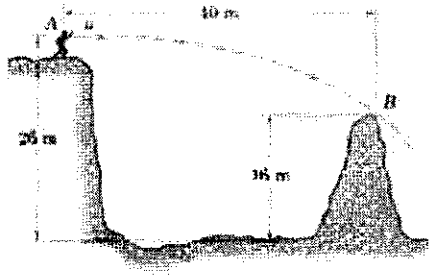


Fig (1.A)

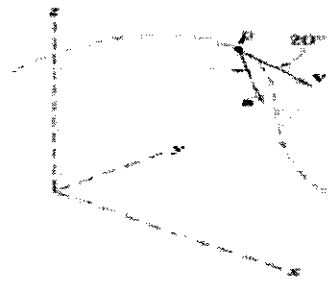
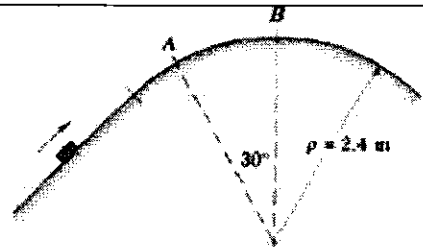


Fig (1.B)

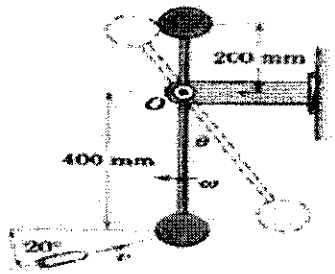
Q2

Fig (2)



Q3

Fig(3)



Q4

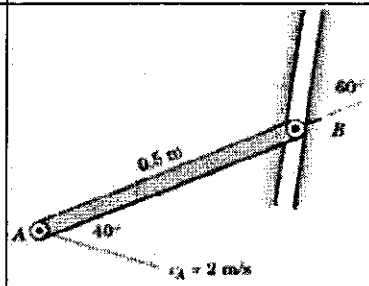


Fig (4.A)

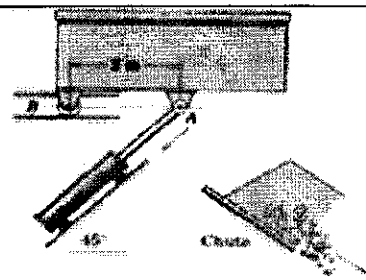
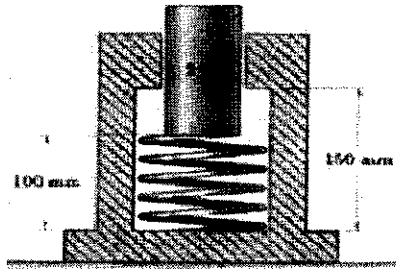


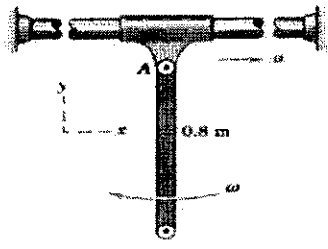
Fig (4.B)

Q5

Fig(5)



Fig(6)



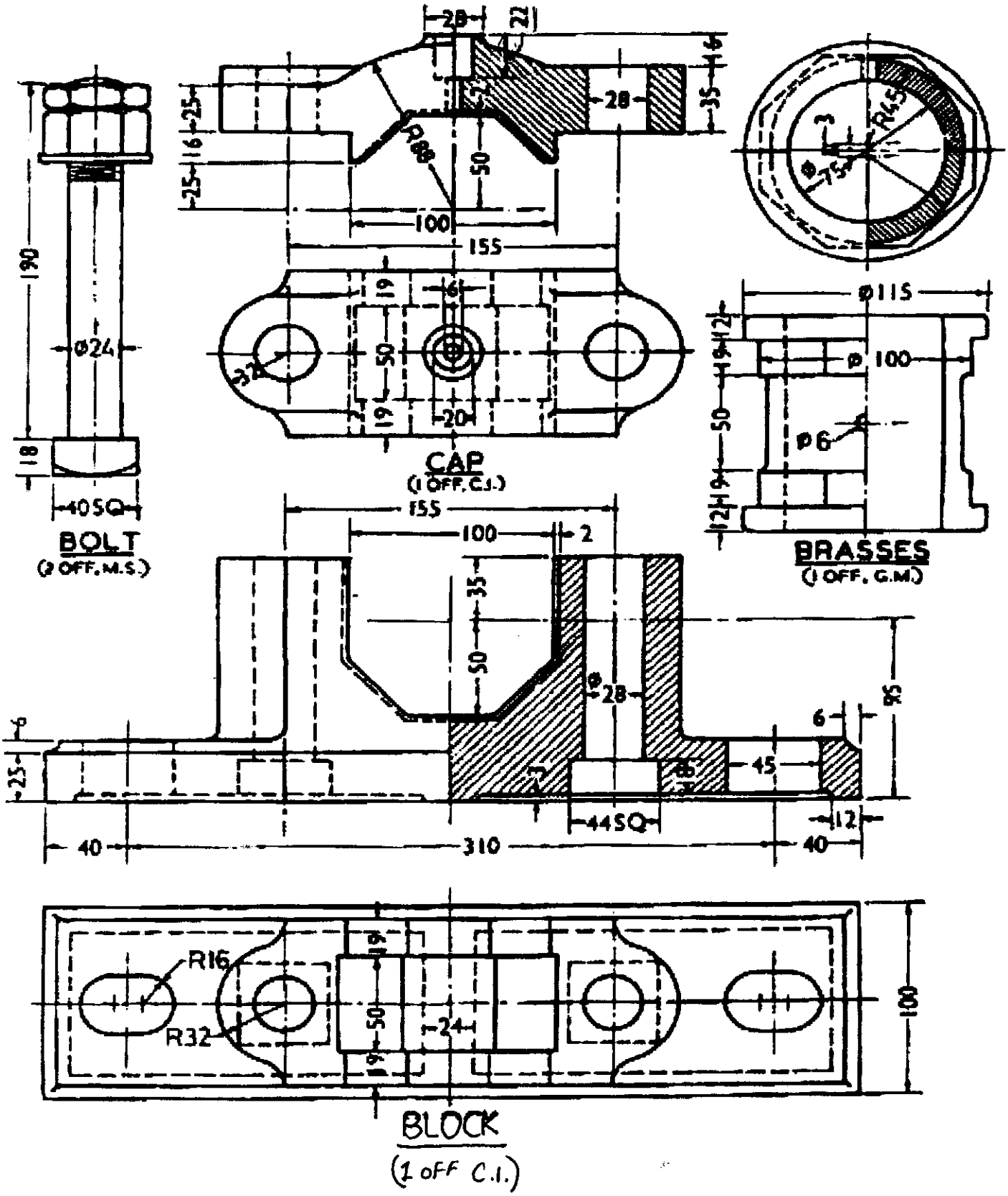
University of Diyala
College of Engineering
Mechanical Engineering Dep.

Final Exam/2st Attempt

Class:2st stage
Subject: Engineering drawing
Year: 2012-2013
Time:3 hour

Note :answer all questions

Q1 : Draw front view half cut for assembly figure (Sol 60)



س^2:- بموجب البيانات التالية ارسم المسقط الامامي لترسين متعشقين مبيناً عليه مايلي : (40 درجة)

- دائرة الخطوة (Pitch diam.)
- طرف السن (Addendum)
- عمق جذر السن (Dedendum)

نوع الترس	اسطواني عدل
المودول	m= 5mm
عدد اسنان الترس الكبير	N_G=50
قطر دائرة الخطوة للترس الصغير	D_p=60mm
عرض الوجه	F=30mm
سمك جدار الترس الكبير	t= 10mm
قطر عمود الترس الكبير	d_{sG}= 32mm
قطر الصرة للترس الكبير	d_{hG}=56mm
قطر عمود الترس الصغير	d_{sp}=26mm

ملاحظة : افترض اية ابعاد ناقصة وحسب تقديرك الخاص

مع تمنياتي لكم بالنجاح والموفقية

مدرس المادة / م.م. راند هادي

University of Diyala
College of Engineering
Dep. Of Mech. Eng.
Final Exam/2nd Attempt

Class: 1st stage
Subject :Tech. English
Year: 2011 - 2012
Time: 2 hrs.

Note:-Answer all the questions

Q4: Draw a matrix to show what part of speech is each underlined word:

The most common example of a machine element is a gear . The rotation of a gear on a shaft drives other gears which may rotate faster or slower , depending on the diameter and number of teeth on the basic gear . A gear , fundamentally combination of a wheel and a lever.

Q5: A-Match the definitions on the right with the words on the left.

1.Geocentric	**A. a three – footed stand that can be used to support a camera**
2.Tripod	**B. go across a limit or boundary**
3.minute	**C. train on one track**
4.monor	**D. having the earth as the center**
5.finale	**E. small and unimportant details**
	F. conclusion of a program

B- Change the following words into nouns. (choose five only)

Transmit , electrify , decide , measure , maintain , able

Q6: Change the following words into numerals : (choose Five only)

1.The cube root of nine.
2.Nough point seven three
3.Forty degrees centigrade .
4. subtract a fourth from one .
5. six point seven percent.
6. eight times two is sixteen

With Best Wishes

Head of Dept.
Dr. Zaid S. Hamoody

Lecturer
M.A Areej S. Dawood

University of Diyala
College of Engineering
Dep. Of Mech. Eng.
Final Exam/2nd Attempt

Class: 1st stage
Subject :Tech. English
Year: 2011 - 2012
Time: 2 hrs.

Note:-Answer all the questions

Q1: Your name is Waleed Taha , compose a message about yourself and send it to techenglish @yahoo.com , your message should include the following:

1. Date of birth.
2. Date of graduation from secondary school.
3. Department , College and University.
4. Your opinion about the field of study.
5. The topics you studied during the first academic year.

Q2: Correct the form of the words in parentheses: (choose Five only)

1. The properties of a material determine (their) use .
2. Lathe is the (important) machine tool.
3. If you learn how to use a lathe , you (be) able to shape a metal.
4. It is no use (lubricate) this machine.
5. They (make) a cutting tool of lead at this moment..
6. The student (submit) the report yet.

Q3: Do as required : (choose Five only)

1. A pump makes a lubricant go into the system .(change into plural)
2. Each molecule remains in a stable position. (insert : in solid , always)
3. Diesel engines, petrol engines, efficient. (use : as... as)
4. Lubrication affects machines . (change into interrogative)
5. This factory produces products obtained from oil. (noun acting as adj.)
6. Ignition of fuel exerts a great pressure . It drives the piston down . (use :such... that)

Head of Dept.
Dr. Zaid S. Hamoody

Lecturer
M.A Areej S. Dawood

المادة: الهندسة الوصفية
المرحلة: الاولى

جامعة ديالى - كلية الهندسة
قسم الهندسة الميكانيكية
امتحان الدور الثاني ٢٠١١-٢٠١٢

الوقت: ٣ ساعات
التاريخ: ١٧ /٩/ ٢٠١٢

الاجابة على جميع الاسئلة

س١ أ :- ارسم المساقط الثلاثة وبين الزاوية الزوجية التي تقع فيها كل من النقاط الاتية: (اجب عن ثلاثة فقط)

أ) (٣ ،- ٣ ، ٣)

ب) نقطة جـ تبعد ٣ سم يمين نقطة الاصل و٢ سم خلف المستوى الراسي و ٤ سم فوق المستوى الافقي.

ج) نقطة د تبعد ٢ سم أمام المستوي الرأسي و ٣ سم تحت المستوي الافقي.

هـ) نقطة هـ تقع ٣ سم يمين نقطة الاصل و ٤ سم خلف المستوي الراسي و٣ سم تحت المستوي الافقي.

س١ ب:- مثل النقطة أ وصفياً حيث ان س= ٣ سم واحداثييها الافقي والرأسي ٤ سم و ٥ سم على التوالي:- (اجب عن اثنين فقط)

١- اذا وقعت في الزاوية الزوجية الرابعة.

٢- اذا وقعت في الزاوية الزوجية الثانية.

٣- اذا وقعت في الزاوية الزوجية الثالثة.

س٢ أ : - بين العلاقة بين المستقيمات التالية في الفراغ واذكر السبب :- (اجب عن اثنين فقط)

١- المستقيم أ ب احداثيات نهايتيه أ (٢ ، ٣ ، ١) و ب (٦ ، ١ ، ٣).
والمستقيم هـ و احداثيات نهايتيه هـ (٢ ، ١ ، ٣) و و (٦ ، ٣ ، ١).

٢- المستقيم أ ب احداثيات نهايتيه أ (١ ، ١ ، ٣) و ب (٤ ، ٣ ، ١).
والمستقيم جـ د احداثيات نهايتيه جـ (٣ ، ٠ ، ٤) و د (٦ ، ٢ ، ٢).

٣- المستقيم أ ب احداثيات نهايتيه أ (١ ، ١.٥ ، ٤) و ب (٦ ، ٢.٥ ، ٠.٥).
والمستقيم جـ د احداثيات نهايتيه جـ (٢ ، ٣.٥ ، ٠.٥) و د (٧ ، ١ ، ٤).

س٢ ب :- للمستقيمات التالية ارسم الآثار والمساقط الثلاثة وبين اي المساقط هو الطول الحقيقي للمستقيم مع ذكر السبب:- (الاجابة عن اثنين فقط)

١- المستقيم أ ب احداثيات نهايتيه أ (٢ ، ٣ ، ٢) ب (٥ ، ٣ ، ٢).

٢- المستقيم هـ و احداثيات نهايتيه هـ (٢ ، ٣ ، ١) و (٢ ، ٣ ، ٣).

٣- المستقيم جـ د احداثيات نهايتيه جـ (٢ ، ٣ ، ١.٥) د (٢ ، ١ ، ١.٥).

تكملة الأسئلة في ظهر الورقة

س٣ أ :- جد الطول الحقيقي للمستقيم أ ب وزاويتي ميله بطريقة الدوران اذا علمت ان احداثيات نهايتيه ص أ =١ سم ، ع أ = ٤ سم و ص ب = ٤ سم ، ع ب = ١ سم والمسافة بين خطي التناظر ٤ سم.

س٣ ب:- المستقيم جـ د احداثيات نهايتيه جـ (٣ ، ٣ ، ١.٥) د (٦ ، ١ ، ٣.٥) جد طوله الحقيقي وزاويتي ميله بطريق فرق البعد.

س٤ :- عين آثار المستويات التالية :- (اجب عن اربعة فقط)

أ- المستوي (-٢ ، ∞ ، ٢).

ب- المستوي أ م ن اذا علمت ان زاويتي ميل أثريه(١، ٦٠°، ٤٠°)،(-١، ٦٠°، ٤٠°).

ت- المستوي هـ و ي اذا علمت ان قيمة س= -٣ ، ص= -٢ و ع = -٣ .

ث- جد آثار المستوي الذي يحوي المستقيم أ ب احداثيات نهايتيه أ (١ ، ٤ ، ٢) ب (٥ ، ١ ، ٦) والنقطة جـ (٦ ، ٥ ، ٢.٥).

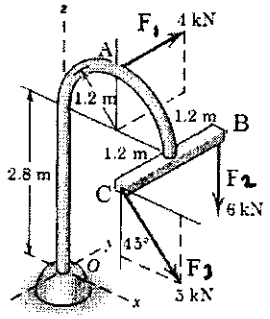
ج- النقاط أ (٢ ، ٢ ، ٣) ، ب (٦ ، ٣.٥ ، ٢) ، جـ (٦ ، ١ ، ٥) ليست على استقامة واحدة عين آثار المستوي الذي يحتويها.

مع تمنياتي لكم بالنجاح والموفقية

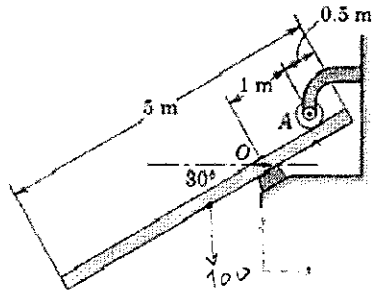
مدرس المادة / م.م. رائد هادى صالح

Note :Answer only five question, all question 20 marks

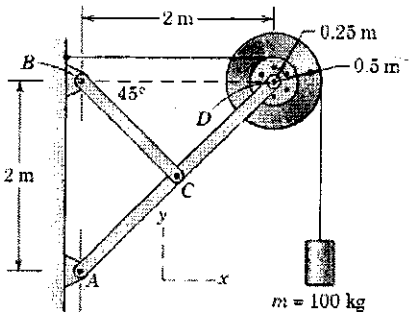
Q1/The combined action of the three forces on the base at O may be obtained by establishing their resultant through O. Determine the magnitudes of R and the accompanying couple M ?



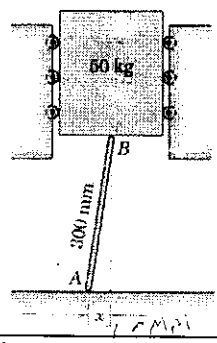
Q2/The uniform 5 m bar with a mass of 100 kg is hinged at O and prevented from rotating in the vertical plane beyond the 30° position by the fixed roller at A. Calculate the magnitude of the load supported by the pin at O?



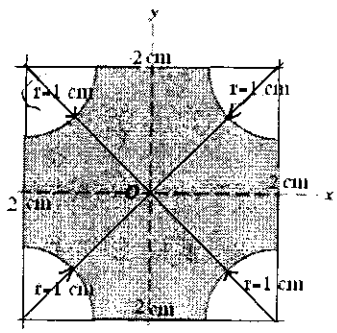
Q3/Calculate the x-and –y components of the force C which member BC exerts on member ACD. The cables are wrapped securely around the two pulleys, which are fastened together?



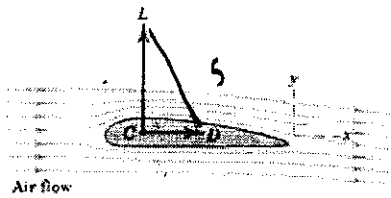
Q4/ The light bar is used to support the 50 kg block in its vertical guides , if the coefficient of static friction is 0.3 at the upper end of the bar and 0.4 at the lower end of the bar ,find the friction force acting at each end for x=75 mm, also find the maximum value of x for which the bar not slip, take friction angle Ø=$\tan^{-1}\mu_s$?



Q5/Determine the moment of inertia of the shaded area about x-axis?



Q6/The ratio of the lift force L to the drag force D for the simple airfoil L/D =5 if the lift force on a short section airfoil is 25N ,find the magnitude of the resultant force R and the angle which it makes with the horizontal?



With best wishes — Mohammed al Mansory

University of Diyala
College of Engineering
Mechanical department
Final Exam/2nd Attempt

Class: 1st stage
Subject: programming I
Year: 2011-2012
Time: 3 hour

Note:-Answer five questions only

Q1	***A:*** Write a program to calculate the value of x_1, y_1 given by : $x_1 = x\cos\theta + y\sin\theta$ $y_1 = -x\sin\theta + y\cos\theta$ ***B:*** Write a program to find the summation of the main diagonal elements of the matrix $M(3,3)$.	20%
Q2	Write a program to print the following data to a file "result.txt" . metal — density aluminum — 2707 Lead — 11373 steel — 7833 copper — 8954	20%
Q3	Write a program to calculate the value of (Z), print $(Z)$when it is larger than or equal to (1000). $Z = 2^3 + 4^3 + 6^3 + \cdots\cdots$	20%
Q4	Write a program to compute the larger between three numbers (X, Y, Z).	20%
Q5	***A:*** Write a subprogram and use it in a main program to calculate the value of V given by : $V = \frac{4}{3}\pi R^3$ ***B:*** Write a program to calculate the values of (F) given by : $F = 1.8C + 32 \quad , C = 50, 60, 70, \cdots\cdots, 100$.	20%
Q6	***A:*** Write a program to find the magnitude of a matrix multiplication $A(2,3)$ by $B(3,4)$. ***B:*** Answer the following : 1-Explain how we can create a new folder in the (F:). 2-What is the procedures to form a notepad file. 3-Explain how we can copy a file from (D:) to desktop. 4-Explain how we can create a short cut of a program on the desktop.	20%

Good Luck

Head of Dep.:
Zaid S.Hammoudi

Lecturer:
Mohammed Ismael

Republic of Iraq
Ministry of Higher Education and Scientific research
University of Diyalya

College of Engineering
Department of Mechanical Engineering
Subject: Metallurgical Engineering
Classes: First

Lecturer: **Dr. Eng. Mustafa Ahmed Rijab / Assistant Professor.**

أسئلة الامتحانات النهائية- الدور الثاني- للعام الدراسي 2011-2012.

Answers All the Questions for First classes for year 2011-2012

Q1-a) What the Uses of Ceramics? (2.5 marks)

Q1-b) How there are possibilities, When metal are mixed to form alloys? (2.5 marks)

Q1-c) What the two basic types of dislocations? (2.5 marks)

Q1-d) What the types of Defects? (2.5 marks)

Q1-e) How Classification of Matter Condition? (2.5 marks)

Q1-f) What the Arrangement of lattice points in the unit cell? (5 marks)

Q1-g) What the types of Joining of Composites? (2.5 marks)

Q2-A) What the Applications of Nanotechnology? (5 marks)

Q2-B) How the Nature of Materials? (5 marks)

Q2-C) What is Nanotechnology? (5 marks)

Q2-D) How is a composite material? (5 marks)

Q3-A) Calculation the volume of an FCC and BCC unit cell in terms of the atomic radius? (5 marks)

Q3-B) Calculation the Number of atoms for SC structure, BCC structure, FCC structure, and HCP structure unit cell? (5 marks)

Q3-C) Classify Engineering Materials as broad families you shown that by illustration figure and give example of each material family? (4 marks)

Q3-D) Show and draw the material tree, Processes tree and give examples of the families and classes of manufacturing processes? (6 marks)

Q4-A) Describe the grain structure of a metallic ingot that was produced by slow- cooling. The metal in a stationary sand mold? And list the factors may be depend on its solidification process and grain structure of any ingot? (5 marks)

Republic of Iraq
Ministry of Higher Education and Scientific research
University of Diyalya

College of Engineering
Department of Mechanical Engineering
Subject: Metallurgical Engineering
Classes: First

Lecturer: **Dr. Eng. Mustafa Ahmed Rijab / Assistant Professor.**

أسئلة الامتحانات النهائية- الدور الثاني- للعام الدراسي 2011-2012.

Q4-B) A material is needed for a tube to carry fuel from the tank to the carburetor of a motor mower. The design requires that the tube can bend and that the fuel be visible. List what you would think to be the design-iimiting properties? (5 marks)

Q4-C) List three applications that, in your judgment, needs optical quality glass? (5 marks)

Q4-D) the Ag-Cu equilibrium phase diagram may shown in the following figure. Show the following:

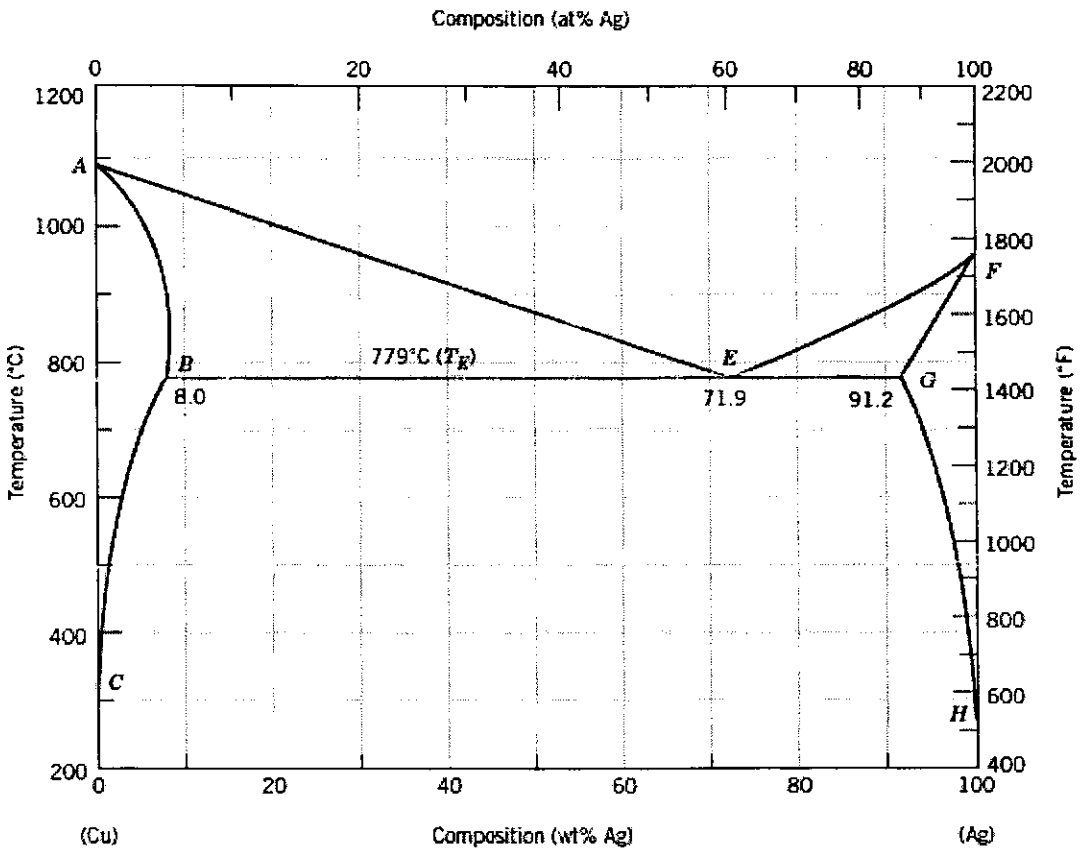
1-From any type this phase diagram?

2-Sign and define the lines & zones in this phase diagram?

3-What are the melting points of (Ag) & (Cu)?

4-Draw the cooling curve of 40% Cu - 60%Ag Alloy?

5- Draw the cooling curve of 71.9% Cu – 28.1%Ag Alloy? (5 marks)



(Good luck) **Examiner: Dr. Eng. Mustafa A.R. /Assistant professor.**

University of Diyala
College of Engineering
Dep. Of Mechanical Engineering
Final Exam/2nd Attempt

Class:1st stage
Subject: حقوق وحريات
Year: 2012-2013
Time:2 hour

أجب عن أربعة أسئلة فقط

25%	عرف الحرية ، المهندس ، الدستور .	Q1
25%	ماهي حقوق الانسان التي أمرت بها الشريعة الاسلامية ،أذكر عشرة فقط	Q2
25%	كيف تحد من التدخين والمخدرات في مجتمعك ؟	Q3
25%	كيف تنمي قدراتك كمهندس ناجح .	Q4
25%	أذكر بعض أسباب السعادة .	Q5

Good Luck

Head of Dep.: .....

Name: .....

Lecturer:.....

Name:.....

University of Diyala
College of Engineering
Dep. of Mech. Eng.
Final Exam/2nd Attempt

Class:1st stage
Subject: Mathematics I
Year: 2012-2013
Time:3 hour

Note:-Answer Five questions only

Q1	A: Sketch the conical section $x^2 - y^2 - 2x + 4y = 4$ and identify its characteristic points. B: Evaluate the integral : $\int_1^4 \ln\left(\sqrt{x}\right)dx$	**20%**
Q2	A: Calculate the surface area generated by revolving the curve $y = \frac{x^3}{9}$ about x-axis from x=0 to x=2. B: Evaluate: $\int_0^{\pi} \cot^3(x)\cdot \csc^4(x)\cdot dx$	**20%**
Q3	Solve the following system of linear equation using Gauss elimination method. $x_1 + 2x_2 - x_3 = 4$ $2x_1 + 3x_2 - x_3 = 2$ $-x_1 + x_2 + 3x_3 = -1$	**20%**
Q4	A: Find the roots of : $\sqrt[3]{3+i4}$ and represent the roots on Argand diagram. B: Find y' for : $y = \left(\cos^{-1} x\right)^{\sin^{-1} x}$	**20%**
Q5	A: If v = i + j + 2k , u = - i - k , find (v · u) , (v × u) , the angle between v and u and the vector projection of u on to v. B: Find y' for : $y = \csc h^{-1}\left(2^{\theta}\right)$.	**20%**
Q6	A: Give the value of : $\lim_{x\to 1}\left(\frac{1}{\ln x} - \frac{1}{x-1}\right)$. B: What is the inverse function of : $y = \ln\left(x + \sqrt{x^2+1}\right)$	**20%**

Good Luck

Head of Dep.: .....

Name: Zaid S. Hammoudi

Lecturer:.....

Name: Ali Z. Asker

Last – yaer Examination 2011 – 2012

Second Attempt

University of Diyala
College of Engineering
Mechanical Department

Subject : Electrical
Class : Third Year
Time : 3 Hours

Note :- Answer about five questions , 20 mark for each question .

Q1/ What are the D.C generator types ? Explain and draw these types .

Q2/ The following information is given for a 300 K.W , 600V long – shunt compound generator : shunt field resistance = 75Ω . Armature resistance including brush resistance = 0.03 Ω , commutating field winding resistance = 0.011Ω , series field resistance = 0.012Ω , diverter resistance = 0.036Ω , when the machine is delivering full load .
Calculate the voltage and power generated by the armature.

Q3/ A single phase transformer have 400 primary and 1000 secondary turns , the net cross sectional area of the core is 60 cm^2 , if the primary winding be connected to a 50Hz supply at 520V ,calculate :

1- The peak of flux density in the core .
2- The voltage induced in the secondary winding .

Q4/ What are the advantages and disadvantages for the induction motors ?

Q5/ A 250V shunt motor runs at 1000 r.p.m at no load and takes 8A , the total armature and shunt field resistance are respectively 0.2Ω and 250Ω . Calculate the speed when loaded and taking 50A , assume the flux to be constant .

Q6/ Each coil of a double – layer wound 20 – pole 180 slot , 3 – Φ , Y connected synchronous generator has 12 turns , the rotor driven at a speed of 300 r.p.m , the r.m.s value of generated voltage per phase 1300V , each phase winding is connected in two – parallel path , determine :-

1- Frequency of induced e.m.f
2- The flux per pole , per phase

GOOD LUCK

University of Diyala College of Engineering Mechmical Department	Final – Year Examination Second Attempt 2011 – 2012	Class: Third Time:2 hour Subject :internal combustion engine Date:

Note :- Answer all questions , 20 mark each question .

Q1/ A/ How do we classify the internal combustion engines ?
B/ Define the following ?
1) Bottom dead center , 2) Cylinder Volume , 3) Displacement Volume
4) Compression Ratio , 5) Clearance Volume .

Q2/ Four stroke , Ignition engine produced (48) bhp , in mechanical efficiency 80 % , consumption fuel (0.3) Kg per one horse brake power / hour .
The air – fuel ratio (14:1) , the fuel heating value (42000) KJ / Kg , Calculate
1) Indicated horse power , 2) Friction horse power , 3) Brake thermal efficiency , 4) Indicated thermal efficiency , 5) Consumption Fuel and air per hour .

Q3/ Diesel engine produce (5) brake horse power , indicated thermal efficiency 30% and mechanical efficiency 75% Calculate :-

1) **Fuel Consumption in Litters / hour and Kg / hour .**
2) **Indicated specific Fuel Consumption (I . s . F . c) and**
3) **Brake specific Fuel Consumption (b . s . f . c) if the heating value of the Fuel (42000) KJ / Kg and density of the Fuel (0.87) Kg / Litter .**

Q4/ In an ideal otto cycle the air at beginning of isentropic compression is at (1 Kg / cm^2) and (15 °C) . The ratio of Compression is (8) . if the heat added during the constant volume process is (250 k cal / Kg) , determine :-

1) **The maximum temperature in the cycle .**
2) **The air standard efficiency .**
3) **The work done per Kg of air .**
4) **The heat rejected , Take Cv = 0.17 , Y = 1.4 .**

Q5/ A duel Combustion cycle has an adiabatic compression volume ratio of (15 : 1) the conditions at the commencement of compression are (1 Kg / cm^2) , (250 °c) and (0.1m^3) . The maximum pressure of the cycle is (66 Kg / cm^2) and the maximum temperature of the cycle is (1500 °c) , if Cv = 0.17 and Y= 1.4 , Calculate the pressure in Kg / cm^2 , Volume in m^3 and temperature in °C at the corners of the cycle and the thermal efficiency of the cycle .

GOOD LUCK

University of Diyala
College of Engineering
Dep. Of Mechanical Engineering
Final Exam/2nd Attempt

Class:1st stage
Subject: Production process
Year: 2012-2013
Time:3 hour

الإجابة عن خمسة أسئلة فقط

س1: فرع A - أشرح مع الرسم كيفية أنتاج الحديد الزهر (Production of Cast Iron)، وما هي الوسائل المؤثرة في تحديد نوعيته بينها بإيجاز.
فرع B - بين بالتفصيل أنواع ومواصفات وطبيعة الخامات الأولية للحديد (Iron Ores).

(10درجات) ----------

س2: فرع A - أشرح طبيعة عمل وكيفية استخدام جهاز فيكرز لقياس الصلادة ثم أحسب الصلادة إذا علمت إن طول البعد القطري للأثر هو(4)ملم وكان الوزن المستعمل في القياس هو(100)كغم .
فرع B - تعتبر الفجوات الغازية (Gas Cavities) من العيوب الشائعة في المسبوكات (Casting)،أشرح هذا العيب مبين بالتفصيل أنواعه ومصادره وكيفية معالجته .

(10درجات) ----------

س3:فرع A - ماهو الفحص الاتلافي (Destructive Testing)،أشرح طريقة لفحص المسبوكات وما هي الاستنتاجات التي سوف يتم الحصول عليها من هذا الفحص .
فرع B- ماهي العناصر الأساسية لعملية التشغيل للمعادن (العناصر التي تؤثر على عملية قطع المعادن)

(10درجات) ----------

س4: فرع A- ما هي أنواع الشبكات الحيزية للمعادن النقية وما هي أنواع الشبكات الحيزية للسبائك مع ذكر مثال لكل نوع، اشرح مع الرسم لواحدة من كل نوع.
فرع B –قارن بين لحام السمكرة أو مايعرف بلحام الكاوية (Soldering) وبين لحام المونة (Prizing).

(10درجات) ----------

س5: فرع A- بين من خلال الرسم طبيعة وأنواع القوى المسلطة على القطعة في عمليات التشكيل المختلفة.
فرع B- عدد عمليات التشكيل على البارد واشرح واحدة بالتفصيل مع الرسم ،وأذكر مزايا وعيوب التشكيل على البارد .

(10درجات) ----------

س6: فرع A - على ماذا تعتمد ضروف ومتطلبات التشغيل في مكائن قطع المعادن ،بينها بالتفصيل .
فرع B –أسطوانة من الحديد غير القابل للصدأ(Stainlessness Steel) من الابعاد قطرها (200)ملم وطولها(144)ملم شكلت بالطرق في درجة حرارة الغرفة إلى تخصر بالطول لكي يصبح (120)ملم وكان معامل الاحتكاك(0.22) والإجهاد الحقيقي (1000 MPa) أحسب قوة الطرق ؟

(10درجات) ----------

Good Luck

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