جامعة طنطا- كلية الهندسة

قسم هندسة القوى الميكانيكية	الفصل الدراسي: الأول		العام الجامعي: 2011 /2012
الفرقة: الثانية	النظام: لائحة جديدة	أسم المقرر: اقتصاد هندسي	كود المقرر:MEP21H5
التاريخ: 26-1-2012	عدد الصفحات: 1	النهاية العظمى: 50 درجة	زمن الامتحان: ساعتان

ملاحظات: أجب على جميع الأسئلة

السؤال الأول (20 درجة)

1- اشرح بالتفصيل المصروفات السنوية لمنشاة صناعية وارسم مخطط بين عناصر التكاليف

2- إذا كانت القيمة الدفترية للآلة بطريقة القسط المتزايد بعد مضى 3 سنوات هو 450 LE وسعر الخردة يساوى 15% من ثمن شرائها و العمر الاقتصادي للآلة 8 سنوات و الفائدة السنوية تساوى 12%. احسب قيمة شراء الآلة وقسط الإهلاك عند السنة الثالثة

3- استخدمت ماكينة لعمل ثقوب وكان ثمن شرائها يساوى $ 5000 جنية وعمرها 10 سنوات وبفائدة 10% وتعمل 5 ثقب لكل ساعة وتكلفة العامل $ 8/hr وتكلفة الوقود والصيانة تساوى $/hr2

وأذا تم استجار ماكينة أخرى لعمل هذه الثقوب وكان إيجار الماكينة $/hr 5 وتعمل 2 ثقب لكل ساعة

أوجد عدد الثقوب عند نقطة التعادل تحليليا

السؤال الثاني (15 درجة)

1. اشرح طرق توزيع المصروفات العامة الثابتة على وحدات الإنتاج

2. أذا أعطيت البيانات التالية لعناصر التكاليف لمعدة ما: العمر الاقتصادي 5 سنوات وسعر الخردة $ 5000 وساعات التشغيل القياسية hr 2000 وساعات التشغيل الفعلية تقل بمعدل 3% ابتداء من السنة الأولى و الفائدة 12% و ضريبة الملكية 2% و التامين 3% وتكاليف أيجار معدة من نفس النوع $/hr 30 ومعدل الزيادة في أسعار المعدات 5% ومعدل انخفاض القيمة الشرائية للعملة 2% وتكاليف التشغيل السنوية للسنة الأولى $ 350 أذا كانت التكاليف السنوية الكلية لكل ساعة تشغيل في السنة الأولى $ 4.376 استخدام طريقة مجموع السنوات لحساب قسط الإهلاك. اوجد: ثمن شراء المعدة

السؤال الثالث(15 درجة)

1- تكلم عن أنواع الإهلاك للمعدات

2- مصنع أنتاجه السنوي 6000 وحدة والتكاليف السنوية الثابتة $ 30000 والتكاليف المتغيرة $/unit 20 وكان الربح $ 30000 اوجد بيانيا:

1- ثمن البيع و كمية الإنتاج عند نقطة التعادل

2- الربح عندما تقل التكاليف الثابتة بنسبة 10%

3- الربح عندما تقل التكاليف المتغيرة بنسبة 10%

انتهت الأسئلة

مع أطيب التمنيات بالنجاح

د/ السيد العجوز

Fourth Question: (15 Marks)

Two pulleys, one 450 mm diameter and the other 200 mm diameter are on parallel shafts 1.95 m apart and are connected by a crossed belt. Find the length of the belt required and the angle of contact between belt and each pulley. What horse power can be transmitted by the belt when the larger pulley rotates at 200 r.p.m., if the max. permissible tension in the belt is 1 KN and the coefficient of friction between the belt and pulley is 0.35 ?

Fifth Question: (25 Marks)

An eccentrically load lap riveted joint is to be designed for a steel bracket as shown in Fig. (4). The bracket is 10 mms thick. All rivets are to be the same size. The loads on the bracket are P= 1250 Kgs and Q=-1000 Kgs. The rivets spacing is c= 50 mms, load arm e=25 cms

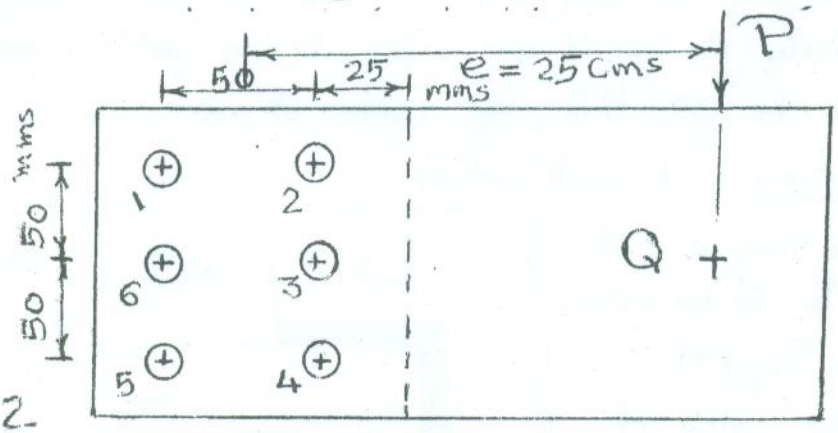


Fig.(4)

مع أطيب الأمنيات بالتوفيق ... دكتور/ مصطفى هنداوى

Tanta University Production Eng. Dep. Eng. Faculty

Course Title : Machine Design Course Code : MP2201

Date : Jan. 20 - 2012 Allowed Time : 3 hrs Year : 2nd Mech.

Answer the following questions :-

First Question : (20 Marks)

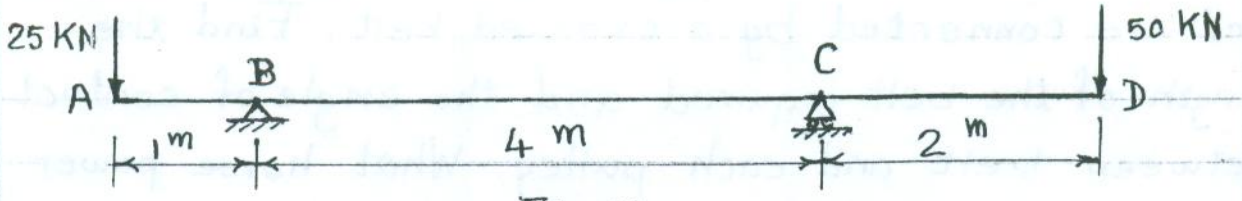


Fig. (1)

A beam ABCD is subjected to loads 50 KN & 25 KN as shown in Fig. (1). Determine the deflection at point D and determine also the position of max. deflection point E and the max. deflection of the beam between point B and C.

Second Question : (20 Marks)

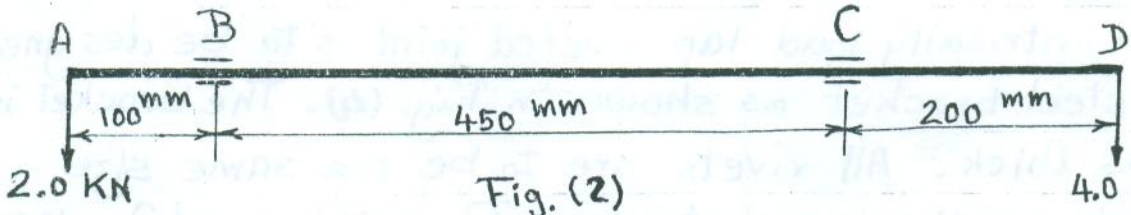


Fig. (2)

The shaft shown in Fig. (2) transmits 30 K.W. between the input point A and the output point D at a speed of 150 r.p.m. Caculate the shaft diameter if the yield stress of its material is 300 MPa, the factor of safty is 3.

Third Question : (20 Marks)

A bracket carring a load of 2000 Kgs is to be welded as shown in Fig. (3). Calculate the size of the weld if the working shear stress is not to exceed 800 Kgs / cm^2.

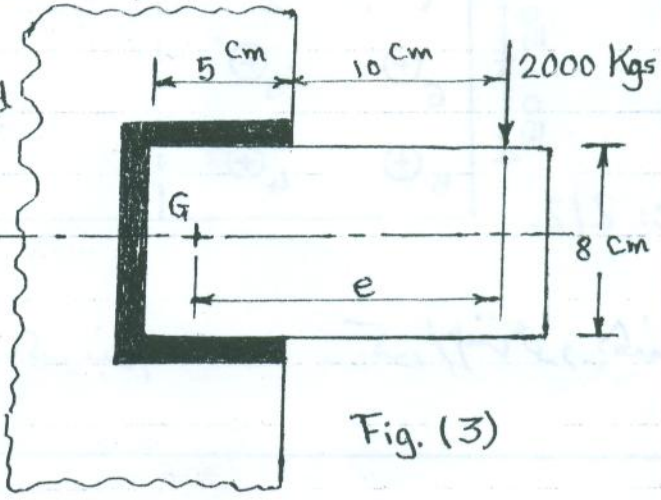


Fig. (3)

P. T. O. Page : 1/2

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

a) How can we increase the efficiency of the Rankine cycle? (3 Marks)

a) Why is the Carnot cycle not a realistic model for steam power plants? (3 Marks)

b) Electricity and process heat requirements of a manufacturing facility are to be met by a cogeneration plant consisting of a gas turbine and a heat exchanger for steam production. The plant operates on the simple Brayton cycle between the pressure limits of 100 and 1200 kPa with air as a working fluid. Air enters the compressor at 30 °C. Combustion gases leave the turbine and inter the heat exchanger at 500 °C, and leave the heat exchanger of 350 °C, while the liquid water enters at 25 °C and leaves at 200 °C as a saturated vapour. The net power produced by the gas turbine cycle is 800 kW. Assuming a compressor isentropic efficiency 82 percent and a turbine isentropic efficiency of 88 percent, determine (a) the mass flow rate of air, (b) the back work ratio and the thermal efficiency, (c) the rate at which steam is produced in the heat exchanger, and (d) the utilization factor of the cogeneration plant. (9 Marks)

Problem number (5) **(15 Marks)**

a) How do we achieve very low temperature with gas refrigeration cycles? (3 Marks)

b) What is cascade refrigeration? What are the advantages and disadvantages of it? (4 Marks)

c) Consider a steam power plant operating on the ideal reheat Rankine cycle. Steam enters the high-pressure turbine at 15 MPa and 600 °C and is condensed in the condenser at a pressure of 10 kPa. If the moisture content of the steam at the exit of the low-pressure turbine is not to exceed 9.0 percent, determine (a) the pressure at which the steam should be reheated (b) the thermal efficiency of the cycle, assume the steam is reheated to the inlet temperature of the high-pressure turbine. (8 Marks)

Tanta University

Department: Mechanical power Engineering
Total Marks: 75 Marks

...y of Engineering

Course Title: Thermodynamics (2)	Course Code: MEP2104	Year: 2nd
Date: Jan. 16th 2012 (First term)	Allowed time: 3 hrs	No. of Pages: (2)

Remarks: (answer the following questions; assume any missing data, steam tables and charts are allowed)

Problem number (1) **(15 Marks)**

a) What are the Carnot principles, prove one of them? (4 Marks)

b) Define the coefficient of performance of a heat pump. Can it be greater than one? (4 Marks)

c) A thermal storage device is made with a rock (granite) bed of 2 m^3 that is heated to 400 K using solar energy. A Carnot heat engine receives a Q_H from the bed and rejects heat to the ambient surroundings at 290 K. The rock bed therefore cools down, and as it reaches 290 K the process stops. Fined the energy the rock bed can give out. What is the heat engine efficiency at the beginning of the process, and what is it at the end of the process? (7 Marks)

Problem number (2) **(15 Marks)**

a) Is a process that is reversible and adiabatic necessarily isentropic? Explain. (4 Marks)

b) Drive the isentropic relations which belong to P, T and V for the ideal gases (assuming constant specific heats)? (4 Marks)

c) A 50 kg block of iron casting at 500 K is thrown into a large lake that is at a temperature of 285 K. the iron block eventually reaches thermal equilibrium with the lake water. Assuming an average specific heat of 0.45 kJ/kg.K for the iron, determine (a) the entropy change of the iron block, (b) the entropy change of the lake water, (c) the entropy generated during this process. (7 Marks)

Problem number (3) **(15 Marks)**

a) Plot Stirling, Carnot and Ericsson cycles on P-V and T-S diagrams? (4 Marks)

b) Do diesel or gasoline engine operate at higher compression ratios? Why? (3 Marks)

c) An air standard Otto cycle has a compression ratio of 8. The pressure and temperature at the beginning of compression are 1 bar and 27 ° C respectively. The heat transfer to the air per cycle is 1600 kJ/kg of air, Determine the following: (a) the pressure and temperature at each corner of the cycle. (b) The thermal efficiency of the cycle. (c) The mean effective pressure of the cycle. (8 Marks)

P.T.O.

Tanta University | Department of Physics & Mathematics | Faculty of Engineering

Course Title: Complex and Special Functions
Date: 2012 (ميكانيكا)
Year: 2nd Mech-Production
Allowed time: 3 hrs
No. of Pages: (1)

Problem number (1)

(1) Use the roots of the equation $z^n - 1 = 0$ to show that

$$\cos\left(\frac{2\pi}{n}\right) + \cos\left(\frac{4\pi}{n}\right) + \cos\left(\frac{6\pi}{n}\right) + \cdots + \cos\left(\frac{2(n-1)\pi}{n}\right) = -1$$

$$\sin\left(\frac{2\pi}{n}\right) + \sin\left(\frac{4\pi}{n}\right) + \sin\left(\frac{6\pi}{n}\right) + \cdots + \sin\left(\frac{2(n-1)\pi}{n}\right) = 0$$

(a) Show that $f(z) = z^n$ is analytic and use Cauchy Reimain inequality to find f '(z) .

(b) Find an analytic function whose real part is $u(x, y) = x^3 - 3xy^2 + y$.

Problem number (2)

(a) Evaluate $\oint_C \frac{e^z}{(z-1)(z-2)} dz$ around $C : |z| = 4$.

(b) Find all values of z such that cosh z = 2 .

(c) $\int_0^{2\pi} \frac{1}{1+\cos 2\theta + \cos\theta} \, d\theta$ use complex integration around unit circle.

Problem number (3)

(a) Using Bromwhish contour to evaluate $L^{-1}\left(\frac{s+5}{s^3-3s^2-s+3}\right)$

(b) Show that $w = \frac{1}{z}$ conform acircle and straight line

$A(x^2 - y^2) + Bx + Cy - D = 0$ to acircle and straight line and used it to find the image of x+2y+3=0

(c) Find Laurent's expansion of $f(z) = \frac{1}{z^2 - 3z + 2}$ on the regions

(i) $1 < |z| < 2$ (ii) $1 < |z - 1|$

Problem number (4)

(a) Show that $\beta(n, m-1) = \sum_{i=0}^{\infty} \beta(n+i, m)$

(b) Evaluate $\int_0^{\infty} \sqrt{x}\, e^{-x^3} dx$

(c) Evaluate $\int_{-\infty}^{\infty} 3^{(5x-3^x)} \, dx$

With my best wishes

Dr. M.S.Nayle

1.2.7) *The locus of locations at any instant of time for all the fluid particles that have passed through a fixed point in a flow field.*

1.2.8) *The flow in which the temporal rate of change of dependent fluid variables vanishes.*

1.2.9) *The flow in which the spatial rate of change of velocity components is zero.*

1.2.10) *The ratio of the actual velocity of flow at the vena contracta to theoretical velocity of flow at the orifice.*

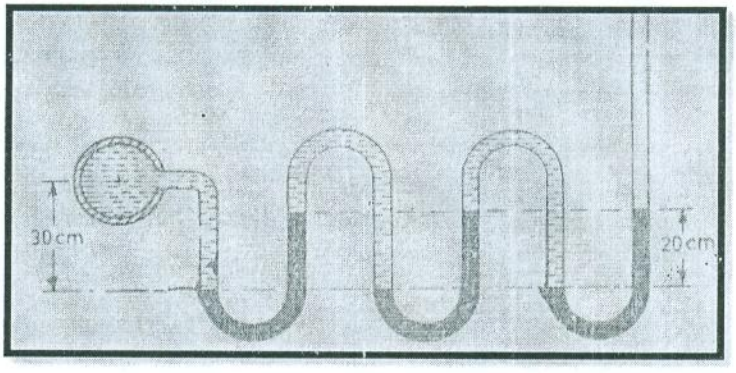
Question (2):

2.1) *A U-tube is made up of two capillaries of diameters 1.0 mm and 1.5 mm respectively. The U-tube is kept vertically and partially filled with water at 20°C of surface tension 0.0736 N/m and zero contact angle. Calculate the difference in the level of the meniscus caused by the capillarity.* (7 Marks)

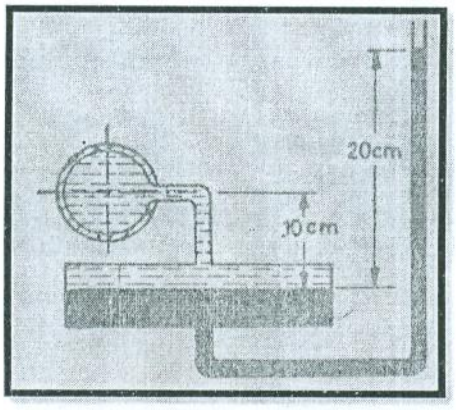
2.2) *An oil of specific gravity 0.85 is flowing through a pipe of 5 cm diameter at the rate of 3 liters/s. Find the type of flow, if the dynamic viscosity is 3.8 Poise.* (7 Marks)

Question (3):

3.1) *The pressure of water flowing in a pipe line is measured by a manometer with U tubes shown in the figure. The measuring fluid is mercury in all the tubes and water is enclosed between the mercury columns. The last tube is open to the atmosphere. Find the pressure of water in the pipeline.* (7 Marks)



3.2) *To determine the pressure in a pipe, containing liquid of specific gravity 0.8, a micro-manometer was used as shown in the figure. The ratio of area of the basin to that of the limb is 50. Find the pressure in the pipe in bar.* (7 Marks)

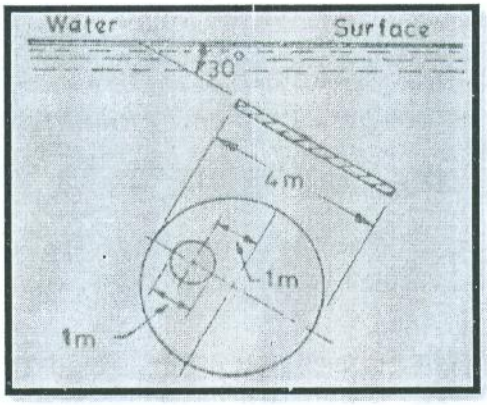


Question (4):

A circular plate of 4 m diameter has a circular hole of 1 m diameter with its centre 1 m above the centre of the plate, as shown in the figure. The plate is immersed in water at an angle of 30° to the horizontal and with its top edge 2 m below the free surface. Find

a) *the pressure force on the plate, and*

b) the depth of centre of pressure. (14 Marks)



Question (5):

5.1) *Two components of velocity in an incompressible fluid flow are given by*

$$u = x^3 - y^3 \quad \text{and} \quad v = z^3 - y^3$$

Determine the third component, assuming that the origin is a stagnation point.

(7 Marks)

5.2) *A stream function is given by the expression*

$$\psi = 2x^2 - y^3$$

Find the components of velocity, as well as the resultant velocity at a point P(3,1).

(7 Marks)

Question (6):

6.1) *Deduce a relation for calculating the actual velocity of a flowing fluid using the data measured by a Pitot static tube (Prandtl probe).* (8 Marks)

6.2) *A submarine moves horizontally in sea water and has its axis much below the surface of water. A Pitot static tube properly placed just in front of the submarine and along its axis is connected to two limbs of a U-tube manometer containing mercury. The difference of mercury levels is found to be 17 cm. Find the speed of the submarine knowing that the density of mercury is 13.6 and that of sea water is 1.026 with respect to fresh water. Take the coefficient of velocity for the probe to be 0.98.* (6 Marks)

With the best wishes

TANTA UNIVERSITY
FACULTY OF ENGINEERING
MECH. POWER Eng. DEPART.
SECOND YEAR

FLUID MECHANICS (1)(a)
Time allowed: 3 hours
Date: 23/1/2012
ميكانيكا موائع (1 أ)

Please, answer the following questions: (Total Marks 90)

Question (1):

1.1) *Identify the following statement as true or false with correcting the false parts:* (10 Marks)

1.1.1) *A Poise is a unit of kinematic viscosity and is equal to 10 Pa.s.*

1.1.2) *The dynamic viscosity decreases with increasing the temperature of gases, while it increases with increasing the temperature of liquids.*

1.1.3) *Critical Reynolds number is the Reynolds number above which the flow is laminar.*

1.1.4) *The coefficient of thermal expansion of a fluid is the ratio of the volumetric strain to the compressive stress.*

1.1.5) *In case of an isentropic process in gases, the bulk modulus of elasticity is equal to pressure.*

1.1.6) *An inverted U-tube manometer is applied when using a manometer liquid heavier than the two pipe liquids.*

1.1.7) *The hydrostatic force on a plane immersed surface remains the same no matter how the surface is turned.*

1.1.8) *A stream function refers to a mass flow rate per unit area.*

1.1.9) *Bernoulli's equation is the differentiation of Euler's equation.*

1.1.10) *The maximum allowable discharge of water at atmospheric temperature through a venturi-meter can be obtained when the pressure head at the inlet pipe is not less than 3 m water.*

1.2) ***Please, give a scientific expression for each of the following statements:*** (10 Marks)

1.2.1) *A pressure of 760 mm Hg.*

1.2.2) *The sum of gauge pressure and atmospheric pressure.*

1.2.3) *The ratio of the inertia force to the viscous force.*

1.2.4) *The flow type over a flat plate in which Reynolds number is more than or equal 5×10^5.*

1.2.5) *A device for measuring low pressures, where accuracy is of much importance.*

1.2.6) *The ratio of the second to the first moment of inertia for an immersed surface about the liquid level.*

[4] The crank (OA) of the mechanism shown in Fig. 3 rotates at uniform speed of 400 r.p.m (cw), find the velocity and acceleration of the slider B at the position shown. The dimensions of the links are as follows: OA=150 mm, OQ= 400 mm. The crank OA makes 45° with the horizontal line. **(Mark 25 %)**

[5] For the mechanism shown in Fig. 3, consider the position of the mechanism at which the slider B is along OQ, find the ratio of the angular velocity of link 4 when it occupies that position on the forward stroke to that when it occupies the same position on the return stroke, *using the instantaneous center method.* Also, find the velocities of the slider B at both of the strokes for a crank rotation of 400 r.p.m (cw). **(Mark 15 %)**

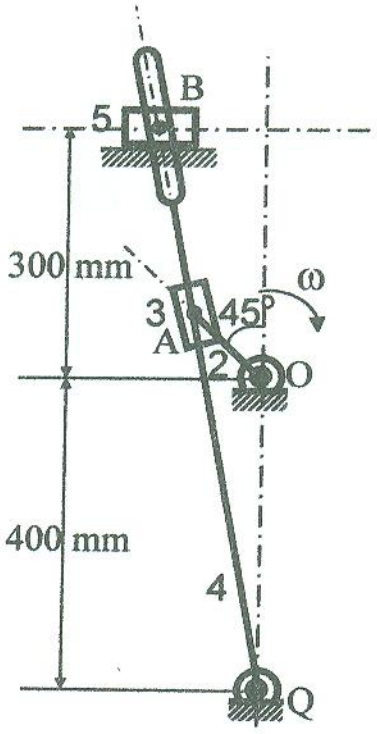


Fig. 3

TANTA UNIVERSITY
FACULTY OF ENGINEERING
PRODUCTION ENG. & MECH. DESIGN DEPT.

THEORY OF MACHINES
2nd YEAR, 2011-2012
TIME: 3 HOURS

FINAL TERM EXAM

[1] A machine is performing a repeated job every 100 sec. The job requires a torque as indicated in Fig. 1. The machine operates at a mean speed of 300 rpm. Determine the following:

a- The driving torque **b-** The power of the driving motor

c- The speed diagram and then locate the time where the engine speed is maximum and minimum during the cycle

d- The energy which causes the maximum speed variation.

e- The moment of inertia to keep the speed variation within 3%.

f- The maximum values of the angular acceleration and deceleration. **(Mark 20%)**

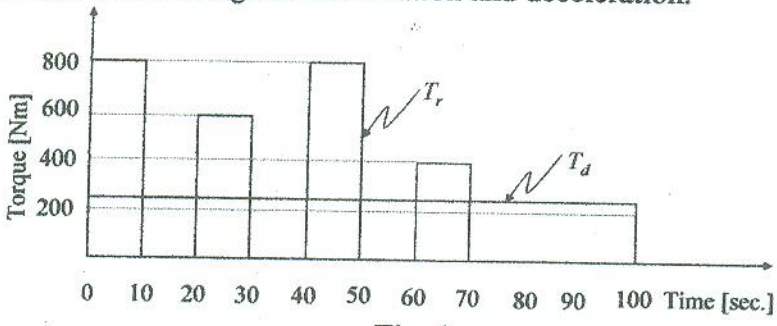


Fig. 1

[2] **a-** Two parallel shafts are to be connected by spur gears. The approximate distance between the shafts is 600 mm. If one shaft runs at 120 r.p.m and the other runs at 360 r.p.m. Find the number of teeth on each gears, if the module is 8 mm. Also, determine the exact distance apart of the shafts.

b- For the gear train shown in Fig. 2(a), if the arm rotates at 800 r.p.m (cw) and annular gear C is fixed, find the speed of the annular gear B. Also, if an additional gear A, which is concentric with gear B as shown in Fig. 2(b), externally meshes with gear E, find the speeds of B and A.

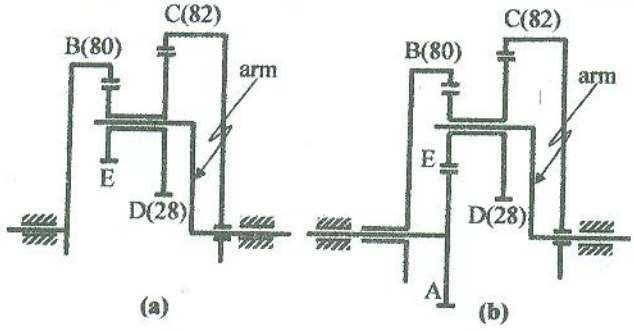


Fig. 2 **(Mark 25%)**

[3] Draw the cam profile to give an oscillating roller follower the following motion:

a- Outward motion through an angular displacement of 25° during the first 120° of the cam rotation with S.H.M.

b- Return motion to its initial position during the next 120° of the cam rotation with cycloidal motion.

c- Dwell motion during the next 120° of the cam rotation.

The minimum radius of the cam is 50 mm. The location of the pivot of the follower is 70 mm to the left and 60 mm above the axis of rotation of the cam. The distance between the pivot center and the roller center of the follower is 70 mm. The roller radius is 10 mm. **(Mark 20%)**

Dr. Samy F. M. Assal