Tanta University
Faculty of Engineering
Prod. & Mech. Design Depart.
Jan. 2010

Theory of metal cutting
3 th year
Term Exam
Time allowable: 3 Hours

Question One:

A) Explain with the help of neat sketch the complete geometry of angles and types of chip formation of a single point tool and label the a) face, b) flank, c) nose, d) cutting edge, e) relief, f) shank.

B) Write short notes with the help of neat sketch on the following: -

a) The causes, characteristics and effects of built up edge.
b) Advantages and disadvantages of negative and positive rake angle.
c) Curling of chip.
d) The methods of cutting.

Question Two:

A) Identify the correct one out of the four given answers?

1) The value of shear angle depends upon
   a) Tool rake angle.
   b) Friction at chip-tool interface.
   c) Built-up-edge formation.
   d) All of the above.
2) Shaping grey cast iron block will produce
   a) A continuous chip with built up edge.
   b) A continuous chip without built up edge.
   c) A discontinuous chip of irregular size and shape.
   d) A discontinuous chip of regular size and shape.
3) The value of chip reduction coefficient does not depend upon.
   a) Cutting velocity
   b) Depth of cut.
   c) Cutting tool material.
   d) Tool rake angle.

B) An orthogonal cut is made with a carbide tool having a 15° positive rake angle. The various parameters were noted, the cut width was 6.35 mm , the feed was set at 0.5175 mm , the chip thickness was measured to be 0.9525 mm , the cutting speed was 76200 mm./min. The forces measured were (horizontal force) Fc = 169.9 N, and (vertical force) Ft = 56.6 N. Use Merchant's Circle to scale, and the velocity diagram. From the Merchant Circle diagram find the shear angle (φ), friction force (F), friction normal force (N), and shear force (Fs). From the Velocity diagram find the friction velocity (Vf). Calculate values for the coefficient of friction (μ) and the metal removal rate.

Question Three:

A) Mention the materials and properties of cutting tool. What are the zones of tool wear?

B) Calculate the change of percentage % in cutting velocity required to reduce 80 % for the tool life at (n=0.12).

Question Four:

A) What are the types and the essential properties of a cutting fluid?

B) A lathe running idle consumes 325 watts, when cutting an alloy steel at 80 ft./min. the power input rises to 2580 watts. Find the cutting force and the torque at spindle when running at 125 rev./min. If the depth of cut is 0.15 in. and the feed 0.008 in./rev. Find the hP/in³/min. required to cut the materials.

جامعة طنطا
كلية الهندسة
قسم هندسة الانتاج والتصميم الميكانيكى
الفرقة الثالثة (لائحة قديمة) - المادة : دراسات بيئية

التاريخ: 28 / 1 /2010
الزمن : ساعتان
الدرجة العظمى : 60 درجة
الامتحان النهائي في ورقة واحدة

أجب عن الأسئلة الآتية:

السؤال الأول:

أ- ما المقصود بمفهوم البيئة وما هي أنواعها ومكوناتها؟

ب- متى نطلق على الهواء أنه ملوثا؛ وما هو دور أول وثاني أكسيد الكربون فى عملية التلوث ؟

ج- من أضرار تلوث الهواء تشويه البيئة من حولنا اشرح ذلك بالتفصيل.

(15 درجة)

السؤال الثاني:

أ- أذكر مصادر تلوث المياه، وما هي الأسباب التي تؤدى إلى تلوث المياه بالنفط؟

ب- تكلم تفصيليا عن المعالجة البيولوجية (Biological treatment) فى معالجة مياه الصرف.؟

ج- ما المقصود بالطمر الصحي ، وما هى أهم الشروط التي يجب توافرها عند اختيار موقع طمر النفايات؟ وما هي أهم المزايا الايجابية لهذه الطريقة؟

(15 درجة)

السؤال الثالث:

أ- تستقبل التربة كميات هائلة من المخلفات و الملوثات سنويا ، ويمكن تصنيف الملوثات حسب منشئها إلى ملوثات طبيعية و ملوثات بشرية أو صناعية، تكلم بالتفصيل عن الملوثات الطبيعية وأذكر فقط الملوثات الصناعية.

ب- من المصادر الصناعية للتلوث بالإشعاع التطبيقات الطبية، تكلم عنها بالتفصيل؟

ج - ما هي أضرار النفايات الصلبة في المقالب العمومية المكشوفة؟

(15 درجة)

السؤال الرابع:

أ- ما المقصود بالطاقة القابلة للاسترجاع (المتجددة) والطاقة الغير متجددة، مع ذكر أنواع كلا منها؟ ثم اشرح فكرة عمل الخلايا الفولت ضونية؟

ب- ما المقصود بالصناعات التحويلية وما مدى تأثيرها على البيئة؟ وما هى العوامل التي تحكم التوطن الصناعي؟

ج- اشرح مع الرسم محطة توليد الطاقة الكهربائية باستخدام طاقة المد والجزر وأذكر مدى مساهمتها في العمل على تقليل التلوث؟

(15 درجة)

مع التمنيات بالنجاح ،،،،،

Tanta University

Department: Pro. Des. Mech. Engineering
Total Marks: 50 Marks

Faculty of Engineering

Course Title: Refrigeration and Air conditioning	Course Code:	Year: 3rd
Date: 26/1/ 2010 (First term)	Allowed time: 3 hrs	No. of Pages: (2)

Remarks: *•(Both tables and charts of refrigeration and air conditioning are allowed (available with students).*
•(Please, answer All questions and assume any missing data and assumptions).

Problem number (1) **(7 Marks)**

a) Estimate the methods of refrigeration and the application of each that. (2 Marks)

b) An air-conditioning system operating on the reversed Carnot cycle is required to transfer heat from a house at a rate of 750 kJ/min to maintain its temperature at 24 °C. If the outdoor air temperature is 35 °C, determine the power required to operate this air-conditioning system and the COP. (5 Marks)

Problem number (2) **(10 Marks)**

a) Compare between open air system and dense air system. (2 Marks)

b) Discus and draw a schematic diagram of the boot strap air cooling system and plot it on the T-S chart. (2 Marks)

c) An air-refrigeration working on Bell-Coleman cycle takes air into the compressor at 100 kPa, -5 °C. It is compressed to 500 kPa then cooled to 25 °C at the same pressure. Air expands to 100 kPa and discharged to take the cooling load. Isentropic efficiency (η) of compressor is 85% and Isentropic efficiency of expander is 90 %. Find:

1. Refrigeration Capacity if $\dot{m}$ = 40 kg/min
2. Compressor power
3. C.O.P, if γ_{air} = 1.4, C_p = 1.0035 k J/kg. K, C_v = 0.7165 k J/kg. k (6 Marks)

Problem number (3) **(10 Marks)**

a) Compare between the systems for cooling three stores in the flowing:

1. Separate expansion valves with one compressor.
2. Separate expansion valves with three individual compressors.
3. Multiple expansion valves with three individual compressors.
4. Multiple expansion valves with three stages compressor. (5 Marks)

b) An R-22 single-store refrigeration system operating at -13 °C with cooling capacity 15 T.R. Condensing temperature is 47 °C. Assume simple vapour compression cycle determine:

i) The mass flow rate of refrigerant in kg/s and power of compressor in kW.
ii) COP of the cycle. (5 Marks)

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

A room 5m × 4m and 3m height (with the longer wall oriented facing north direction) in a gymnasium building is to be conditioned. The building site is 32° North latitude. East wall separate the room from conditioned space otherwise south wall separates the room from unconditioned space. Other walls (north and west) are side streets All walls are constructed from 100-mm face brick, 50-mm insulation and 100-mm concrete. The room

P.T.O.

has single window facing north with 2 m × 1.5 m and 6-mm single glass having light colour medium weave shading. The average number of occupants in space is 15 person's works from 8.00 Am till 4.00 Pm. Lighting is unvented and unsuspended fluorescent lamps, Number of lamps are 8 and each lamp has 40 watt. Inside design condition is 25 °C and outdoor air is assumed to be 40 °C. Neglect all other loading and calculate the space total load and the sensible heat factor (SHF). Base your calculations on June, 2.00 Pm O'clock.

Problem number (5) **(8 Marks)**

An amount of 0.3 kg/sec of air at 15 °C dbt and 10 °C wbt is preheated, then partially adiabatic saturated to relative humidity of 90%, then reheated to a final condition of 30 °C dbt and 40% relative humidity. Draw a schematic diagram of the system and plot it on the psychometric chart and then Calculate:

i) The capacity of the heaters in kW.

ii) The quantity of water consumed for humidification in kg/sec.

iii) The humidifying efficiency of the air washer.

Greeting sentence (Optional)

Course Examination Committee

Prof.
Dr. **Abd-elkader saad**

Prof.
Dr.

Course Coordinator: Prof. Abdl Naby Kabeel

Tanta University

Department: Pro. Des. Mech. Engineering
Total Marks: 50 Marks

Faculty of Engineering

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

THEORY OF VIBRATION
3rd YEAR 2009-2010
TIME: 3 HOURS

FINAL TERM EXAM

1- A machine of a mass 100 kg is mounted on an elastic support having stiffness 400 KN/m and no damping. The machine runs at a constant speed of 3000 rpm at which it vibrates at high amplitude. In order to reduce the amplitude to 25% of its original value, a vibration absorber of mass 20 kg is attached to the machine. Determine:
   a- The stiffness of the absorber.
   b- The two natural frequencies of the system.

(Mark 20%)

2- A vehicle of weight 4448 N travels along a rough road at 26.8 m/sec. The sine curve representing the rough road has amplitude of 2.54 cm and a wave length of 6.09 m. Determine:
   a- The spring constant k such that 26.8 m/sec is the critical speed.
   b- The spring constant to give vibration amplitude of 0.636 cm of the vehicle at 26.8 m/sec.
   c- Weather a rider in the vehicle would leave his seat under the condition of (b).

(Mark 20%)

3- Vibration isolation is recommended for high precision machines like laser or CNC machines. Figure 1 shows the vibration of the floor Y_f=20μm in the vertical direction at the control point of the machine through unbalanced motor which has constant speed of 980 rad/min. If the machine mass is 310 kg, calculate the stiffness of the isolation k to insure that the machine's vertical vibration does not exceed $Y_f/10$.

(Mark 15%)

4- A disc mounted on the middle of a light shaft weights 140 N and has an unbalance of 0.002 kg.m. The two bearings that support the shaft are not rigid and are assumed to have a stiffness of 8×10^6 N/m each. When the shaft runs at 10000 rpm the bearing deflection is 0.25 mm. Calculate the following:
   a- The shaft deflection at that speed.
   b- The critical speed.
   c- What will be the change in the critical speed and why if a dashpot is added to the bearings?

(Mark 20%)

5- A rigid block with a mass m and moment of inertia I ($I=\frac{1}{6}ma^2$), as shown in Fig. 2 is supported by four equal springs, two vertical and two lateral.

Dr. Samy F. M. Assal

a- Consider the case in which the block is constrained to translate in Y-direction and rotate θ in the X-Y plane; show that, X and θ are *principle coordinates* and then find the natural frequencies and the response of the system.

b- Consider the case in which the block is constrained to translate in X-direction and rotate θ in the X-Y plane; find the natural frequencies and the response of the system. **(Mark 25%)**

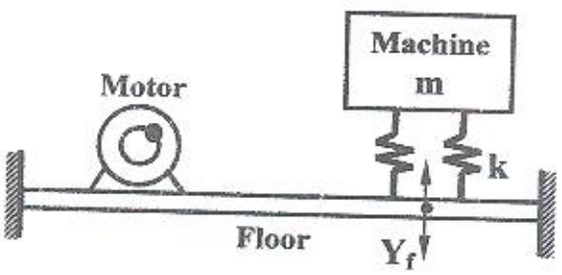

Fig.1

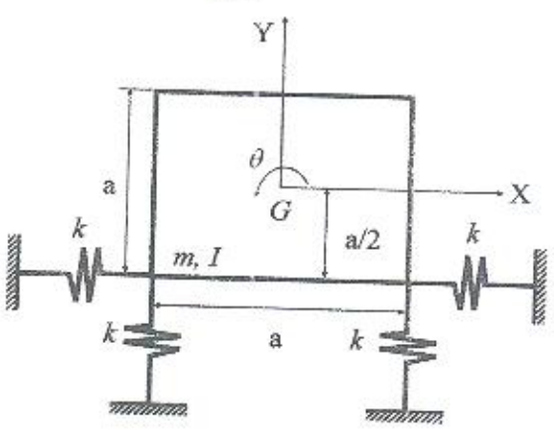

Fig. 2