NATIONAL UNIVERSITY OF SCIENCE AND TECHNOLOGY

FACULTY OF INDUSTRIAL TECHNOLOGY

INDUSTRIAL & MANUFACTURING ENGINEERING DEPARTMENT

Engineering Design Applications II : TIE 2208

SUPPLIMENTARY EXAMINATIONS - OCTOBER 2009

<u>Time</u>: 3hours Instructions: Answer five questions

QUESTION 1

a)	Explain the Design phases	[10]
b)	Define machine design process	[10]

QUESTION 2

A cone clutch has an angle of 12.5° and a mean diameter of 508mm. If the clutch is to trasmit15 hp at1000rpm and the coefficient of friction is 0.25. what axial spring force is required. Calculate on the basis of uniform wear. [20]

QUESTION 3

A pulley of 150mm diameter running at 1600rpm drives a follower of 800mm diameter the two shafts being 1.2m apart. And the free part of the belt is considered straight. The belt has mass of 0.5 kg/m, Tm =800N and friction =0.5;

Estimate:

- i. Tension in slack sided
- ii. The speed of the driven pulley
- iii. The power transmitted

[20]

QUESTION 4

The pinion 2 runs at 1800rpm and transmits 3Kw to the idler gear 3. The teeth are cut on the 20° full depth system and has module of m =3. Draw a free body diagram of gear 3 and show all the forces which act upon it. [20]



QUESTION 5

A gear set consists of a 16tooth pinion driving a 40tooth gear. The module ie is 12mm and the addendum and dedendum are 12 and 15 mm respectively. The gears are cut using a pressure angle of 20°

Compute:

- i. The circular pitch
- ii. The center distance
- iii. thew radii of circles

QUESTION 6

A block brake has a configuration as shown in the diagram below. The drum is 300mm in diameter rotates at 100rpm, and transmits 5horse power. Assume that a=150mm, b=300mm and c=100mm and that the coefficient of friction is 0.3. Find the operating force needed to stop the drum if;

- i. Clockwise rotation is assumed
- ii. Counterclockwise rotation is assumed.

