Reg. No.										

MANIPAL INSTITUTE OF TECHNOLOGY

MANIPAL

A Constituent Institution of Manipal University

VII SEMESTER B.TECH. (AUTOMOBILE ENGINEERING)

END SEMESTER EXAMINATIONS, NOV/DEC 2016

SUBJECT: TRIBOLOGY [AAE 475]

REVISED CREDIT SYSTEM
(30/11/2016)

Time: 3 Hours MAX. MARKS: 50

Instructions to Candidates:

- Answer **ANY FIVE FULL** questions.
- Missing data may be suitable assumed.

1A. Enlist the principle functions of lubricants **(02)**

1B. A box weighing 28Kg is released on a 37° inclination. It accelerates down the inclination at 0.37m/s^2. Find the friction force obstructing its motion. **(03)**

1C. What is wear and what are different types of wear. Explain the different types of abrasion wear. Determine the value of Coefficient of kinetic friction. **(05)**

2A. Where does friction originate from? Give appropriate examples of those causes **(02)**

2B. Calculate the viscosity of a lubricant at 25KPa using Barus equation. The atmospheric viscosity of the lubricant is 20mPaS at a temperature of 24 deg. Celsius. Use the chart -1 which is provided below for calculation. **(03)**

2C. With the aid of a neat diagram, Derive Petroffs Friction Equation. Enlist the assumptions made. **(05)**

3A. What are metal forming process and how are they classified? Give few examples **(02)**

3B. Write brief notes on the following topics **(03)**

i. Viscosity Index
ii. Jellium Model of Adhesion wear

3C. State the differences between Newtonian & Non-Newtonian fluids. Explain the different behaviors exhibited by non-Newtonian fluids **(05)**

4A. Describe barreling effect with the aid of a sketch. **(02)**

4B. What is forging? Classify them and give short notes on it. **(03)**

4C. Forging process is carried out on a square workpiece, which is possessing a dimension of initial height as 80 mm and a side as 65 mm. The material which is exposed to this process has a flow curve defined by K = 350MPa and strain-hardening exponent as 0.17. The co-efficient of friction is assumed to be 0.2 and the initial strain to be assumed is 0.002. Determine the forging force as the process commences and at a height of 70 mm. **(05)**

5A. Derive Reynolds two-dimension equation with neat diagram. State the assumptions made while deriving the equation. **(10)**

Can use Leibnitz method for Integration

$$\int_a^b \frac{\partial u(y,x)}{\partial x}\,dy = \frac{d}{dx}\int_a^b u\,dy - u(b,x)\frac{db}{dx} + u(a,x)\frac{da}{dx}$$

6A. What is Springback and give the formula to determine it **(02)**

6B. List down the different stages of bearing damages caused by inadequate lubrication? Write a short note to explain each stage **(03)**

6C. Derive the bearing geometry and the pressure distribution of a titled Pad bearing with the aid of neat diagram. **(05)**

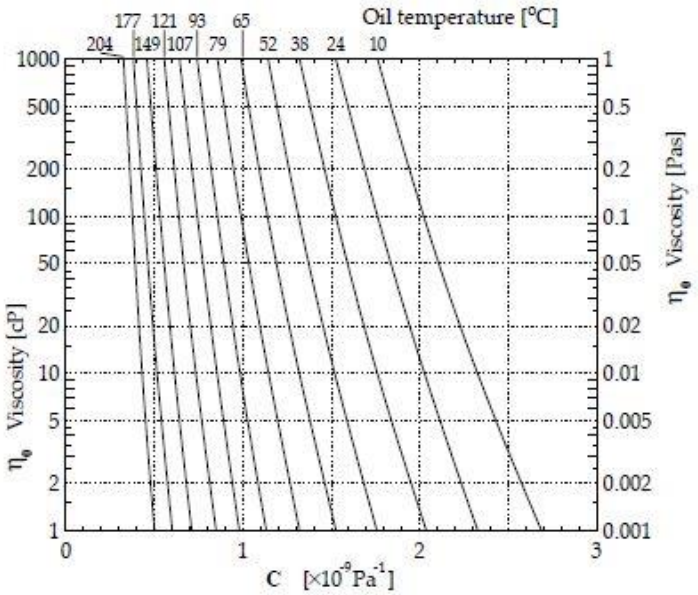

Chart – 1