Reg. No.										

Manipal Institute of Technology, Manipal

(A Constituent Institute of Manipal University)

VII SEMESTER B.TECH (AUTOMOBILE ENGINEERING)

END SEMESTER EXAMINATIONS, DEC 2015 /JAN 2016

SUBJECT: TRIBOLOGY [AAE 475]

REVISED CREDIT SYSTEM

Time: 3 Hours MAX. MARKS: 50

Instructions to Candidates:

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

1A. What is friction? How is it classified? 2M

1B. Classify different types of lubricants and state few advantages of synthetic oils. 3M

1C. Derive the frictional Torque of a Flat Pivot Bearing
i. Considering Uniform Wear
ii. Considering Uniform Tear 5M

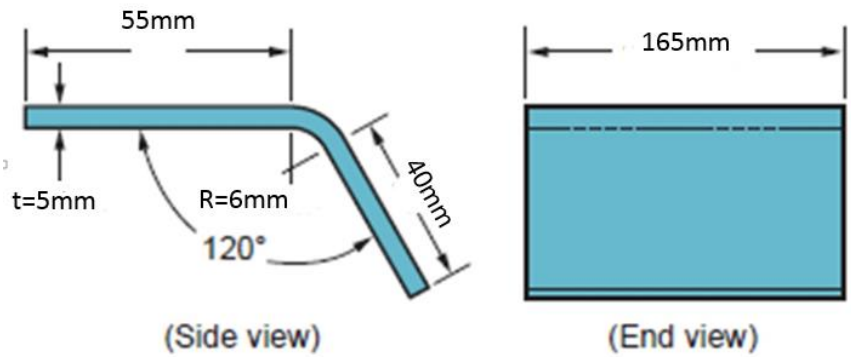
2A. What are the mandatory characteristics for a retainer material? 2M

2B. State the Burwell and Strang laws of wear. 3M

2C. Write short notes on the following areas
i. Viscosity Index
ii. Important Properties of a liquid 5M

3A. What are efflux viscometers? Give some examples of those. 2M

3B. 3M



A Sheet metal is bent as shown in the above figure. Find the Starting blank size of the sheet metal. Use $K_{ba} = 0.33$

3C.	Describe cone-on-plate viscometer with a diagram.	5M
4A.	What is Oil whirl & Oil Whip?	2M
4B.	Explain Squeeze film and Hydrostatic Lubrication with suitable diagrams.	3M
4C.	With the aid of a neat diagram, Derive Petroffs Friction Equation. Enlist the assumptions made.	5M
5A.	What is metal forming process and how are they classified?	2M
5B.	What is Boundary Lubrication and enumerate the reasons for its happening.	3M
5C.	List down the properties which needs to considered while choosing two types of boundary lubricants.	5M
6A.	Derive Reynolds two-dimension equation with neat diagram. State the assumptions made while deriving the equation.	10M

Can use Leibnitz method for Integration

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