



**Make-Up Exam for Quiz (Open Book)**  
**Time allowed: 40 minutes**

**Student Name:** ..... **University #:**.....

**Question (1)** [6 marks]

- a- Write down (at least 5) functions of the lubrication in machines.
- b- Write (with sketch) the main regimes of lubrication systems in machines and how to specify its type.
- c- Write (at least 3) differences between the Hydrodynamic and hydrostatic lubrication in machines.

**Question (2)** [4 marks]

Define the meaning of **Surface Hardness** and mention the different methods used to measure the hardness experimentally.

**Problem (2)** [10 marks]

A full journal bearing of **100 mm** diameter by **200 mm** long supports a radial load of **5 kN**. The speed of the shaft is **1000 RPM**. The room temperature is **20 °C** and the surface of the bearing is to be limited to **60 °C**. if the bearing is well ventilated and no artificial cooling is to be used, assume  **$r/c = 500$** .

- a- Select a suitable oil (viscosity) to satisfy the above requirements.
- b- Find the oil flow rate passing through that bearing
- c- Determine the amount of artificial colling (if needed). *Assume any missed data*

