

National Institute of Technology Hamirpur (HP)

Name of the Examination: B. Tech. 16 December 2020 (2 PM)

Branch : Mechanical Engineering

Semester :VII

Course Name : Industrial and Engine Tribology

Course Code : ME-452

Time: 2 Hours

Max Marks: 50

Note: Attempt all questions; assume missing data, if any.

1. All the students are required to adhere to the guidelines already shared on the classroom
2. Each student is required to write Name, Roll Number, Subject code on Top of the sheets and sign with date on bottom of the sheets
3. The students can scan and upload the answer sheets on google classroom till 4.15 PM. Delay in submission may lead to reduction in marks or rejection of the whole answer booklet.
4. Be brief and concise in your answers, justify your claims with suitable examples wherever possible.
5. Keep your camera on during the examination and till uploading the answer sheet. You may send the pdf file by 4.15 through email, if it is not getting uploaded on google classroom.

Q. No. 1

- i. What is the difference in Centre line average and root mean square values of roughness?
- ii. Why oil needs to be replaced, what is the criterion for such a decision?
- iii. What are contact stresses, where such stresses normally are encountered in machines?
- iv. What do you understand by junction growth?
- v. What role does the surface play in combating friction?
- vi. What types of devices are used for measuring friction? Discuss with suitable sketch.
- vii. In what type of engine parts and circumstance fatigue wear is most commonly encountered?
- viii. Is wear related to hardness? If yes, how?
- ix. In what way temperature plays its role in influencing friction coefficient?
- x. What does 5W20 oil signify? Where are such notations applicable?

[10 x 1]

Q. No. 2

- a. What is rolling friction, what type of mechanism governs such friction?
- b. How friction influences the engine performance, is it beneficial?

[2.5x2]

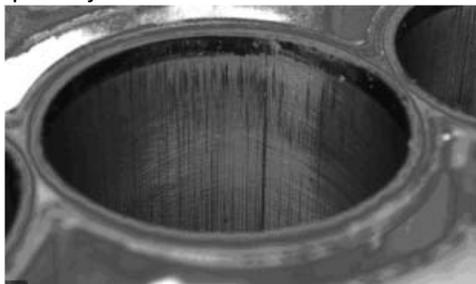
Q. No. 3

- a. What are various mechanisms of wear? Which type of wear is more predominant in gears?
- b. How wear is judged and measured, what type of instruments/devices can be used?

[2.5x2]

Q. No. 4

Examine the images below and give your comments from tribology point of view with appropriate justification.



a)



b)



c)



d)

[2.5x4]

Q. No. 5

- a. What type of bearings are used in engines? Write the names of all types of bearings and their location of use.
- b. How contamination of oil can be monitored? What type of mechanism in oil analysis can indicate the wear of machine parts?

[2.5x2]

Q. No. 6

- a. Deduce the Reynolds equation for a fluid film bearing, how can this be used for an infinitely long thrust pad bearing?
- b. A fluid film bearing has the following operating parameters: load=16 kN, speed of sliding pad=30 m/s, length = 150mm, width = 75mm, SAE 20 oil, and inlet temperature= 40°C. Find various performance parameters by considering the maximum load condition using appropriate charts.

[7.5x2]