ITL 705 (Materials for tribological applications)

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I Minor Exam 2015, 30/8/2015

Time 1 hrs	Marks 25
Question 1	
(i) List the principal factors which affects the wear of materials?	(1)
(ii) Explain abrasive and fretting wear and suggest suitable material for wear res	sistance for
both (give reasons)?	(1)
(iii) Explain the process of fatigue failure and suggest a suitable material with rea	ason to
prevent it.	(1.5)
(iv) What do you mean by tribological contact? List the assumptions in Hertzian	contact
analysis?	(1.5)
Question 2: Answer following briefly	
(i) What are the tribological relevant properties of materials?	(1)
(ii) What is rule for tribological compatibility and its limitations?	(1.5)
(iii) What is allotropic change in metals? Explain the allotropic changes in pure in	
(iv) What is precipitation hardening?	(1)
Question 3: Differentiate following	
(i) Hyoeutectoid and hypereutectoid steel; draw microstructure also	(1)
(ii) Pearlitic and martensitic steel; draw microstructure also	(1)
(iii) Bainitic and tempered-martensitic steel; draw microstructure also	(1)
(iv) Adhesive and abrasive wear	(1)
(v) Scuffing and pitting in gears	(1)
Question 4	
(i) List the parameter for piston-cylinder tribopair and material with recent ad	
(ii) Write a short note on tribological use of magnesium alloy? What elements	are present
in AZ61 and AM60 alloys?	(1.5)
(iii) What are the mechanism of nano-lubrication?	(1)
(iv) Write a short note of materials for biotribological applications?	(1.5)

P.T.O.

Question 5

400

300

200

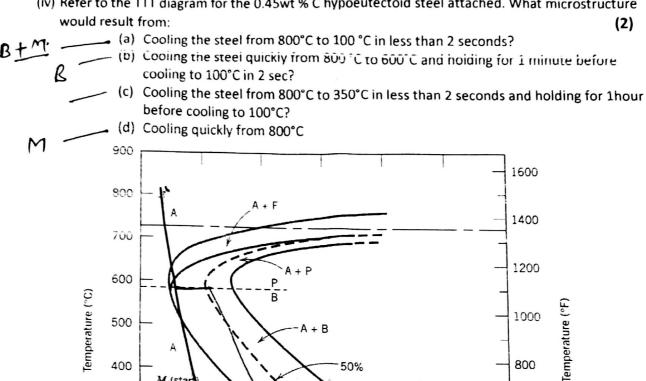
100

0 0.1 M (star M (50%

M (90%)

10

- (i) Why ferrite has very low solubility of carbon, while austenite has high solubility of carbon? (1)
- (ii) What is the expected crystal structure of martensite and why? (1)
- (iii) Differentiate Eutectoid and proeutectiod cemented carbides? (1)
- (iv) Refer to the TTT diagram for the 0.45wt % C hypoeutectoid steel attached. What microstructure would result from:



50%

800

600

400

200

10⁵

10²

Time (s)

10³

104