

Unit 8 - Week 7

Course outline

How does an NPTEL online course work?

Week 1

Week 2

Week 3

Week 4

Week 5

Week 6

Week 7

● Overview: Cryogenic wear properties of materials

○ Sliding wear of alumina ceramics and zirconia ceramics in cryogenic environment

● Sliding wear of silicon carbide in cryogenic environment

○ Wear of TiB₂ Ceramic Composites

● Erosive wear of ultra-high temperature NbB₂-based ceramic composites

○ Quiz : Assignment 7

○ Solution For Assignment 7

Week 8

Text Transcripts

DOWNLOAD VIDEOS

WEEKLY FEEDBACK

Assignment 7

The due date for submitting this assignment has passed.
As per our records you have not submitted this assignment.

Due on 2020-03-18, 23:59 IST.

1) Bearing life is reduced due to

1 point

- extensive wear and spalling because of high speed sliding under high contact pressure
 extensive wear and spalling because of high speed sliding under low contact pressure
 mild wear and spalling because of high speed sliding under high contact pressure
 mild wear and corrosion because of high speed sliding under high contact pressure

No, the answer is incorrect.
Score: 0

Accepted Answers:
extensive wear and spalling because of high speed sliding under high contact pressure

2) Choose proper statement for the wear of self-mated zirconia ceramics

1 point

- tetragonal to monoclinic phase transformation occurs in cryogenic conditions
 tetragonal to orthorhombic to monoclinic phase transformation occurs in cryogenic conditions
 tetragonal to orthorhombic to monoclinic phase transformation occurs in ambient conditions

No, the answer is incorrect.
Score: 0

Accepted Answers:
tetragonal to orthorhombic to monoclinic phase transformation occurs in cryogenic conditions

3) Select proper requirements for space bearing materials

1 point

- High COF and compressive strength, low wear resistance and hardness
 Low COF, high wear resistance and hardness
 Low COF, high wear resistance and hardness along with properties retention at low temperatures
 high compressive strength along with properties retention at low temperatures

No, the answer is incorrect.
Score: 0

Accepted Answers:
Low COF, high wear resistance and hardness along with properties retention at low temperatures

4) For wear of titanium against steel in liquid nitrogen environment,

1 point

- smearing of tribolayer and deformation is observed with small grain size and high sliding speed
 smearing of tribolayer and deformation is observed with large grain size and high sliding speed
 smearing of tribolayer and deformation is observed with small grain size and low sliding speed
 smearing of tribolayer and deformation is observed with large grain size and low sliding speed

No, the answer is incorrect.
Score: 0

Accepted Answers:
smearing of tribolayer and deformation is observed with large grain size and high sliding speed

5) Wear mechanism(s) for self-mated zirconia in unlubricated sliding at room temperature is/are

1 point

- spalling
 microcrack-induced damage
 limited cracking and large plastic deformation

No, the answer is incorrect.
Score: 0

Accepted Answers:
limited cracking and large plastic deformation

6) Low friction observed in cryogenic wear of self-mated alumina ceramics is because of

1 point

- high thermal conductivity of alumina at cryogenic temperatures
 high density of alumina at cryogenic temperatures
 low thermal conductivity of alumina at cryogenic temperatures
 low density of alumina at cryogenic temperatures

No, the answer is incorrect.
Score: 0

Accepted Answers:
high thermal conductivity of alumina at cryogenic temperatures

7) In dry unlubricated fretting wear conditions against steel counterbody, the most possible observation for TiB₂ ceramics is

1 point

- wear volume decrease with increase in load
 3-body abrasive wear
 2-body abrasive wear
 transfer material and 3-body abrasive wear

No, the answer is incorrect.
Score: 0

Accepted Answers:
transfer material and 3-body abrasive wear

8) Abrasive wear parameter depends on

1 point

- fracture toughness
 hardness
 load
 all of the given options

No, the answer is incorrect.
Score: 0

Accepted Answers:
all of the given options

9) When NbB₂-ZrO₂ composite is eroded by alumina particles, the increase in erosion test temperature from 25 oC to 800 oC results in

1 point

- increase in depth of erosion crater
 decrease in depth of erosion crater
 no change in depth of erosion crater

No, the answer is incorrect.
Score: 0

Accepted Answers:
decrease in depth of erosion crater

10) Select the ultra-high temperature ceramics from the following:

1 point

- a) Alumina
 b) Niobium boride
 c) Tantalum carbide
 d) a and b
 e) b and c

No, the answer is incorrect.
Score: 0

Accepted Answers:
e) b and c