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B.E.(FULL-TIME) DEGREE EXAMINATIONS, APRIL/MAY 2013
MATERIALS SCIENCE AND ENGINEERING

FIFTH SEMESTER
(REGULATIONS 2008)

(10)

ML 9302 – MATERIALS ASPECTS IN DESIGN

Time : 3 Hours

Answer ALL Questions

Max. Marks : 100

PART – A (10 X 2 = 20 Marks)

1. What is the need for value analysis?
2. What do you understand by material performance index?
3. What are the factors to be considered in decision making between manual and automated assemblies?
4. Define Machinability index.
5. Distinguish unilateral and Bilateral tolerances.
6. What do you understand by the term Redundant dimensioning?
7. What do you mean by stress free strain?
8. When a local yielding may occur with reference to nominal stress?
9. Define the term selective leaching.
10. How would you compute maximum allowable stress to prevent brittle fracture?

PART – B (5 X 16 = 80 Marks)

11. Explain the different evaluation methods adopted for appropriate materials selection.
12. a) i) Explain the classifications of manufacturing process. (6)
ii) Discuss the various factors to be considered in selection of appropriate manufacturing process (10)
(OR)
b) i) What are the general guidelines to be followed while designing a weldment? (10)
ii) Appropriate weldment design requires consideration of joint design and stress generated during welding process- Justify (6)
13. a) i) A general rule that surface finish should be no finer than required by the function of a part- comment (8)
ii) Discuss briefly the relationship between surface roughness and minimum dimensional tolerance. (8)
(OR)
b) i) Specify the amount of allowance and tolerance on the hole and a mating shaft for different fits as per ANSI. (8)
ii) "A small tolerance will result in greater ease of interchangeability"- illustrate. (8)

14. a) i) Illustrate the importance of stress-strain diagram during the designing of a component under static loading. (10)

ii) Discuss the effect of geometry of a component on stress concentration. (6)

(OR)

b) i) Elaborate the design requirements for light springs. (8)

ii) Make a property chart to select materials for spring using σ_y^2/E index. Which three metals emerge as best metallic choices? (8)

15. a) i) Explain the fatigue design criteria. (8)

ii) How the total strain amplitude influences the fatigue limit of structural component? (8)

(OR)

b) i) Discuss briefly the eight basic forms of corrosion. (8)

ii) Explain the basis design for heat exchanger/ pressure vessels. (8)