Roll No. | | | | | | | | |

B.E / B.Tech (Full Time) DEGREE END SEMESTER EXAMINATIONS, APR / MAY 2014

MATERIAL SCIENCE AND ENGINEERING

Fourth Semester

ML 9251 MECHANICAL METALLURGY
(Regulation 2008)

Time : 3 Hours Answer ALL Questions Max. Marks 100

PART-A (10 x 2 = 20 Marks)

1. Differentiate between engineering stress and true stress.
2. Define Burger's vector?
3. What are Luder bands in yield point phenomenon?
4. Justify the following statement as true or false with adequate reason.
   "As the grain size of a material increases the yield stress will increase".
5. Distinguish between fracture and faileure.
6. Differentiate between fracture toughness and impact toughness.
7. Define Endurance Limit.
8. Distinguish between reversed and repeated cycles in fatigue.
9. Define steady state creep rate.
10. Define dislocation glide.

Part – B (5 x 16 = 80 marks)

11. .i) Classify the defects in crystals. Explain them in detail. (10)
    ii).What is resolved shear stress? Derive an expression for it. (6)

12. a) (i) Explain in detail the age hardening .Discuss the variables affecting it. (8)

    (ii).What is rule of mixture? Explain the role of different elements involved in fibre Strengthening. (8)

OR

b) (i) .Discuss the strain hardening mechanism in detail. (8)

(ii) . What is solid solution strengthening? Discuss in detail the various variables affecting it. (8)

13. a) a) (i). State and explain Griffith's theory of brittle fracture and derive an expression for the fracture stress. (10)

(ii). Define the term fracture toughness and state various modes of fracture. (6)

OR

b) (i). What is Ductile-brittle transition in steel ?Explain in detail the various s parameters affecting it. (10)

(ii).Classify the various modes of fracture based on the load action and crack propagation directions, illustrate them with neat sketches and state the significance of critical stress intensity factor of mode I failure (6)

14. a) a) How a high fatigue cycle test is conducted and result presented? What are the uses of fatigue test result? (8)

(ii). A steel plate is subjected to a maximum fatigue stress of 200 MPa, the fracture toughness of the steel is 130MPa$\sqrt{m}$ and the geometry factor α is 1.1.The values of Paris equation parameters are A=6.9X10-12 and p=3.0.How many fatigue cycles are required to fracture the plate? (8)

OR

b) (i) Differentiate between high and low cycle fatigue test. (8)

(ii) How is a plot of crack growth rate Vs ΔK is obtained? State the significance of Paris Equation. (8)

15. a) (i) Define the term creep? What are the various stages of creep? and what are the factors affecting creep? (8)

(ii) Draw and explain the deformation mechanism map. (8)

OR

b) Write short notes on any two of the following: (2x8=16)

(i) Grain boundary strengthening.

(ii) Substitution and intertial solid solution

(iii) Fatigue crack growth mechanism.

DEGREE	:	**B.E.**
Branch	:	**Material Science and Engineering**
Semester	:	**4**
Code No./Subject	:	**ML 8401 Analytical Instrumentation Techniques**

END SEMESTER EXAMINATIONS, APRIL/MAY 2014

TIME: 3 Hours **MAX MARKS: 100**

Answer ALL Questions

Part - A **10 x 2 = 20 Marks**

1. What is the principle of absorption spectroscopy?
2. What is a Jablonski diagram? What is its use?
3. What is Franck condon principle?
4. What are photometric titrations?
5. What are stretching and bending vibrations?
6. What is the principle of ICP AES?
7. What is distribution ratio?
8. What is Rf value?
9. What is the principle involved in AFM? What are its modes?
10. Sketch a DSC curve and show the important thermal events.

Part - B **5 x 16 = 80 Marks**

11. (i) What is Beer Lambert's law? Derive it. 10
    (ii) What is the difference between fluorescence and phosphorescence? 6

12. (a) (i) What is a shift? What are its types? 6
    (ii) Explain the effect of conjugation on electronic transition with suitable examples. 10

    OR

    (b)(i) What is a filter? What are its types? Explain their construction and working. 6

(ii) What are the ideal properties of a radiation transducer? What are its types? Explain any one of them in detail. 10

13. (a) (i) Explain the sample preparation for IR spectroscopy. 6

(ii) Explain the principle and process of atomic absorption spectroscopy in detail. 10

OR

(b)(i) Explain the mechanism and working of flame photometry with a block diagram. 6

(ii) What is the difference between dispersive and Fourier transform IR spectrometers? Explain in detail. 10

14. (a) (i) What are the characteristics of a good adsorbent? 6

(ii) Explain the method, theory and experimental technique involved in column chromatography with suitable examples. 10

OR

(b)(i) What is TLC and what are its advantages? Explain the theory involved. 6

(ii) What are the essential parts of a gas chromatography? Explain its working with a block diagram. 10

15. (a) Discuss the optical arrangement, illumination source, working environment, image formation, its mechanism and sample preparation in SEM. 16

OR

(b) (i) Write about the sample preparation in TEM analysis. 6

(ii) What is TGA? Explain the instrumentation and experimental aspects of TGA. 10