Reg No.:_____ Name:_____

APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY

Third Semester B.Tech Degree (S,FE) Examination December 2020 (2015 Scheme)

Course Code: ME210
Course Name: METALLURGY AND MATERIALS ENGINEERING (MC)

Max. Marks: 100　　　　　　　　　　　　　　　　　　　　　　Duration: 3 Hours

PART A
Answer any three questions, each carries 10 marks.

Marks

1	a)	Why FCC is more ductile compared to BCC?	(5)
	b)	Compare slip and twinning.	(5)
2	a)	Explain Schmid's law. Derive an expression for Critical Resolved Shear Stress (CRSS)?	(5)
	b)	Discuss the effect of slip systems on the plastic deformation of metals.	(5)
3	a)	Differentiate homogenous and heterogenous crystallization.	(5)
	b)	Explain the effect of grain size and grain shape on dislocation movement.	(5)
4	a)	With the help of a neat sketch explain edge and screw dislocations.	(5)
	b)	Explain Fick's first and second laws of diffusion.	(5)

PART B
Answer any three questions, each carries 10 marks.

5	With the help of a neat sketch explain Fe-C equilibrium diagram.	(10)
6	Explain the following heat treatments i) Annealing ii) Tempering iii) Normalising iv) Spheroidizing v) Hardening	(10)
7	Explain the different types of strengthening mechanisms in materials.	(10)
8	Discuss the effect of following alloying elements on the properties of steel, i) Molybdenum ii) Nickel iii) Chromium iv) Vanadium v) Tungsten.	(10)

PART C
Answer any four questions, each carries 10 marks.

9	a)	Define fatigue and specify the conditions under which it occurs.	(5)
	b)	Explain why the strengths of brittle materials are much lower than predicted by theoretical calculations.	(5)
10		Illustrate the mechanisms of creep.	(10)
11		With the help of a neat diagram explain fatigue test.	(10)
12		Explain the structural changes occurring due to creep.	(10)

13   Explain the following i) Intermetallics ii) Maraging steel iii) Super alloys   (10)
        iv) Titanium v) Smart materials.

14   a) Explain Griffith theory of fracture.   (5)

     b) Explain bio materials. List any four applications.   (5)

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