Reg No.:_____ Name:_____

APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY

Third Semester B.Tech Degree Examination December 2020 (2019 Scheme)

Course Code: IET205
Course Name: MATERIALS AND MANUFACTURING PROCESSES

Max. Marks: 100 Duration: 3 Hours

PART A

Answer all questions. Each question carries 3 marks Marks

1	With neat sketch explain about planar density	(3)
2	Draw the Burgers circuit for a line dislocation and mark the Burgers vector	(3)
3	With the aid of a sketch corresponding to the phase diagram of any binary isomorphous system explain how the phases and composition are identified for a system in which both the systems coexist.	(3)
4	Discuss the general steps involved in any heat treatment process.	(3)
5	Explain the concept of flow stress.	(3)
6	Explain spring back effect.	(3)
7	List any six common defects encountered in casting process.	(3)
8	Why casting is preferred over other methods of manufacturing? Discuss.	(3)
9	Explain the term ‘flux’ or ‘soldering fluid’. Enumerate the fluxes commonly used in soldering process.	(3)
10	List the use and types of filler materials and fluxes used in gas welding.	(3)

PART B

Answer any one full question from each module. Each question carries 14 marks

Module 1

11(a)	Derive the atomic packing factor of FCC.	(4)
(b)	With neat sketch explain any two point defect and three line defects.	(10)
12(a)	Explain with neat sketch about the plastic deformation by slip.	(10)
(b)	With neat sketch explain about the estimation of grain size by intercept method.	(4)

Module 2

13(a)	With the help of TTT diagram for eutectoid steel of Carbon concentration	(10)

0.8% explain in detail the various heat treatment process along with the subsequent microstructure developed.

(b) Sketch the nucleation rate, growth rate and overall transformation curve. (4)

14(a) What are the characteristics of martensitic transformation? (6)

(b) With neat sketch explain about electron beam hardening and laser beam hardening. (8)

Module 3

15(a) Derive an expression for true stress as a function of engineering stress and strain and also derive the relationship between true strain and engineering strain. (6)

(b) Describe the construction and advantages of planetary roll mill with a simple sketch. (8)

16(a) A brass billet is to be extruded from its initial diameter of 100 mm to a final diameter of 50 mm. The working temperature is 700^{o}C and extraction constant is 250Mpa . What is the force required for extrusion in MN (4)

(b) With the help of a schematic illustration, explain hydrostatic extrusion process. (10)

Module 4

17(a) Write down an expression for critical radius of nucleus for heterogeneous nucleation and show that it is easier for heterogeneous nucleation to take place. (6)

(b) Discuss about under cooling and dentritic growth. (8)

18(a) Draw the schematic of sand casting process and briefly describe different parts. (10)

(b) List any 4 important properties of moulding sand. (4)

Module 5

19(a) Explain friction welding process. (4)

(b) With a neat sketch explain submerged arc welding process and list any two applications. (10)

20 Write short note on gas welding. Write any three applications, advantages and disadvantages. (14)