

UNIVERSITY OF PETROLEUM AND ENERGY STUDIES
End Semester Examination, April/May 2018

Course: Advanced Materials Technology
Program: B. Tech MSNT VIII
Time: 03 hrs.

Semester:
Max. Marks: 100

Instructions:

SECTION A: 20 marks

S. No.		Marks	CO
Q 1	Discuss the advantages and disadvantages of using polymers as matrix material in making composite.	5	CO4
Q2	With the help of neat sketch, explain the three stages of creep failure. Also, discuss the significance of homologous temperature.	5	CO3
Q3	Sketch the nature of dimple rupture when the material is in a) pure tension, b) shear, c) tensile tearing.	5	CO3
Q4	Discuss parameters that affect tensile curve.	5	CO1

SECTION B: 40 marks

Q5	List the functions of matrix and dispersed phase in composite materials. Also, discuss various factors involved while selecting matrix material.	10	CO4
Q6	Derive the expression for elastic modulus for the deformation in longitudinal direction of FRC	10	CO1
Q7	Explain the three models to relate mean stress and alternating stress during fatigue.	10	CO3
Q8	I. Explain how stir casting is done and for which materials? Give its limitation. OR II. Explain squeeze casting infiltration process along with its applications.	10	CO1

SECTION-C: 40 marks (Attempt either Q9 I or Q9 II, Q10 is mandatory)

Q9 I	A. List the characteristic features of high temperature materials.	6	CO2
	B. Describe the composition and structure of γ' and γ'' metallurgical phases present in super-alloys. Explain their roles in enhancing mechanical properties.	6	CO1
	C. Brief about carbide and boride phases present in Ni-based superalloys.	8	CO4
Q9 II	A. Sketch deformation mechanism maps for creep.	6	CO2
	B. Why single crystals are beneficial for turbine blade applications?	6	CO1
	C. Explain directional solidification process for turbine blades.	8	CO4
Q 10	A. Why there is need for making advanced materials?	6	CO1
	B. List any two advanced ceramics along with their properties and applications.	8	CO4
	C. How superalloys were developed?	6	CO1