Ref. No.: Ex/PG/MatE/T/128A/2017

M. TECH MATERIAL ENGG FIRST YEAR SECOND SEMESTER – 2017

Subject: HIGH TEMPERATURE MATERIALS **Time: 3 hrs.** **Full Marks: 100**

Use Separate Answer Scripts for Part A and Part B

Part - I

Instructions: Answer any five questions

1		In the context of steels and there welds, briefly explain the causes and remedies of (a) hot cracking, (b) cold cracking.		10
2		Write short notes on any TWO of the following: (a) Stabilized grades of austenitic stainless steels. (b) Type IV cracking in ferritic steel weldments (c) Creep-fatigue design for steel welds (d) TBC (e) Ni-based ODS alloys		5 X 2
3		List the key concepts to make polymers thermostable as well as mechanically strong and chemically resistant.		10
4		What are the important characteristics for which alloys of refractory metals find use in high temperature applications? Give a few examples.		10
5		Summarize the basic principles of designing Ni-base super-alloys for high temperature structural applications.		10
6		Very briefly explain the process of casting single crystals of superalloys.		10
7		Briefly compare the important processing routes for production of ODS alloys.		10
8		Briefly compare CVD and PVD techniques for applying high temperature coatings.		

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M.TECH. IN MATERIAL ENGINEERING 2ND SEM EXAMINATION, 2017

Subject: HIGH TEMPERATURE MATERIALS

Part: II **Marks: 50**

Answer Question 1 and any two questions from the rest

1. Discuss the essential properties of high temperature oxide materials. 10

2. a) Define RUL. How do you determine the RUL? 2+8

b) Discuss the types of polymorphic transformation of silica. Write in a tabular form the polymorphic transformation of silica. 6+4

3. a) Discuss the temperature dependent phase transformation of kaolinite, bentonite and fire clay upto 1000^0C. 12

b) Hot strength of silica bricks is excellent above 600^0C. Explain 8

4. a) Discuss the effect of dihedral angle on the high temperature strength of magnesite bricks. 7

b) Discuss the temperature dependent variation of strength of magnesite bricks during heating and cooling. 8

c) Discuss the stabilization of dolomite bricks. 5