Reg.No. \_\_\_\_\_\_\_\_\_\_\_\_\_

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**End Semester Examination – Nov/Dec– 2018**

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| **Code :** | **18RO2001** | **Duration :** | **3hrs** |
| **Sub. Name :** | **MATERIAL SCIENCE** | **Max. marks :** | **100** |

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| **Q. No.** | **Questions** | **Course**  **Outcome** | **Marks** |
| **PART-A(10X1=10 MARKS)** | | | |
| 1. | Identify the material that is more resistant to high temperatures and harsh environments.   1. Metals b) polymers c) ceramics d) both metals and ceramics | CO1 | 1 |
| 2. | If an atom has a valence of zero, the element is \_\_\_\_\_\_\_\_\_\_\_. | CO1 | 1 |
| 3. | Mention the transformation in which one solid phase transforms to two other solid phases. | CO2 | 1 |
| 4. | The elements or compounds which are present in an alloy is known as \_\_\_\_\_\_\_\_\_\_\_. | CO2 | 1 |
| 5. | For a given dielectric, the ionic polarisibility \_\_\_\_\_\_\_\_\_\_\_.   1. Increases with temperature 2. Decreases with temperature 3. Is not affected by temperature 4. May increase or decrease with temperature | CO3 | 1 |
| 6. | Recall the machining method primarily used for hard metals or those that would be very difficult to machine with traditional techniques. | CO4 | 1 |
| 7. | Time dependent deformation at constant stress, in which the material does not completely recover its original dimension on removal of stress is called \_\_\_\_\_\_\_\_\_\_\_.   1. Elasticity b) Anelasticity c) plasticity d) viscoelasticity | CO4 | 1 |
| 8. | Mention the driving force for solid state sintering of powdered metals and ceramics. | CO4 | 1 |
| 9. | A normal conductor is converted into a superconductor at a temperature known as \_\_\_\_\_\_\_\_\_\_\_. | CO5 | 1 |
| 10. | Mention the materials which exhibit spontaneous magnetization. | CO5 | 1 |

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| **PART B (6 X 3= 18 MARKS)** | | | |
| 11. | List the primary classification of materials and mention their mechanical properties. | CO1 | 3 |
| 12. | Discuss the effects of alloying elements on the Fe-C steels. | CO2 | 3 |
| 13. | Define dielectric loss and mention the reason for such loss. | CO3 | 3 |
| 14. | Compare slip and twinning deformations with suitable sketch. | CO4 | 3 |
| 15. | Briefly explain the frequency effects on polarization. | CO5 | 3 |
| 16. | Explain bio mimetic materials with examples. | CO6 | 3 |

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| **PART C(6 X 12= 72 MARKS)**  **(Answer any five Questions from Q.no 17 to 23. Q.No 24 is a Compulsory Question)** | | | | |
| 17. |  | Describe ionic, covalent and metallic bonding with suitable examples. | CO1 | 12 |
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| 18. |  | Schematically sketch the distinction between hypo and hyper eutectoid steels on the Fe-C phase diagram and explain the microstructure of each phases present. | CO2 | 12 |
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| 19. |  | Explain in detail, the various parts of EDM and discuss its use in machining tools. | CO3 | 4+8 |
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| 20. |  | Define fatigue. Explain in detail, the various factors that affect fatigue life and mention the methods to improve fatigue life. | CO4 | 2+10 |
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| 21. | a. | Differentiate hard and soft magnetic materials. Give examples. | CO5 | 8 |
| b. | Define ferroelectricity. Discuss in detail, the various properties of ferroelectric materials. | CO5 | 4 |
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| 22. | a. | Define superconductivity. | CO5 | 2 |
| b. | With suitable sketch explain the different types of polarization in detail. | CO3 | 10 |
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| 23. | a. | Sketch the Fe-C phase diagram and label the various phase regions. | CO2 | 8 |
| b. | Briefly discuss the frequency effects on polarization. | CO5 | 4 |
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| **Compulsory:** | | | |  |
| 24. | a. | Discuss the physical properties and applications of nanophase materials. | CO6 | 8 |
| b. | Schematically sketch the twisted nematic liquid crystal display function. | CO6 | 4 |