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



**End Semester Examination – Nov / Dec – 2019**

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| **Code :** | **16NT2005** | **Duration :** | **3hrs** |
| **Sub. Name :** | **MATERIALS SCIENCE II** | **Max. Marks :** | **100** |

**ANSWER ALL QUESTIONS (5 x 20 = 100 Marks)**

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| **Q. No.** | **Sub Div.** | **Questions** | **Course**  **Outcome** | **Marks** |
| 1. | a. | Explain the process of welding with suitable example. | CO1 | 3 |
| b. | Cite the advantages of powder metallurgy over casting. | CO1 | 3 |
| c. | Mention the different metal fabrication techniques? Elaborate the different casting operations used in metal fabrication with suitable sketch. | CO1 | 14 |
| **(OR)** | | | | |
| 2. | a. | Differentiate between sand casting and wax casting. Mention the advantages and disadvantages of each method. | CO1 | 3 |
| b. | Describe the process of continuous casting and mention its advantages. | CO1 | 3 |
| c. | Explain in detail the different types of heat treatment processes for metals. | CO1 | 14 |
|  |  |  |  |  |
| 3. | a. | Differentiate between slip casting and tape casting with a suitable sketch. | CO1 | 6 |
| b. | List the different ceramic fabrication techniques. With suitable sketch, explain in detail the different glass forming processes. | CO1 | 14 |
| **(OR)** | | | | |
| 4. | a. | Differentiate between the ceramics and metals with suitable examples. Cite one reason why ceramic materials are, in general harder yet more brittle than metals. | CO1 | 6 |
| b. | Explain in detail, the different particulate forming processes in ceramic fabrication techniques. | CO1 | 14 |
|  |  |  |  |  |
| 5. | a. | Compare and contrast thermoplastics and thermosetting plastics. Give examples. | CO1 | 6 |
| b. | With a neat sketch, explain in detail the stress-strain behavior of brittle polymer, plastic polymer and elastomer. | CO1 | 14 |
| **(OR)** | | | | |
| 6. | a. | Differentiate between glass transition temperature and melting temperature. | CO1 | 3 |
| b. | List the different molding techniques employed to mold polymers. | CO1 | 3 |
| c. | Discuss in detail the addition and condensation polymerization. | CO1 | 14 |
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| 7. | a. | Differentiate between pyroelectric and ferroelectric materials and give examples. | CO2 | 6 |
| b. | Mention the classification of composites based on reinforcement. Explain each one in detail. | CO1 | 14 |
| **(OR)** | | | | |
| 8. | a. | Define whiskers and give examples. | CO2 | 3 |
| b. | Differentiate between electronic and ionic conduction. | CO2 | 3 |
| c. | With a suitable sketch, differentiate between fiber reinforced composites based on the alignment of fibers. | CO1 | 6 |
| d. | A continuous and aligned fiber-reinforced composite is to be produced consisting of 45 vol% aramid fibers and 55 vol% of a polycarbonate matrix; mechanical characteristics of these two materials are as follows:   |  |  |  | | --- | --- | --- | |  | Modulus of Elasticity (GPa) | Tensile Strength (MPa) | | Aramid fiber | 131 | 3600 | | Polycarbonate | 2.4 | 65 |   Also, the stress on the polycarbonate matrix when the aramid fibers fail is 35 MPa.  For this composite, compute   1. the longitudinal tensile strength 2. the longitudinal modulus of elasticity | CO1 | 8 |
|  | | **Compulsory**: |  |  |
| 9. | a. | Distinguish Rayleigh scattering from Tyndall scattering. | CO3 | 6 |
| b. | Discuss in detail, the optical properties of metals and non-metals. | CO3 | 14 |