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



**UNIVERSITY**

(Karunya Institute of Technology & Sciences)

(Declared as Deemed-to-be University under Sec.3 of the UGC Act, 1956)

**End Semester Examination – April / May – 2017**

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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. | Name a metal forming process which involves tensile force for pulling a metal piece through a die. | CO1 | 1 |
| b. | Name the forming process in which, the reduction in thickness of metal results from compressive stresses. | CO1 | 1 |
| c. | Is powder metallurgy process suitable for metals having low ductility? If yes, why? | CO1 | 2 |
| d. | What are the 3 factors that determines the production of martensitic microstructure during heat treatment of steel? | CO2 | 2 |
| e. | What are the different metal fabrication techniques? With suitable sketch explain in detail the different forming operations used in metal fabrication. | CO1 | 14 |
| (OR) | | | | |
| 2. | a. | Metal specimens with\_\_\_\_\_\_\_\_\_ shapes are more amenable to hardening by quenching process. | CO2 | 1 |
| b. | Raising the yield strength by permanently straining the material is called \_\_\_\_\_\_\_\_. | CO1 | 1 |
| c. | Explain why do metals have high conductivity. | CO2 | 2 |
| d. | Cite two advantages of powder metallurgy over casting. | CO1 | 2 |
| e. | Explain in detail, the different types of heat treatment processes for metals. | CO2 | 14 |
| 3. | a. | Which type of powder pressing is utilized when high densities without appreciable grain growth are desired? | CO1 | 1 |
|  | b. | By properly engineering the \_\_\_\_\_\_\_\_\_ , it is possible to convert ceramics into semiconductors. | CO2 | 1 |
|  | c. | Briefly discuss the electrical conduction in ionic ceramics. | CO2 | 2 |
|  | d. | Briefly explain why glass–ceramics may not be transparent. | CO1 | 2 |
|  | e. | What are the different ceramic fabrication techniques? With suitable sketch explain in detail the different glass forming processes. | CO1 | 14 |
| (OR) | | | | |
| 4. | a. | \_\_\_\_\_\_\_\_ forms the major composition in soda lime glass. | CO1 | 1 |
|  | b. | \_\_\_\_\_\_\_\_ refractories are commonly used in the arched roofs of steel- and glass-making furnaces. | CO1 | 1 |
|  | c. | Briefly explain the process of forming continuous glass fibers. | CO1 | 2 |
|  | d. | Mention the factors that affects the degree of vitrification. | CO1 | 2 |
|  | e. | Explain in detail, the various steps involved in slip casting and hydroplastic forming. | CO1 | 14 |
| 5. | a. | Briefly discuss the Mathiessens rule of resistivity. | CO2 | 2 |
|  | b. | Define the term “degree of Polymerization”. | CO1 | 2 |
|  | c. | Differentiate number average molecular weight and weight average molecular weight. How are they useful in determination of the degree of polymerization? | CO1 | 8 |
|  | d. | Draw the heat Vs temperature plot for a crystalline polymer and amorphous polymer. Explain the difference between them. | CO2 | 8 |
| (OR) | | | | |
| 6. | a. | Polymers such as polyphthaocyanine can be cross-linked by special curing processes to raise its \_\_\_\_\_\_\_\_\_\_\_\_\_. | CO1 | 1 |
|  | b. | Crystallization rate of polymer decreases with the increase in \_\_\_\_\_\_\_\_\_\_\_\_\_. | CO1 | 1 |
|  | c. | Are polymers conductors? If not, can it be made conductors? | CO2 | 2 |
|  | d. | Does the melting point of polymers depend on its molecular weight? If yes, how and why? | CO1 | 2 |
|  | e. | Mention the classification of polymeric materials. Discuss in detail the mechanical behavior of polymers with suitable stress-strain diagram. | CO1 | 14 |
| 7. | a. | The piezoelectric crytals that have no centre of symmetry are called\_\_\_\_\_\_\_\_\_\_. | CO2 | 1 |
|  | b. | \_\_\_\_\_\_\_\_\_\_\_ is a very efficient wood composite structure. | CO1 | 1 |
|  | c. | Briefly explain the role of the two different phases in a composite material. | CO1 | 2 |
|  | d. | Define piezoelectricity. Give examples for piezo electric materials. | CO2 | 2 |
|  | e. | Mention the classification of composites. Discuss any two in detail. | CO1 | 14 |
| (OR) | | | | |
| 8. | a. | Differentiate electronic and ionic conduction. | CO2 | 2 |
|  | b. | Write shortnotes on structural composites. | CO1 | 4 |
|  | c. | Explain in detail, the different production methods of composite materials. | CO1 | 7 |
|  | d. | With suitable sketch, differentiate fiber reinforced composites based on the alignment of fibers. | CO1 | 7 |
|  | | **Compulsory:** |  |  |
| 9. | a. | What is meant by Ryleigh scattering? How is it different from Tyndall scattering? | CO3 | 3 |
|  | b. | What is thermal shock resistance? How can it be improved? | CO2 | 3 |
|  | c. | Discuss in detail, the optical properties of non-metals. | CO3 | 8 |
|  | d. | Define thermal conductivity. Briefly discuss the conduction mechanism in metals, ceramics and polymers. | CO2 | 6 |