A **Reg. No. :** | | | | | | | | | | | | |

Question Paper Code: U2P03

B.E./B.Tech. DEGREE EXAMINATION, NOV 2022

Second Semester

Mechanical Engineering

21UPH203- Applied Material Science

(Regulations 2021)

Duration: Three hours Maximum: 100 Marks

Answer ALL Questions

PART A - (10 x 1 = 10 Marks)

1. The efficiency of an Otto cycle increases as CO1- U

   (a) compression ratio decreases

   (b) compression ratio increases

   (c) adiabatic expansion ratio increases

   (d) isothermal expansion ratio increases.

2. A diesel cycle works at CO5-App

   (a) constant pressure (b) constant volume

   (c) constant temperature (d) constant heat

3. Which of the following is a weak magnet? CO2-U

   (a)Ferromagnetic material (b)Anti ferromagnetic

   (c) Paramagnetic (d) Diamagnetic

4. A superconductor is a _____ CO2-U

   (a)Purely paramagnetic (b) purely diamagnetic

   (c) purely ferromagnetic (d) none of these

5. Shape memory alloys demonstrate CO2-U

   (a) Thermal hysteresis (b) Electrical hysteresis

   (c) magnetic hysteresis (d) No hysteresis

6. Which of the following is a metallic glass? CO2-U

(a) Argon (b) crypton (c) Gold (d) Nickel

7. The colour of the nano gold particles is _____ CO2-U

(a) Yellow (b) Orange (c) Red (d) Variable

8. Quantum dots can be used in _____ CO2-U

(a) Crystallography (b) Mechanics (c) Optoelectronics (d) Quantum physics

9. Hardness during over-aging CO1-U

(a) Decreases (b) Increases (c) Constant (d) Decreases abruptly

10. Fine grain size, usually, cannot be obtained during the following process CO1-U

(a) Slow cooling (b) increasing nucleation rate

(c) retarding grain growth (d) fast cooling

PART – B (5 x 2= 10Marks)

11. Define an isolated system CO1-U

12. The critical magnetic field at 5 K is 2 $x10^3$ A/m in a super conductor ring of radius 0.02 m. find the value of critical current CO4-App

13. What are shape memory alloys? CO2-U

14. What is the dimension of quantum dot? CO1-U

15. Mention the expression for brinell hardness number CO1-U

PART – C (5 x 16= 80Marks)

16. (a) State and explain the laws of thermodynamics. What is the significance of the first law of thermodynamics? CO1-U (16)

Or

(b) Explain principle and working of Internal combustion engine CO1-U (16)

17. (a) What are ferromagnetic materials? Discuss the domain theory of a ferromagnetic material. CO2-U (16)

Or

(b) Explain in detail, various properties and important applications of superconducting materials CO2-U (16)

18.	(a)	Discuss the properties, types and applications of metallic glasses	CO2-U	(16)
		Or		
	(b)	What are shape memory alloys? Write the characteristics. List out any four applications of shape memory alloys	CO2-U	(16)
19.	(a)	Discuss in detail how the mechanical and optical properties of nano materials vary with particle size	CO2-U	(16)
		Or		
	(b)	Discuss the structure, properties of carbon nano tubes and its applications	CO2-U	(16)
20.	(a)	Explain in detail the strengthening mechanisms in amorphous materials	CO1-U	(16)
		Or		
	(b)	How will you find hardness of a material using Brinell hardness test	CO1-U	(16)