Roll No												

PRESIDENCY UNIVERSITY
BENGALURU

SCHOOL OF ENGINEERING
END TERM EXAMINATION - JAN 2023

Semester : Semester III - 2021
Course Code : MEC3012
Course Name : Sem III - MEC3012 - Material and Characterisation Techniques
Program : B.Tech. Mechanical Engineering

Date : 11-JAN-2023
Time : 1.00PM - 4.00PM
Max Marks : 100
Weightage : 50%

Instructions:
(i) Read all questions carefully and answer accordingly.
(ii) Question paper consists of 3 parts.
(iii) Scientific and non-programmable calculator are permitted.

PART A

ANSWER ALL THE TEN QUESTIONS **10 X 3 = 30M**

1. For the following geometries, mention their respective characteristic symmetries.
a) Square
b) Rectangle
c) Equilateral Triangle

(CO1) [Knowledge]

2. How many lattice parameters does a unit cell has? Draw a tetragonal unit cell which clearly shows the lattice parameters for the same.

(CO1) [Knowledge]

3. Explain why X-ray is useful in studying the crystal structure of materials.

(CO2) [Knowledge]

4. In order to define the following crystal systems, how many lattice parameters are required?
a) Orthogonal
b) Monoclinic
c) Cubic

(CO2) [Knowledge]

5. Mention any three steps to improve depth of field.

(CO3) [Knowledge]

6. Mention the formula for the following and also tell what does each term in the formula mean.
a) Magnification of a compound microscope
b) Resolution

(CO3) [Knowledge]

7. Mention the formula for the following and also tell what does each term in the formula mean.
a) Brightness of a transmission light microscope
b) Brightness of a reflected light microscope

(CO3) [Knowledge]

8. Mention any three advantages of SEM over OM.

(CO4) [Knowledge]

9. Mention any three stages of specimen preparation in case of optical microscopy.

(CO4) [Knowledge]

10. Mention any three factors that affects SE emissions in case of SEM.

(CO4) [Knowledge]

PART B

ANSWER ALL THE TWO QUESTIONS **2 X 10 = 20M**

11. Briefly explain hot mounting with a neat diagram.

(CO3) [Comprehension]

12. Write short notes on thermionic emitters and field emitters.

(CO4) [Comprehension]

PART C

ANSWER ALL THE FIVE QUESTIONS **5 X 10 = 50M**

13. With the help of neat diagram, explain the principle of image formation in an optical microscope.

(CO2) [Application]

14. Write short notes on grinding and polishing.

(CO2) [Application]

15. Mention any five applications of SEM.

(CO3) [Application]

16. What are secondary electrons? Explain with the help of neat diagrams.

(CO3) [Application]

17. The spacing between successive 100 planes in NaCl is 2.820 Aº. A X-ray incident upon the surface of this crystal is formed to give rise to the first order Bragg reflection at a glazing angle of 8º 35'. Calculate the wavelength of X-ray and find the angle at which the second order Bragg reflection would occur?

(CO4) [Application]

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