Reg. No. : | | | | | | | | | | | | |

Question Paper Code : 71118

B.E./B.Tech. DEGREE EXAMINATIONS, NOVEMBER/DECEMBER 2023.

Seventh/ Ninth Semester

Mechanical Engineering

OML 751 – TESTING OF MATERIALS

(Common to : Aeronautical Engineering / Aerospace Engineering / Automobile Engineering / Civil Engineering / Electrical and Electronics Engineering/ Electronics and Communication Engineering / Electronics and Instrumentation Engineering / Electronics and Telecommunication Engineering/ Industrial Engineering/ Industrial Engineering and Management/ Instrumentation and Control Engineering/ Manufacturing Engineering/ Marine Engineering/ Mechanical Engineering (Sandwich)/ Mechatronics Engineering/ Petrochemical Engineering/ Production Engineering/ Robotics and Automation/ Safety and Fire Engineering/ Bio Technology/ Chemical Engineering/ Chemical and Electrochemical Engineering/ Food Technology/ Petrochemical Technology/ Petroleum Engineering/ Pharmaceutical Technology)

(Regulations 2017)

Time : Three hours Maximum : 100 marks

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1. List any four advantages of material testing.
2. How are engineering materials classified based on their electrical properties?
3. How is the elastic modulus measured from the stress-strain curve?
4. What are the purposes of fatigue tests?
5. What are the advantages of visual inspection?
6. Mention the basic principle used in thermography.
7. What is SEM analysis?
8. Sketch the schematic diagram of the gas mass spectrometer.
9. Write down the equation for a two-phase mixture in quantitative analysis.
10. What is meant by the precision in chemical analysis?

PART B — (5 × 13 = 65 marks)

11. (a) Explain the classification of materials and their properties.

Or

(b) Explain the types of testing standards for metals in a detailed manner.

12. (a) Explain the methodology to conduct the Charpy and Izod impact tests. In both tests, how are the specimens fixed before testing? (6+7)

Or

(b) Explain the different types of fatigue stress cycles, stresses and ratios. Discuss briefly any one strengthening mechanism due to dislocations with neat sketches. (6+7)

13. (a) Explain with a suitable sketch, the various stages of liquid penetrant testing.

Or

(b) Explain with a neat sketch, the exposure charts in the radiography testing technique.

14. (a) Explain the diffraction patterns of continuous and intermittent in XRD.

Or

(b) Describe the X-ray crystallography with a neat sketch.

15. (a) Explain the working principle of TEM. Mention its advantages and limitations. (8+5)

Or

(b) Explain the principle of an X-ray fluorescence spectrometer and mention its advantages. (10+3)

PART C — (1 × 15 = 15 marks)

16. (a) Compare the engineering true stress-strain curves of mild steel. Also, derive the expression for the true stress and strain. (7+8)

Or

(b) Briefly discuss the magnetic particle testing for revealing surface and subsurface cracks in the steam turbine blade. Comment on the performance of LPT for inspection of such similar defects. (7+8)

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