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

Question Paper Code : 41048

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B.E./B.Tech. DEGREE EXAMINATIONS, NOVEMBER/DECEMBER 2021.

Seventh/Nineth Semester

Aeronautical Engineering

OML 751 — TESTING OF MATERIALS

(Common to 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/Mechanical Engineering (Sandwich)/ Mechatronics Engineering/Petrochemical Engineering/Production Engineering/ Robotics and Animation/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. What is the need for standards in testing?

2. What is the difference between Destructive Testing and Non Destructive testing?

3. Why the tensile samples are dog-bone shaped?

4. What is the significant difference between Rockwell hardness testing and Vicker's hardness testing?

5. State the principle of liquid penetrant testing.

6. What is the purpose of lead screen in radiographic testing?

7. Why electron microscope gives better resolution than optical microscope?

8. What is the difference between Energy dispersive and wave dispersive spectroscopy?

9. What does Differential scanning calorimeter do and how does it work?

10. What are the basic components of Mass Spectrometer?

PART B — (5 × 13 = 65 marks)

11. (a) Explain briefly about the classification of materials testing and testing standards. (6+7)

Or

(b) Discuss briefly the testing organisation and its committees. (7+6)

12. (a) Draw S-N diagram (schematic) for mild steel and for Aluminium. Explain how S-N diagram is plotted. (6+7)

Or

(b) Write briefly about the constant load creep testing machines.

13. (a) Explain Magnetic particle testing and why metals with low coercive force is difficult to test in Magnetic particle inspection technique. (6+7)

Or

(b) Explain the principle, advantages and limitations of Acoustic emission techniques. (5+4+4)

14. (a) Explain the interaction of electron beam with matter and explain how they are used to analyse the structural and compositional features.

Or

(b) Explain any two magnetic techniques used for characterisation of materials.

15. (a) Explain the principle and applications of thermo-mechanical and dynamic mechanical analysis.

Or

(b) Explain how Optical Emission Spectroscopy works and mention its limitations.

PART C — (1 × 15 = 15 marks)

16. (a) How Ductile to Brittle Transition Temperature (DBTT) is determined from toughness versus temperature plot and explain the factors affecting DBTT. (15)

Or

(b) (i) When a magnetic field strength of 0.2 Tesla is applied on an electromagnetic lens perpendicular to the electron beam direction with an applied voltage of 20 kV, what would be the radius of electron beam (Mass of electron is 9.109×10^{-31} kg and charge is 1.602×10^{-19} coulombs. (8)

(ii) Discuss on the effect of various parameters on the Depth of penetration in Eddy current testing. (7)