

Dr.APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY

First Semester B-Tech Degree Examination

Model Question Paper

BE101-02 Introduction to Mechanical Engineering Sciences

Time : 3 Hours

Max. Marks : 100

Part – A

(Answer all questions. All questions carry 3 marks each)

- 1.State Zeroth Law of Thermodynamics and its significance
- 2.Mention the different types of compressors and their applications.
- 3.Why are vapour cycles preferred over gas cycles for refrigeration?
- 4.What is the function of a suspension system in an automobile? List the different types of suspension systems
- 5.Differentiate between synthesis and analysis
- 6.List the different phases in mechanical engineering design
- 7.Give the main features of BCC and FCC structures
- 8.Classify manufacturing processes with examples for each class

(8 X 3 = 24 marks)

Part – B

(Answer any 2 question out of 3 from each module)

Module – 1

- 9.a] What is thermodynamics? (2 marks)
- b] List the applications of the first law of thermodynamics (2 marks)
- c]Are heat and work thermodynamic properties? Give reason for your answer (2 marks)
- 10.a]Are there any truly reversible process in nature? If answer is yes, give an example. If answer is no, then why do we study reversible processes? (2 marks)
- b] An inventor claims to have developed an engine that works between 400°C and 20°C with an efficiency of 65%. Is this claim true? Justify your answer. (4 marks)
- 11.a].State the increase of entropy principle. What is its significance? (2 marks)

b] Which are the various renewable energy sources ?What are their merits over fossil fuels ?
(4 marks)

Module – 2

12.a]List 3 landmark events in the history of development of steam engines (3marks)

b]What are turbo machines? Which are the different classes of turbo machines? (3 marks)

13How does a 4-stroke diesel engine work ? Illustrate with the aid of sketches (6 marks)

14.a]What is the principle of rocket propulsion (2marks)

b] List any four landmark events in the Indian space programme (2marks)

c]Compare solid propellant rockets and liquid propellant rockets. (2 marks)

Module – 3

15.a]Explain the scope of refrigeration (4 marks)

b]Differentiate between commercial refrigeration and industrial refrigeration (2 marks)

16.a] Give any 3 applications of refrigeration in the chemical and process industry (3 marks)

b]Differentiate between refrigeration and air-conditioning (3 marks)

17.a] List the main components of an air-conditioning system and their function (3 marks)

b] Define dry bulb temperature and wet bulb temperature. When do they become equal?

(3 marks)

Module – 4

18.a]List any 3 Indian manufacturers of passenger cars and any two models they make (3 marks)

b] Give the functions of (i) Clutch (ii) Brake and (iii) Differential in an automobile (3 marks)

19.Explain with a block diagram, the layout of an automobile (6 marks)

20.a] What is drag and lift of an aeroplane ? (2 marks)

b] List the different types of aircraft engines and their applications (4 marks)

Module – 5

- 21.a]Differentiate between machine and mechanism (1 mark)
- b]Define planar , spherical and spatial mechanisms . Give one example for each (6 marks)
- 22.a]What is meant by mobility of a mechanism? State and explain the Kutzbach criterion for the mobility of a planar mechanism (5 marks)
- b]What is meant by mechanical advantage ? (2 marks)
- 23.a]What is the significance of standards and codes inmechanical engineering design? (2 marks)
- b] What do you understand by factor of safety in Mech Engg Design. What is its significance? (2 marks)
- c] Mention 3 general rulesin engineering design useful for cost reduction (3 marks)

Module – 6

- 24.Which are the different classes of engineering materials? Give 2 significant properties of each class with examples.(7 marks)
- 25.a]List any 4 material testing methods and their application (4 marks)
- b]Bring out the purpose of heat treatment with the help ofexamples.(3 marks)
- 26.a]What is meant by agile manufacturing? List some of the ways by which agile manufacturing can be achieved. (4 marks)
- b]List the ways by which environmentally conscious design and manufacturing can be achieved (3 marks)
