BRAINWARE UNIVERSITY

Term End Examination 2024-2025
Programme – B.Tech.(ME)-2024
Course Name – Basic Mechanical Engineering
Course Code - BES00003
(Semester I)

Full Marks : 60 **Time : 2:30 Hours**

[The figure in the margin indicates full marks. Candidates are required to give their answers in their own words as far as practicable.]

Group-A
(Multiple Choice Type Question) 1 x 15=15

1. *Choose the correct alternative from the following :*

(i) Identify the importance of surrounding in thermodynamics.

a) It helps in understanding the energy exchanges between the system and its environment.
b) It determines the chemical composition of the system.
c) It is used to calculate the internal energy of the system.
d) It identifies the boundaries within which the laws of thermodynamics do not apply

(ii) Describe the difference between intensive and extensive properties in thermodynamics.

a) Intensive properties depend on the mass of the system, while extensive properties do not.
b) Intensive properties are additive, while extensive properties are not.
c) Intensive properties are independent from mass of the system, while extensive properties depend on it.
d) Intensive properties change with temperature, while extensive properties remain constant.

(iii) Illustrate the different types of equilibrium that must be satisfied for a system to be in thermodynamic equilibrium.

a) Thermal equilibrium only
b) Mechanical equilibrium only
c) Chemical equilibrium only
d) Thermal, mechanical, and chemical equilibrium

(iv) Judge the validity of a process where heat is completely converted into work according to the Kelvin-Planck statement.

a) The process is valid and follows the second law of thermodynamics.
b) The process is impossible as it violates the Kelvin-Planck statement.
c) The process is valid if it occurs in a reversible cycle.
d) The process is impossible only if it violates the Clausius statement.

(v) Express the First Law of Thermodynamics in terms of energy conservation.

a) Energy can be created or destroyed in a closed system.

b) Energy is transferred from the surroundings to the system in equal measure to the work done by the system.

c) The total energy of an isolated system remains constant, but can be transformed between forms.

d) The energy of a system is always constant and does not change with external work.

(vi) Construct the change in internal energy of a system given that 500 J of heat is added to the system and 300 J of work is done by the system.

a) 200 J
b) 800 J
c) -200 J
d) 300 J

(vii) Apply the principles of thermodynamics to calculate the amount of heat rejected by a heat engine that absorbs 800 J of heat and has an efficiency of 40%.

a) 320 J
b) 400 J
c) 480 J
d) 500 J

(viii) Identify the material that is commonly used in the moulding process.

a) Plastic
b) Wood
c) Metal
d) All of the mentioned

(ix) Predict the primary purpose of the extrusion process in metal forming.

a) To increase the hardness of the metal
b) To reduce the grain size of the metal
c) To produce a desired cross-sectional shape by forcing metal through a die
d) To remove surface defects from the metal

(x) Define machine tools and machining processes using the following statements that correctly describe them.

a) Machine tools are handheld devices used for crafting materials, while machining processes are only applicable to wood.

b) Machine tools are powered equipment used for shaping or machining materials, and machining processes refer to the various methods employed to remove material to achieve desired shapes and sizes.

c) Machine tools refer exclusively to CNC (Computer Numerical Control) machines, and machining processes are limited to automated techniques.

d) Machine tools are any tools used in construction, and machining processes are solely focused on manual operations.

(xi) Describe the primary purpose of a grinding machine.

a) To cut materials into specific shapes
b) To create holes in materials
c) To remove material for surface finishing
d) To assemble parts

(xii) Name the operation that can be performed on a lathe machine from the following options.

a) Milling
b) Turning
c) Grinding
d) All of the mentioned

(xiii) Express the purpose of the tailstock on a lathe machine.

a) To drive the workpiece
b) To provide additional support for long workpieces
c) To control the speed of the spindle
d) To change the cutting tool

(xiv) Write the drilling machine that is capable of drilling up to 12.5 mm diameter.

a) pillar drilling machine
b) radial drilling machine
c) Column drilling machine
d) sensitive drilling machine

(xv) Calculate the speed range of the work or surface speed for cylindrical grinding from the following.

a) 5 to 10 m/min
b) 10 to 20 m/min
c) 20 to 30 m/min
d) 40 to 60 m/min

Group-B

(Short Answer Type Questions) 3 x 5=15

2. Interpret the concept of feed rate in milling. (3)
3. Illustrate the importance of grade as a specification of a grinding wheel. (3)
4. Calculate the temperature of the gas if the gas at 27 °C was heated until its volume was doubled. (3)
5. Write a short note about tensile stress and compressive stress. (3)
6. Evaluate the concept of specific heat capacity. Provide an example to illustrate its significance in real-world applications. (3)

OR

Explain the relationship between pressure, volume, and temperature in an ideal gas. (3)

Group-C

(Long Answer Type Questions) 5 x 6=30

7. Discuss the difference between Cold Working and Hot Working. (5)
8. Discuss the importance of Quick return mechanism in shaper machine. (5)
9. Determine the specific gravity of a fluid having viscosity 0.07 poise and kinematic viscosity 0.042 stokes. (5)
10. Categorize the types of fluid flow and give examples of each. (5)
11. Describe the key design requirements of machine elements. (5)
12. Evaluate the effect of temperature on the material's flow behaviour during forging. (5)

OR

Explain the different types of Pattern Allowances. (5)

****