



BRAINWARE UNIVERSITY

Term End Examination 2023-2024

Programme – Dip.ME-2022

Course Name – Basic Mechanical Engineering

Course Code - DMEPC301

(Semester III)

LIBRARY
Brainware University
Barasat, Kolkata -700125

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) Choose in which thermodynamic process there is no flow of heat between system and surrounding

- | | |
|--------------|---------------|
| a) Isobaric | b) Isochoric |
| c) Adiabatic | d) Isothermal |

(ii) Show the expression for thermal diffusivity if density of a substance is ρ , thermal conductivity be k and c be the specific heat

- | | |
|-----------------|-----------------|
| a) $(\rho c)/k$ | b) $k/(\rho c)$ |
| c) $(kc)/\rho$ | d) $(k\rho)/c$ |

(iii) Select the process through which radiant heat transfer primarily occurs

- | | |
|--------------------------|----------------------|
| a) Conduction | b) Convection |
| c) Electromagnetic waves | d) Thermal diffusion |

(iv) Select which of the following statements best defines the first law of thermodynamics.

- | | |
|--|---|
| a) Heat always flows from a hot object to a cold object. | b) Energy cannot be created or destroyed, only converted from one form to another. |
| c) The entropy of a system always decreases over time. | d) The volume of a gas is inversely proportional to its pressure at constant temperature. |

(v) If a gas is compressed while its temperature remains constant, identify what happens to its internal energy from the following,

- | | |
|-------------------------|--|
| a) It increases. | b) It decreases. |
| c) It remains the same. | d) It cannot be determined from the given information. |

(vi) A piston-cylinder system contains 0.5 moles of an ideal gas. If the gas is expanded isothermally at constant temperature, interpret what happens to its pressure?

- | | |
|-------------------------|--|
| a) It increases. | b) It decreases. |
| c) It remains the same. | d) It depends on the type of gas used. |

- (vii) Select which heat engine cycle is characterized by isentropic compression and expansion processes.
- a) Carnot cycle
b) Rankine cycle
c) Otto cycle
d) Brayton cycle
- (viii) Select from the following where is the cooling effect experienced in a Carnot heat pump.
- a) At the heat source
b) At the heat sink
c) At the compressor
d) At the expansion valve
- (ix) Choose the efficiency of Carnot engine =
- a) $1 - \frac{\text{Temperature of Sink}}{\text{Temperature of Source}}$
b) $1 - \frac{\text{Temperature of Sink}}{\text{Temperature of Source}}$
c) $1 - \frac{\text{Temperature of Source}}{\text{Temperature of Sink}}$
d) $1 + \frac{\text{Temperature of Source}}{\text{Temperature of Sink}}$
- (x) Recognize the main purpose of a boring operation from the following, as compared to drilling, is to
- a) Drill a hole
b) Finish the drilled hole
c) Correct the hole
d) Enlarge the existing hole
- (xi) Determine if temperature of the source is increased, the efficiency of the Carnot engine
- a) Increase
b) Decrease
c) Remains constant
d) First increases and then becomes constant
- (xii) Select from the following why slow speed of the spindle is necessary
- a) Thread cutting
b) Turning a work of larger diameter
c) Turning a hard or tough material
d) All of these
- (xiii) The angle between the face and flank of the single point cutting tool is show as
- a) Rake angle
b) Clearance angle
c) Lip angle
d) Point angle
- (xiv) Select from the following by which the size of a lathe is specified
- a) Length between centers
b) Swing diameter over the bed
c) Swing diameter over the carriage
d) All of these
- (xv) Identify what a single point thread cutting tool should ideally have
- a) Zero rake angle
b) Positive rake angle
c) Negative rake angle
d) Point angle

LIBRARY
Brainware University
Berasat, Kolkata - 700 135

Group-B

(Short Answer Type Questions)

3 x 5=15

2. Explain the concept of specific heat capacity. Provide an example to illustrate its significance in real-world applications. (3)
3. Name the major components of the Babcock and Wilcox Boiler. (3)
4. State the principle behind the working of the Cochran Boiler. (3)
5. Discuss the factors that affect the rate of heat conduction in a material. (3)
6. Distinguish between 4-stroke engine and 2-stroke engine. (3)

OR

Evaluate the working principle of cooling tower. (3)

Group-C

(Long Answer Type Questions)

5 x 6=30

7. Explain Zeroth Law of Thermodynamics and describe its significance. (5)
8. Define forging in the context of metalworking processes. (5)
9. Describe the role of recrystallization in the hot working process. (5)
10. Distinguish between Cold Working and Hot Working. (5)

11. Justify the importance of Solidification Time in casting. (5)
12. Distinguish between Upmilling and Downmilling with suitable diagram. (5)
- OR**
- Distinguish between shaper and planer in the terms of their working principle, advantages and disadvantages. (5)

LIBRARY
Brainware University
Berasat, Kolkata - 700125