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Total No. of Questions: [09]

B. Sc. Operation Theater Technology (Semester – 2nd)
APPLIED PHYSICS
Subject Code: BOTTS1204
Paper ID: [20131908]

Time: 03 Hours **Maximum Marks: 60**

Instruction for candidates:

1. Section A is compulsory. It consists of 10 parts of two marks each.
2. Section B consist of 5 questions of 5 marks each. The student has to attempt any 4 questions out of it.
3. Section C consist of 3 questions of 10 marks each. The student has to attempt any 2 questions.

Section – A **(2 marks each)**

Q1. Attempt the following:

a. With the help of examples differentiate between the laminar and turbulent flow.
b. State Bernoulli's principle along-with writing mathematical expression for the same.
c. Define a thermistor. How does the resistance of two different types of thermistors changes with temperature?
d. Explain why the molar heat capacity of an ideal gas at constant pressure (C_p) is greater than the molar heat capacity at constant volume(C_v).
e. Define gram molecular weight. Explain its significance in context to this course.
f. What are isotonic solutions? Why it is important for the medical practitioners to administer isotonic solutions to the patients who have lost fluids due to dehydration?
g. What is ambient pressure? How does it vary with altitude?
h. How does the pressure affect boiling point of a liquid?
i. Describe two clinical applications of Bernoulli's theorem in the field of medical/healthcare.
j. How does the structure of a flame differ between a candle flame and a Bunsen burner flame?

Section – B **(5 marks each)**

Q2. Find the loss of head when a pipe of diameter 200 mm is suddenly enlarged to a diameter of 400 mm. The rate of the flow of water through pipe is 250 litres per second.

Q3. Define the term specific heat capacity. What is its SI unit? If a total of 0.8 kg of water at 20^0C is placed in 1.2 kW electric kettle. How much time is needed to raise the temperature of the water to 100^0C?

Q4. Define the terms conduction and convection. Provide at-least two examples each of the natural and forced convection.

Q5. Define the terms oxidation, osmosis and combustion. Provide an example of a common oxidation reaction and explain how it occurs at molecular level.

Q6. Differentiate between absolute pressure and gauge pressure. How do the pressure gauges work, and what are their common applications?

Section – C **(10 marks each)**

Q7. What is Newton's law of cooling? Derive an expression for the same. A body at temperature of 40^0C is kept in a surrounding of constant temperature 20^0C. It is observed that its temperature falls to 35^0C in 10 minutes. Find how much more time will it take for body to attain a temperature of 30^0C.

Q8. A $1kg$ ball is lifted to the height of 5 $meters$ above the ground and then dropped, calculate

a. The potential energy of the ball when its lifted.
b. The kinetic energy of the ball just before it hits the ground.
c. The mechanical efficiency, if the ball hits the ground with 80% of its initial potential energy gets converted into kinetic energy.
d. The kinetic energy of the ball just before hitting the ground is converted entirely into thermal energy upon impact, calculate the increase in temperature assuming that all energy is absorbed by the ball.

Q9. A gas cylinder with a volume of 10 litres is filled with compressed oxygen gas at a pressure of 150 atmospheres (atm) and a temperature of 25^0C. Calculate

a. The amount of oxygen gas (in moles) in the cylinder.
b. If the cylinder is to be filled to a pressure of 200 atm at the same temperature, calculate the new volume required.
c. Determine the filling ratio of the cylinder, which is the ratio of the actual volume of the gas in the cylinder to the maximum volume it can hold at the given pressure and temperature.