NOBLE'19 PHY 103 EXAM PQ II

SECTION A

Question 1

Which of the following is the principle that guides the operation of a liquid-in-glass thermometer

(A)>> The expansion and contraction of liquid when there is a difference in temperature.

The expansion and contraction of liquid when there is a difference in thermal energy.

The change in conductivity of liquid under the influence of temperature.

The change in mass of liquid under the influence of temperature.

Question 2

Given the bulk modulus of a sample of water is 2.3x109 Pa, How much pressure in atm is needed to compress a sample of water by 0.1% (1 atm = 1.013x105 Pa)

(2)>>3x106 atm

(B)>> 2.27x101 atm

2.36x10-6 atm

2.27x10-1 atm

Question 3

A steel wire 1.3 mm2 in cross section supports a load of 10 kg and stretches by 2.87 mm. Taking the young's modulus of steel as 2.1x1011 Pa. What is its original length (Take g=9.8 ms-2).

(A)>> 8 m

8 mm

80 m

80 mm

Question 4

A steel rod 2.0 m long has across sectional area of 0.30 cm2. The rod is now hung by one end from a support structure, and a 550-kg milling machine is hung from the rod's lower end. Determine the strain of the rod

(A)>>9.0x10-4 m

9.0x104 m

9.0x10-4

9.0x104

Question 5

Strain can be measured in:

N/m2

N/m

N· m

(D)> it is unitless

QUESTION 6

Stress can be measured in:

(a)> N/m2

N·m2

N/m

N· m

Question 7

Evaluate the force required to punch a hole 1 cm in diameter in a steel sheet 3mm thick whose shearing strength is 2.76x108 Pa.

(A)>>2.6x104 N

2.6x104 Pa

2.4x106 N

2.4x106 Pa

QUESTION 8

From the figure shown below, Zeroth's law of equilibrium demands that

(A)>Vessel A is in thermal equilibrium with vessel B

Vessel B is in thermal equilibrium with vessel C

Vessel A is in thermal equilibrium with vessel C

All of the above

Question 9

Under adiabatic conditions, the bulk modulus is expressed as:

Question 10

Which of the following modulus of materials relates to change in shape of a material?

Bulk modulus

(b)> Young modulus

Shear modulus

Poisson modulus

SECTION B

Question 1

A non-viscous incompressible liquid is flowing through a horizontal pipe of constant cross section. Bernoulli's equation and the equation of continuity predict that the drop in pressure along the pipe:

is zero

depends on the length of the pip e

(b)> depends on the fluid velocity

depends on the cross-sectional area of the pipe

Question 2

Engine oils are used as lubricants because of their ----------

Low viscosity

Medium viscosity

Non viscosity

(D) High viscosity

Question 3

If the average velocity of water flowing through a pipe of diameter 10cm is 3cm/s. What is the velocity of water flowing out of a pipe of diameter 1cm?

0.3m/s

(b)>>30m/s

0.03m/s

3.0m/s

Question 4

The constant or uniform velocity attained by a body falling vertically through a viscous liquid is called

Average velocity

(B)>> Terminal velocity

Relative velocity

Instantaneous velocity

Question 5

Which of these statements are correct about streamline flow conditions for an ideal fluid? I. Fluid must be viscous II. Fluid must be incompressible III. Fluid motion must be steady IV. Fluid flow must be rotational

All

(B)>> II and III

I, II and III

II, III and IV

Question 6

Bernoulli's equation can be derived from the conservation of:

(A)>> energy

mass

angular momentum

volume

QUESTION 7

A person blows across the top of one arm of a U-tube partially filled with water. The water in that arm:

rises slightly

drops slightly

(C)>> remains at the same height

rises if the blowing is soft but drops if it is hard

Question 8

A fluid is undergoing steady flow. Therefore:

the velocity of any given molecule of fluid does not change

the pressure does not vary from point to point

the velocity at any given point does not vary with time

(D)>> the density does not vary from point to point

Question 9

Atoms are made up of the following particles except

Protons

(B)>> Nucleons

Electrons

Neutrons

Question 10

Flow rate varies inversely wit viscosity is a statement of

(A)>>Poiseuilli's law

Avogadro's law

Bernoulli's equation

Pascal's law

SECTION C

Question 1

Liquid-in-glass thermometer operates based on

(A)>> The expansion and contraction of liquid when there is a difference in temperature.

The expansion and contraction of liquid when there is a difference in thermal energy.

The change in conductivity of liquid under the influence of temperature.

The change in mass of liquid under the influence of temperature.

Question 2

How much heat must be added to a 4.0 X 10-3 kg steel ball bearing in order to increase its temperature by 30 K if the specific heat capacity of steel is 4.49 X 102 J/kg K?

(A)>> 53.88 J

33.68 J

54.42 J

38.49 J

Question 3

Which of the following about conduction is/are true?

1. Conduction can transfer thermal energy faster in denser medium. 2. Conduction cannot happen together with convection 3. Conduction can transfer thermal energy faster through good electrical conductors

(A)>> 1 and 2only

1 and 3 only

2 and 3 only

1, 2 and 3 only

Question 4

The heat absorbed or released during a phase change is termed

Phase heat

crossover heat

(C)>>latent heat

heat capacity

Question 5

Gas turns to liquid by a process called

Vapourisation

freezing

(C)>> condensation

ionization Question 6

Which of the following can be done to increase the rate of cooking?

I. Use a black pot instead of silver pot.

III. Cover the pot with a lid.

1 and 2only

1 and 3 only

(C)>> 2 and 3 only

1, 2 and 3 only

Question 7

What is Charles' law?

P1 V1 = P2 V2

(B)>> V1 = V2 x T1 ÷ T2

V1 = V2 ÷ T1 x T2

P1 V2 = P2 V1

Question 8

A ball of 4.0 X 10-3 kg was made of gold with specific capacity 1.29 X 102 J/kg K. By how much will the temperature of the ball change if heat energy of 53.88 J is applied?

(a)>> 104.4 K

27.8 K

59.17 K

57.5 K

Question 9

A heat of transformation of a substance is:

the energy absorbed as heat during a phase transformation

the energy per unit mass absorbed as heat during a phase transformation

(c)>> the same as the heat capacity

the same as the specific heat

Question 10

The kinetic energy of different particles at a particular time_____

Is constant

Differs from each other

(c)>> Gradually increases

Gradually decreases

SECTION D

Question 1

What happens to the less dense of two immiscible liquids?

It falls to the bottom

It mixes

(c)>> It rises to the top

It remains on the same level

Question 2

The vertical upward and downward movement of liquid in a tube is called

Viscosity

Cohesion

(c)>>Capillarity

Adhesion

Question 3

A student standardizes the concentration of a saltwater solution by slowly adding salt until an egg will just float. The procedure is based on the assumption that:

all eggs have the same volume

all eggs have the same weight

(c)>>all eggs have the same density

all eggs have the same shape

Question 4

A body with apparent weight of 102N has an upward force of 63N when immersed in water. Calculate the real weight of the body

(A)>> 39N

25N

90N

165N

Question 5

A 0.50-N metal sinker appears (as measured using a spring scale) to have a weight of 0.45 N when submerged in water. The specific gravity of the metal is:

6

8

(c)>>9

10

Question 6

Which of the following factors affects the surface tension of a liquid?

Pressure

(B)>>Temperature

Volume

All of the above

Question 7

All fluids are:

gases

liquids

(c)>>gases or liquids

non-metallic

Question 8

Which of the following dimensional equation is a dimensional analysis of surface tension?

ML2T-2

MLT-2

ML2T-3

(D)>> MT-2

Question 9

In a stationary homogeneous liquid:

(A)>>pressure is the same at all points

pressure depends on the direction

pressure is independent of any atmospheric pressure on the upper surface of the liquid

pressure is the same at all points at the same level

Question 10

A bucket resting on the floor of an elevator contains an incompressible fluid of density ρ. When the elevator has an upward acceleration of magnitude a the pressure difference between two points in a fluid separated by a vertical distance Δh, is given by:

ρaΔh

ρgΔh

(C)>>ρ(g + a)Δh

$\rho(g - a)\Delta h$

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