AO—82—2018
FACULTY OF SCIENCE
B.Sc. (First Year) (Second Semester) EXAMINATION

MARCH/APRIL, 2018

(CGPA Pattern)

PHYSICS

Paper III

(Kinetic Theory, Heat and Thermodynamics)

(MCQ & Theory)

(Saturday, 31-03-2018)   **Time : 10.00 a.m. to 12.00 noon**

Time—2 Hours   *Maximum Marks—40*

N.B. :— (*i*)   *All* questions are compulsory.

(*ii*)   Non-programmable calculator is allowed.

(*iii*)   Symbols have their usual meanings.

MCQ

1.   Choose the *correct* alternatives of the following :   10

(*i*)   The expression for mean free path is :

(*a*) $\lambda = \dfrac{1}{\pi d n}$ (*b*) $\lambda = \dfrac{1}{\pi d^2 n}$

(*c*) $\lambda = \dfrac{1}{\pi d}$ (*d*) $\lambda = \pi d^2 n$

(*ii*)   The conductivity of a gas is due to transport of :

(*a*)   energy   (*b*)   momentum

(*c*)   mass   (*d*)   volume

(*iii*)   At critical temperature a gas can be liquefied by the increase in :

(*a*)   Temperature   (*b*)   Volume

(*c*)   Pressure   (*d*)   None of these

P.T.O.

(iv) The expression of the critical volume is :

(a) $\dfrac{a}{27b^2}$ (b) $\dfrac{a}{27}$

(c) $3b^2$ (d) $3b$

(v) In Carnot's heat engine...............is hot body.

(a) Source   (b) Sink

(c) Substance   (d) All of these

(vi) The work done in thermodynamical system is :

(a) $dW = T\,dP$ (b) $dW = P\,dV$

(c) $dW = dP$ (d) $dW = dN$

(vii) According to first $T\,dS$ equation $T\,dS = \ldots\ldots + T\left(\dfrac{dP}{dT}\right)_V \, dN$:

(a) $C_P \, dT$ (b) $C_P \cdot C_V \, dT$

(c) $C_V \, dT$ (d) $C_P \cdot C_V$

(viii) The Gibbs's function is thermodynamics is given by :

(a) $G = U - TS + PV$ (b) $G = U + TS + PV$

(c) $G = TS + PV$ (d) $G = TS - PV$

(ix) An engine works between the temperatures 30 K and 300 K. What is the efficiency ?

(a) 50%   (b) 47%

(c) 90%   (d) 10%

(x) The critical temperature of CO_2 gas is :

(a) 13·1°C   (b) 21·5°C

(c) 31·1°C   (d) 48·1°C

Theory

2. Attempt any *five* of the following :   10

   (*a*)   Define critical pressure.

   (*b*)   Write van der Waals' equation of state.

   (*c*)   Define Inversion temperature.

   (*d*)   State third law of thermodynamics.

   (*e*)   Define enthalpy of the system.

   (*f*)   Define adiabatic process.

   (*g*)   State Gibb's function of a system.

3. Attempt any *two* of the following :   10

   (*a*)   Obtain an expression for Boyle's temperature.

   (*b*)   Derive van der Waals' reduced equation of state.

   (*c*)   Explain Carnot's ideal heat engine.

   (*d*)   Derive Clausius-Clapeyron heat equation.

4. Attempt any *one* of the following :   10

   (*a*)   Derive an expression for coefficient of viscosity of a gas.

   (*b*)   Explain in detail Andrew's experiment.