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R—86—2017

FACULTY OF SCIENCE

B.Sc. (First Year) (Second Semester) EXAMINATION

MARCH/APRIL, 2017

(CBCS Pattern)

PHYSICS

Paper III (CCP-II, Sec. A)

(Heat and Thermodynamics)

(MCQ & Theory)

(Thursday, 6-4-2017) **Time : 10.00 a.m. to 12.00 noon**

Time—2 *Hours* *Maximum Marks*—40

N.B. :— (*i*) Attempt *All* questions.

(*ii*) Use separate answer-sheets for MCQs and theory questions.

(*iii*) Negative marking system is applicable to wrong answer of MCQ.

MCQ

1. Attempt *all* Multiple Choice Questions : 10

(*i*) The coefficient of viscosity of gas is equal to :

(*a*) $\eta = \frac{1}{3}\rho\bar{c}\lambda$ (*b*) $\eta = \rho\bar{c}\lambda$

(*c*) $\eta = \frac{1}{3}\rho\bar{c}$ (*d*) $\eta = \rho\bar{c}$

(*ii*) The relation between coefficient of thermal conductivity and viscosity is :

(*a*) $K = c_v$ (*b*) $K = \eta c_v^2$

(*c*) $K = \eta c_v$ (*d*) $K = \eta\rho$

P.T.O.

(*iii*) The expression for critical pressure is :

(*a*) $3b$ (*b*) $\frac{a}{27b^2}$

(*c*) $\frac{a}{27b}$ (*d*) none of these

(*iv*) The van der Waals introduced a correction for :

(*a*) Pressure (*b*) Volume

(*c*) Both (*a*) and (*b*) (*d*) None of these

(*v*) The SI unit of entropy is :

(*a*) Cal (*b*) Kelvin

(*c*) Joule (*d*) Cal/Kelvin

(*vi*) An adiabatic process occurs at constant :

(*a*) Temperature (*b*) Heat

(*c*) Volume (*d*) Pressure

(*vii*) The efficiency of Carnot engine working between steam point and ice point is :

(*a*) 26.81% (*b*) 16.81%

(*c*) 0 (*d*) 50.50%

(*viii*) The enthalpy of the thermodynamic system is :

(*a*) H = U – PV (*b*) H = U + PV

(*c*) H = U – P*d*V (*d*) H = U + P*d*V

(*ix*) The combined form of first and second law of thermodynamics is :

(*a*) T*ds* = *d*U (*b*) T*ds* = *d*U + *p*V

(*c*) T*ds* = *d*U + *pd*V (*d*) None of these

(*x*) According to Stefan's Boltzman's law is :

(*a*) $E = \sigma T_0^4$ (*b*) $E = \sigma T^2$

(*c*) $E = \sigma\left(T^2 - T_0^2\right)$ (*d*) $E = \sigma\left(T^4 - T_0^4\right)$

Theory

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

(*a*) Define Boyle's temperature.

(*b*) What is an adiabatic process ?

(*c*) State second law of thermodynamics by Kelvin.

(*d*) Define Helmholtz function.

(*e*) Write down Clausius-Clapeyron heat equation.

(*f*) State Planck's radiation law.

(*g*) State Wien's displacement law.

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

(*a*) Describe porous plug experiment.

(*b*) Explain entropy change in irreversible process.

(*c*) Prove the following T*ds* equation :

$$Tds = C_v dT + T\left(\frac{\partial P}{\partial T}\right)_v dv .$$

(*d*) Give the deduction of Wien's displacement law.

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

(*a*) Deduce an expression for coefficient of self diffusion.

(*b*) Explain Carnot's cycle and its efficiency.