DAG-003-1014002 Seat No. _____

B. Sc. (Sem. IV) (CBCS) (W.E.F. 2016) Examination

April - 2022

Physics Theory : Paper - 401

(Thermodynemic & Elec.) (Old Course)

Faculty Code : 003

Subject Code : 1014002

Time : $2\frac{1}{2}$ Hours] [Total Marks : **70**

Instructions : (1) All questions are compulsory.
(2) Symboles have their usual meaning.
(3) Right side indicate marks.

1 (a) Give the answers of following questions : **4**
(1) State zeroth law of thermodynemics.
(2) Define heat.
(3) Write the relation between C_P and C_V.
(4) What is reversible process ?

(b) Answer any **one** questions : **2**
(1) In carnot engine the temperature of source is 300K and the temperature of sink is 200K then find the efficiency of carnot engine.
(2) If the efficiency of carnot engine is 60% and work done by the engine is 600 jule then find the heat energy absorbed by the engine.

(c) Answer any **one** question : **3**
(1) Explain second law of thermodynemics.
(2) Explain internal energy of the system.

(d) Answer any **one** question : **5**
(1) Explain carnot theorem.
(2) Explain the porous plug experiment.

2 (a) Write the answers of following questions : **4**

(1) In adiabatic process change in entropy is zero. (True/False)

(2) The entropy of the system increase in all irreversible process. (True/Flase)

(3) Write the SI unit of entropy.

(4) Define black body.

(b) Answer any **one** question : **2**

(1) Calculate the entropy of a system required 2730 Jule heat energy to convert ice into water at 273K temperature.

(2) Calculate the energy of a photon of wavelength $1A^{o}$.

(c) Answer any **one** question : **3**

(1) Explain black body radiation.

(2) Explain Stefan-Boltzmann law.

(d) Answer any **one** question : **5**

(1) Explain principle of increase of entropy.

(2) State and prove Kirchhoff's law of thermal radiation.

3 (a) Give the answer of following questions : **4**

(1) What is thermodynemic potential ?

(2) What is Gibbs free energy ?

(3) What is latent heat ?

(4) Write Maxwell's second relation.

(b) Answer any **one** question : **2**

(1) Calculate the change in boiling point of water when the pressure is increased by 1 atmosphere boiling point of water is 373K. Specific volume of system is $1.67/m^3/kg$ and latent heat of system is 2.268×10^6 J/kg. (1 Atm=10^5 N/m^2).

(2) Water boils at temperature of $101^{o}C$ at a pressure of 787 mm of Hg. 1 gram of water occupies 1601 cm^3 on evaporation. Calculate the latent heat of the system. J=4.2×10^7 erg/call.

(c) Answer any **one** question : **3**

(1) Derive Maxwell third relation.

(2) Derive T.ds equation.

(d) Answer any **one** question : **5**

(1) Derive Clausius - Clapeyron equation.

(2) Explain Joule-Thomson effect.

4 (a) Give the answers of following questions : **4**

(1) What is full form of LED ?

(2) What is full form of FET ?

(3) JFET has high power gain. (True / False)

(4) What is logic gate ?

(b) Answer any **one** question : **2**

(1) Convert 1101_2 to decimal.

(2) Convert 25_{10} to binary.

(c) Answer any **one** question : **3**

(1) Write a note on photo diode.

(2) Write a note on solar cell.

(d) Answer any **one** question : **5**

(1) Explain output characteristics of JFET.

(2) Explain : (1) OR-gate (2) AND-gate.

5 (a) Give the answer of following questions : **4**

(1) Write the formula of resonance frequency in LCR series circuit.

(2) Write the formula of balance condition of a.c. bridge.

(3) In phase shift oscillator single RC section produce 60^o phase shift. (True / False)

(4) What is tapped in heastely oscillator ?

(b) Answer any **one** question : **2**

(1) In wein bridge oscillator $R_1 = R_2 = 220\ k\Omega$ and $C_1 = C_2 = 250\ pF$. Find the frequency of oscillator.

(2) A phase shift oscillator connects a $5\ pF$ capacitor. If frequency of oscillator is 800 KHz then find the value of R.

(c) Answer any **one** question : **3**

(1) Explain De-Sauty bridge.

(2) Exlain Maxwell LC bridge.

(d) Answer any **one** qustion : **5**

(1) Discuss RC phase-shift oscillator

(2) Discuss Heartley oscillator.