Paper / Subject Code: 24302 / Chemical Science - V .

[Time: 2:30 Hours]   **[Marks:60]**

Please check whether you have got the right question paper.

N.B: 1. All questions are compulsory.
          2. Figures to the right indicates full marks
          3. Draw neat and labelled diagrams wherever necessary.

Q.1   Any **3** Out of **5** (5M Each)   15
1. Give the applications of liquid chromatography.
2. Describe the properties of solvents used in column chromatography.
3. Describe the steps involved in paper chromatography.
4. Explain how HPLC is different from traditional LC.
5. Compare and contrast gas solid and gas liquid chromatography

Q.2   Any **3** Out of **5** (5M Each)   15
1. Give the Definition, extraction and Properties with an example of tannins.
2. Draw the structure of nicotine and write a short note on caffeine.
3. Write a note on Quercetin and explain different types of flavonoids.
4. What are phytochemicals? Describe the Biological Activities of Phytochemicals.
5. What are taxol? Add a note on terpenoids.

Q.3   Any **3** Out of **5** (5M Each)   15
1. Explain the equilibrium constant K_P and K_C. Also deduce their relation between the two Constants
2. Show that "$-\Delta A$"gives maximum work and "$-\Delta G$" gives network of the system.
3. Derive Gibbs Helmholtz equation.
4. Derive the equation for the reversible adiabatic expansion of an ideal gas in terms of 'Temperature' & 'Volume'. If air at 298K is compressed adiabatically from $20dm^3$ to 5 dm^3.Find the final temperature if C_v if air is $20.92JK^{-1}mol^{-1}$
   Obtain the integrated form of Clausius -Clapeyron equation using the Clapeyron equation.
5. Calculate the molar heat of vaporization of a liquid whose vapor pressure doubles when temperature increases from 358 K to 368 K.

Q.4   Any **3** Out of **5** (5M Each)   15
1. Write a note on alkaloids.
2. Derive the Clapeyron equation to relate the change in temperature and pressure occurring in a biphasic system of a pure substance in equilibrium
3. Explain detectors used in HPLC.
4. What are the applications of ion exchange chromatography?
5. Prove that the chemical potential is equal to its free energy per mole, for any pure substance

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