

**BIRLA INSTITUTE OF TECHNOLOGY, MESRA, RANCHI
(MID SEMESTER EXAMINATION)**

CLASS: IMSC
BRANCH: CHEMISTRY

SEMESTER: II
SESSION : SP/2020

SUBJECT : CH107 PHYSICAL CHEMISTRY-II CHEMICAL THERMODYNAMICS AND ITS APPLICATIONS

TIME: 2 HOURS

FULL MARKS: 25

INSTRUCTIONS:

1. The total marks of the questions are 25.
 2. Candidates may attempt for all 25 marks.
 3. Before attempting the question paper, be sure that you have got the correct question paper.
 4. The missing data, if any, may be assumed suitably.
 5. Tables/Data hand book/Graph paper etc. to be supplied to the candidates in the examination hall.
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Q1	(a) State the 1st law of thermodynamics.	[2]	1	Remember
	(b) For one mole of an ideal gas, show $C_p - C_v = R$	[3]	1	Remember
Q2	(a) The reversible work of compression is minimum. Explain.	[2]	1	Understand
	(b) One mole of an ideal monoatomic gas undergoes a reversible change from 25 °C and 1 atm pressure to twice the original volume in such a way that $\Delta U = 0$. Calculate Q and ΔH .	[3]	1	Application
Q3	(a) Why efficiency (η) of Carnot engine can never be 1?	[2]	1	Understand
	(b) Calculate the work produced in a reversible Carnot engine.	[3]	1	Remember
Q4	(a) Prove the Clausius inequality.	[2]	1	Remember
	(b) Show that $\left(\frac{dU}{dV}\right)_T = T\left(\frac{dp}{dT}\right)_V - P$	[3]	1	Remember
Q5	(a) Derive the Kirchoff's equation to determine the variation of ΔH of a reaction with temperature.	[2]	1	Remember
	(b) One mole of an ideal gas is compressed isothermally at 300 K from a volume of 25 L to 10 L in a reversible way. Find out ΔS , ΔS_{surr} , ΔS_{univ} for the process.	[3]	1	Application

::: 26/02/2020 :::M