y **two** questions: 10×2=20

টি প্রশ্নের উত্তর দাও ঃ

is ecology? Explain the principles of deep
gy.

স্থান কাকে বলে? গভীর বাস্তুসংস্থানের মূলসূত্রগুলি
কর।

in the features of 'Human Rights'. Do you
that all men should have equal rights?

ধিকারের বৈশিষ্ট্যগুলি ব্যাখ্যা কর। তুমি কি মনে কর যে
ানুষের সমান অধিকার থাকা উচিত?

is racial discrimination? What are the
nents advanced by Peter Singer against
discrimination?

ত বৈষম্য কাকে বলে? জাতিগত বৈষম্যের বিরুদ্ধে
সিঙ্গার কি কি যুক্তি উত্থাপন করেছেন?

do you mean by 'informed consent' of a
nt? Why is confidentiality' necessary in
of doctor-patient relationship?

। রোগীর 'অবহিত সম্মতি' বলতে কি বোঝায়?
ক এবং রোগীর সম্পর্কের ক্ষেত্রে 'গোপনীয়তা' কেন
নীয়?

U.G. 6th Semester Examination - 2023

CHEMISTRY

[HONOURS]

Discipline Specific Elective (DSE)

Course Code : CHEM-H-DSE-T-3

(Advanced Physical Chemistry)

Full Marks : 40 Time : $2\frac{1}{2}$ Hours

The figures in the right-hand margin indicate marks.

Candidates are required to give their answers in their own words as far as practicable.

1. Answer any **five** questions: 2×5=10

   i) "A unit cell cannot be spherical in shape." – Justify or criticize.

   ii) State and explain Nernst heat theorem.

   iii) 1000 molecules are distributed in three energy levels with energy values kT, $2kT$ and $3kT$. Calculate the number of molecules in different levels (assuming Boltzmann distribution).

   iv) Write two differences between classical thermodynamics and statistical thermodynamics.

v) Show that as T approaches 0°K the coefficient of thermal expansion (α) tends to zero.

vi) What are the differences between addition and condensation polymerization?

vii) Draw a curve showing the variation of entropy when a solid (at temperature, T; T < melting point) is heated to form vapour at temperature, T_1 (Given: T_1 > boiling point).

2. Answer any **two** questions from the following: 5×2=10

a) i) Define partition function.

ii) Show that for a Boltzmann distribution: $N_{i+1} \leq N_i$. When does this equality hold? 2+(2+1)

b) i) Consider a two-dimensional square lattice (each side being "a") and show that the separation between the successive (hk0) planes is given by,

$$d_{hkl} = \frac{a}{\sqrt{h^2 + k^2}}.$$

ii) Express heat capacity at constant volume in terms of molar partition function. 3+2

c) i) Each unit cell of NaCl contains 4 Na^+ and 4 Cl^- ions. Justify.

ii) Classify polymers on the basis of thermal behavior. Give suitable example. 3+2

3. Answer any **two** questions from the following: 10×2=20

a) i) NaCl and KCl have same geometric arrangements of positive and negative ions in their crystals. But X-ray diffraction indicates that KCl has a simple cubic lattice and NaCl has a face-centered cubic lattice. Explain.

ii) Find an expression of U in terms of partition function. Hence derive the equation

$$\left[\frac{\partial(A/T)}{\partial T}\right]_V = -\frac{U}{T^2}.$$

iii) Derive the mathematical expression of Barometric Distribution Law. 3+4+3

b) i) C_v of a system is represented by the expression: $C_v = a + bT + cT^2$. Show that the value of "a" has to be zero.

ii) Discuss the concept of ensemble, canonical ensemble and grand canonical ensemble.

iii) What do you mean by "degree of polymerization"? Derive a relation between $\overline{DP}$ (*average degree of polymerization*), $f_{average}$ (*average functionality*) and P (*specific extent of reaction*) of a polymerization process. 3+3+4

c) i) For a system of "N" molecules, the number of molecules (N_i) in a nondegenerate energy level (ε_i) is given by the following equation: $N_i = C\exp(-\beta\varepsilon_i)$, where "C" is a constant. Obtain an expression for "C".
Show that β is always positive.
Calculate "C" when ε_i is expressed as, $\varepsilon_i = ih\nu$ (where, i = 0, 1, 2, ...) [Symbols have their usual meaning].

ii) The first six observed Bragg diffraction angles from a powdered sample of iridium crystal are 21.97°, 25.60°, 37.66°, 45.75°, 48.43° and 59.75°. Determine the type of unit cell and assign corresponding Miller indices for every observed angle. 6+4

U.G. 6th Semester Examination

GEOGRAPHY

[HONOURS]

Discipline Specific Elective (DS

Course Code : GEO-H-DSE-T-0

(Resource Geography)

[NEW SYLLABUS under CBC

Full Marks : 60 Time

The figures in the right-hand margin indi

Candidates are required to give their answ own words as far as practicable

UNIT–I

[Marks : 30]

1. Answer any **five** from the followings:

a) Define resource.

b) What is meant by abiotic renewa

c) Define agro-forestry.

d) Specify the importance of resou

e) What is water pollution?

f) Mention any four causes of def