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Sl.No. 2085 Total No. of Pages : 3

II Semester B.Sc. Examination, May/June - 2017
(Semester Scheme) (2014 - 15 Onwards)
PHYSICS
Heat and Thermodynamics (Paper - II)

Time : 3 Hours **Max. Marks : 60**

Instructions : **Answer any three questions from parts-A and B, three questions from part-C and six questions form part-D.**

Part - A

1. a) Explain the principle of equipartion of energy and show that $U=\frac{3}{2}RT$ for monoatomic gas [4]

   b) What are Andrew's isothermals? Explain Andrew's isothermals of CO_2. [5]

   c) Define mean free path of a molecule of a gas. mention the factors affecting the mean free path of gas molecule. [3]

2. a) on the basis of planck's law Deduce [6]

      i) Rayleigh Jean's law

      ii) Stefan's fourth power law.

   b) Obtain an expression for temperature of inversion. [6]

Part - B

3. a) Derive clausius - clapeyron first latent heat equation. Discuss the effect of pressure on the boiling point of liquid. [8]

   b) What are thermodynamic potentiols? Explain. [4]

P.T.O.

4. a) on the basis of entropy state [6]

   i) Second law of thermodynamics.

   ii) Third law of thermodynamics.

   b) Using Maxwell's relations obtain the expression for change in temperature during adiabatic process. [6]

Part - C

5. Find the temperature at which the RMS velocity of the molecules of a gas would become twice its value at 100°C. [4]

6. A blackbody initially at 27°C radiates an amount of energy 138 $Js^{-1}m^{-2}$. Find the energy radiated by it when it is heated to 327°C. What is the wavelength of the maximum energy radiated at 327°C?

   Given : Wein's constant = 2.898×10^{-3}mk. [4]

7. One mol of a gas expands isothermally to 5 times its original volume. Calculate the change in entropy. Given : R = 8.31 J mol^{-1} k^{-1}. [4]

8. If water vapour is assumed to be a perfect gas, molar enthalpy change for vapourisation of 1 mol of water at 100°C is 41×10^3 $Jmol^{-1}$ calculate internal energy change when 1 mol of water is vapourised at 100°C. R = 8.314 J mol^{-1} k^{-1}. [4]

Part - D

9. a) Write maxwell's law of distribution of velocities of a molecule. [2]

b) Distinguish between Real and Ideal gas. [2]

c) What is the principle of regenerative cooling? [2]

d) Distinguish between spontaneous and stimulated emission. [2]

e) State carnot's theorem. [2]

f) Write down any two maxwell's thermodynamic relations. [2]

g) Write down Boltzmann entropy relation and explain the terms involved. [2]

h) Write the expression for entropy of an ideal gas in terms of Cp. [2]

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II Semester I B. Sc. Examination, May/June - 2017
(Semester Scheme) (2014-15 onwards)
CHEMISTRY
(Paper - II) (New Syllabus)

Time : 3 Hours **Max. Marks : 60**

Instruction : ***Write equations and neat diagrams wherever necessary.***

Part - A

Answer all questions. [6 × 1 = 6]

1. i) Define bond length.

   ii) Give an example for an electron donating group.

   iii) Name the shape of water molecule.

   iv) Define critical solution temparature.

   v) What is the effect of solute on vapour pressure of the solvent?

   vi) Which is the most unstable cycloalkane?

Part - B

[INORGANIC CHEMISTRY]

Answer any three questions. [3 × 6 = 18]

2. i) How is the lattice energy of an ionic solid determined using Born-Haber's cycle? [3]

   ii) Explain the formation of a coordinate bond by taking NH_4^+ as an example. [3]

P.T.O.

9. i) Write the resonating structures of anthracene. [3]

ii) Explain Huckel's rule of aromatility in [3]

a) Cyclo pentadienyl anion b) Naphthalene

Part - D

[PHYSICAL CHEMISTRY]

Answer any three questions. [3 × 6 = 18]

10. i) Explain vapour pressure-composition diagram of a binary liquid mixture showing positive deviation from Raoult's law. [3]

ii) What is a semipermeable membrane? Mention the types with examples. [3]

11. i) Derive the relationship between depression in freezing point and molar mass of a solute. [3]

ii) Write a note on ideal and non ideal solutions. [3]

12. i) The boiling point of chloroform was raised by 0.416K when 5.253×10^{-4} kg of Anthracene was dissolved in 32×10^{-3}Kg of chloroform. Calculate the molar mass of Anthracene [Kb for chloroform = 3.9K/kg] [3]

ii) Explain Berkley - Hartley's method for the determination of Osmotic pressure. [3]

13. i) Explain the Fractional distillation of type - I liquid mixture. [3]

ii) Define : [3]

a) Boiling point of a liquid.

b) Freezing point of a liquid

c) Molal elevation constant

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II Semester B.Sc Examination, May/June 2017
(Scheme Semester)
MATHEMATICS (Paper - II)
Differential Calculus - II and Integral Calculus - I
(2015 - 16 on Words)

Time : 3 Hours **Max. Marks : 60**

Instruction : Answer all the Sections.

SECTION - A

1. Answer any six questions.Each question carries two marks.

a) Examine the continuity of the function.

$$q(x)=\begin{cases}3x^2+2, if\ x\le 4\\ x^3-14, if\ x>4\end{cases} \quad \text{at } x=4$$

b) Give an example for continuous function which is not differentiable justify?

c) Verify rolle's theorem for $f(x)=2+(x-1)^{2/3}$ in $[0, 2]$

d) Evaluate $\lim_{x\to\pi}\left[\frac{\sin x}{x-\pi}\right]$

e) If z = cos (x sin y), Find $\frac{\partial^2 z}{\partial x,\partial y}$

f) If $z=\sqrt{x^2+y^2}$ prove that x Zx + y Zy = Z

g) Evaluate $\int_0^1 \frac{x^4}{\sqrt{1-x^2}}dx$

P.T.O.

h) Evaluate $\int_0^{\pi/2} \sin^5 x \cos^3 x \, dx$

SECTION - B

(Differential Calculus - II)

2. Answer any six questions. Each question carries four marks.

a) Examine the differentiability of $f(x) = \begin{cases} x^2 \text{ for } x < 2 \\ 6x - 2 \text{ for } x \geq 2 \end{cases}$ at $x = 2$.

b) Discuss the continuity of the function $f(x) = \frac{1}{1+e^{-x}}$ at $x = 0$

c) Verify lagrange's mean value theorem for f (x) = (x - 1) (x - 2) (x - 3) in [0 , 4].

d) Find $\lim_{x \to 0} (\cot x)^{\sin 2x}$.

e) Expand $e^x \sin x$ upto the term containing x^4 by maclanrin's series.

f) State and prove intermediate valuetheorem.

g) State. and prove cauchy's mean. Value Theorem.

h) Evaluate $\lim_{x \to 0} \left[\frac{1}{x^2} - \frac{1}{x \tan x} \right]$.

SECTION - C

(Integral Calculus - I)

3. Answer any six questions. Each question carries four marks.

a) If $u = \log (x^2 + y^2 + z^2)$, Prove that $x \frac{\partial^2 u}{\partial y \partial z} = y \frac{\partial^2 u}{\partial z \partial x} = z \frac{\partial^2 u}{\partial x \partial y}$

b) Verify Eulers theorem for the function $u = x^4 \log\left(\frac{y}{x}\right)$

c) Find the jacobian of the transformation
$u = x^2 + y^2 + z^2,\ v = xy + yz + zx,\ w = x + y + z$

d) Obtain second taylos polynomial of $\tan^{-1}\left(\frac{y}{x}\right)$ about (1, 1)

e) Prove that $\int_0^{\pi/2} \cos^n x\,dx$

$$= \frac{n-1}{n}\frac{n-3}{n-2} \ldots\ldots K$$

Where $k = 1$ *if* n *is odd*

$$= \frac{\pi}{2} \text{ if } n \text{ is even}$$

f) Evaluate $\int_0^{\pi} x \sin^8 x \cos^6 x\,dx$

g) Evaluate $\int_0^1 x^5 (1-x^2)^{5/2}\,dx$

h) Evaluate $\int_0^{\pi} \frac{\sin^4\theta}{(1+\cos\theta)^2} dx$

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B.Sc. II Semester Examination, May/June - 2017
(Semester : Scheme)
COMPUTER SCIENCE(Paper - II) (New)
Data Structure Applications with 'C'
(2013-14 Batch onwards)

Time : 3 Hours **Max. Marks : 60**

Instructions to Candidates :

Answer any 2 full questions from each part.

Part - A

1. i) Define a pointer. List the advantages of pointer. [5]

   ii) What is a file? Explain any two file handling functions. [5]

2. i) Explain Malloc and calloc functions. Write their syntax. [6]

   ii) Write a note on preprocessor directives. [4]

3. i) Explain the problem solving techniques. [6]

   ii) Differentiate structure and union. [4]

Part - B

4. i) What is a Data Structure? Discuss the classification of Data Structures. [5]

   ii) Write an algorithm to search an element using binary search method. [5]

5. i) Write an algorithm to perform Operations on Stack? Mention the applications of Stack. [7]

   ii) Write the advantages of circular queue over linear queue. [3]

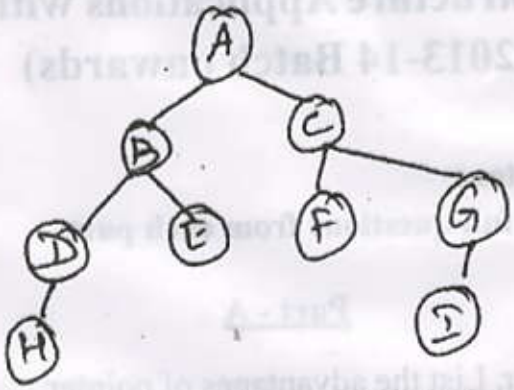
P.T.O.

6. i) Define a linked list. Write the algorithm to insert an element at the begining of a list. [7]

ii) Write a note on Doubly linked list. [3]

Part - C

7. i) Write the in-order, pre-order and post-order traversal for the following tree. [6]



ii) Write a note on left skewed tree and right skewed tree : [4]

8. i) Define with an example : [6]
   a) Depth of a Tree
   b) Degree of a node
   c) Siblings

ii) Give the memory representation of Binary Tree [4]

9. i) Write an algorithm for pre-order tree traversal. [6]

ii) Write a note on Graph and directed graph. [4]