



RE-3571-72

M. Sc. (Part - II) Examination

April / May - 2010

Physical Chemistry : Paper - I

Time : 3 Hours]

[Total Marks : 70

RE-3571

Instructions :

(1)

नीचे दृष्टावेक निशानीवाणी विगतो उत्तरवही पर अवश्य कपवी. Fillup strictly the details of signs on your answer book.	Seat No. :
Name of the Examination :	<input type="text"/>
<input type="checkbox"/> M. SC. (PART - 2)	<input type="text"/>
Name of the Subject :	<input type="text"/>
<input type="checkbox"/> PHYSICAL CHEMISTRY - 1	<input type="text"/>
Subject Code No. : <input type="text"/> 3 <input type="text"/> 5 <input type="text"/> 7 <input type="text"/> 1	<input type="text"/>
Section No. (1, 2,.....) : <input type="text"/> 1	<input type="text"/>
	Student's Signature

(2) Attempt all the six questions.

(3) Figures to the right indicate full marks.

- 1 (a) Derive appropriate relation for rotational contribution to entropy for polyatomic molecules. 4
- (b) Distinguish all types of ensembles used in statistical mechanics. 4
- (c) Explain thermodynamic functions of mixing of non-ideal solution. 4

OR

- 1 (a) Explain briefly about excess functions for non-ideal solutions and write expressions for excess Gibbs free energy  $G^E$ , excess entropy  $S^E$ , excess enthalpy  $H^E$ , excess volume  $V^E$ . 4
- (b) Calculate the rotational contribution to entropy of benzene at 362 K. Its moment of inertia are  $I_A = 2.93 \times 10^{-38} \text{ g cm}^2$ ,  $I_B = I_C = 1.44 \times 10^{-38} \text{ g cm}^2$ , and its symmetry number is 12. 4
- (c) Compare third law of thermodynamics with statistical entropy. 4

- 2 (a) Discuss fluid mosaic model of biomembranes. 4
- (b) Explain different types of inhibitors in catalysis. 3
- (c) Describe the function of cell membrane. 4

**OR**

- 2 (a) Describe enzyme catalysis. 4
- (b) Write a note on liposomes. 3
- (c) Explain Lineweaver-Burk plots in enzyme catalysis. 4
- 3 (a) Give classification and examples of different types of surfactants with their structures. 4
- (b) Discuss mass action model for thermodynamics of micellization. 4
- (c) Write a short note on HLB number of surfactants. 4

**OR**

- 3 (a) What is CMC? Discuss any two techniques to determine CMC. 4
- (b) Discuss in detail about size and shape of micelles. 4
- (c) Explain effect of temperatures, non-electrolytes and electrolytes on solubilization. 4

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(1)

नीचे दशांशों के निशानीवाणी विगतो उत्तरवही पर अवश्य लिखनी. Fillup strictly the details of signs on your answer book.	Seat No. :
Name of the Examination :	<input type="text"/>
<input type="text" value="M. SC. (PART - 2)"/>	<input type="text"/>
Name of the Subject :	<input type="text"/>
<input type="text" value="PHYSICAL CHEMISTRY - 1"/>	<input type="text"/>
Subject Code No. : <input type="text" value="3"/> <input type="text" value="5"/> <input type="text" value="7"/> <input type="text" value="2"/>	Section No. (1, 2,.....) : <input type="text" value="2"/>
Student's Signature	

(2) Attempt all the six questions.

(3) Figures to the right indicate full marks.

- 4 (a) Give thermodynamic formulation of conventional transition-state theory (CTST) and discuss assumptions and limitation. 4
- (b) Explain single-sphere model for a reaction between ions and derive equation for rate constant. 4
- (c) Write a short note on linear free energy relationship. 3

OR

- 4 (a) Describe kinetic theory of collisions. 3
- (b) Explain difference between collisions and encounters. Describe an experiment to show encounter in reactions in solution. 4
- (c) What is catalyst? Explain general catalytic mechanism. 4
- 5 (a) Describe theory of IR spectroscopy. 4
- (b) Describe the local diamagnetic effect with suitable example. 4
- (c) Give a brief idea about FT-NMR. 4

OR

- 5 (a) Describe monochromator, cells and detector used in IR. 4
- (b) Describe instrument of FT-IR and give its advantages against IR. 5
- (c) Write a short note on shift reagent. 3

- 6** (a) Derive semi-empirical mass equation. **6**  
(b) Explain chemical and radiation dosimetry. **3**  
(c) Compare ionic liquids and super critical fluids. **3**

**OR**

- 6** (a) Explain periodicity in nuclear properties of shell model. **3**  
(b) Mention twelve principles of green chemistry. **6**  
(c) Describe the application of super critical fluids. **3**
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