BIRLA INSTITUTE OF TECHNOLOGY, MESRA, RANCHI
(END SEMESTER EXAMINATION)

CLASS: B. PHARM. **SEMESTER: III**
BRANCH: PHARMACY **SESSION: MO/2023**

SUBJECT: BP302T PHYSICAL PHARMACEUTICS-I

TIME: 3.00 Hours **FULL MARK: 75**

INSTRUCTIONS:

1. **The missing data, if any, may be assumed suitably.**
2. **Before attempting the question paper, be sure that you have got the correct question paper.**
3. **Tables/Data hand book/Graph paper etc. to be supplied to the candidates in the examination hall.**
4. **This question paper consists of (03) three parts. Read the part wise instructions before attempting the questions.**

PART-I
Objective types questions (Instruction: Answer all questions)

Q1. (10 x 2 = 20 Marks)

A.	Give a reason for the enhanced solubility of tertiary butyl alcohol over n-butyl alcohol in water.	CO: 2	BL: 2
B.	Benzoic acid exists predominantly in the form of …… in benzene.	CO: 1	BL: 1
C.	In crystalline solids …… system exhibits the highest symmetry, and the …….. system exhibits the lowest symmetry.	CO:1	BL: 1
D.	Write an equation to estimate the molar refraction of a compound.	CO:2	BL: 1
E.	Justify: Interfacial tensions are less than surface tensions.	CO: 3	BL: 4
F.	The contact angle of solid over liquid was found to be near 180^{O}. Comment on the wetting property of solid.	CO: 5	BL: 2
G.	What are the central metal ion, the ligand, and the coordination number in the $[Cu(H_2O)_6]^{2+}$ complex ion	CO: 1	BL: 1
H.	Number of glucose residues in alpha cyclodextrin is ……	CO: 2	BL: 1
I.	Differentiate between hypertonic, isotonic, and hypotonic solutions.	CO: 4	BL: 3
J.	The pH of 0.01 M HCl is ……	CO: 3	BL: 1

PTO

PART-II
Short Answers
(Instruction: Answer seven out of nine questions)

(7 x 5 = 35 Marks)

Q2.	If benzoic acid is distributed between equal volumes of peanut oil and water, what must be the original concentration in the water phase in order that 0.37 mg/mL of undissociated acid remains in the aqueous phase buffered at a pH of 4.21. The partition coefficient K = $[HA_o]/ [HA_w]$ is 5.33 and the dissociation constant of the acid in water is 6.4×10^{-5}. Since the two phases are present in equal amounts, q=1.	CO: 3	BL: 3
Q3.	Demonstrate that the highest efficiency in extraction occurs when numerous extractions are performed using small amounts of extracting liquid.	CO: 1	BL: 4
Q4.	Distinguish between smectic and nematic liquid crystal types and provide a brief overview of the pharmaceutical applications of liquid crystals.	CO: 2	BL: 4
Q5.	Examine various states of matter of water at different pressure and temperature using suitable illustration.	CO: 4	BL: 4
Q6.	Examine the solubilization of drugs with diverse polarities through micellar interactions and determine the appropriate localization of these drugs within such micelles.	CO: 5	BL: 4
Q7.	At a temperature of 20°C, a chloroform sample ascended to a height of 3.67 cm within a capillary tube with an internal radius of 0.01 cm. Calculate the surface tension of chloroform at this temperature, considering a chloroform density of 1.476 g/cm^3.	CO: 4	BL: 4
Q8.	Elaborate on the various pharmaceutical uses of complexation.	CO-1	BL: 1
Q9.	Analyse the method of continuous variation for establishing stability parameters of complex products.	CO-5	BL: 4
Q10.	At a hydrogen ion concentration of 1.75×10^{-5} (pH = 4.76), what is the capacity of a buffer containing 0.10 mole each of acetic acid and sodium acetate per Liter of solution? The total concentration, C=[Acid]+[Salt], is 0.20 mole/Liter, and the dissociation constant is 1.75×10^{-5}.	CO: 2	BL:4

PART-III
Long Answers
(Instruction: Answer two out of three questions)

(2 x 10 = 20 marks)

Q11.	Derive Scatchard-Hildebrand-Wood Equation and examine its relevance in mutual solubility with a focus on solubility parameters.	CO:4	BL:4
Q12.	Prove that spreading will occur when the surface tension of the sublayer liquid is greater than the sum of the surface tension of the spreading liquid and the interfacial tension between the sublayer and the spreading liquid.	CO: 3	BL-5
Q13.	Describe the complexation mechanism between cupric ions and glycine and outline the procedure for determining ñ (n bar) and pA in this context.	CO: 2	BL: 2

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