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

CLASS: BPHARM **SEMESTER : IV**
BRANCH: PHARMACY **SESSION : SP/18**

SUBJECT: PS4401 PHARMACEUTICAL SYSTEMS-I

TIME: 3 HOURS **FULL MARKS: 60**

INSTRUCTIONS:
1. The question paper contains 7 questions each of 12 marks and total 84 marks.
2. Candidates may attempt any 5 questions maximum of 60 marks.
3. The missing data, if any, may be assumed suitably.
***4*. Before attempting the question paper, be sure that you have got the correct question paper.**
5. Tables/Data hand book/Graph paper etc. to be supplied to the candidates in the examination hall.

Q.1(a) The measured solubility of silver chloride in water at 20 °C is 1.12×10^{-5} mole/liter. Calculate the solubility product of this salt. [2]

Q.1(b) Discuss the effect of temperature on the solubility of salts. [4]

Q.1(c) Discuss and derive an equation for pH below which salt of weak acid begins to precipitate from aqueous solutions. [6]

Q.2(a) What is the solubility of naphthalene at 20 °C in an ideal solution? The melting point of naphthalene is 80 °C, and the molar heat of fusion 4500 cal/mole. [2]

Q.2(b) Write short notes (i) effect of particle size on solubility and (ii) influence of solvents on the solubility of drugs. [4]

Q.2(c) Discuss various factors influencing solubility of gases in liquids. [6]

Q.3(a) The distribution coefficient for iodine between water and carbon tetrachloride at 28 °C is 0.016. How many grams of iodine are extracted from a solution in water containing 0.1 gms in 50 mL by one extraction of 10 mL of CCl_4? How many grams are extracted by two- 5mL portions of CCl_4. [2]

Q.3(b) The plot of $(Ka + [H_3O^+])/C_w$ against $[H_3O^+]$ for benzoic acid distributed between equal volumes of peanut oil and buffered aqueous solutions yielded a slope of b=4.16 and intercept of $a=4.22 \times 10^{-5}$. The K_a of benzoic acid is 6.4×10^{-5}. Compute the true partition coefficient, K. [4]

Q.3(c) Discuss in detail about the preservation of oil-water system using weak acids. [6]

Q.4(a) Write short note on hydrophile-lipophile balance. [2]

Q.4(b) Write short notes on (i) Langmuir isotherm and (ii) *BET* equation. [4]

Q.4(c) Discuss electrical double layer in detail considering preferential adsorption of cations onto the surface, giving it a positive charge. [6]

Q.5(a) Define Surface and interfacial tension. Why interfacial tension is less than surface tension. [2]

Q.5(b) A sample of chloroform rose to a height of 4.67 cm at 25 °C in a capillary tube having the inside radius of 0.01 cm. What is the surface tension of chloroform at this temperature? The density of chloroform is 1.476 g/cm^3. [4]

Q.5(c) "Spreading occurs when the surface tension of sublayer liquid is greater than the sum of the surface tension of the spreading liquid and the interfacial tension between the sublayer liquid and the spreading liquid" Justify the statement. [6]

Q.6(a) When the logarithm of the particle size is plotted against cumulative percent frequency on probability scale a linear relationship is obtained. Explain two important parameters associated with it for both number and weight distribution. [2]

Q.6(b) From the number distribution data, d_g was found to be 7.1 μm and α_g was found to be 1.43. Using relevant Hatch-Choate equation, calculate d_{ln} and d'_g. [4]

Q.6(c) A powdered material, density 2.7 g/cm^3, is suspended in water at 20 °C. What is size of the largest particle that will settle without causing turbulence? The viscosity of water at 20 °C is 0.01 poise and the density is 1.0 g/cm^3. If the same material is suspended in a syrup containing 60 % by weight of sucrose, what will be the critical diameter (i.e., maximum diameter) that will settle without turbulence. The viscosity of syrup is 0.567 poise and density is 1.3 g/cm^3. Explain and discuss the findings in relation to Reynolds number. [6]

Q.7(a) Draw the representative Rheograms of Newtonian and Non-Newtonian flow. [2]

Q.7(b) Explain quantitative methods to measure Thixotropy. [4]

Q.7(c) Write short notes on (i) Falling Sphere Viscometer and (ii) Cup and Bob Viscometer [6]

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