

RAMAKRISHNA MISSION VIDYAMANDIRA

(Residential Autonomous College affiliated to University of Calcutta)

B.A./B.Sc. SIXTH SEMESTER EXAMINATION, MAY 2018

THIRD YEAR [BATCH 2015-18]

INDUSTRIAL CHEMISTRY (Honours)

Date : 04/05/2018

Time : 11 am – 1 pm

Paper : VII [Unit – III, IV & V]

Full Marks : 50

[Use a separate Answer Book for each Unit]

UNIT-III

(Answer any two questions)

[2×5]

1. Explain the following terms used in pharmaceutical industry (any five) : [5]
 - a) I.P; B.P; U.S.P
 - b) Fine Chemicals
 - c) Bulk drugs
 - d) Basic drugs
 - e) Formulation
 - f) Antibiotics
2.
 - a) How antibiotics work on human being? [1]
 - b) Discuss the manufacturing process of chloramphenicol by fermentation route in detail. [4]
3.
 - a) Write names of anti malarial drugs. [1]
 - b) Discuss the manufacturing process of chloroquin phosphate in detail. [4]

UNIT-IV

(Answer any two questions)

[2×5]

4.
 - a) Define PVC and state its utility to ascertain the paint quality. [2]
 - b) An anticorrosive black surface coating for steel structure of a refinery has the following composition (% vol)

Black Iron oxide pigment	—	30
powdered state (mineral)	—	5
50% Solution of Bitumen in white spirit (mineral terpentine)	—	60
manganese octoate (20% solid)	—	5

Calculate the PVC and your general comments. [3]
5.
 - a) Differentiate between insecticide and herbicide. [2]
 - b) Write example of a natural insecticide and its application. [1]
 - c) Discuss the synthesis (reactions only) and uses of the following (any two) : [2]
 - i) DDT
 - ii) BHC
 - iii) 2,4 D
6. Write short notes on (any two) : [2×2.5]
 - a) Emulsion Paints

- b) Electrochemical corrosion of iron & steel
- c) Oleoresinous varnish vs. Lacquer.

UNIT-V

(Answer any six questions)

[6×5]

7. a) The vibrational energy levels of F_2 molecule is given by the expression,

$$E_v(\text{cm}^{-1}) = 215\left(v + \frac{1}{2}\right)\left\{1 - 0.003\left(v + \frac{1}{2}\right)\right\}$$
 Find the (i) anharmonicity constant, equilibrium oscillation frequency (iii) zero point energy (iv) position of the first overtone [4]
 b) What do you mean by hot bands in IR spectroscopy? [1]
8. a) What is the essential condition for a light-induced vibrational transition? [2]
 b) What is the selection rule for a light-induced vibrational transition? [1]
 c) Calculate the frequency of light which induces a vibrational transition in terms of the frequency of vibration for a simple harmonic oscillator. [2]
9. a) Write down the energy expression for a rigid rotor. [1]
 b) Calculate the difference in energy of two successive levels. [2]
 c) With the help of a schematic diagram show how the frequency of transition changes with the quantum number of the ground state. [2]
10. a) The rotational spectrum of $^{79}\text{Br}^{19}\text{F}$ shows a series of equidistant lines spaced 0.71433 cm^{-1} . Calculate the moment of inertial and the bond length of the molecule. [3]
 b) Describe the normal modes of vibration of carbon dioxide (CO_2) and identify the raman active and IR active modes. [2]
11. a) Explain what do you mean by Frank Condon principle. [2]
 b) How can you spectroscopically obtain the bond distance of homonuclear diatomic molecule like H_2 or N_2 ? [3]
12. a) Invoking the idea of virtual states, explain the origin of stokes and antistokes line. [3]
 b) Which of the two lines is more intense and why? [2]
13. a) With the help of a suitable diagram show all the radiative and non-radiative process that follows an electronic transition. [4]
 b) Why phosphorescence is observed even minutes after excitatory radiations is switched off while fluorescence disappears instantaneously? [1]
14. a) Find out the rotational quantum level at which the molecular population maximises. [4]
 b) Find out the same for vibrational levels. [1]
15. a) The force constant of $^{79}\text{Br}^{79}\text{Br}$ is 240 N.m^{-1} . Calculate the fundamental vibrational frequency and the zero-point energy of $^{79}\text{Br}_2$. [4]
 b) What is the zero point energy of a rigid rotor? [1]

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