AIKTC/KRRC/SoP/ACKN/QUES/2018-19/   Date: _____

School: __SoP-CBCS__   Branch: __SoP__   SEM: ____III____

To,
Exam Controller,
AIKTC, New Panvel.

Dear Sir/Madam.   ✓ (A.T.K.T.)

Received with thanks the following **Semester/Periodic** question papers from your exam cell:

Sr. No.	Subject Name	Subject Code	Format SC	Format HC	No. of Copies
1	Organic Chemistry I	BPH_C_301_T		✓	02
2	Physical Pharmacy I	BPH_C_302_T		✓	02
3	Anatomy, Physiology & Pathophysiology III	BPH_C_303_T			
4	Pharmaceutical Analysis I	BPH_C_304_T		✓	02
5	Pharmaceutical Engineering	BPH_C_305_T		✓	02
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Note: SC – Softcopy, HC - Hardcopy

(Shaheen Ansari)
Librarian, AIKTC

08/04/2014

Sem-III CBES

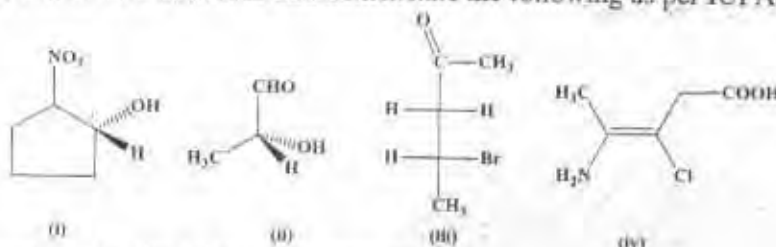(3 Hours)   **Total Marks: 80**

N.B.: 1. All questions are compulsory
       2. Answer all sub questions together
       3. Figures to right indicate full marks

Q.1 A) Assign R/ S, E/Z or D/L notations and nomenclate the following as per IUPAC rule.   **[4M]**

(i)   (ii)   (iii)   (iv)

B) Give suitable structures for the following compounds.   **[4M]**
   i.   (Z)-3-Chlorohex-3-en-1-yne
   ii.   (S)-Ethyl 4-cyano-3-oxopentanoate
   iii.   3-Bromocyclohex-2,5-dienoic acid
   iv.   4-Cyclopropyl-1-butene

C) Answer the following questions (**ANY SIX**)   **[12M]**
   i. Draw and identify the HOMO and LUMO of **Formaldehyde**
   ii. Draw resonating structure of the following molecules

   (i)   (ii)
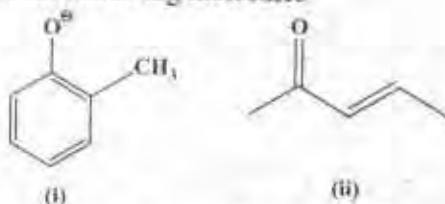
   iii. Represent 2(S)-2-Hydroxybutanoic acid using Fischer and Newmann projection formulae.
   iv. Identify the relationship between following chiral structures

   (A)   (B)
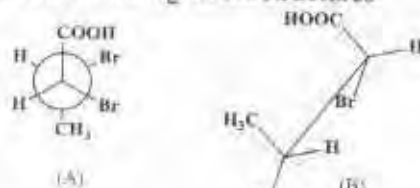
   v. Write conjugate acid/base of the **N,N,N-trimethylamine** and **chloroacetic acid**
   vi. Identify the electrophiles and nucleophiles in the given reaction.

$$CH_3COOH + CH_3OH \xrightarrow{H_2SO_4} CH_3COOCH_3 + H_2O$$
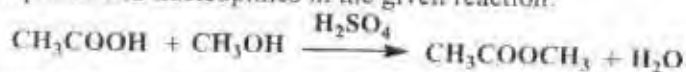
   vii. Arrange the following carbocations in increasing order of stability & justify the same.

   (i)   (ii)   (iii)

Q.2. i. Draw the molecular orbital energy diagram for acetone & Label the orbitals.   **[2M]**
     ii. Identify the hybridization state of the underlined atom from the given molecule.   **[2M]**
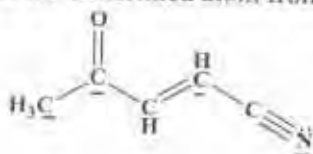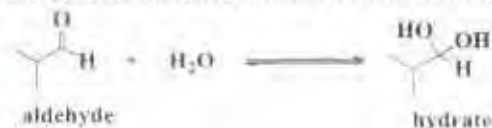
iii. List the following alkyl halides in decreasing order of S$_N$1 reactivity. Justify your answer.

Propose the mechanism of the most active compound with alcoholic NaOH.   [4M]

iv. Draw the energy profile diagram to depict the following reactions and identify the transition states, identify whether the reaction is endothermic or exothermic.   [4M]
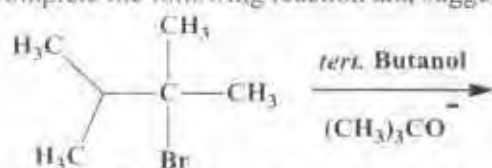

Q.3 i. Discuss Bayer strain in cycloalkane   [2M]

ii. Arrange the order of reactivity of following nucleophiles   [2M]
Sodium t-butoxide, Sodium methoxide, Sodium acetate

iii. What is Hoffmann rule? Complete the following reaction and suggest the mechanism (E1/ E2) [4M]

iv. Write a note on epoxidation of **trans 2-butene** and comment on the stereochemistry of the product. [4M]

Q. 4 i. Define Enthalpy. Comment on the ΔG, ΔH, ΔS of the given reaction.   [4M]

ii. Which one of the following pair is expected to exhibit H-bonding and why. Justify your answer
Phenylethylamine and Anisole   [2M]

iii. On the basis of solubility, justify the increasing order of logP for the following compounds   [2M]
Benzene (logP= 2.13), **Bromobenzene** (logP= 2.99), **Chlorobenzene** (logP= 2.84), **Fluorobenzene** (logP= 2.27)

iv. Identify the best leaving group MeO , OH, NH$_2$ and justify.   [2M]

v. Identify whether the given molecules are chiral or achiral and Justify.   [2M]
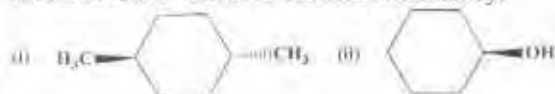
Q.5 i. Arrange the following compounds in increasing order of acidity & Justify.   [2M]
o-Nitrobenzoic, p-Nitrobenzoic acid and m-Nitrobenzoic acid

ii. Arrange the following compounds in increasing order of basicity & Justify.   [2M]
**Aniline, Cyclohexylamine, Hexanamine**

iii. With the help of energy profile diagram draw various conformers of **n-butane**. Comment on their relative stability.   [4M]

iv. Give the scheme for acid degradation/ base degradation of Paracetamol.   [4M]

Q.6 i. Distinguish between the terms – intermediates and transition states giving suitable examples and support your answer by drawing energy profile diagram.   [4M]

ii. Identify whether the given molecules are aromatic, nonaromatic or antiaromatic   [4M]
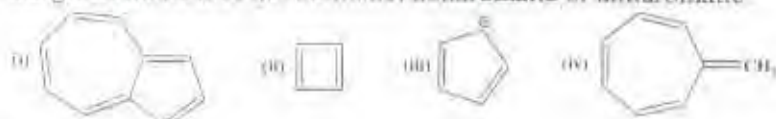
iii. Give the product   [4M]

10/04/2019

sem - III CBCS
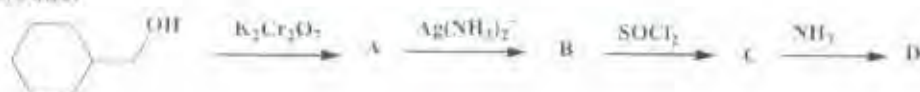
[Time: 3 Hours]   **[Marks:80]**

Please check whether you have got the right question paper.

1. All questions are compulsory.
2. Figures to the right indicate full marks.

Q.1	a. What are Vander Waal's intermolecular forces.	2
	b. Define the terms vapor pressure and boiling point.	2
	c. Define additive and colligative properties with examples.	2
	d. State phase rule and explain degrees of freedom.	2
	e. How do pressure and temperature affect the solubility of gases in liquids?	2
	f. Differentiate between strong and weak electrolytes.	2
	g. Calculate the pH of: i. 0.05 M NaOH and, ii., 0.0005 M HCl	2
	h. Define the terms surface tension and surface free energy.	2
	i. Explain the terms wetting and contact angle.	2
	j. Define the terms dynamic viscosity and viscoelasticity.	2

Q.2 a. What are ideal and real gases? One mole of diethyl ether occupies 15 liters at 227°C 4
Calculate the pressure if Van der Waal's constants for diethyl ether are a = 17.38
atm.lit^{-2} mol^{-2}, and b = 0.134 lit.mol^{-1}.
(Given: R 0.0821lit.atm.K^{-1} mol^{-1})

b. What are isotonic solutions? Explain any one class I method to adjust tonicity. 4

c. Explain the effect of temperature on partial miscibility of liquids with suitable example. 4

Q.3 a. What is optical rotation? Explain the working of polarimeter. 4

b. What is buffer capacity? Write a note on buffers used in pharmaceutical system. 4

c. Write a note on surface active agents. If the saponification value and acid value of a 4
surfactant are 55 and 70.2 respectively, calculate its HLB. Also comment on the nature
of the surfactant.

Q.4 a. Define Raoult's law and differentiate between ideal and real solutions. **OR** Write a note 4
on azeotropic mixtures.

b. State and explain Distribution Law. Mention the modifications of the law for weak 4
electrolytes.

c. Derive Henderson Hasselbalch equation for a buffer comprising acetic acid and sodium 4
acetate.

Q.5 a. What is polymorphism? With suitable examples explain pharmaceutical significance of 4
polymorphs and amorphous solids.

b. Define adsorption isotherm. Derive equation for Langmuir adsorption isotherm. 4

c. Draw rheograms for non-newtonian systems and explain any one in detail. **OR** What 4
do you understand by thixotropy? State its significance.

Q.6 a. Write a note on liquid crystalline state. 4

b. Enlist methods to determine surface tension and explain any one in detail. 4

c. What are the different viscometers available to measure viscosity of newtonian and 4
non-newtonian liquids? Explain the principle and working of any one.

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Q4. Attempt **any three** of the following questions. (12)
   a) Give the principle and chemical reactions involved in the assay of: **(any two)**
      i.   Sodium benzoate
      ii. Soluble aspirin tablets
      iii. NaCl
      iv. H_2O_2
   b) Give the role of:
      i.   Starch iodide paste in nitrite titrations
      ii. Pyridine in Karl Fischer reagent
      iii. Potassium sulphate in Kjeldahl's method
      iv. NaOH in oxygen flask combustion technique
   c) What are amperometric titrations? Explain with suitable examples and diagrams.
   d) Explain the role of supporting electrolyte. Write a note on differential pulse polarography.

Q5. Attempt **any three** of the following questions: (12)
   a) NH_3 obtained when 0.5g of an organic compound substance was subjected to Kjeldahl's method was neutralized by 10 mL of 1M H_2SO_4. Estimate the composition (percentage) of nitrogen in the given organic compound.
   b) Four measurements of an analytical experiment are: 51.3, 55.6, 49.9 and 52.0. Calculate the mean, standard deviation, variance and relative standard deviation.
   c) Solve the following:
      i) Calculate the pH of a solution containing 5×10^{-5} M of H^+ ions per liter. Also calculate the pOH of the solution.
      ii) Calculate the gravimetric factor for conversion of CaO to $CaCO_3$. (Given: At. Wt. of Ca= 40, C= 12, O= 16)
   d) A solute A (Partition co-efficient= 4) was dissolved in 10ml of water. This solution was extracted twice with 10ml of ether each time. Calculate the percentage of solute A in the solution at the end of two extractions.

Q6. Attempt **any three** of the following questions: (12)
   a) What is the significance of the von Weirmarn ratio? Write a note on precipitation from homogeneous solutions.
   b) Classify different precipitating agents used in gravimetry. Give ideal properties of both the precipitating agents and precipitate formed.
   c) Give the role of :
      i.   KCN and formaldehyde-acetic acid solution in complexometric titrations.
      ii. 0.05 M $MgSO_4$ solution in assay for Calcium gluconate.
   d) What is the importance of buffers in complexometry? Give an account of metallochromic indicators.

Duration: 3 Hours   **Total marks: 80**

i. All questions are compulsory.
ii. Figures to the right indicate full marks.
iii. Draw neat and labeled diagrams wherever relevant.

Q1 A. Complete the following table: (05)

API	Indicator used in its assay
Ferrous sulphate	
Aspirin	
Acetazolamide	
Ascorbic acid	
Calcium gluconate	

B. Explain the following terms (**Any Five**):   (05)
i. Precision
ii. Solubility product
iii. Peptization
iv. Overvoltage
v. Buffer capacity
vi. Limiting current

C. Attempt **any five** of the following questions.   (10)
i. Balance the given reaction:
$$I^- + MnO_4^- \longrightarrow I_2 + Mn^{2+}$$
ii. What is the Ilkovic equation? Explain the terms involved.
iii. Enlist the contents of a pharmacopoeial monograph.
iv. Identify number of significant figures in following: $6.022140857 \times 10^{23}$, 3.147
v. What are the types of coulometric titrations?
vi. What is Ostwald ripening?

Q2. Attempt **any three** of the following questions: (12)
a) What is a "blank" determination? Give the reactions of an assay involving blank determination.
b) Discuss the neutralization curve obtained for the titration of a strong acid versus a strong base. Suggest a suitable indicator for such a titration.
c) Explain the term "fractional precipitation". Write a note on standardization of 0.1N $AgNO_3$.
d) Using suitable examples, discuss "leveling and differentiating solvents".

Q3. Attempt **any three** of the following questions: (12)
a) What are the disadvantages of $KMnO_4$? Suggest a suitable titrant which overcomes most of these disadvantages for redox titrations.
b) Give an account of iodate titrations.
c) Compare determinate and indeterminate errors. What is relative error?
d) Write a note on multiple extraction. Draw a suitable diagram of an apparatus used for continuous extraction using an extractant of high density.

(3 HOURS) |TOTAL MARKS : 80|

N.B. 1) All questions are compulsory.
2) Draw neat and labelled diagrams wherever necessary.

a). With neat and labelled diagrams discuss simple manometer. 3M
b). Explain the concept of mass transfer. 3M
c). Elaborate factors affecting rate of crystallization. 2M
d). Define Economy and capacity of evaporation. 2M
e). Enlist the different methods for distillation of miscible binary liquid system. 2M
f). Write notes on aluminium as material for plant construction. 3M
g). Discuss Meir's Theory of Supersaturation. 3M
h). Discuss expansion traps as evaporator accessories. 2M

Q2.
a). Discuss principal, construction and working of Rotary pump. 4M
b). Elaborate design and working of Krystal crystallizer. 4M
OR
b). Elaborate design and working of Circulating Magma crystallizer.
c). Explain principal of molecular distillation unit and give its application. 4M

Q3.
a). Explain construction and working of Orifice meter. 4M
OR
a). Explain construction and working of Pitot tube
b). Elaborate on the construction and working of horizontal tube evaporator. 4M
c). Discuss Refrigeration. Load in detail. 4M

Q.4
a). Discuss the experiment for understanding of Bernoulli's theorem. 4M
b). Define different modes of heat transfer and write notes on Fourier's Law. 4M
OR
b). Enlist various types of temperature measurement device and explain any one in detail.
c). Discuss in brief crystal Habit and Crystal Form. 4M

Q.5
a). Explain design and working of centrifugal pump. 4M
b). Discuss a fractional distillation. 4M
OR
b). Elaborate on the construction and working of plate column.
c). Write note on Chemical hazards. 4M

Q.6
a). Discuss construction and working of Screw conveyor. 4M
b). Elaborate on the construction and working of falling film evaporator. 4M
c). Explain factor affecting rate of corrosion. 4M
OR
c). Define corrosion and discuss methods to combat corrosion