



PUNJAB ENGINEERING COLLEGE (DEEMED TO BE UNIVERSITY), CHANDIGARH

**Mid-term Examination
28th September, 2018**

Programme: B.E. (Electrical & ECE Engg.)

Course: Chemistry

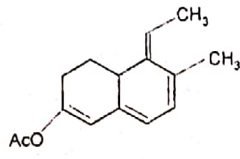
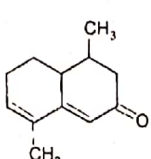
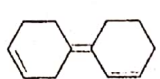
Maximum Marks: 30

Notes: All questions are compulsory.

Year/Semester: 2018/1st

Course Code: CHN101

Time allowed: 1.5 Hours

Q.No.		Marks
1.	(a)	50ml of water each time of titration against standard soap solution gave the following results: Lather factor = 0.4ml, Total hardness=8.2ml, Permanent hardness=2.5ml and standard hard water (containing 0.2g CaCO ₃ per litre) =19.9ml. Calculate each type of hardness in ppm. [3]
	(b)	Describe the demineralization process of softening of hard water. What are its advantages over zeolite process? [3]
	(c)	Calculate the quantities of lime and soda required for softening 300,000 litres of water, using 20ppm of sodium aluminate as a coagulant. Impurities in water are as follows: Ca ²⁺ =160ppm; Mg ²⁺ =96ppm ; HCO ₃ ⁻ =403ppm ; dissolved CO ₂ =34ppm [4]
2.	(a)	Define Crystal Field Stabilization Energy. Calculate its value for the following system: (i) d ⁵ low spin octahedral (ii) d ⁵ High spin octahedral (iii) d ^d Tetrahedral Account for their magnetic behavior also. [4]
	(b)	How does crystal field theory explain the colour of co-ordination complexes? Explain with examples. [2]
	(c)	What are assumptions on which crystal field theory is based? Show the effect of tetragonal distortion on the octahedral ligand field in which trans ligand are more closer than others. [4]
3.	(a)	Discuss the effect of polar solvents on n → π* and π → π* transitions. [3]
	(b)	What are absorption laws? How is an ultraviolet spectrum plotted? [2.5]
	(c)	Calculate the λ _{max} of the following: [4.5] <div style="display: flex; justify-content: space-around; align-items: center;">    </div>



PUNJAB ENGINEERING COLLEGE: CHANDIGARH
(DEEMED TO BE UNIVERSITY)

Examination
November, 2018

Programme: B.E. (Electrical & Electronics)

Course Name: Chemistry

Maximum Marks: 80

Notes:

Year/Semester: 2018/1st

Course Code: CHN101

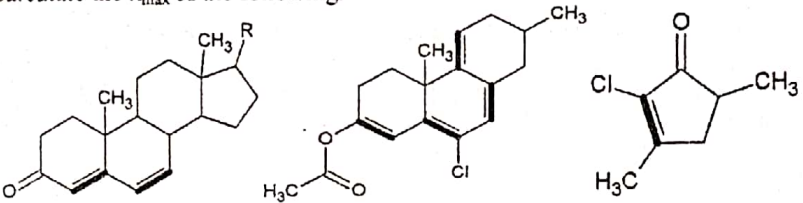
Time allowed: 3.0 Hours

1. All questions are compulsory.
2. Unless stated otherwise, the symbols have their usual meanings in context with subject. Assume suitably and state, additional data required, if any.
3. The candidates before starting to write the solutions, should please check the question paper for any discrepancy, and also ensure that they have been delivered the question paper of right course code.

Q.No.		Marks	
1	(a)	Calculate the quantities of lime and soda required for softening of 1, 00, 000 litres of water using 278 ppm of $\text{FeSO}_4 \cdot 7\text{H}_2\text{O}$ as a coagulant. The results of analysis of raw water and softened water are as follows: Analysis of raw water: $\text{Ca}^{2+} = 120 \text{ ppm}$; $\text{Mg}^{2+} = 144 \text{ ppm}$; $\text{HCO}_3^- = 732 \text{ ppm}$; dissolved $\text{CO}_2 = 22 \text{ ppm}$ Analysis of treated water: $\text{CO}_3^{2-} = 30 \text{ ppm}$; $\text{OH}^- = 17 \text{ ppm}$	[5]
	(b)	A zeolite softner was 95% exhausted, when 10,000 L of hard water was passed through it . The softner required 150L of sodium chloride solution of strength 50 g NaCl/L of solution to regenerate. What is the hardness of water.	[5]
	(c)	What are boiler scales and their ill-effects? Give the best internal treatment method to prevent them.	[5]
2.	(a)	Give the synthesis of epoxy resins. Mention its important properties and uses.	[4]
	(b)	What is meant by compounding of plastic? Give significance of each additive.	[3]
	(c)	What is coordination polymerization? Explain its mechanism and also give its significance.	[3]
3	(a)	Give the detailed mechanism, for the conversion of p-nitro phenyl chloride to N,N dimethyl-p-nitrobenzene	[4]
	(b)	Show the synthesis of the following compounds from benzene. <div style="display: flex; justify-content: space-around; align-items: center;"><div style="text-align: center;">NH_2 CH_3</div><div style="text-align: center;">COOH Cl</div><div style="text-align: center;">OH NO_2</div></div>	[3]

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	(c)	Show the stepwise mechanism for the nitration of 4-bromo toluene	[3]
4	(a)	What is delta scale in NMR spectroscopy? How is it related to tau scale?	[5]
	(b)	Give the factors affecting vibrational frequency in IR spectra. Give the peak to characterize acetone and acetic acid.	[4]
	(c)	How many NMR signals are expected in each of the following compounds and give their multiplicity. (i) Methyl propyl ether (ii) Acetophenone (iii) 1-Butanol (iv) Tertiary butyl amine (v) Isopropyl chloride	[5]
	(d)	Calculate the λ_{\max} of the following: 	[6]
5	(a)	Explain various types of batteries by taking at least one example of each.	[4]
	(b)	What are different types of fuel cells based on the type of electrolytes? Explain any one of them.	[4]
	(c)	What are crystal defects and how are they classified?	[4]
6.	(a)	What are semi-conductors? Give their applications in rectifiers and transistors.	[4]
	(b)	How does Crystal field theory explain the colour and magnetic properties of co-ordination complexes? Explain with examples.	[5]
	(c)	Give four factors which may affect the magnitude of crystal field splitting in a transition metal complex. Give an example for each.	[4]

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