Name : .....

Roll No. : .....

Invigilator's Signature : .....

CS/B.PHARM/SEM-8/PT-801/2011

2011
PHARMACEUTICAL ANALYSIS

Time Allotted : 3 Hours *Full Marks* : 70

The figures in the margin indicate full marks.
Candidates are required to give their answers in their own words as far as practicable.

GROUP – A
(Multiple Choice Type Questions)

1. Choose the correct alternatives for any *ten* of the following : $10 \times 1 = 10$

i) Hypsochromic shift is known as

a) Blue shift b) Orange shift

c) Red shift d) Yellow shift.

ii) Which of the following bonds show strongest absorption in IR spectra ?

a) –OH bond b) –CH bond

c) –SH bond d) –NH bond.

iii) Energy absorbed in UV region produces changes in the

a) Rotational energy of the molecule

b) Electronic energy of the molecule

c) Vibrational energy of the molecule

d) None of these.

iv) Alcohols exhibit a strong and broad band in the region 1200 – 1000 cm^{-1} due to

a) O — H stretching b) C — O stretching

c) C — H stretching d) C — C stretching.

v) Flame photometry is used for the rapid quantitative determination of the

a) elements present in *f*- block of the periodic table

b) elements present in group I & II of the periodic table

c) B-vitamins

d) hydrophilic polymers.

vi) The region from $1 \cdot 2\,\mu m$ to $2 \cdot 5\,\mu m$ is known as

a) Photographic region b) Overtone region

c) Vibration region d) Rotation region.

vii) Toluene is most likely to have a base peak at

a) m/e = 91 b) m/e = 77

c) m/e = 48 d) m/e = 88.

viii) Wavelength of a radiation is 5 μm. Wave number corresponding to that is

a) 1000 cm^{-1} b) 2000 cm^{-1}

c) 3000 cm^{-1} d) 4000 cm^{-1}.

ix) The chemical shift value is

a) proportional to field strength

b) not proportional to field strength

c) ratio of number of protons in each group

d) proportional to the number of protons.

x) Absorbance of a diazepam solution in $0 \cdot 1\,M$ hydrochloric acid having concentration $5\,\mu g/ml$ is found to be 0.244 at 286 nm, then what should be the A (1%, 1 cm) value of diazepam ?

a) 480 b) 484

c) 488 d) 492.

xi) Which of the following solvent should be suitable for preparing samples to run NMR spectrum ?

a) Water b) Deuterated water

c) Both (a) & (b) d) Acetone.

xii) Absorption maxima (λ_{max}) of benzene changes from 255 nm to 280 nm when the auxochrome ..... is added to benzene ring.

a) — $NHCH_3$ group b) — OH group

c) — OCH_3 group d) — NH_2 group.

GROUP – B

(Short Answer Type Questions)

Answer any *three* of the following. $3 \times 5 = 15$

2. What are chromophores and auxochromes ? Explain why and how auxochrome increases the colouring power of chromophores.

3. Why is a reference standard needed in NMR spectroscopy ? Name a suitable reference standard indicating its advantages.

4. According to Beer – Lambert law prove that A = ε c t, where A is the absorbance of the solution, "ε" is the molar extinction coefficient, "c" is the concentration of the solution in moles/litre and "t" is the optical path length in cm.

5. In the determination of calcium in natural waters by atomic absorption spectroscopy, series of solutions was prepared. Each 50 ml of unknown solution was diluted up to 100 ml by addtion of known increments of standard calcium solutions. Concentrations of standard calcium solutions and absorbencies of final solutions are summarized in the table below. Calculate the concentration of calcium in water.

Sl. No.	Initial volume of unknown solution in ml	Concentration of Ca^{2+} in mg/ml	Concentration of standard Ca^{2+} added in mg/ml	Absorbencies
1	50	X (Unknown)	0·0	0·10
2	50	X (Unknown)	0·2	0·25
3	50	X (Unknown)	0·4	0·40
4	50	X (Unknown)	0·6	0·55

6. What are the electronic transitions responsible for UV absorption ?

GROUP – C

(Long Answer Type Questions)

Answer any *three* of the following. $3 \times 15 = 45$

7. State the rules of calculating absorption maxima in conjugated dienes and trienes. Calculate the absorption maxima of

   a) toluene

   b) 2, 3 dimethyl 1, 3 butadiene and

   c) 1-acetylcyclohexene.

State the procedure for preparation of solid sample to be studies in IR spectrophotometer. What is the utility of "Fingerprint" region ? 2 + 6 + 4 + 3

8. a) What do you mean by flame emission spectroscopy ? Write the basic principles of flame photometry.

   b) Write the instrumentation and working of a flame photometer.

   c) How do you determine the sodium content of a unknown sample using flame photometer ? 5 + 5 + 5

9. a) Give the definition of validation and explain the steps involved in process validation.

   b) What are the performance characteristics for validation of an analytical method ? Discuss about the validation of analytical procedures for High Performance Liquid Chromatography (HPLC). (1 + 6) + (4 + 4)

10. Describe about the theory and components of mass spectrometer with necessary mathematical equations and neat labeled diagrams. What are the general rules for interpretation of mass spectra ? 4 + 7 + 4

11. a) Write down the differences between fluorescence and phosphorescence.

b) Describe the different types of detectors used in fluorimetry.

c) How can you estimate uranium, ruthenium, cadmium, aluminium (III) and boron using fluorimeter ?

4 + 6 + 5