

## U.G. 6th Semester Examination - 2021

## CHEMISTRY

## [PROGRAMME]

## Skill Enhancement Course (SEC)

Course Code : CHEM(G)SEC-T-1&amp;2(A),(B),(C)&amp;(D)

Full Marks : 40

Time : 2 Hours

*The figures in the right-hand margin indicate marks.**Candidates are required to give their answers in their own words as far as practicable.***Answer all the questions from selected Option.**

## OPTION-A

## CHEM(G)SEC-T-1(A)

## (IT Skills for Chemists)

1. Answer any **five** questions: 2×5=10
- What is an upper triangular matrix?
  - If  $f(x) = \frac{(x+\cos x)}{\tan x}$ , find  $f'(x)$ .
  - Explain the term relative error with example.
  - Write the characteristics of gaussian distribution curve.
  - Define the term 'Mode' with examples.
  - What is the molar extinction co-efficient of a compound?

g)  $f(x) = 108x + 5x^2 + 2x^3$ . Find  $f'(-3)$

h) What does ASCII Stand for?

2. Answer any **four** questions: 5×4=20
- What are the differences between AND and NAND logical operators?
  - What are standard uncertainties? Give examples.
  - Describe Bragg's Law.
  - When ice melts what happens to the entropy of the system and why?
  - What is the pH of 0.3 (M) CH<sub>3</sub>COOH? pK<sub>a</sub> of Acetic acid = 4.75.
  - What are iteration statements in C?
3. Answer any **one**: 10×1=10
- Write the ASCII code for the word TEST. What happens if you press F<sup>^</sup> while debugging? Does it go into the method if it has break point or not?
  - What do you mean by standard deviation? Calculate the value of standard deviation for the following results: 70.2, 70.12, 70.18.
  - Show  $E = 3 nkt/2v$ .

**OPTION-B**

**CHEM(G)SEC-T-1(B)**

**(Basic Analytical Chemistry)**

1. Answer any **five** questions:  $2 \times 5 = 10$
- a) What do you mean by complexometric titration?
  - b) Give one example of metal-ion indicator. Draw its structure.
  - c) Calculate the mean of the following measurements: 20.23, 20.54, 20.76.
  - d) Define accuracy.
  - e) Write the composition of soil.
  - f) What do you mean by stationary phase? Give one example.
  - g) Give the major constituents of talcum powder.
  - h) Define significant figures.
2. Answer any **two** questions:  $5 \times 2 = 10$
- a) How will you estimate  $\text{Ca}^{2+}$  and  $\text{Mg}^{2+}$  as calcium carbonate by complexometric titration? 5
  - b) The concentration of copper in two separate analyses is given by 16.17 ppm and 15.80 ppm. If the accepted value is taken as 16.00 ppm, calculate the absolute error as well as the relative

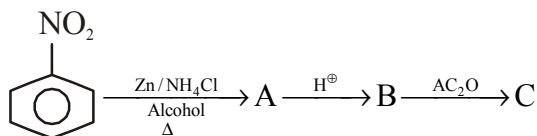
error as percent in two cases. 5

- c) Explain the terms food processing and food preservation. Give its advantages.  $2+2+1=5$
  - d) Define  $R_f$  value. Explain the factors on which it depends.  $2+3=5$
3. Answer any **two** questions:  $10 \times 2 = 20$
- a) What is chromatography? Give at least two advantages of TLC. What is the basic principle of paper chromatography?  $2+2+6=10$
  - b) What do you mean by water contamination and water purification? Discuss the alkalinity of water and method for its determination.  $2+2+6=10$
  - c) What are food additives? Differentiate between pasteurization and fermentation? Name the adulterants found in coffee powder, asafetida and pulses.  $2+2+2+2=10$
  - d) Explain spectrophotometric techniques to determine iron in dietary tablets. What are arson accelerants? Explain by taking various examples.  $5+5=10$

**OPTION-C**  
**CHEM(G)SEC-T-2(A)**  
**(Pharmaceutical Chemistry)**

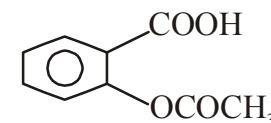
1. Answer any **five** questions: 2×5=10
- What are drugs? What is the ideal requirement of drug?
  - Antibiotics are chemotherapeutic agents. Explain.
  - From which moulds chloramphenicol was isolated at first?
  - Why should aspirin not to be taken on an empty stomach?
  - Draw the structure of the product when vitamin C is oxidised in the body.
  - What are  $\beta$ -lactam antibiotics?
  - Aspirin is considered as Pro-drug. Explain.
  - Why vitamin B<sub>2</sub> is also called Lactoflavin?

2. Answer any **two** questions: 5×2=10
- Write down the products:



What is the common name of product 'C'?  
Mention its use. 3+1+1

- Work backward to indentify the starting materials for the following compound:



Show its synthesis.

Between aspirin and paracetamol, when one is more toxic and why?

- Name one drug which is used as hyponotic and antiepileptic. How it could be prepared? What precautions are necessary during application of this drug? 1+2+2
  - Which form of ascorbic acid is vitamin C?
    - Why intake of excess amount of paracetamol is not safe?
    - What will be the effect of Prolong intake of vitamin C? 1+2+2
3. Answer any **two** questions: 10×2=20
- Name one antibiotic which is used mainly for the treatment of Typhoid fever. How it can be

prepared? How many chiral centres are present in it? How many stereoisomers are possible? Which isomer is used as medicine?

2+3+1+2+2

b) How will you prepare rectified spirit and absolute alcohol from dilute alcohol? How will you prepare denatured and methylated spirit? Why denaturation and methylation are necessary? Comment on the optical activity of citric acid.

4+4+2

c) How will you prepare the following through fermentation process (i) Citric acid (ii) Vitamin B<sub>12</sub> (iii) Penicillin. 'Indiscriminate use of chloromycetin for minor infection may give rise to fatal anaemia'. Explain.

$2\frac{1}{2} + 2\frac{1}{2} + 2\frac{1}{2} + 2\frac{1}{2}$

d) Complete the following: 10

i) Streptomycin was isolated from cultures of \_\_\_\_\_.

ii) Penicillin was discovered by \_\_\_\_\_ in 1929.

iii) Fermentation reaction is \_\_\_\_\_ reaction.

iv) Aspirin contains \_\_\_\_\_, \_\_\_\_\_ and \_\_\_\_\_ properties.

v) \_\_\_\_\_ is known as vitamin D.

vi) Another name of paracetamol or N-(4-hydroxyphenyl) acetamide is \_\_\_\_\_.

vii) Glutamic acid is \_\_\_\_\_ type  $\alpha$ -amino acid.

viii) Vitamin B<sub>12</sub> contains \_\_\_\_\_ metal in its structure.

**OPTION-D**

**CHEM(G)SEC-T-2(B)**

**(Analytical Clinical Biochemistry)**

1. Answer any **five** questions:  $2 \times 5 = 10$
- a) What are the building blocks of proteins. Give some examples of these building blocks.
  - b) Which type of macromolecules have general formula  $CH_2O_n$ ? Explain with example.
  - c) Which type of macromolecule is not soluble in water? Give explanation.
  - d) What are the monomers of lipid? Explain with example.
  - e) Which macromolecules are used in animals as a source of quickenergy that can be stored in liver and muscle and which macromolecules are responsible for storing and transportation of genetic informations?
  - f) What is the active site of an enzyme and how does it work during catalysis?
  - g) Haemoglobin of an adult person is a tetramer consisting of two identical  $\alpha$  and two identical  $\beta$  polypeptide chains. What is this kind of the protein structure called? Give an example of simple protein.

- h) Write down the structures of purine and pyrimidine bases of DNA.
2. Answer any **two** questions:  $5 \times 2 = 10$
- a) Derive the Michaelis-Menten equation for enzyme catalysis reaction. 5
  - b) What are the complex proteins? Classify complex proteins with at least one example for each type. 2+3
  - c) Write a short note on Blood Coagulation. 5
  - d) What is the iodine number of oil? Discuss about its determination method. 2+3
3. Answer any **two**:  $10 \times 2 = 20$
- a) Discuss about the primary, secondary, tertiary and quaternary structure of protein. 10
  - b) What are the enzyme inhibitors? Discuss about competitive and non-competitive inhibition. 2+8
  - c) Discuss about the Watson-Crick model of DNA structure. What are the constituents of blood? 8+2
  - d) Write short notes on: 5+5
    - i) Biuret reaction
    - ii) SDS PAGE