U. G. 6th Semester Examination 2022

CHEMISTRY (Honours)

Paper Code : CEMH SEC-2

[CBCS]

Full Marks : 40 Time : Two Hours

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

SEC 2-A : Pharmaceutical Chemistry

1. Answer any ***eight*** questions from the following : 1×8=8

   (a) Identify the compound which does not act as a target for drug action in the human body?

   (i) RNA

   (ii) DNA

   (iii) Vitamin C

   (iv) Protein

   (b) Which of the term is used to describe the dose of a drug required to kill 50% of a group of animals?

   (i) LD_1

   (ii) LD_{50}

   (iii) ED_{50}

   (iv) ED_{99}

   (c) Which of the following is not a classification of drugs?

   (i) Based on size

   (ii) Based on chemical structure

   (iii) Based on drug action

   (iv) Based on target

(d) Aspirin is a synthetic prodrug of

(i) Cinnamic acid

(ii) Salicylic acid

(iii) Benzoic acid

(iv) Ascorbic acid

(e) Vitamin B_{12} contains

(i) Mg

(ii) Co

(iii) Fe

(iv) Cr

(f) Streptomycin is an antibiotic which is————————.

(i) Monosaccharide

(ii) Disaccharide

(iii) Trisaccharide

(iv) None of them

(g) Fermentation is an

(i) Aerobic Respiration where incomplete oxidation of pyruvate happens

(ii) Anaerobic Respiration where incomplete oxidation of pyruvate happens

(iii) Aerobic Respiration where complete oxidation of pyruvate happens

(iv) Anaerobic Respiration where complete oxidation of pyruvate happens

(h) "Chloroquine" molecule bears

(i) One type of amine

(ii) Two types of amines

(iii) Three types of amines

(iv) None of them.

(i) "Diazepam" is

(i) An antifungal Drug

(ii) An AIDS related drug

(iii) An anxiolytic drug

(iv) An antiviral drug.

(j) "AZT" is

(i) Nucleoside Reverse Transcriptase Inhibitor

(ii) An orphan receptor

(iii) A hypotonic agent.

(iv) An antipyretic agent

(k) Penicillin contains ..... unit.

(i) α -lactam

(ii) β - lactam

(iii) γ - lactam

(iv) δ - lactam

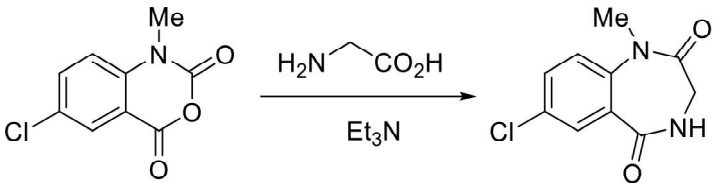
2. Answer any ***six*** questions : 6×2=12

(a) Based on structures write down different classes of antibiotic drugs.

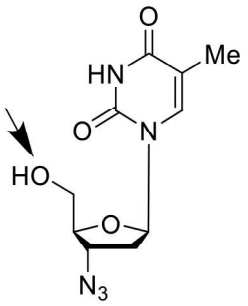
(b) During the synthesis of Ibuprofen, identify the chemical reaction of a step that utilises the following reaction.

$$RCOMe \longrightarrow RCH(Me)CHO$$

(c) Write down the mechanism of the following step toward the synthesis of Valium



(d) What is the role of the following OH group (marked arrow) of AZT for its drug activity?



(e) 6-aminopenicillanic acid is a pivotal precursor for Amoxicillin, a modified penicillin. Explain.

[P.T.O.]

(f) Both lysine and glutamic acid are produced from Krebs cycle, but intermediates are different. Write down the name of these two intermediates.

(g) What is the basic structural difference between a penicillin and a cephalosporin?

(h) What is NSAID? Give an example.

3. Answer any ***two*** questions : 10×2=20

(a) What is synergistic action? Give one example of such drug. What type of drug it is? What are the adverse effects of this drug? Show the retrosynthetic analysis and the corresponding synthesis of trimethoprim. 2+1+1+2+(2+2)

(b) (i) Explain the basic principle of pain relief mechanism by ibuprofen. 4

(ii) Make a retrosynthetic analysis of Dapsone corresponding to its synthesis from acetanilide & outline the important steps of this synthesis. 4+2

(c) (i) Write down the schematic presentation of the biosynthetic pathway for the production of citric acid. 5

(ii) Write down the structure of Vitamin B_{12}. In context of NAD+ regeneration what is the basic difference between aerobic and anaerobic fermentation. 3+2

(d) (i) What are the important steps for the production of Vitamin C from D -Glucose? Sketch the important steps. 5

(ii) Outline the synthesis of Streptose and Streptidine. 5

SEC 2-B : Analytical Clinical Biochemistry

1. Answer any ***eight*** questions from the following: 1×8=8

(a) A 20-carbon fatty acid among the following is :

(i) Linoleic acid

(ii) α -Linolenic acid

(iii) β -Linolenic acid

(iv) Arachidonic acid

(b) A 20-carbon fatty acid among the following is :

(i) 110 days

(ii) 120 days

(iii) 90 days

(iv) 180 days

(c) During prolong starvation, which of the following hormone is responsible for increasing gluconeogenesis in the liver

(i) Insulin

(ii) Glucagon

(iii) TSH

(iv) Thyroxine

(d) During gluconeogenesis, the three irreversible steps of glycolysis have to be bypassed. The first step is the conversion of pyruvate to phosphoenolpyruvate. Which of the following statement is false regarding the reaction step

(i) This reaction involves a two-step process catalyzed by pyruvate carboxylase and phosphoenolpyruvate carboxykinase

(ii) Conversion of oxaloacetate from pyruvate occurs in mitochondria and shuttled into the cytosol.

(iii) Formation of phosphoenolpyruvate requires both ATP and GTP as an energy source.

(iv) Acetyl CoA is an activator of the enzyme pyruvate carboxylase.

(e) Which of the following organ expresses glucokinase?

(i) Kidney

(ii) Muscle

(iii) Liver

(iv) Brain

(f) A tripeptide functioning as an important reducing agent in the tissues is:

(i) Glutathione

(ii) Tyrocidin

(iii) Kallidin

(iv) Bradykinin

(g) The parameter that is estimated in blood sample by van den Bergh test is:

(i) Creatinine

(ii) Urea

(iii) Bilirubin

(iv) Sugar

(h) The lipoprotein that transports dietary cholesterol from the intestine to the other parts of the body is :

(i) VLDL

(ii) LDL

(iii) HDL

(iv) Chylomicrons

(i) Cofactor for urease is :

(i) Mg^{2+}

(ii) Mn^{2+}

(iii) Ni^{2+}

(iv) Zn^{2+}

(j) HbA1c is measured primarily to determine average blood sugar level of :

(i) 3 months

(ii) 5 months

(iii) 6 months

(iv) 12 months

(k) The anti-coagulant among the following is :

(i) Thrombin

(ii) Serotonin

(iii) Fibrin

(iv) Heparin

2. Answer any ***six*** questions : 2×6=12

(a) Mention two important functions of cholesterol.

(b) "Denatured protein is more easily digested" — Explain.

(c) What are the differences between serum and plasma?

(d) What are anomers of D-glucose?

(e) Outline the underlying principle of DAM method for estimation of serum urea content.

(f) Find out the topicity relation between the two CH_2COO- groups of citrate.

(g) What are simple and compound lipids?

(h) Describe how venous blood can be collected from our body for analysis.

3. Answer any *two* questions : 10×2=20

(a) (i) What is a coenzyme? Provide the names and structures of two of the common Coenzymes.

(ii) Outline the steps of conversion from *cis*-Aconitate to α-ketoglutarate as in TCA cycle (no mechanism required, only flowchart).

(iii) Edman's method for determination of the N-terminal residue of a peptide is superior to Sanger's method– Explain. (3+4+3)

(b) (i) What are nonsense codons? Why are they called so?

(ii) How is the sugar level controlled naturally in blood?

(iii) Define $\mathbf{K}_m$. How can $\mathbf{K}_m$ be determined graphically? [3+3+(1+3)]

(c) (i) Point out a basic difference between plasma and serum.

(ii) Cellulose is not digested in human beings - why?

(iii) Outline the role of cholesterol in controlling the fluidity of a lipid bilayer.

(iv) Why Krebs cycle is also called tricarboxylic acid (TCA) cycle? [2+2+4+2]

(d) (i) Identify all the tricarboxylic acid intermediates involved in TCA. Write down the overall reaction of glycolysis.

(ii) What is fibrous protein? Give one example of a fibrous protein. (3+5)+2
