TDC (CBCS) Odd Semester Exam., 2020
held in March, 2021

CHEMISTRY

(5th Semester)

Course No. : CHMHCC–501T

(Biomolecules)

Full Marks : 50
Pass Marks : 20

Time : 3 hours

The figures in the margin indicate full marks for the questions

SECTION—A

1. Answer any *ten* of the following questions : 2×10=20

(a) The two strands in DNA are not identical but are complementary. Explain.

(b) How is adenosine formed?

(c) Draw the structure of *A* and *T* and show hydrogen bonding between them and also the hydrogen bonding between bases *G* and *C*.

(d) Write the names and structures of purine and pyrimidine bases in RNA.

(e) What are essential amino acids? Name two of them and write their structure. 1+(½×2)=2

(f) Prepare glycine by Gabriel's phthalimide synthesis. What happens when glycine is treated with nitrous acid? 1+1=2

(g) What is zwitterion? Write the zwitterion of alanine. How does it behave in strongly acidic medium? 1+½+½=2

(h) If three amino acids, viz., glycine, alanine and phenylalanine react together, how many possible tripeptides can be formed? Write their names.

(i) What are the characteristics of an enzyme?

(j) Why do enzymes work best at 30 °C–40 °C and at pH 7–9?

(k) Distinguish between irreversible and reversible inhibition of an enzyme.

(l) What is acetyl coenzyme A? Discuss its use in biological conversions.

(m) Stearic acid and oleic acid both have equal number of carbon atoms, but the melting point of stearic acid is much higher than oleic acid. Explain why.

(n) Define iodine value of a lipid. What does a lower iodine value signify? 1+1=2

(o) What is hardening of oils? Discuss its importance. 1+1=2

(p) Explain why food products like potato chips are marketed in sealed, coloured and cellophane bags.

(q) What are Gram-negative bacteria? What types of infections are caused by these bacteria? 1+1=2

(r) Write down the synthesis of chloroquine.

(s) What are the different forces involved in drug receptor interaction?

(t) What are the medicinal values of curcumin?

SECTION—B

Answer *any* **five** questions

2. (a) Give the synthesis of thymine. How will you convert thymine into 5-methyl cytosine? 1½+1½=3

(b) Write down the mechanism of replication of DNA. What is a codon? 2+1=3

3. (a) Discuss the process of protein synthesis by RNA. 2½

(b) What are the structural and functional differences between DNA and RNA? 2½

(c) Draw the structure of ATP. 1

4. (a) How will you prepare alanine from ethyl bromide? What are the products formed when alanine reacts with (i) $(CH_3CO)_2O$ and (ii) EtOH/HCl? 2+1+1=4

(b) How can the C-terminal of an amino acid be identified? 2

5. (a) Describe the Merrifield solid-phase process for synthesizing peptides. 3

(b) What are the difficulties encountered in the synthesis of peptides? 2

(c) Name all the different dipeptides that can be made from alanine and glycine. 1

6. (a) What are the various factors that affect enzyme activity? 2

(b) Discuss the various steps involved in an enzyme catalysed reaction. 2

(c) Sulpha drugs act as a competitive inhibitor. Explain. 2

7. (a) What are coenzymes? Discuss the metabolic functions of NAD and FAD. 1+(1½×2)=4

(b) Account for the stereochemical specificity of enzymes with chiral substrate. 2

8. (a) What are triglycerides? Write down the structural formulae of (i) tristearin and (ii) 2-oleo-3-palmito-1-stearate. 1+½+½=2

(b) Why are saturated triglycerides solid at room temperature? 2

(c) What is rancidity? What causes rancidity? 1+1=2

9. (a) What are lipids? Mention the important functions of lipids in the body. 1+2=3

(b) What happens when lipids are hydrolysed? 1

(c) What do you mean by (i) drying oils and (ii) *trans*-esterification? 1+1=2

10. (a) What are antibiotics? Explain the role of antibiotics on the immune system of humans. 1+2=3

(b) Draw the chemical structure of chloramphenicol and discuss the mechanism of action of this antibiotic. 1+2=3

11. (a) Give the synthesis and therapeutic use of ibuprofen. 2+1=3

(b) Write the mechanism of action of ranitidine. What is ranitidine used for? 2+1=3

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