

2017

CHEMISTRY

(Major)

Paper : 6.3

(Organic Chemistry)

Full Marks : 60

Time : 3 hours

*The figures in the margin indicate full marks
for the questions*

1. Answer all questions : 1×7=7

(a) Write the zwitterion structure of glycine.

(b) Define quantum yield of a photochemical reaction.

(c) What is meant by reducing sugar? Give an example of it.

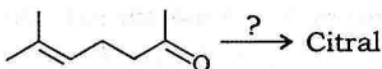
(d) Name one thermosetting and one thermoplastic polymer.

(e) What is peptide linkage?

- (f) Name one sulpha drug and give its structure.
- (g) Write the structure of nicotine.

2. Answer any *four* of the following : 2×4=8

- (a) What are glycosides? Describe a glycosidic linkage.
- (b) Apply isoprene rule to citral molecule to show the attachment of isoprene units. How can you convert the following ketone to citral?



- (c) What products are obtained when acetone is photolysed in absence of hydrogen donor?
- (d) What are nucleotides? Write the name and structure of a nucleotide obtained from RNA.
- (e) Why the triplet state cannot be populated directly by photoexcitation? What is meant by intersystem crossing?
- (f) State the composition and functional difference between DNA and RNA.

3. Answer any *three* of the following : 5×3=15

(a) How will you establish the pyranose ring structure of glucose? 5

(b) Name the monomers used in the manufacture of the following polymers :

(i) Terylene

(ii) Teflon

(iii) Bakelite

(iv) Nylon 6,6

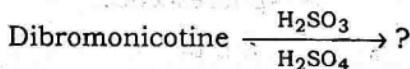
(v) PVC

Write the polymerization reactions which give the above polymers.

$$(\frac{1}{2} \times 5) + (\frac{1}{2} \times 5) = 5$$

(c) What are alkaloids? How will you establish the presence of pyridine nucleus in nicotine? Write the products of the following sequence of reactions :

$$1 + 2 + 2 = 5$$



(d) (i) Plan a synthesis of *cis*-platin. 2

(ii) Name an antimalarial drug and write its structure. 1

(iii) What are hormones? What is the function of insulin in the body? 2

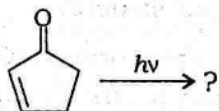
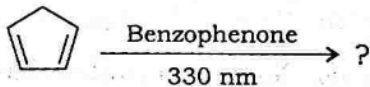
(4)

(e) What are coenzymes? What are the biological functions of the following enzymes? 1+(1×4)=5

- (i) TPP
- (ii) FAD
- (iii) NAD⁺
- (iv) CoASH

4. Answer (a) or (b); (c) or (d); (e) or (f) : 10×3=30

- (a) (i) Draw Jablonski diagram of the process of photoexcitation and energy dissipation of organic compounds. 3
- (ii) Explain why [2+2] cycloaddition of ethene is a photochemically allowed process. 3
- (iii) Mention the essential differences between fluorescence and phosphorescence. 2
- (iv) Find the product(s) of the following reactions : 2



(b) (i) Explain chain-growth polymerization and step-growth polymerization with a suitable example in each case. 4

(ii) What are biodegradable polymers? Give an example of an aliphatic biodegradable polyester. 2

(iii) Name the monomer units of natural rubber and neoprene. 2

(iv) Describe what you mean by vulcanization of rubber. 2

(c) (i) Name the three pyrimidine heterocycles present in nucleic acid. Write their structures. Write a general method of synthesis of a pyrimidine derivative. 3+2=5

(ii) What are the conditions under which enzymes are denatured? What do you understand by inhibition of enzyme action? 2+1=3

(iii) Discuss the importance of Sanger's reagent in peptide chemistry. 2

- (d) (i) Point out the structural differences between hemoglobin and myoglobin. 2
- (ii) Why do glucose and mannose form same osazones? 2
- (iii) What are the constituents of a cell membrane? Write the general structure of a phospholipid. 2
- (iv) Write short notes on helical and sheet structure of proteins. 4
- (e) (i) Give a synthesis of citral. 3
- (ii) Give an example each of narrow-spectrum and broad-spectrum antibiotics. 2
- (iii) Name a drug which finds application both as analgesic and antipyretic. Write the reaction involved in its preparation. 2
- (iv) What is the structural unit present in sulpha drugs? Explain the mechanism of action of sulpha drugs. 3

- (f) (i) Give an example of a chiral drug and draw its structure. 2
- (ii) What is meant by glycolysis? Write the overall reaction involved in glycolysis. 2
- (iii) What is Hofmann's exhaustive methylation? Explain how this reaction can be used to establish the structure of alkaloids. 4
- (iv) D-fructose is a ketohexose, yet it reduces Fehling's solution. Explain. 2
