

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?

(2)

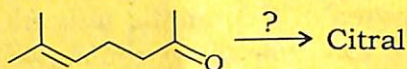
(f) Name one sulpha drug and give its structure.

(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 : $5 \times 3 = 15$

(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

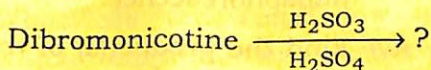
(v) PVC

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

(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

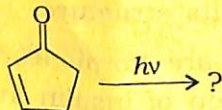
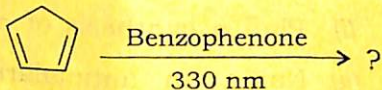
4. Answer (a) or (b); (c) or (d); (e) or (f) : 10×3=30

(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
