

2014

CHEMISTRY

(Major)

Paper : 6.3

Full Marks : 60

Time : 3 hours

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

1. Answer the following questions (any seven) :

1×7=7

(a) What is the geometry of acetylene in the excited state? State the hybridization of the carbon atom.

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

(b) What type of electronic excitations are generally observed in aldehydes or ketones?

1

(c) Write the structure of ATP.

1

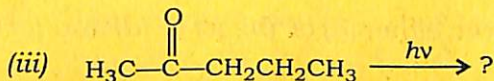
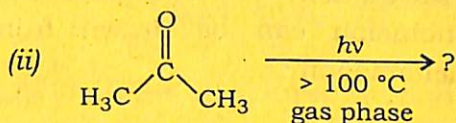
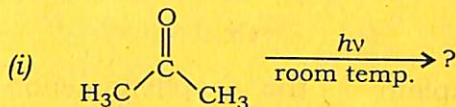
- (d) Give one example each of—
(i) a basic amino acid;
(ii) a heterocyclic amino acid. $\frac{1}{2} + \frac{1}{2} = 1$
- (e) Show that D-glucose and D-mannose are epimers. 1
- (f) Define therapeutic index. 1
- (g) Name an antimalarial drug and draw its structure. $\frac{1}{2} + \frac{1}{2} = 1$
- (h) What is meant by oxidative phosphorylation? 1

2. Answer the following questions : $2 \times 4 = 8$

- (a) Is dacron an addition polymer or condensation polymer? Justify your answer. $\frac{1}{2} + 1\frac{1}{2} = 2$
- (b) How can you explain the fluidity of membranes? 2
- (c) State the special isoprene rule and explain using a specific terpenoid. $1 + 1 = 2$
- (d) Mention the functions of any two sex hormones. 2

3. Answer either (b) or (c) and (d) or (e) and (a) which is compulsory. 5×3=15

(a) Predict the product(s) for the following photochemical transformations :



Propose a general mechanism for Norrish type-II reactions. 1+1+1+2=5

- (b) Describe a method for the synthesis of ala-gly, clearly mentioning the steps involved. 5

Or

- (c) How can you identify the *N*-terminal amino acid of a peptide or a protein? Mention the steps involved. 1+4=5
- (d) Write the reaction and name the product formed, when—

(i) glucose reacts with acetic anhydride;

(ii) glucose reacts with bromine water;

(iii) glucose reacts with conc. nitric acid.

Provide two evidences in support of the cyclic structure of glucose. $1+1+1+2=5$

Or

(e) Explain the phenomenon of mutarotation of D(+)-glucose. What conclusion can be drawn from this phenomenon? $4+1=5$

4. Answer either (a) or (b), (c) or (d) and (e) or (f) : $10 \times 3 = 30$

(a) (i) For a photochemical reaction $A \rightarrow B$ 1.0×10^{-5} mole of B were formed on absorption of 6.0×10^7 ergs at 3600 \AA . Calculate the quantum efficiency. 2

(ii) Draw the Jablonski diagram, clearly showing the photophysical processes. 3

(iii) What is Ziegler-Natta polymerization? How many types of head-to-tail polymers are possible in vinyl polymerization? Write about them in brief. $2+3=5$

Or

(b) (i) State Einstein's law of photochemical equivalence. 1

(ii) Predict the product and provide a mechanism for the following reaction : 1+3=4



(iii) Write the structures of cellulose and starch to show their differences. 2

(iv) What is gutta-percha? How can the properties of natural rubber be improved? 1+2=3

(c) (i) What are coenzymes? Among vitamin C and vitamin D, with which one can associate overdose problem and why? 1+1+1=3

(ii) The conversion of D-glucose to D-glucose-6-phosphate is an example of a coupled reaction. Explain. 3

(iii) Diagrammatically show the base pairing between adenine and thymine and between cytosine and guanine. 2

(iv) Define gene and genetic code. 1+1=2

Or

- (d) (i) Draw the structure of NAD^+ and label the components. 2
- (ii) What happens when isocitrate reacts with NAD^+ in presence of isocitrate dehydrogenase? Write the reaction. 2
- (iii) What is meant by transcription? Write briefly about it. 1+3=4
- (iv) Distinguish between nucleosides and nucleotides. 2
- (e) (i) What are alkaloids? Write the structures of nicotine and nornicotine. Write the reaction involved, when nicotine is allowed to react with potassium permanganate. 1+1+1=3
- (ii) "Prontosil is a prodrug." Explain the statement. 2
- (iii) Describe about the mode of action of sulpha drugs. 3
- (iv) Why is aspirin called a wonder drug? Write the reaction for its preparation. 1+1=2

Or

- (f) (i) What are terpenes? Write the structures of the isomers of citral. Write the reaction involved, when citral is allowed to react with aqueous potassium carbonate. $1+\frac{1}{2}+\frac{1}{2}+1=3$
- (ii) What is meant by immune system? What cells are responsible for mammalian immunity? $1+1=2$
- (iii) Write about the mode of action of any one class of antibiotic. 3
- (iv) Name two anti-cancer drug. Why is it difficult to prepare an anti-cancer drug? $1+1=2$
