

2018

CHEMISTRY

( Major )

Paper : 5.3

( Organic Chemistry )

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) Write one reaction of Pd used as dehydrogenating agent.

(b) Define 'ketonic hydrolysis'.

(c) Write name and formula of an antidote compound.

(d) Write the structure of benzilic acid anion.

(e) What is Adam's catalyst?

(f) What is the limited importance of Lossen rearrangement reaction?

( Turn Over )

(g) Write the structure and name of a quinolinium salt.

(h) Fill in the blank of the following statement :

"Pericyclic reactions are \_\_\_\_\_."

2. Answer the following questions (any four) :  $2 \times 4 = 8$

(a) Give symmetry properties of  $\pi$ -orbitals of ethylene.

(b) What is Hinsberg's test?

(c) How can  $\text{CH}_3\text{CH}_2\text{SH}$  be prepared from thiourea? Write with reactions.

(d) How do you get adipic acid from diethyl malonate?

(e) Give one reaction each to distinguish acetonitrile and methyl isonitrile.

3. Answer the following questions [any one from (a) and (b) and two from (c), (d) and (e)] :  $5 + (5 \times 2) = 15$

(a) How do the following reagents take part in reaction?  $1 \times 5 = 5$

(i) Lead tetraacetate in oxidative decarboxylation

(ii)  $\text{SeO}_2$  in oxidation of allylic C—H fragments

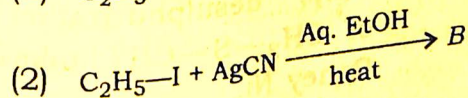
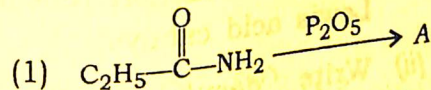
(iii)  $\text{LiAlH}_4$  in hydride transfer

(iv) Pyridinium chloromate with  $2^\circ$  alcohol

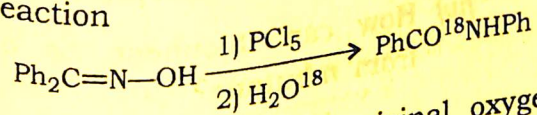
(v)  $\text{CrO}_3$  with aq.  $\text{H}_2\text{SO}_4$  to cleave  $\text{>C=C<}$

(b) (i) What happens when  $\text{C}_6\text{H}_5\text{CH}_2\text{CON}_3$  is heated? Give the mechanism of this reaction.  $1+2=3$

(ii) Identify A and B in the following reactions (give structure and name of each) : 2



(c) Write the mechanism of the following reaction



and establish that (i) original oxygen atom of oxime is lost, (ii) carbonium ion is formed as intermediate and (iii) it does not proceed by intramolecular exchange.  $2+1+1+1=5$

( Turn Over )



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- (d) What is Woodward-Hoffmann rule of an electrocyclic reaction? Explain the rule with orbital symmetry of 1,3-butadiene.
- (e) What is a keto-quarternary ammonium salt? How does it react with strong base? Write the reaction and its mechanism.

4. Answer the following questions :

Either

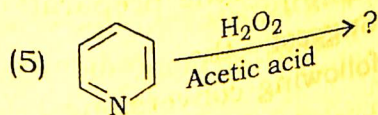
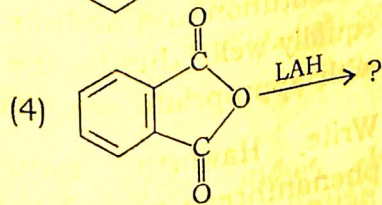
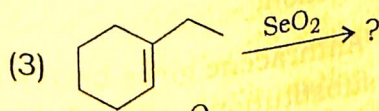
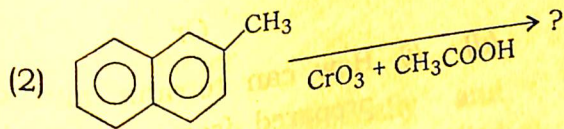
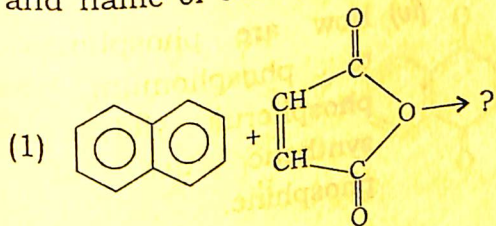
- (a) (i) Discuss relative reactivity of pyridine, thiophene, pyrrole and furan towards Friedel-Crafts acylation reaction reflected in the Lewis acid catalyst.
- (ii) Write desulphurization reaction of  $\text{CH}_3\text{-S-CH}_3$  takes part by Raney Ni.
- (iii) "Birch reduction is regioselective." Justify with appropriate example.
- (iv) How can thiophene be obtained from *n*-butane?

Or

- (b) (i) How can nitrobutane be converted to butanal? Give the reaction and write the mechanism.

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- (ii) With the help of a reaction, prove that pyridine ring is present in quinoline.
- (iii) Prepare sulphone from thioether.
- (iv) Give the product in each of the following reactions (give formula and name of each product) :  $1 \times 5 = 5$



Either

- (c) (i) How is cyanoacetic ester prepared?



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(ii) How do  $\alpha$ -diazoketones undergo rearrangement with elimination of  $N_2$ ? Give the reaction with mechanism.

(iii) Why does pyrrole give electrophilic substitution reaction with mild reagent?

(iv) How are phosphines converted to phosphonium salts and phosphorus ylides? Show one synthetic use of triphenylphosphine.

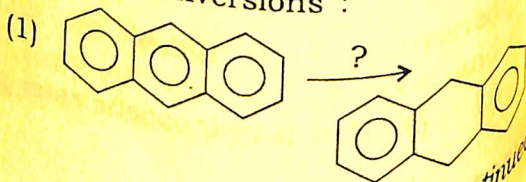
Or

(d) (i) How can tetralin and decalin be prepared from naphthalene? Give reaction.

(ii) "Anthracene gives both electrophilic substitution and addition reactions equally well." Justify the statement with appropriate example.

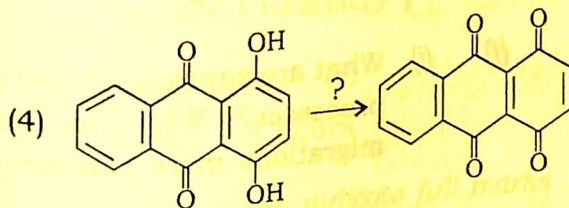
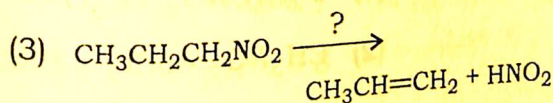
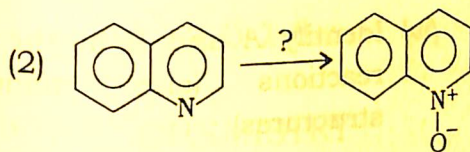
(iii) Write Haworth synthesis for phenanthrene preparation.

(iv) Suggest the reagents for the following conversions :



(Continued)

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Either

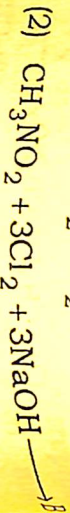
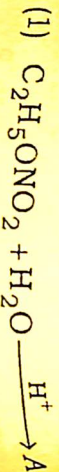
(e) (i) Discuss about kinetically and thermodynamically controlled product of naphthalene, when it undergoes sulphonation reaction with conc.  $H_2SO_4$  at  $80^\circ C$  and  $160^\circ C$ .

(ii) Show that indole undergoes electrophilic substitution reaction at C-3 regioselectively.

(iii) How can 'yellow oil' be prepared from  $CH_3-NH-CH_3$ ? Give reaction.

( Turn Over )

(iv) Identify A and B in the following reactions (give names and structures) :

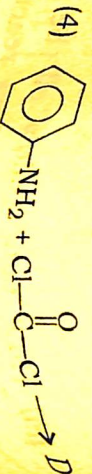
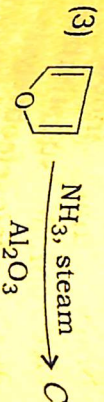
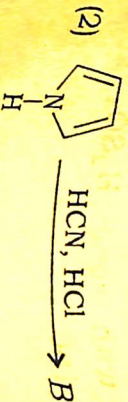
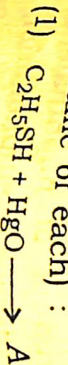


Or

(f) (i) What are suprafacial and antafacial processes? Why are suprafacial migrations more common? (1+1)<sup>1/2</sup>

(ii) Prepare pentanone from acetoacetic ester.

(iii) Identify A, B, C and D in the following reactions (give structure and name of each) :



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