

S.No. : 252

NBS 4103

No. of Printed Pages : 06

Following Paper ID and Roll No. to be filled in your Answer Book.

PAPER ID : 49903

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B. Tech. Examination, 2024-25

(Odd Semester)

ENGINEERING CHEMISTRY

Time : Three Hours]

[Maximum Marks : 60

Note :- Attempt all questions.

SECTION - A

1. Attempt all parts of the following : $8 \times 1 = 8$

- Explain the magnetic behaviour of O_2 molecules.
- What is chain isomerism? Give examples.
- Write the monomer of natural rubber.
- BIS 14543 refer to which type of water.

[P. T. O.]

- (e) Write the constituents responsible for temporary hardness of water.
- (f) Define threshold energy.
- (g) Give an example of zero order reaction.
- (h) Define particulate matter.

SECTION - B

2. Attempt any two parts of the following : $2 \times 6 = 12$

- (a) Draw the molecular orbital diagram of C_2 and NO. Find out their bond orders and magnetic behaviour.
- (b) Draw various conformations of n-butane and explain their order of stability using energy profile diagram.
- (c) Discuss about thermoplastic and thermosetting resin. Write the preparation and structure of :
 - (i) Nylon-6
 - (ii) PTFE
 - (iii) Buna-S

- (d) Write the
Discuss v
with suita

Note :- Attempt
from each

3. (a) Derive A
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- (b) Write
(i)
(ii)

- (c) Der
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4. (a) Wh
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- (d) Write the principle of ultraviolet spectroscopy. Discuss various types of electronic transitions with suitable examples.

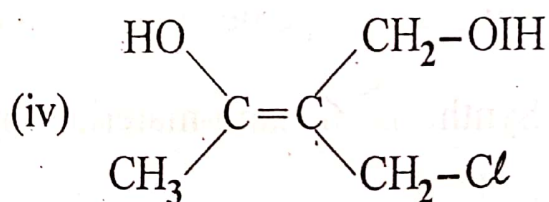
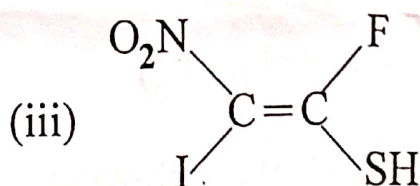
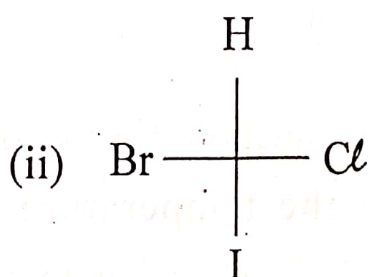
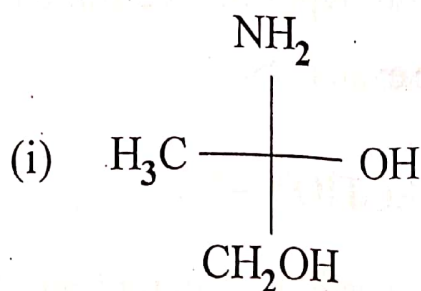
SECTION - C

Note :- Attempt all questions. Attempt any two parts from each questions. $8 \times 5 = 40$

3. (a) Derive Arrhenius equation. The rate of reaction doubles when the temperature changes from 293K to 323 K. Calculate the energy of activation of the reaction.
(Given $R = 8.314 \text{ Jk}^{-1} \text{ mol}^{-1}$)
- (b) Write short notes on the following :
- (i) Structure, properties and uses of fullerenes
 - (ii) Synthesis of nano-materials by sol-gel method.
- (c) Derive the rate equation for a second order reaction when both the reactants are different.
4. (a) What is optical isomerism? Draw all the probable stereoisomers of tartaric acid.

[P. T. O.]

(b) Assign R/S and E/Z nomenclature of the following:



(c) What are the principles of green chemistry?
Discuss them in brief.

5. (a) Discuss about preparation, properties and uses of various types of conducting polymers.

(b) Explain the following :

- (i) Endocrine disrupting chemical and their effects on humans.
- (ii) Classification of polymers on the basis of origin and mode of synthesis.

(c) Define Persistent Organic Pollutants (POPs). What are their properties and health effects on humans and environment?

6. (a) Why hard water requires lot of soap? Calculate the temporary, permanent and total hardness of water sample in mg/l which is analysed as :

Sample Impurity	Quantity	Molecular Weight
MgSO_4	14 mg/l	120
$\text{Mg}(\text{HCO}_3)_2$	8.5 mg/l	146
CaSO_4	12 mg/l	136
$\text{Ca}(\text{HCO}_3)_2$	10 mg/l	162

(b) Write short notes on the following :

- (i) Zeolite process of softening of water.
- (ii) Biofuels and its importance.

[P. T. O.]

- (c) Define High Performance Liquid Chromatography (HPLC). What is its principle? Discuss about its two main types. How is it operated?
