

**2026/FYUG/EVEN/SEM/
CHMDSC151T/116**

FYUG Even Semester Exam., 2026

**CHEMISTRY
(2nd Semester)**

Paper Code : CHMDSC151T

(Organic Chemistry—I)

Full Marks : 70

Pass Marks : 28

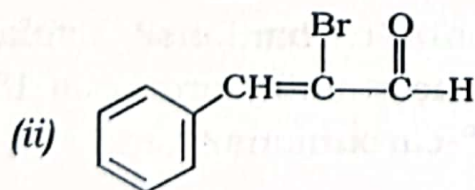
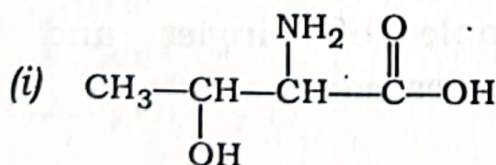
Time : 3 hours

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

UNIT—I.

1. Answer any *two* questions from the following : 2×2=4

- (a) Write the IUPAC name of the following organic compounds : 1×2=2

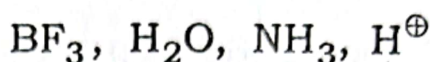


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(Turn Over)

(b) What do you mean by homolytic and heterolytic bond fissions? Give one example of each. 1+1=2

(c) Identify the electrophiles and nucleophiles from the following : $\frac{1}{2} \times 4 = 2$



2. Answer either (a) or (b) : 10

(a) (i) What is hyperconjugation? Explain in detail the stability orders of 1° -, 2° - and 3° -carbocations on the basis of hyperconjugation. 1+3=4

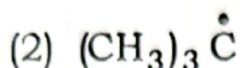
(ii) "NaOH is nucleophilic in water, but basic in alcohol." Justify the statement with proper reasoning. 2

(iii) What is inductive effect? Mention one example of +I- and -I-effects each. 2

(iv) What are carbenes? Give one example of singlet and triplet carbenes each. 1+1=2

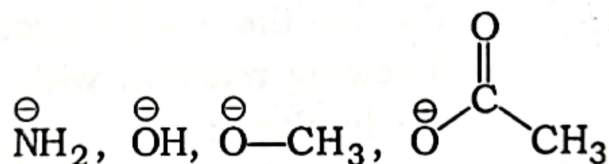
(b) (i) What are carbanions? Explain in detail the stability orders of 1° -, 2° - and 3° -carbanions? 1+2=3

(ii) Draw the orbital structures of the following by mentioning the hybridization of all the carbon atoms : 2×2=4



(iii) Electromeric effect is not a permanent effect in an organic compound. Explain with valid reasons and examples. 2

(iv) Arrange the following in increasing order of their basicity : 1



UNIT—II

3. Answer any two questions from the following : 2×2=4

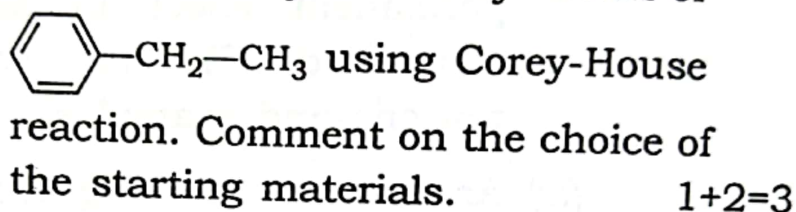
(a) Illustrate the Diels-Alder reaction of alkenes by taking one appropriate example. 2

(b) What is Kharasch effect? How will you convert 2-bromopropane into 1-bromopropane? 1+1=2

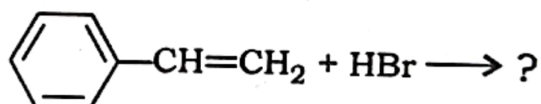
- (c) Explain Saytzeff and Hoffmann elimination reactions by taking one appropriate example of each. 1+1=2

4. Answer either (a) or (b) : 10

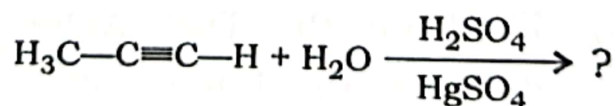
- (a) (i) What is Corey-House synthesis of alkanes? Carry out the synthesis of



- (ii) Predict the major product of the following reaction with appropriate mechanism : 1+2=3



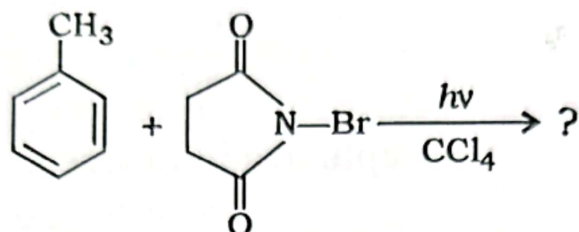
- (iii) Complete the following reaction and write the mechanism : 1+2=3



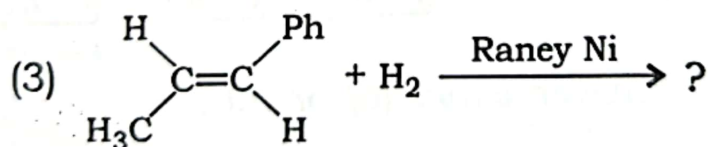
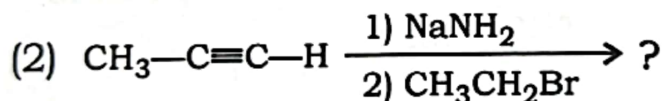
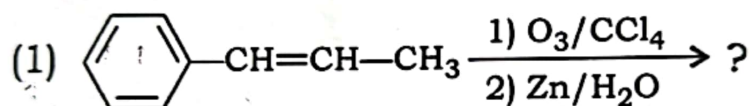
- (iv) How will you synthesize ethane from methyl bromide? (Write the chemical reaction) 1

(5)

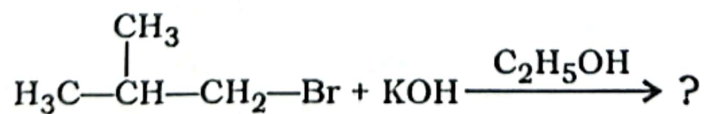
- (b) (i) Write down the product of the following reaction with plausible mechanism : 1+3=4



- (ii) Predict the products of the following reactions : 1×3=3



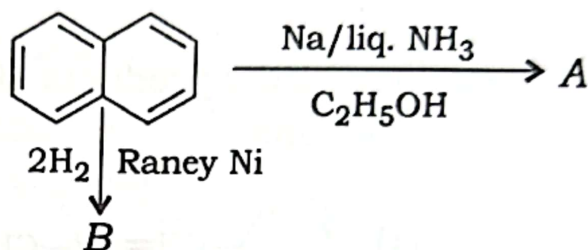
- (iii) Complete the following chemical reaction with appropriate mechanism : 1+2=3



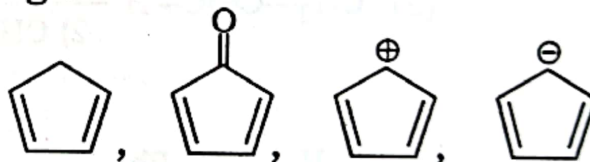
UNIT—III

5. Answer any *two* questions from the following : 2×2=4

- (a) Why does benzene undergo electrophilic substitution reaction instead of electrophilic addition reaction? Explain. 2
- (b) Identify the compounds A and B : 1×2=2

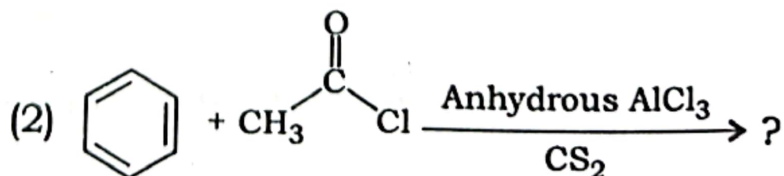
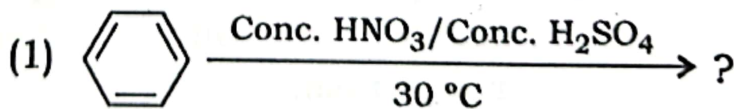


- (c) Identify the aromatic, anti-aromatic and non-aromatic compounds from the following : 2



6. Answer *either* (a) or (b) : 10

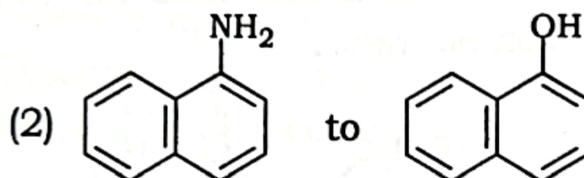
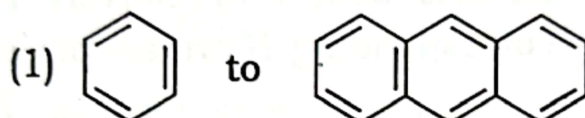
- (a) (i) Predict the products and outline the mechanisms for each of the following reactions : 2½×2=5



(ii) Discuss the Haworth synthesis of naphthalene. 3

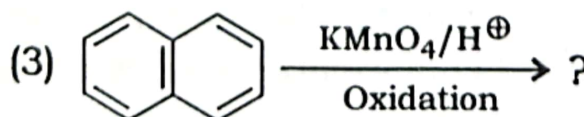
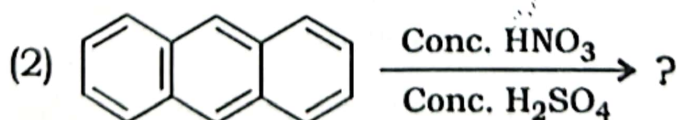
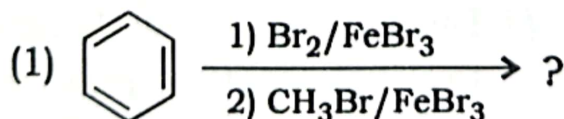
(iii) Complex polynuclear hydrocarbons are carcinogenic in nature. Justify the statement with proper examples and reasons. 2

(b) (i) Carry out the following conversions using suitable reagents and solvents : $2 \times 2 = 4$



(ii) [14] annulene and [18] annulene are aromatic but [10] annulene is non-aromatic. Justify the statement with proper reasoning. 2

(iii) Predict the products of the following reactions : $1 \times 3 = 3$



(iv) Mention two uses of naphthalene. 1

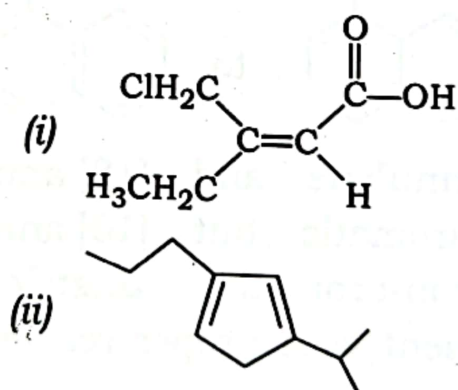
UNIT—IV

7. Answer any *two* questions from the following : 2×2=4

(a) Define enantiomers and diastereomers with one example of each. 1+1=2

(b) Draw the Fischer projection of *meso*-tartaric acid and convert it into the corresponding Newman projection. 2

(c) Assign *E/Z*-notations for the following compounds : 1×2=2

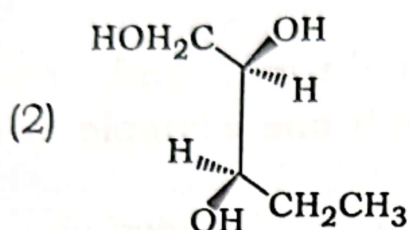
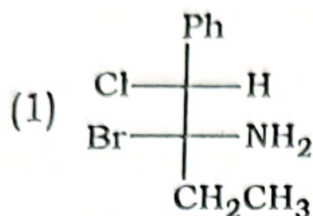


8. Answer either (a) or (b) : 10

(a) (i) Discuss the Baeyer's strain theory to explain the relative stability of cycloalkanes. What are its limitations? 3+2=5

(ii) Discuss in detail the potential energy relationship among different conformations of cyclohexane. 3

- (iii) Assign *R/S* designation to the following compounds : $1 \times 2 = 2$



- (b) (i) What is racemic mixture? Why is racemic mixture optically inactive? Discuss one method for the resolution of racemic mixture. $1+1+2=4$
- (ii) Draw all the possible *cis*- and *trans*-isomers of 1-ethyl-2-methylcyclohexane (chair conformation). Determine the overall stability order of these isomers. $2+1=3$
- (iii) What is specific rotation of an optically active substance? 20 mg mandelic acid is dissolved in 1 ml of ethanol and the solution is placed in a 10 cm long polarimeter cell. An optical rotation of -4.35° is observed at 20°C with light of wavelength 589 nm. What is the specific rotation of the mandelic acid? $1+2=3$

UNIT—V

9. Answer any *two* questions from the following : 2×2=4

(a) What is mutarotation? Explain with suitable example. 2

(b) Define reducing and non-reducing sugars with one example of each. 1+1=2

(c) Starch is generally used as an indicator in iodometric titrations. Justify the statement with valid reasons. 2

10. Answer *either* (a) or (b) : 10

(a) (i) What is Kiliani-Fischer synthesis? Discuss the reaction by taking D-arabinose as the starting material. 1+2=3

(ii) Carry out the following conversions : 2×2=4

(1) D-Glucose to D-Fructose

(2) D-Fructose to D-Mannose

(iii) Define epimers and anomers with one example of each. 1+1=2

(iv) Draw the chair-conformations of α - and β -D-glucose. 1

- (b) (i) How will you convert D-glucose into D-arabinose? Discuss with appropriate chemical reactions. 3
- (ii) D-Glucose and D-fructose form the same osazone. Justify. 2
- (iii) Draw the Haworth projection formula of lactose. Mention the type of glycosidic linkage present in the structure. 2
- (iv) What happens when (write only the reaction)—
- (1) fructose is treated with HI and red phosphorus at 100 °C;
- (2) glucose is treated with HCN;
- (3) fructose is treated with NaBH_4 ? 1+1+1=3

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