



**Graphic Era**  
HILL UNIVERSITY

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University under section 2(f) of UGC Act, 1956

**Sessional I (Odd) Semester Examination, September 2025**

Roll no.....

Name of the Course: B. Pharma

Semester: III Semester

Name of the Paper: Pharmaceutical organic Chemistry II

Paper Code: BP301T

Time: 1.5-hour

Maximum Marks: 30

**Note:**

- (i) This question paper contains three sections.
- (ii) All the questions are compulsory.

**Section-A**

**Q1. Multiple Choice Questions – Attempt all questions**

**(10 X 1 = 10 Marks)**

a. Which electrophile is generated in Friedel-Crafts acylation of benzene? **CO-1**

- A)  $\text{CH}_3\text{CO}^-$
- B)  $\text{CH}_3\text{CO}^+$
- C)  $\text{CH}_3^+$
- D)  $\text{CH}_3\text{COO}^-$

b. Which of the following substituents deactivates the benzene ring but directs new substituents to ortho and para positions? **CO-1**

- A)  $-\text{CH}_3$
- B)  $-\text{Cl}$
- C)  $-\text{OH}$
- D)  $-\text{COOH}$

c. Which of the following is NOT an evidence for the resonance in benzene? **CO-1**

- A) Equal bond lengths in benzene
- B) Heat of hydrogenation of benzene is less than expected
- C) Benzene undergoes addition reactions readily
- D) Benzene resists addition reactions but undergoes substitution

d. Which orbital overlaps to form the  $\pi$ -bond system in benzene? **CO-1**

- A)  $\text{sp}^2 - \text{sp}^2$
- B)  $\text{p} - \text{p}$  (sideways)
- C)  $\text{s} - \text{p}$
- D)  $\text{s} - \text{s}$

e. Which substituent is meta-directing in electrophilic substitution? **CO-1**

- A)  $-\text{OH}$
- B)  $-\text{NH}_2$
- C)  $-\text{CH}_3$
- D)  $-\text{NO}_2$

f. Which of the following is used to detect phenol using a colour change? **CO-2**  
A) Tollen's reagent                      B)  $\text{FeCl}_3$  solution  
C) Baeyer's reagent                      D) Benedict's solution

g. Resorcinol has hydroxyl groups at which positions? **CO-2**  
A) 1 and 2                                  B) 1 and 3  
C) 1 and 4                                  D) 2 and 4

h. The basic character of aniline is less than that of ammonia because: **CO-2**  
A. Aniline is a weak acid  
B. Lone pair on nitrogen in aniline is delocalized  
C. Benzene ring donates electrons to nitrogen  
D. Aniline is more polar than ammonia

i. Which of the following statements is true about benzoic acid? **CO-2**  
A. It is more acidic than acetic acid  
B. It cannot undergo electrophilic substitution  
C. It has no resonance structures  
D. It forms a less stable conjugate base than acetic acid

j. Aryl diazonium salts are commonly used in which of the following synthetic transformations? **CO-2**  
A. Nitration                                  B. Friedel-Crafts acylation  
C. Sandmeyer reaction                      D. Aldol condensation

### Section B

**Q. 2 Short Questions: Attempt any two questions** (2X 5 = 10 Marks)

- a. What is molecular orbital structure of benzene? **CO-1**  
b. What is the effect of ortho and para directing groups on orientation? **CO-1**  
c. Enumerate the chemical properties of Aromatic amines **CO-2**

### Section C

**Q. 3 Long questions: Attempt any one question** (1X10 = 10 Marks)

- a. Elaborate on various electrophilic substitution reactions in benzene by giving the detailed mechanism of any one reaction. **CO-1**  
b. What are phenols? Explain the chemical reactions and effect of substituents on acidity of phenol. **CO-2**