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G. VENKATASWAMY NAIDU COLLEGE (AUTONOMOUS), KOVILPATTI – 628 502.



UG DEGREE END SEMESTER EXAMINATIONS - NOVEMBER 2024.

(For those admitted in June 2021 and later)

PROGRAMME AND BRANCH: B.Sc., CHEMISTRY

| SEM | CATEGORY | COMPONENT | COURSE CODE | COURSE TITLE |
|-----|------------|-----------|-------------|----------------------|
| VI | PART - III | CORE | U21CH611 | ORGANIC CHEMISTRY-IV |

Date & Session: 14.11.2024 / FN

Time : 3 hours

Maximum: 75 Marks

| Course Outcome | Bloom's K-level | Q. No. | SECTION - A (10 X 1 = 10 Marks) Answer ALL Questions. |
|----------------|-----------------|--------|---|
| CO1 | K1 | 1. | Select which of the following is the product of the chain lengthening of an aldose? a) Ribose b) Erythrose c) Xylose d) Glucose |
| CO1 | K2 | 2. | Show what type of reaction leads to the formation of osazone from glucose? a) Oxidation b) reduction c) condensation d) hydrolysis |
| CO2 | K1 | 3. | Choose why is phenol more acidic than alcohols? a) Due to the resonance stabilization of the phenoxide ion b) Due to the electron-donating nature of the hydroxyl group c) because phenol is more soluble in water d) Due to the presence of multiple hydroxyl groups |
| CO2 | K2 | 4. | Benzoin condensation is catalyzed by which type of catalyst? a) acid b) base c) nucleophilic d) lewis acid |
| CO3 | K1 | 5. | Name the intermediate which is typically formed in the pinacol rearrangement. a) Carbocation b) Radical c) Carbanion d) Nucleophile |
| CO3 | K2 | 6. | Indicate which type of compound undergoes rearrangement in the Dakin reaction to form hydroxyaryl aldehydes or ketones. a) Aryl aldehydes b) Aromatic amines c) Aromatic esters d) Aryl ketones |
| CO4 | K1 | 7. | Terpenes are classified based on which of the following units? a) Benzene rings b) Isoprene units c) Hydroxyl groups d) Carbonyl groups |
| CO4 | K2 | 8. | Conine consist of _____. a) Piperidine ring b) Pyridine ring c) Indole ring d) Quinoline ring |
| CO5 | K1 | 9. | In which of the following systems Woodward-Fieser rules help in predicting the λ_{max} a) Conjugated dienes and α,β -unsaturated ketones b) Aromatic compounds c) Amines d) Alcohols |
| CO5 | K2 | 10. | O-H stretching frequency of alcohols is typically found in _____. a) 1600-1700 cm^{-1} b) 2500-3000 cm^{-1} c) 3200-3600 cm^{-1} d) 700-900 cm^{-1} |
| Course Outcome | Bloom's K-level | Q. No. | SECTION - B (5 X 5 = 25 Marks) Answer ALL Questions choosing either (a) or (b) |
| CO1 | K3 | 11a. | Illustrate the formation of osazone from glucose and fructose. (OR) |
| CO1 | K3 | 11b. | Explain the mechanism of mutarotation in glucose and describe how this phenomenon confirms the cyclic structure of the sugar. |

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| CO2 | K3 | 12a. | Demonstrate the mechanism of Kolbe's reaction using phenol as the starting material. What is the final product, and how is it useful in industry? (OR) |
| CO2 | K3 | 12b. | Outline the mechanism of the Houben-Hoesch synthesis and explain its application in synthesizing aromatic ketones. |
| CO3 | K4 | 13a. | Analyze the mechanism of the Wagner-Meerwein rearrangement and discuss how the carbocation stability impacts the product formation. (OR) |
| CO3 | K4 | 13b. | Examine the mechanistic pathway of the Fries rearrangement. |
| CO4 | K4 | 14a. | Evaluate the classification of alkaloids. How does the structural diversity among alkaloids correlate with their pharmacological activities? (OR) |
| CO4 | K4 | 14b. | Contrast the structural features of piperine. How do these features influence their biological effects and uses in traditional medicine? |
| CO5 | K5 | 15a. | Critically analyze the Woodward-Fischer rules in the context of UV spectroscopy. (OR) |
| CO5 | K5 | 15b. | Evaluate the role of NMR spectroscopy in elucidating the structure of complex organic molecules. |

| Course Outcome | Bloom's K-level | Q. No. | SECTION – C (5 X 8 = 40 Marks) Answer ALL Questions choosing either (a) or (b) |
|----------------|-----------------|--------|---|
| CO1 | K3 | 16a. | Demonstrate the epimerization of glucose and explain how glucose can be converted to mannose. ii) Using the Kiliani-Fischer synthesis, describe how you can increase the chain length of aldoses. (OR) |
| CO1 | K3 | 16b. | Compare the structural features and functions of starch and cellulose as polysaccharides ii) Describe the process of hydrolysis of sucrose. |
| CO2 | K4 | 17a. | Analyze the mechanisms of the Cannizzaro reaction and benzoin condensation. What are the key steps in each mechanism? (OR) |
| CO2 | K4 | 17b. | Explain the mechanisms of the benzoin condensation and Perkin reaction. |
| CO3 | K4 | 18a. | Analyze the mechanisms of the Hofmann rearrangement. (OR) |
| CO3 | K4 | 18b. | Discuss the mechanistic differences between the Curtius rearrangements. What role does the formation of an isocyanate intermediate play in this reactions? |
| CO4 | K5 | 19a. | Assess the synthetic pathways for citral. How do the mechanisms of these synthetic routes compare, and what implications do they have for industrial production? (OR) |
| CO4 | K5 | 19b. | Evaluate the method used for the structural elucidation and synthesis of piperine in the context of natural product chemistry. How do their structures inform their biological activities and potential applications in medicine? |
| CO5 | K5 | 20a. | Critically analyze the applications of UV spectroscopy in studying functional groups and cis-trans isomerism. How do the Woodward-Fischer rules aid in predicting the absorption characteristics of conjugated systems and alpha and beta unsaturated ketones? (OR) |
| CO5 | K5 | 20b. | Evaluate the significance of IR absorption frequencies in identifying functional groups. How do variations in these frequencies correlate with molecular structure, including factors such as hydrogen bonding? |