

CHUKA



UNIVERSITY

UNIVERSITY EXAMINATION

RESIT /SPECIAL EXAMINATION

EXAMINATION FOR THE AWARD OF DEGREE OF BACHELOR OF SCIENCE

CHEM 332: ORGANIC CHEMISTRY III

STREAMS:

TIME: 2 HOURS

DAY/DATE: THURSDAY 04/11/2021

11.30 A.M – 1.30 P.M

**INSTRUCTIONS:**

Answer Question ONE and Any Other TWO Questions

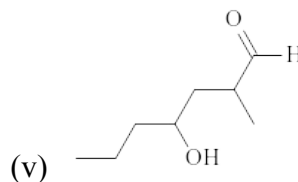
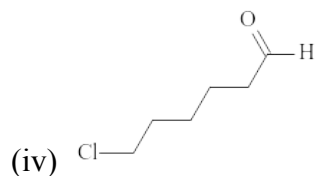
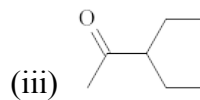
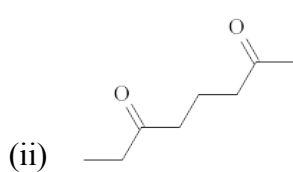
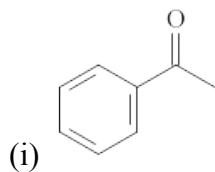
**QUESTION ONE [30 MARKS]**

(a) Draw the structures corresponding to the following IUPAC names [5 Marks]

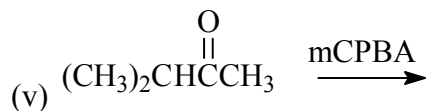
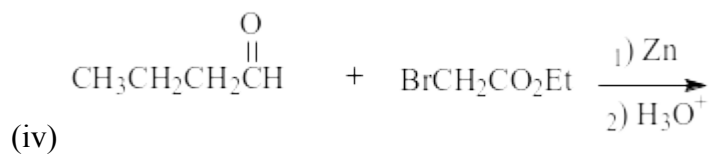
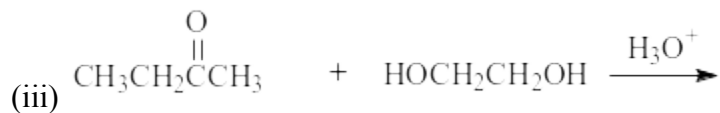
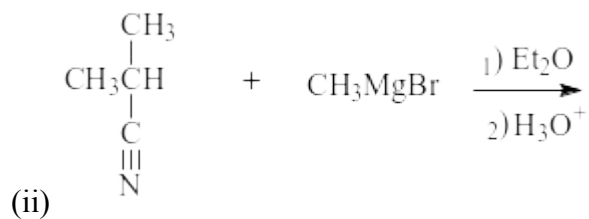
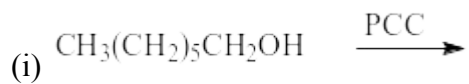
(i) Hexan-2-one (ii) 4-Methylpentanal (iii) 2-Ethyl-3-hydroxyhexanal

(iv) Cyclohexanecarbaldehyde (v) Pent-4-en-2-one

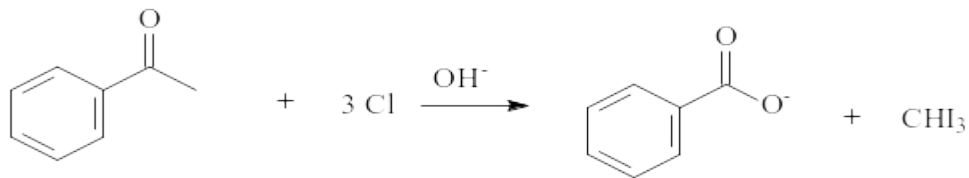
(b) Give the IUPAC names corresponding to the following compounds [5 Marks]



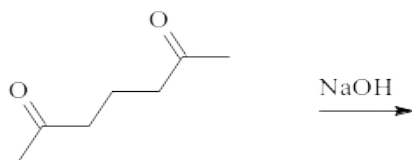
(c) Write the major organic product(s) of each of the following reactions [5 Marks]



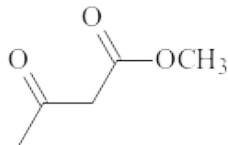
(d) Write a plausible mechanism for the following reaction [5 Marks]



(e) Draw the structure of the aldol condensation product for the following diketone [2 Marks]



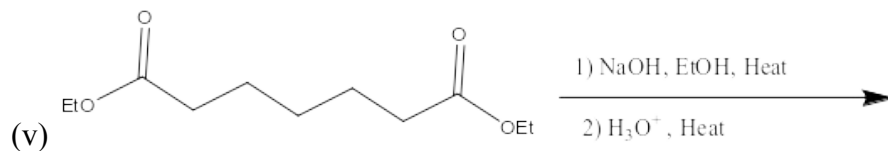
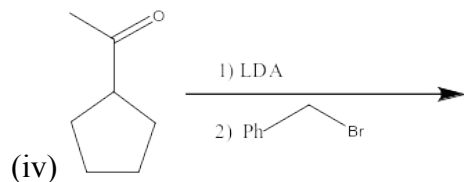
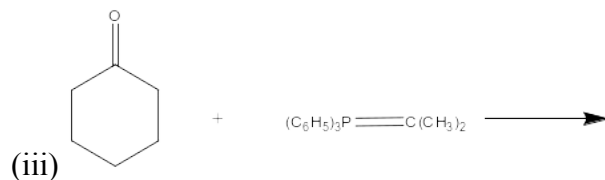
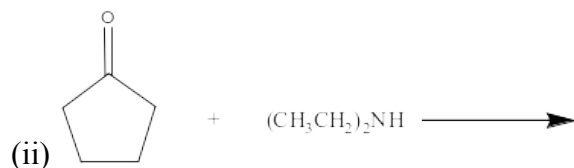
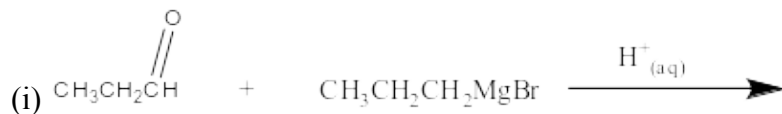
(f) Draw the structure expected from the Claisen condensation of the following ester [2 Marks]



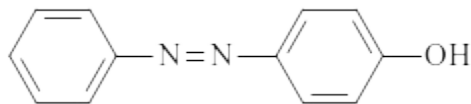
(g) Discuss the physical properties of aldehydes and ketones [6 Marks]

**QUESTION TWO [20 MARKS]**

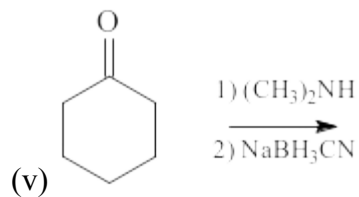
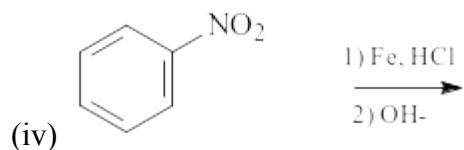
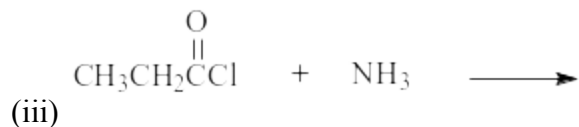
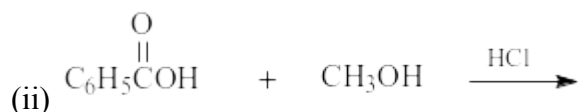
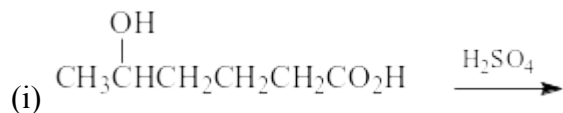
(a) Write the major organic product(s) of each of the following reactions [10 Marks]



(b) Outline the stepwise synthesis of *p*-(phenylazo) phenol from benzene, phenol and any other reagents of your choice [10 Marks]

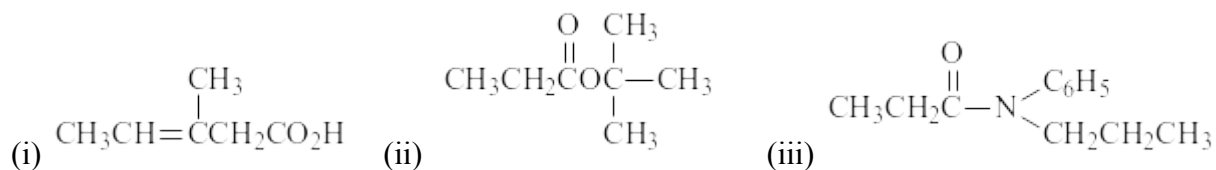
*p*-(phenylazo) phenol**QUESTION THREE [20 MARKS]**

(a) Write the major organic product(s) of each of the following reactions

**[10 Marks]**(b) Draw the product formed when pentanoyl chloride ( $\text{CH}_3\text{CH}_2\text{CH}_2\text{CH}_2\text{COCl}$ ) is treated with each of the following reagent(s) **(10 Marks)**(i)  $\text{H}_2\text{O}$ , pyridine(ii)  $\text{CH}_3\text{CH}_2\text{OH}$ , pyridine(iii)  $\text{CH}_3\text{COO}^-$  (excess)(iv)  $\text{NH}_3$  (excess)(v)  $(\text{CH}_3\text{CH}_2)_2\text{NH}$

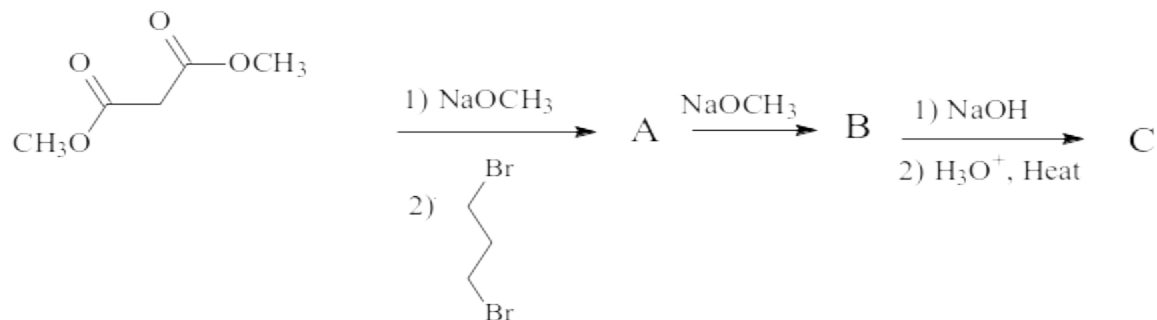
**QUESTION FOUR [20 MARKS]**

(a) Write the IUPAC name of each of the following organic compounds [5 Marks]



(b) Discuss the physical properties of carboxylic acids and their derivatives (5 Marks)

(c) Give the structures of products A, B, and C in the reaction below [6 Marks]



(d) Write the structure of each of the following organic compounds (4 Marks)

- (i) N,N-dimethylpentanamide      (ii) 3-bromohexanenitrile  
 (iii) 3-methylbutanoyl chloride      (iv) N-methylpropan-2-amine
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