

2020

CHEMISTRY (Honours)

Paper Code : V - A & B

[New Syllabus]

Important Instructions for Multiple Choice Question (MCQ)

- Write Subject Name and Code, Registration number, Session and Roll number in the space provided on the Answer Script.

Example : Such as for Paper III-A (MCQ) and III-B (Descriptive).

Subject Code :

III	A	&	B
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Subject Name :

- Candidates are required to attempt all questions (MCQ). Below each question, four alternatives are given [i.e. (A), (B), (C), (D)]. Only one of these alternatives is 'CORRECT' answer. The candidate has to write the Correct Alternative [i.e. (A)/(B)/(C)/(D)] against each Question No. in the Answer Script.

Example – If alternative A of 1 is correct, then write :

1. – A

- There is no negative marking for wrong answer.

মাল্টিপল চয়েস প্রশ্নের (MCQ) জন্য জরুরী নির্দেশাবলী

- উত্তরপত্রে নির্দেশিত স্থানে বিষয়ের (Subject) নাম এবং কোড, রেজিস্ট্রেশন নম্বর, সেশন এবং রোল নম্বর লিখতে হবে।

উদাহরণ — যেমন Paper III-A (MCQ) এবং III-B (Descriptive)।

Subject Code :

III	A	&	B
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Subject Name :

- পরীক্ষার্থীদের সবগুলি প্রশ্নের (MCQ) উত্তর দিতে হবে। প্রতিটি প্রশ্নে চারটি করে সম্ভাব্য উত্তর, যথাক্রমে (A), (B), (C) এবং (D) করে দেওয়া আছে। পরীক্ষার্থীকে তার উত্তরের স্বপক্ষে (A)/(B)/(C)/(D) সঠিক বিকল্পটিকে প্রশ্ন নম্বর উল্লেখসহ উত্তরপত্রে লিখতে হবে।

উদাহরণ — যদি 1 নম্বর প্রশ্নের সঠিক উত্তর A হয় তবে লিখতে হবে :

1. – A

- ভুল উত্তরের জন্য কোন নেগেটিভ মার্কিং নেই।

Paper Code : V - A

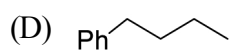
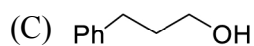
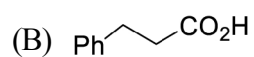
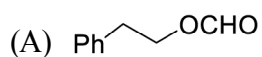
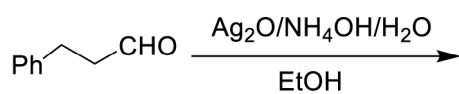
Full Marks : 10

Time : Twenty Minutes

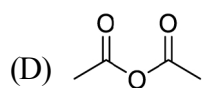
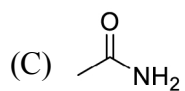
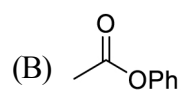
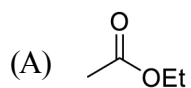
Choose the correct answer.

Answer *all* the following questions,
each question carries 1 mark.

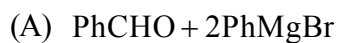
1. What is the major organic product obtained from the following reaction?



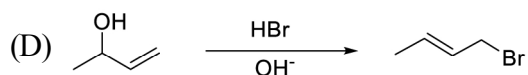
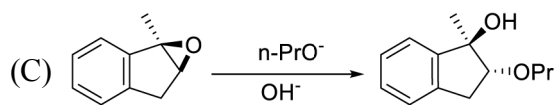
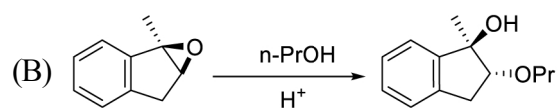
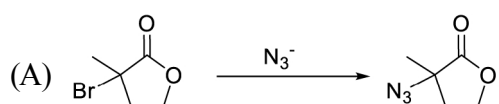
2. Which of the following is the most reactive towards methylamine?



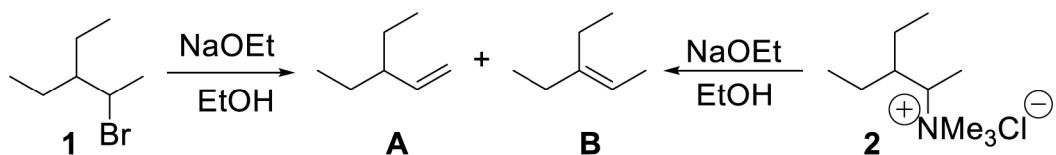
3. For the following pair of reactants which one does not give triphenylmethanol after an aqueous workup?



4. Among the following reactions, which one is incorrect?

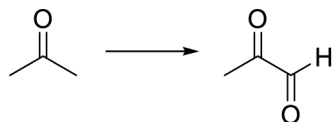


5. Compounds 1 and 2 with sodium ethoxide give two alkenes, A and B with different selectivity. Among the following statements which one best indicates the most probable outcome?



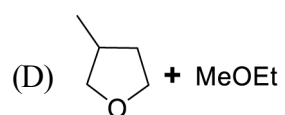
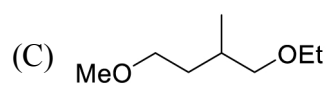
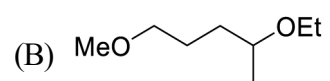
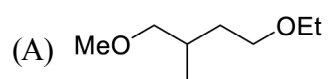
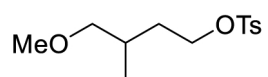
- (A) A both from 1 & 2
- (B) B both from 1 & 2
- (C) A from 1 & B from 2
- (D) B from 1 & A from 2
6. Reaction of aqueous sodium hydroxide on chlorobenzene gives which of the following products?
- (A) p-Chlorophenol
- (B) o-Chlorophenol
- (C) Phenol
- (D) no reaction

7. Reagent required for the following conversion is —



- (A) KMnO_4
(B) $\text{Pb}(\text{OAc})_4$
(C) SeO_2
(D) H_2O_2
8. Which one of the following produces secondary by reduction with H_2/cat ?
- (A) Methyl cyanide
(B) Nitroethane
(C) Methyl isocyanide
(D) Acetamide
9. Consider the following ester molecules. Their solubility in water decreases in the following order —
- (i) Ethyl Methanoate
(ii) Ethyl Butanoate
(iii) Ethyl Ethanoate
(iv) Ethyl propanoate
- (A) $\text{i} > \text{ii} > \text{iii} > \text{iv}$
(B) $\text{i} > \text{iii} > \text{iv} > \text{ii}$
(C) $\text{i} > \text{ii} > \text{iv} > \text{iii}$
(D) $\text{iii} > \text{i} > \text{iv} > \text{ii}$

10. Consider the ethanolysis of the following molecule. Which product is most unlikely to be formed?



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Full Marks : 40

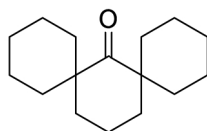
Time : One Hour Forty Minutes

The figures in the margin indicate full marks.

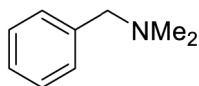
Answer any *four* questions taking *two* from each group.

Group - A

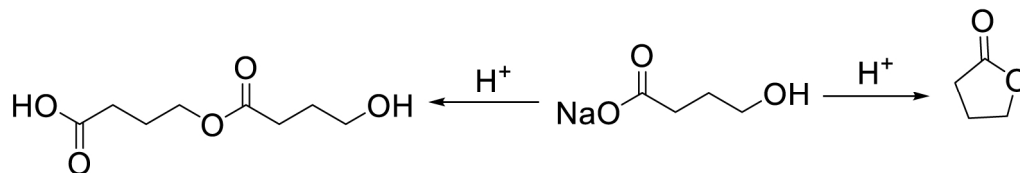
- (a) What will be the major product obtained from reaction of acetone with Propan-1,3-dithiol in presence of $\text{BF}_3 \cdot \text{Et}_2\text{O}$. Explain your answer from mechanistic point of view. 3
- (b) During the reduction of any ketone by Aluminium isopropoxide presence of isopropanol is highly essential — justify your answer. 3
- (c) The following compound does not undergo Clemmenson Reduction – why? 2



- (d) How the following compound may be prepared by reductive amination? 2



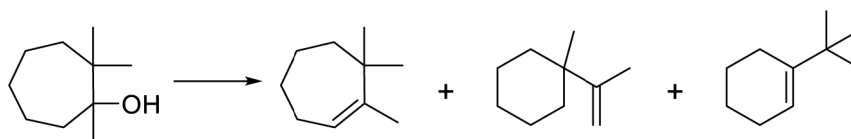
2. (a) What will be actual product and why? 2



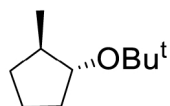
- (b) How will you carry out the following conversion : 2



- (c) When the given seven membered ring alcohol is dehydrated with conc. H_2SO_4 three isomeric alkenes are formed. Propose a mechanism for their formation. 3

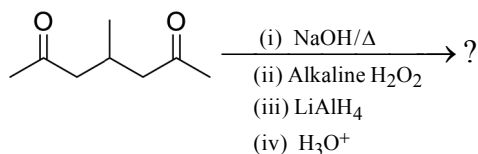


- (d) Synthesise the compound shown below from 1-methylcyclopentane and isobutane. Use these compounds as the source of the carbon atoms and any other reagents necessary. 3

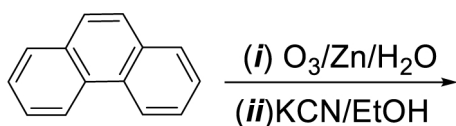
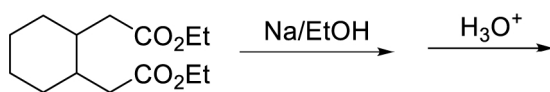


3. (a) Reaction between potassium phenoxide and allyl bromide in dry acetone in dry acetone gives allyl phenyl ether as the major product but use of benzene instead of acetone as solvent in the same reaction furnishes 2-allyl phenol as the major product — Explain. 2

- (b) Predict the product from the following reaction. Explain the reaction mechanistically 2



- (c) Write down the major product from the following reactions with plausible mechanism 2
- $\text{C}_6\text{H}_5\text{C}(\text{OH})_2\text{Me} + \text{POCl}_3 \rightarrow ?$
- (d) How will you convert acetone to $\text{Me}_3\text{C} - \text{CH}_2\text{CO}_2\text{H}$? Explain the key steps from mechanistic point of view. 3
4. (a) Ethyl-2-methylpropanoate undergoes alkaline hydrolysis reluctantly than ethyl acetate. Explain. 2
- (b) What are the products of the following reactions? Explain mechanistically. 4



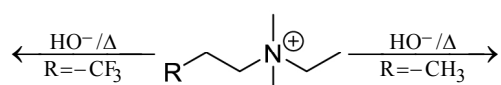
- (c) For the preparation of diazoketone RCOCHN_2 , more than one equivalent diazomethane is used — why? 2
- (d) Identify the products and explain their formation :
- $\text{Glycerol} + \text{anh. KHSO}_4/\text{heat} \rightarrow ? + \text{Al(OEt)}_3 \rightarrow ?$ 3

Group - B

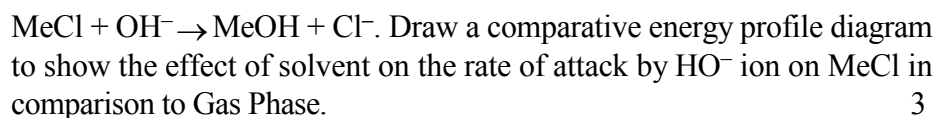
5. (a) Comment on the stereochemical course involved in each step of the following reaction sequences and give 3-D structures with R/S designation for the compounds I to IV. 2



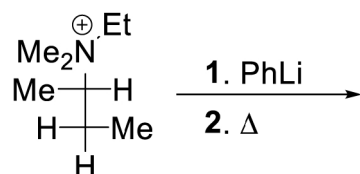
- (b) Explain the product profiles of the following reactions logically : 3



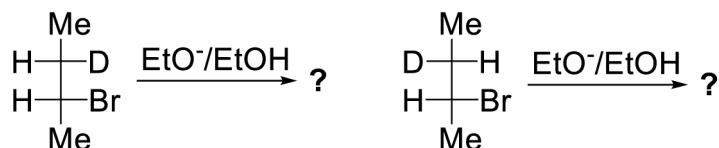
- (c) Arrange the following compounds in order of decreasing reactivity toward MeO^- in an $\text{S}_{\text{N}}2$ reaction carried out in dry MeOH : CH_3Cl , CH_3I , CH_3OH , CH_3F , CH_3Br . 2
- (d) Explain the observed effects of increasing solvent polarity (solvent ionizing power) on the rates of the following $\text{S}_{\text{N}}2$ reaction :



6. (a) Suggest a mechanism for the following pyrolytic reaction and write down the major product : 3

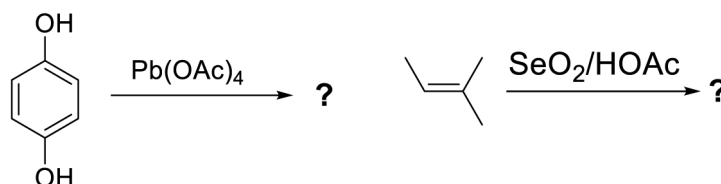


- (b) Predict the distribution of products from the following reactions with proper justification : 4



(c) Optically active threo-3-phenyl-2-butyl tosylate loses its optical activity on solvolysis in acetic acid – Explain. 3

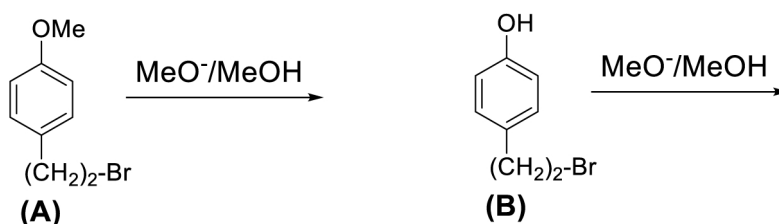
7. (a) Write down the major products from the following reactions with allied mechanisms : 4



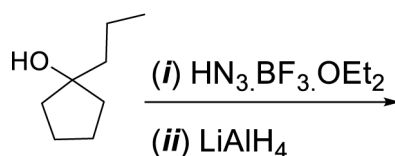
(b) Prove that Hofmann rearrangement is strictly intramolecular in nature. 3

(c) What is enantiomeric excess? Mandelic acid can undergo racemisation in presence of alkali. Explain. 3

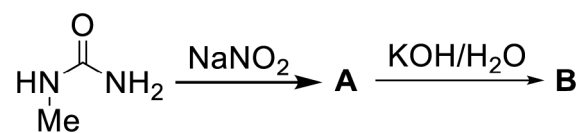
8. (a) Explain why molecule B reacts 100 times faster than molecule A for the following reaction? 4



(b) The following synthetic protocol is a potential gateway to produce a cyclic amine – Explain. 2



- (c) Identify the molecules A and B and explain the mechanism for the formation of B. 2



- (d) What is the major product from the following reaction : 2

