Reg. No. : .....

Name : .....

K21U 2069

III Semester B.Sc. Degree (CBCSS – Sup./Imp.)
Examination, November 2021
(2015-'18 Admissions)
CORE COURSE IN CHEMISTRY
3B04CHE : Organic Chemistry – I

Time : 3 Hours

Max. Marks : 40

***Instruction** : Answer the questions in **English** only.*

SECTION – A

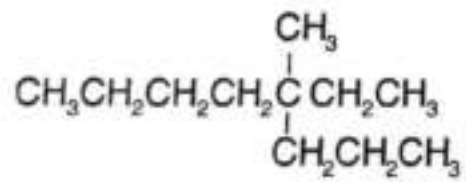
(Objective type – **each** carries **1** mark- Answer **all 4** questions.)

1. Give the structural formula of

   a) N, N dimethylformamide

   b) 3-methyl-2-pentanol.

2. Give the IUPAC names of

   a) 

   b) 

3. Which is the major product obtained when HBr is added to propene ?

4. Give an example of a polymer prepared from alkenes. **(4×1=4)**

P.T.O.

SECTION – B

(Short answer type- **each** carries **2** marks- Answer **7** questions out of 10)

5. Formic acid is stronger than acetic acid. Why ?
6. Illustrate the hybridization in Ethyne.
7. Give the mechanism of Claisen rearrangement with suitable example.
8. How are 1°, 2° and 3° alcohols prepared from Grignard reagent ?
9. Give one method for the synthesis of anisole and phenetole.
10. How is picric acid synthesized ?
11. Explain Walden inversion with a suitable example.
12. Differentiate between a singlet and triplet carbenes.
13. What are the products obtained when 2-butene react with alkaline $KMnO_4$ and $O_3/Zn\text{-}H_2O$?
14. How is phenol synthesized from cumene ?

(7×2=14)

SECTION – C

(Short essay/problem type- **each** carries **3** marks. Answer **4** questions out of 6.)

15. Illustrate E1 and E2 mechanism with suitable examples.
16. What are the factors affecting the stability of carbocations ?
17. How is chloroform prepared from ethanol ?
18. Outline the Haworth synthesis of naphthalene.
19. Discuss in brief the acid catalyzed addition of H_2O to alkene and alkynes.
20. Discuss the mechanism and stereochemistry of SN1 reaction. **(4×3=12)**

SECTION – D

(Long essay type- **each** carries 5 marks- Answer **any 2** questions out of 4.)

21. Discuss the following reaction mechanisms :

    a) Pinacol-pinacolone

    b) Claisen rearrangement

    c) Fries rearrangement.

22. Explain :

    a) Electromeric effect

    b) Inductive effect

    c) Resonance

    d) Hyperconjugation.

23. Discuss the generation, structure and stability of carbenes and nitrenes.

24. Compare the acidity of alcohols and phenols. Give two methods to differentiate 1°, 2° and 3° alcohols. **(2×5=10)**

K20U 1269

Reg. No. : .....

Name : .....

III Semester B.Sc. Degree (CBCSS – Sup./Imp.) Examination, November 2020
(2014 – '18 Admns)
CORE COURSE IN CHEMISTRY
3B04 CHE : Organic Chemistry – I

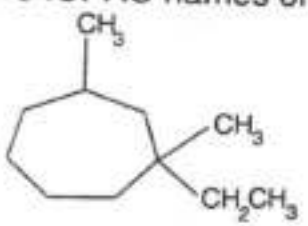
Time : 3 Hours Max. Marks : 40

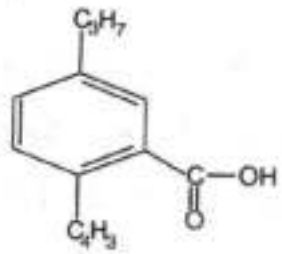
Instruction *: Answer the questions in* ***English only.***

SECTION – A

(Objective type-each carries **1** mark. Answer **all 4** questions)

1. Give IUPAC names of the following.

a) 

b) 

2. Write the structural formulae of
   a) *trans*-3-methylhex-3-ene and b) *cis*-3-methylhex-3-ene
3. Give one example for homolytic bond cleavage.
4. What are electrophiles ?

(4×1=4)

SECTION – B

(Short answer type. **Each** carries **2** marks. Answer **7** questions out of **10**)

5. Which has higher boiling point, *o* nitrophenol or *p* nitrophenol ? Why ?
6. What are the products obtained by the ozonolysis of $C_6H_5CH = CHCH_3$?
7. Which is more reactive, $CH_2 = CH - CH_2Cl$ or $CH_2 = CHCl$? Why ?
8. How is the conversion made possible ? $CH_3COCH_3 \rightarrow (CH_3)_3COH$.
9. What happens when glycerol is heated with $KHSO_4$?
10. Give the increasing order of basicity among CH_3NH_2, $(CH_3)_2NH$ and $(CH_3)_3N$.

P.T.O.

11. How is *n* butane obtained by Kolbes electrolytic method ?

12. $(CH_3)_2C = CHCH_3 + BH_3$ in ether /$H_2O \rightarrow$?

13. Explain the hybridization in allene.

14. How is ethanol converted to *n* propanol ? **(7×2=14)**

SECTION – C

(Short essay/problem type. **Each** carries **3** marks. Answer **4** questions out of **6**)

15. Explain the mechanism of the rearrangement reactions.
    a) Pinacol pinacolone and b) Claisen

16. Discuss :
    a) Haworth synthesis of naphthalene and
    b) Wislicenus synthesis of cycloalkane.

17. How is chloroform prepared from a) Acetone and b) Ethanol ? Explain.

18. Discuss 1, 2 and 1, 4 additions in butadiene.

19. Comment on the acidic nature of phenol.

20. How will you distinguish 1°, 2° and 3° alcohols by Lucas method ? Explain. **(4×3=12)**

SECTION – D

(Long essay type. **Each** carries **5** marks. Answer **2** questions out of **4**)

21. Discuss the mechanism of S_N1 and S_N2 reactions with reference to stereochemistry, intermediate/transition state and factors affecting the reaction.

22. Comment on the structure, generation and reactivity of
    a) Carbenes and
    b) Nitrenes.

23. Discuss the following :
    a) Addition of HBr to unsymmetrical alkenes and
    b) Action of alcoholic potash in 2-bromo-pentane.

24. How are the following synthesized ?
    a) Phenol from cumene
    b) Phenolic ethers and
    c) Dihydric phenols.

(2×5=10)

K20U 1812

Reg. No. : .....

Name : .....

III Semester B.Sc. Degree CBCSS (OBE) – Regular Examination, November 2020
(2019 Admission Only)
CORE COURSE IN CHEMISTRY/POLYMER CHEMISTRY
3B03CHE/PCH : Organic Chemistry – I

Time : 3 Hours

Total Marks : 40

Instruction : *Answer the questions in* ***English only***.

SECTION – A

Very short answer type – **Each** carries **1** mark. Answer **all 4** questions.

1. Among methyl, ethyl, isopropyl and tert-butyl cations, which is the most stable ?
2. What is the general term used to describe a synthetic process in which an optically active chiral compound is produced from an achiral compound ?
3. Which is the least stable conformer of ethane ?
4. What is the product formed when N-bromosuccinimide is heated with propene ?

(4×1=4)

SECTION – B

Short answer type - **Each** carries **2** marks – Answer **7** questions out of 10.

5. Why is trimethylamine less basic than dimethylamine ?
6. What are electrophiles ? Give two examples.
7. Distinguish between a singlet carbene and a triplet carbene.
8. What is tropylium ion ? Explain its aromaticity on the basis of Hückel's rule.
9. Differentiate between asymmetric and dissymmetric molecules.
10. Draw the Fischer projections of the optical isomers of 2-bromobutane.

P.T.O.

11. Give any two postulates of Baeyer's strain theory.
12. What are conducting polymers ? Give two examples.
13. How is Nylon-66 prepared ?
14. Give the structure of methyl orange.

(7×2=14)

SECTION – C

Short essay/problem type - **Each** carries **3** marks. Answer **4** questions out of 6.

15. Explain the term hyperconjugation and its significance with illustrative examples.
16. What are annulenes ? Give the names and structures of two annulenes that are aromatic.
17. Discuss the optical isomerism of lactic acid.
18. Give the preparation and applications of the following :
    a) Phenol-formaldehyde resin
    b) Buna-S.
19. Explain the term chromophore and auxochrome with suitable examples.
20. What is Wittig reagent ? Give the preparation and synthetic application of Wittig reagent.

(4×3=12)

SECTION – D

Long essay type – **Each** carries **5** marks – Answer **2** questions out of 4.

21. Discuss the generation, structure and stability of carbocations.
22. a) Explain the mechanism of Sulphonation of benzene.
    b) Explain the term ortho-para ratio.
23. a) What is optical activity ? Which types of organic molecules exhibit optical isomerism ?
    b) Draw different conformations of cyclohexane. Which is more stable ? Why ?
24. a) Explain Reformatsky reaction.
    b) How are the following obtained with the help of ethyl acetoacetate :
        i) Crotonic acid
        ii) Glutaric acid
        iii) 3-methylpentan-2-one.

(2×5=10)

Name : .....

III Semester B.Sc. Degree (CBCSS-Reg./Sup./Imp.)
Examination, November - 2019
(2014 Admn. Onwards)
CORE COURSE IN CHEMISTRY
3B04 CHE: ORGANIC CHEMISTRY-I

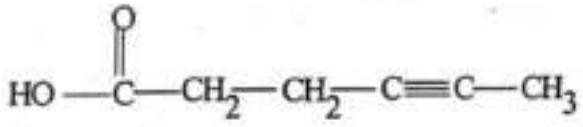
Time : 3 Hours Max. Marks : 40

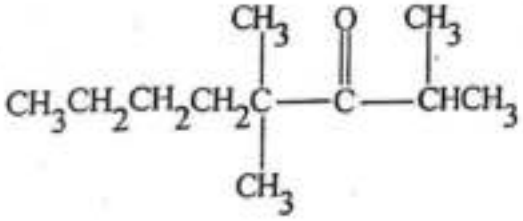
Answer the questions in English only

SECTION-A

(Objective type-each carries **1** mark - Answer All **4** questions) **(4×1=4)**

1. Give IUPAC names of the following

a) 

b) 

2. Write the structural formulate of
   a) bicyclo [1, 1, 0] butane and
   b) bicyclo [2, 2, 1] heptane.
3. Exemplify Wurtz reaction.
4. Give the major product of addition of HBr to CH_3CH_2 $CH{=}CH_2$

P.T.O.

SECTION-B

(Short answer type. Each carries **2** marks- Answer **7** questions out of (7x2=

5. How is *n*-butanol converted to *n*-propanol?
6. How do alkenes react with
   a) Cold dilute $KMnO_4$ and
   b) hot concentrated acidified $KMnO_4$
7. Give the geometry of the products obtained when H_2 is added to 2-butyne in the presence of
   a) Pd/quinolone and
   b) Na/liq.NH_3
8. How is phenol prepared from cumene?
9. Outline the course of hydration of alkynes in the presence of $HgSO_4$ and H^+
10. How does SeO_2 oxidize
    a) Internal alkyne and
    b) terminal alkyne?
11. How is $C_6H_5CO\,CH_3$ and $C_6H_5COC_6H_5$ differentiated using a chemical test?
12. What are the different types of polymerization possible for acetylene?
13. Explain Fries rearrangement with a suitable example.
14. Differentiate between singlet carbene and triplet carbene.

SECTION-C

(Short essay/problem type-each question carries **3** marks. Answer 4 questions out of 6). (4x3=12)

15. How are 1 and 2 naphthols prepared?
16. Give an account of the polymerization reactions and products of alkenes and substituted alkenes.

What are the products obtained when alkenes are oxidized using

a) OsO_4,

b) Peroxyacids,

c) $O_3/Zn, H_2O$

8. Discuss the preparation of cycloalkanes by Freunds and Wislicenus methods.

19. How is m-cresol prepared from benzene?

20. Give a brief account of SN2 reaction.

SECTION-D

(Long essay type - each question carries 5 marks. Answer 2 questions out of 4) **(2×5=10)**

21. Explain sp, sp2 and sp3 hybridization with suitable examples.

22. Give brief notes on

a) Inductive

b) Mesomeric

c) Electromeric and

d) Hypercojugative effects

23. Comment on the generation reactivity, structure and stability of

a) Carbocations and

b) Carbanions.

24. a) Discuss the synthesis of glycerol from

i) Fats and oils and

ii) Propylene

b) What happens when glycerol is heated with excess of HI?

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Reg. No. : .....

Name : .....

III Semester B.Sc. Degree (CBCSS-Reg./Sup./Imp.) Examination, November - 2019

(2014 Admn. Onwards)

COMPLEMENTARY COURSE IN CHEMISTRY

3C03 CHE(BS) : CHEMISTRY (FOR BIOLOGICAL SCIENCES)

Time : 3 Hours Max. Marks : 32

SECTION-A

Answer **All** questions. Each question carries **1** mark. **(5×1=5)**

1. What is meant by isolated systems?
2. Define the term conformation.
3. Name the functional group in
   a) Carboxylic acid
   b) Amide
4. What is meant by chirality ?
5. What are chelating ligands?

SECTION-B

Answer any **Four** questions. Each question carries **2** marks. **(4×2=8)**

6. Name the following
   a) $Zn_2[Fe(CN)_6]$
   b) $[Cr(NH_3)_6]\ Cl_3$
7. Predict the products $CH_3 - CH = CH_2 + HBr \rightarrow$
8. What is meant by heterolysis? Give one example.
9. What are free radicals? Give any two reaction in which they are formed.
10. What are isochoric and isobaric processes?

P.T.O.

11. The boiling point of diethyl ether is 35°C. Its heat of vaporization at its boiling point is 27.2 KJ/mole. Calculate entropy of vaporization.

SECTION-C

Answer any **Three** questions. Each question carries **3** marks. **(3×3=9)**

12. Write down Gibbs Helmholtz equation. What are the criterion for spontaneity?
13. Discuss Werners theory of coordination.
14. Discuss the optical isomerism of tartaric acid.
15. Explain peroxide effect with a suitable example.
16. Give an account of formaldehyde based plastics.

SECTION-D

Answer any **Two** questions. Each question carries **5** marks. **(2×5=10)**

17. Discuss the factors affecting stability of complexes.
18. Explain with mechanism the various electrophilic substitution reactions of benzene.
19. a) Derive a relation between Cp and Cv.
    b) State and explain second law of thermodynamics.
20. Write notes on
    a) co polymers
    b) biodegradable polymers.

Reg. No. : .....

Name : .....

K20U 1813

III Semester B.Sc. Degree CBCSS (OBE) – Regular Examination, November 2020

(2019 Admission Only)

COMPLEMENTARY ELECTIVE COURSE IN CHEMISTRY/POLYMER CHEMISTRY

3C03CHE/PCH(BS) : Chemistry (For Biological Sciences)

Time : 3 Hours

Max. Marks : 32

Instruction *: Answer the questions in* ***English only.***

SECTION – A

(Very short answer type – **Each** carries **1** mark – Answer **all 5** questions)

1. Which is more acidic : acetic acid or chloroacetic acid ?
2. The separation of a racemic mixture into its *d* and *l* components is called _____
3. Give two examples for copolymers.
4. The thermodynamic variable, which is the sum of internal energy and the product of pressure and volume is known as _____
5. The substance which increases the activity of a catalyst is known as _____

(5×1=5)

SECTION – B

(Short answer type – **Each** carries **2** marks – Answer **4** questions out of 6)

6. Distinguish between unidentate and bidentate ligands.
7. What is meant by peroxide effect ?
8. Define conformational isomerism.

P.T.O.

9. Name any one synthetic rubber and give its uses.

10. State the first law of thermodynamics and explain.

11. Calculate the half-life of a first order reaction of rate constant 0.025 min^{-1}. **(4×2=8)**

SECTION – C

(Short essay type – **Each** carries **3** marks – Answer **3** questions out of 5)

12. Predict the magnetic behavior of $[Co(CN)_6]^{3-}$ ion, on the basis of valence bond theory.

13. Describe geometrical isomerism taking 2-butene as example.

14. Distinguish between thermoplastics and thermosetting plastics.

15. Define Gibb's free energy. Discuss its physical significance.

16. How does collision theory explain the effect of temperature on the reaction rate ?

(3×3=9)

SECTION – D

(Long essay type – **Each** carries **5** marks – Answer **2** questions out of 4)

17. a) What are the main postulates of Werner's theory of coordination complexes ?
    b) Find the effective atomic number of central atom of $[Cu(NH_3)_6]^{2+}$.

18. Describe the mechanism of an S_N1 reaction.

19. a) Discuss the mechanism of nitration of benzene.
    b) Explain the physical significance of entropy.

(2+3)

20. a) Write a note on optical isomerism of lactic acid.
    b) What are the factors affecting the rate of a chemical reaction ?

(2+3)

(2×5=10)

Reg. No. : .....

Name : .....

0091503

K19U 2460

III Semester B.Sc. Degree (CBCSS-Reg./Sup./Imp.) Examination, November - 2019

(2014 Admn. Onwards)

COMPLEMENTARY COURSE IN CHEMISTRY

3C03 CHE(BS) : CHEMISTRY (FOR BIOLOGICAL SCIENCES)

Time : 3 Hours

Max. Marks : 32

SECTION-A

Answer **All** questions. Each question carries **1** mark. **(5×1=5)**

1. What is meant by isolated systems?
2. Define the term conformation.
3. Name the functional group in
   a) Carboxylic acid
   b) Amide
4. What is meant by chirality ?
5. What are chelating ligands?

SECTION-B

Answer any **Four** questions. Each question carries **2** marks. **(4×2=8)**

6. Name the following
   a) $Zn_2[Fe(CN)_6]$
   b) $[Cr(NH_3)_6]\ Cl_3$
7. Predict the products $CH_3 - CH = CH_2 + HBr \rightarrow$
8. What is meant by heterolysis? Give one example.
9. What are free radicals? Give any two reaction in which they are formed.
10. What are isochoric and isobaric processes?

P.T.O.

K19U 2460

11. The boiling point of diethyl ether is 35°C. Its heat of vaporization at its boiling point is 27.2 KJ/mole. Calculate entropy of vaporization.

SECTION-C

Answer any **Three** questions. Each question carries **3** marks. **(3×3=9)**

12. Write down Gibbs Helmholtz equation. What are the criterion for spontaneity?
13. Discuss Werners theory of coordination.
14. Discuss the optical isomerism of tartaric acid.
15. Explain peroxide effect with a suitable example.
16. Give an account of formaldehyde based plastics.

SECTION-D

Answer any **Two** questions. Each question carries **5** marks. **(2×5=10)**

17. Discuss the factors affecting stability of complexes.
18. Explain with mechanism the various electrophilic substitution reactions of benzene.
19. a) Derive a relation between Cp and Cv.
    b) State and explain second law of thermodynamics.
20. Write notes on
    a) co polymers
    b) biodegradable polymers.

Reg. No. : .....

Name : .....

K21U 2071

III Semester B.Sc. Degree (CBCSS – Sup./Imp.) Examination, November 2021
(2015-'18 Admissions)
COMPLEMENTARY COURSE
3C03CHE(PS) : Chemistry (For Physical Sciences)

Time : 3 Hours

Max. Marks : 32

SECTION – A

Answer **all** questions

Each question carries **1** mark.

1. What is meant by homologous series ?
2. Give one example of a tridentate ligand.
3. Name any two ores of titanium.
4. Name the following
   a) $[Ni(CN)_4]^{2-}$
   b) $[Ni(CO)_4]$.
5. What are isobaric processes ?

(1×5=5)

SECTION – B

Answer **any four** questions

Each question carries **2** marks.

6. Draw the nmr spectrum of acetone.
7. What are closed systems ? Give one example.
8. What are free radicals ? How are they formed ?
9. State and explain group displacement law.
10. What is meant by EAN ? Calculate the EAN of $[Co(NH_3)_6]^{3+}$.
11. What is Monds process ?

(2×4=8)

P.T.O.

SECTION – C

Answer **any three** questions

Each question carries **3** marks.

12. Explain the methods for ore concentration.
13. What are the terms internal energy change and enthalpy change of a system ? Derive a relation between U and H.
14. What is chemical shift ? What are the factors affecting chemical shift ?
15. Discuss the Werners theory.
16. Write notes on :
    a) Mass defect
    b) Binding energy. **(3×3=9)**

SECTION – D

Answer **any two** questions

Each question carries **5** marks.

17. Discuss the applications of radioisotopes in agriculture and industry.
18. Explain the applications of complexes.
19. Outline the principle of microwave spectroscopy. What are its applications ?
20. What are the electron displacement effects ? Explain any two. **(5×2=10)**

Reg. No. : .....

Name : .....

K20U 1814

III Semester B.Sc. Degree CBCSS (OBE) – Regular Examination, November 2020

(2019 Admission Only)

COMPLEMENTARY ELECTIVE COURSE IN CHEMISTRY/POLYMER CHEMISTRY

3C03 CHE/PCH(PS) : Chemistry (for Physical Science)

Time : 3 Hours

Total Marks : 32

Instruction : *Answer the questions in* ***English*** *only.*

SECTION – A

(Very short answer type. **Each** carries **1** mark. Answer **all 5** questions.)

1. How many NMR signals are expected for ethyl chloride ?
2. What is the work done when a system undergoes free expansion ?
3. Give an example for bidentate ligands.
4. The neutron to proton ratio for ^{12}C is _____
5. Which is the stationary phase in paper chromatography ?

(5×1=5)

SECTION – B

(Short answer type. **Each** carries **2** marks. Answer **4** questions out of **6**.)

6. What is meant by zero point energy ?
7. Distinguish between reversible process and irreversible process in thermodynamics.
8. Write the names of the complexes :
   a) $[CoCl_3(NH_3)_3]$ b) $[Co(NH_3)_6]^{2+}$.
9. A first order reaction is 50% completed in 13.86 hours. Calculate its rate constant.

P.T.O.

10. State and explain group displacement law.

11. What is meant by R_f value ? What is its significance ? **(4×2=8)**

SECTION – C

(Short essay type. **Each** carries **3** marks. Answer **3** questions out of **5**.)

12. Explain the terms Stoke's and anti-Stoke's lines with regard to Raman spectra.

13. Discuss the physical significance of Gibb's free energy.

14. Explain the terms C_p and C_v. How are they related ?

15. How does collision theory explain the effect of temperature on the rate of a reaction ?

16. Write a note on radiocarbon dating. **(3×3=9)**

SECTION – D

(Long essay type. **Each** carries **5** marks. Answer **2** questions out of **4**.)

17. a) A large amount of energy is released during nuclear fission. Explain the reason.

    b) Calculate the binding energy of helium nucleus in MeV [mass of proton = 1.00758 amu; mass of neutron = 1.00897 amu; mass of helium nucleus = 4.00820 amu] **(2+3)**

18. a) Explain Werner's theory of coordinate compounds with suitable examples.

    b) Describe the shape and magnetic behaviour of $[Ni(CN)_4]^{2-}$ with the help of VB theory.

19. a) Give the important characteristics of catalytic reaction.

    b) Explain how a catalyst increases the rate of a reaction. **(2+3)**

20. a) The microwave spectrum of CO consists of a series of equally spaced lines separated by 3.844 cm^{-1}. Calculate the moment of inertia and C-O bond length.

    b) Write a note on thin layer chromatography. **(2+3)**

(2×5=10)