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University Roll No.....

**FIRST Mid Term Examination, 2016 – 2017**  
**B. Tech. I Year I Semester**  
**AHC – 1001: ENGINEERING CHEMISTRY**

Time: - 1 ½ Hrs.

Max. Marks:- 20

**Section – A**

**Note : Attempts all Questions**

**1 X 5 = 5 Marks**

- I. Arrange  $N_2$ ,  $F_2$  and  $O_2$  in increasing order of their bond length.
- II. What is necessary condition for showing a molecule to form diastereomer ? Write any one structure of diastereomer.
- III. Write Dulong Pettit formula for calculating HCV of fuel.
- IV. Why methanol is soluble in water while carbon tetra chloride is insoluble in water ?
- V. Write two examples of insulating lubricating oil .

**Section – B**

**Note : Attempt any Three Questions**

**2 X 3 = 6 Marks**

- I. How calorific value of a fuel is determined by bomb calorimeter? Explain with diagram.
- II. How synthetic petrol is prepared by Fischer Tropsch method ?
- III. What is metallic bond ? Write electron sea model theory of metallic bond.
- IV. What is geometrical isomerism ? Explain with E-Z configuration of geometrical isomers.

### Section – C

**Note : Attempt any Three Questions**

**3 X 3 = 9 Marks**

- I. What are conformers ? With the help of Newmann projection explain the conformers of a molecule in which Gauche ( or Skew ) conformer exist .
- II. Explain Molecular orbital Theory .With the help of M.O.Theory draw M.O.Diagram of CO molecule.
- III. A fuel sample has following composition :-Ethane – 10 % , Isobutane = 30 % , Propene = 20 % , Carbon Monoxide = 5% , Nitrogen = 5% and oxygen = 30%. Calculate the volume of air required of 100 m<sup>3</sup> of fuel sample if 40 % excess air is required .
- IV. What are ceramics ? How are they classified ? What are the main constituents of ceramics ?

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University Roll No.....

Second Mid Term Examination, 2016-2017

B.Tech. I Year I Semester

AHC-1101: ENGINEERING CHEMISTRY

Time: 1 ½ Hrs.

Max. Marks: 20

Section-A

Note: Attempt all Questions

1X5= 5Marks

- I. What are the boiler problems?
- II. Mention two examples of industrially important smart materials.
- III. Write the name of monomer of nylon 6, 6.
- IV.  $\text{CaCO}_3$  is accepted as a standard to represent hardness of water, why?
- V. Discuss role of annealing in manufacturing of glass.

Section-B

Note: Attempt any three Questions

2X3= 6Marks

- I. Discuss briefly about Potash glass and Jenna glass.
- II. Distinguish thermoplastic and thermosetting polymer.
- III. Explain calgon conditioning for treatment of water to be used in boiler.
- IV. Why are the functional materials so important for industries? Mention at least four reasons.

Section -C

Note: Attempt any three Questions

3X3= 9Marks

- I. Reverse Osmosis process is the best water purification process, justify. Discuss different technical aspects of Reverse Osmosis for water treatment with diagram.
- II. Write the preparation and industrial applications of the following.  
a) Teflon                      b) Buna-N                      c) PLA
- III. The hardness of 100 Lts of a water sample is completely removed by passing through zeolite softener which required 10 Lts brine solution containing 1 g/l of NaCl for regeneration. Calculate hardness of water in ppm.
- IV. Discuss the mechanism of preparation of polypropylene using Ziegler-Natta catalyst.



First Mid Term (Even Sem.) Theory Examination-2016-17

Sub: - Engineering Chemistry Paper Code:-AHC1101

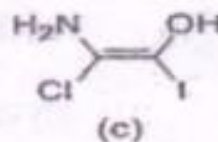
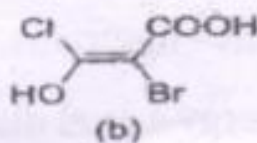
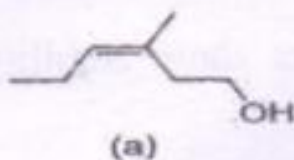
Time: - 90 Min.

Max. Marks:-20

Section- A*Note: Attempt All Five Questions.*

1×5 = 5 marks

- (I) How does bond order relate dissociation energy?
- (II) Name the highest ranking coal. Give its approximate calorific value.
- (III) Lubricants are essential in automobile industries, Justify.
- (IV) Name the ceramic material used in manufacturing of bullet proof vest.
- (V) Assign E-Z nomenclature to the following compounds.  
(Any two)

Section- B*Note: Attempt Any Three Questions.* 2 × 3 = 6 marks

- (I) What is hydrogen bond? Explain different types of hydrogen bonds with suitable examples
- (II) Discuss the industrial significance of any one pair of the following.
- (a) Flash point and fire point
- (b) Cloud and Pour point

(P.T.O.)

(III) 0.98 gram of a liquid fuel containin 0.1% C, 8% H have the following result in bomb calorimeter experiment

Amount of water taken in calorimeter = 1450 gram

Water equivalent of calorimeter = 450 gram

Rise in Temp. =  $1.8^{\circ}\text{C}$

If latent heat of steam is 587 cal/gram, calculate gross and net calorific value of fuel.

(IV) What is ceramic? Discuss the applications of ceramics in the field of engineering and technology.

### Section- C

*Note: Attempt Any Three Questions.  $3 \times 3 = 9$  marks*

- (I) What are conformers? Explain conformation in n-butane with suitable diagrams. Discuss their stability order by using Energy Level diagram.
- (II) With the help of Molecular Orbital Theory, draw the MO diagrams of NO and also calculate their bond order & assign their magnetic behavior.
- (III) Calculate the weight and volume of air needed for complete combustion of 3 Kg. coal having following composition C=70%, H=20%, O=5% and N=5%. (Molar mass of air = 28.94 gm/mol).
- (IV) Explain Bergius method for manufacturing of synthetic petrol with diagram.

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**I-Mid-Term Examination**  
**Odd-Semester, 2017-18**

Program: B.Tech.  
Year:-I  
Time: 1 Hour

Branch: Computer Science & Engineering,  
Subject with Code: Engg.Chemistry, AHC1101  
Maximum Marks: 15

**Section-A**

Three questions of 02 marks each (with no internal choice).      **3 x 2 = 6 Marks**

- I. Differentiate Gross and Net Calorific value of a fuel.
- II. Draw the potential energy diagram for the various conformations of n-butane.
- III. What are ceramics? How are they classified?

**Section-B**

Three questions of 03 marks each (with no internal choice).      **3 x 3 = 9 Marks**

- I. Explain the following properties of lubricants and discuss their significance:  
a) Flash point and Fire Point      b) Cloud and Pour point
- II. A petroleum gas has the following composition. Ethane 10%, Propane 15%, Butane 75%. If 35% excess air is used, find the volume of air required for complete combustion per  $\text{m}^3$  of the gas.
- III. Draw the molecular orbital diagram of  $\text{O}_2$  molecule. Calculate bond order and predict magnetic behavior.

**First Term Examination,  
Odd Semester 2018-19**

**Program:** B.Tech

**Year:** First

**Univ. No.** -----

**Subject:** Engineering Chemistry

**Subject Code:** BCHS-0101

**Time:** 1 Hour

**Max. Marks:** 15

**Section-A**

**Note: Attempt All Questions**

**3 x 2 = 6 Marks**

1. Explain the Cloud and Pour point of lubricants
2. Differentiate Higher Calorific and Lower calorific value of a fuel.
3. What is hydrogen bond? Explain different types of hydrogen bonds with suitable examples

**Section-B**

**Note: Attempt All Questions**

**3 x 3 = 9 Marks**

1. With the help of Molecular Orbital Theory, draw the MO diagram of  $F_2$ . Calculate bond order & magnetic behavior also.
2. A gaseous fuel has the following composition by volume:  $H_2=32\%$ ,  $CH_4=14\%$ ,  $N_2=40\%$  and  $O_2=14\%$ . If 25% excess air is used, find the weight of air actually supplied per  $m^3$  of this gas.
3. What are conformers? Explain conformation in n- butane with suitable diagrams. Discuss their stability order by giving Energy Level diagram.

First Term Examination  
Even Semester, 2018-19

Course: B.Tech.

Title of Paper: Engineering Chemistry

Time: 1 Hour

Univ. No. \_\_\_\_\_

Paper Code: BCHS0101

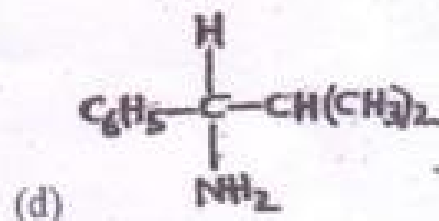
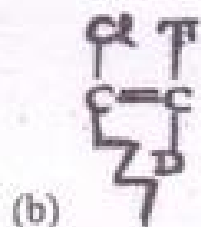
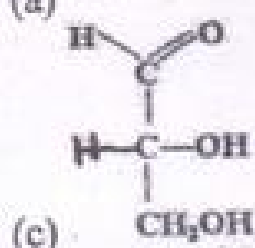
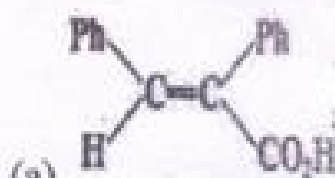
Max. Marks: 15

Section-A

Note: Attempt All Questions

3 × 2 = 6 Marks

- (I) Draw MO diagram of  $O_2$  molecule and calculate its bond order.
- (II) (a) What do you mean by lubrication?  
(b) Write important applications of ceramics.
- (III) Assign E or Z configuration for (a) & (b) and R or S configuration for (c) & (d) molecules with proper leveling in their order of priority.



Section-B

Note: Attempt All Questions

3 × 3 = 9 Marks

- (I) What do you understand by hydrogen bond? Discuss its types with example. How does it affect the properties of the compound?
- (II) Explain the Bergius process for preparation of synthetic petrol with neat diagram.
- (III) (a) Differentiate HCV and LCV.  
(b) A gas has following composition by volume:  $H_2 = 32\%$ ,  $CH_4 = 14\%$ ,  $C_2H_4 = 10\%$ ,  $N_2 = 30\%$  and  $O_2 = 14\%$ . If 30% excess air is used, find the weight of air actually needed for combustion of gas.



## Mid-Term Theory Examination, 2019-20

## Engineering Chemistry (BCHS 0101)

Course: B.Tech.

Branch: CSE

Year/Semester: I/I

Time: 2 Hr

Max. Marks: 30

Section- ANote: Attempt all questions. $2 \times 3 = 6$  marks

1. Differentiate HCV and NCV.
2. With the help of reaction, explain how vulcanization of rubber is done? What are the advantages of vulcanized rubber over raw rubber?
3. Write the significance of the following in lubrication process:
  - i) Flash point and fire point
  - ii) Cloud point and pour point

Section- BNote: Attempt all questions $3 \times 3 = 9$  marks

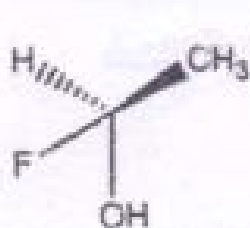
1. What do you understand by conformational isomers? Draw all possible conformers of n-butane. State which one is most stable and which one is least stable?
2. What are ceramics? How they can be classified?
3. Calculate the weight of air required for complete combustion of  $1 \text{ m}^3$  of a gaseous fuel having following composition:  
 $\text{CH}_4 = 45 \%, \text{C}_2\text{H}_6 = 15\%, \text{CO} = 16\%, \text{N}_2 = 10\%, \text{H}_2 = 10\%, \text{O}_2 = 10\%.$

Section- CNote: Attempt any three questions $5 \times 3 = 15$  marks

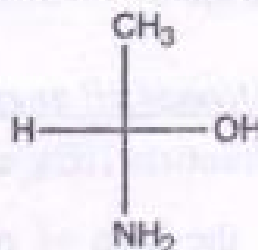
1. Using the concept of Molecular orbital theory, draw molecular orbital diagram of Oxygen molecule. Also, write its molecular orbital electronic configuration, bond order and magnetic character.

2. i) Explain with help of well labeled diagram, how petrol can be synthesized using "Fisher Tropsch Method". Also, write reactions involved in this method.

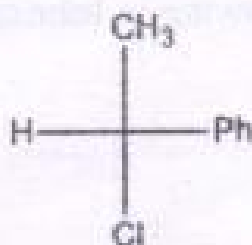
ii) Assign R/S configuration in the following compounds:



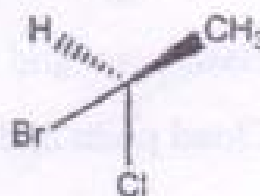
(a)



(b)



(c)



(d)

3. i) Differentiate Thermosetting and thermoplastic polymers. (2)

ii) Design the method of synthesis and write the applications of following polymers (*any two*): (3)

a. Buna-S

b. Polystyrene

c. Polylactic acid

4. i) Write the composition and uses of *any two* type of glasses: (3)

a. Borosilicate glass

b. Lead glass

c. Soda glass

ii) Draw a well labeled diagram of bomb calorimeter for determination of HCV. Also, write the formula involved in it. (2)

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University Roll No.....

Mid-Term Theory Examination, 2021-22

Engineering Chemistry (BCHS 0101)

Course: B.Tech.

Year/ Semester: I/I

Time: 2 Hours

Maximum Marks: 30

### Section A

Note: Attempt all questions

2 × 3 = 6 marks

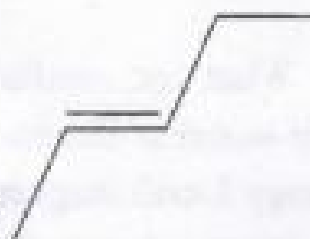
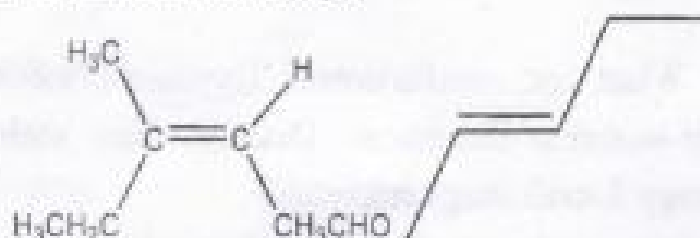
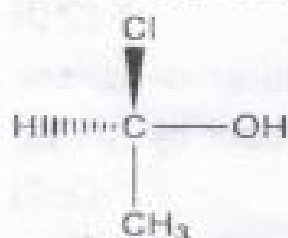
1. What is optical activity? Give the stereoisomers of Tartaric acid.
2. Suggest the role of flux used in ceramic industry. Discuss important industrial applications of ceramics.
3. What is metallic Bond? Explain conductor, semiconductor and insulator on the basis of molecular orbital theory.

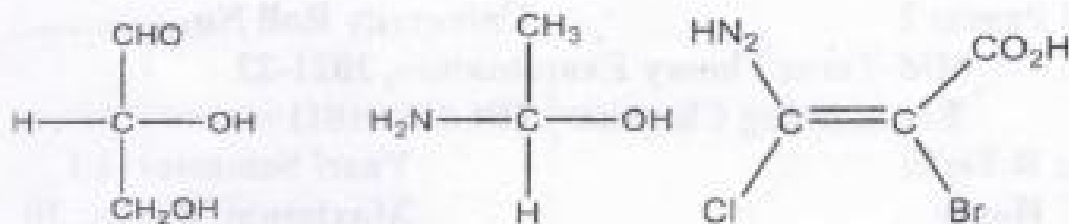
### Section B

Note: Attempt all questions

3 × 3 = 9 marks

1. Define is lubricant? Discuss the SEN and Flash & Fire point of lubricants.
2. (a) Design preparation process and industrial application of any one polymer. (2.0)
  - I. Nylon6,6
  - II. Vulcanized rubber
- (b) Find weight average molecular weight for polypropene, given its degree of polymerization as 10,000. (1.0)
3. Assign R/S and E/Z to the following.





### Section C

Note: Attempt any three questions

**5 × 3 = 15 marks**

1. (a) Differentiate Gross and Net Calorific value of a fuel. (1.5)  
 (b) Discuss the importance of proximate analysis of Coal. (1.5)  
 (c) A Coal has the following composition by weight C=90%, O=3%, S=0.5, N=0.5 and ash=2.5%. Net Calorific value of the coal was found to be 8490.5 kcal/kg. Calculate the percentage of Hydrogen and Higher calorific value of a coal. (2.0)
2. Using the concept of Molecular orbital theory, draw the molecular orbital diagram of N<sub>2</sub> molecule, find out bond order and also assign magnetic behavior.
3. (i) List composition and uses of any two of the glasses. (3.0)
  - (a) Flint
  - (b) Pyrex
  - (c) Potash glass
 (ii) A gaseous fuel has the following composition by volume: H<sub>2</sub>=34%, CH<sub>4</sub>=16%, N<sub>2</sub>=38% and O<sub>2</sub>=12%. If 22% excess air is used, find the weight of air actually supplied per m<sup>3</sup> of this gas. (2.0)
4. (i) What are conformers? Explain conformation in n-butane with suitable diagrams. Discuss their stability order by giving Energy Level diagram. (3.0)  
 (ii) Discuss heterochain and homochain polymer with examples. (2.0)

**Course Name: B.Tech.****Course Outcome:**

- CO1- Understanding fundamental concepts of chemistry and its applications in the various branches of engineering sciences.
- CO2- Applying the knowledge of chemistry in solving socio-economic and environmental issues.
- CO3- Identify and analyze engineering problems to achieve practical solutions
- CO4- Knowledge of chemical science for better appreciation of applications in engineering chemistry.
- CO5- Student ability to perform, analyze and interpret the experimental data for better understanding

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University Roll No. ....

**Mid Term Examination, Odd Semester 2022-23****B.Tech. Year-I<sup>st</sup>, Semester-I<sup>st</sup>****Subject Code: (BCHS-0101)****Subject Name: Engineering Chemistry****Maximum Marks: 30****Time: 2 Hours****Instruction for students:**

1. All questions are compulsory to attend.
2. You are advised to read the question paper carefully and write relevant answers accordingly.
3. Appropriate diagrams (if any) in support of the answer is desirable.

**Section – A****3 X 5 = 15 Marks****Attempt All Questions**

No.	Detail of Question	Marks	CO	BL	KL
1	Explain briefly how HCV of the fuel can be derived experimentally by Bomb calorimeter, with the help of a suitable diagram?	3	1	U, A	C
2	Create various conformers of n-butane and highlight them on the energy diagram with their stability order.	3	4	C	F
3	Assign R&S, OR E&Z to the following stereoisomer with proper numbering: <div style="display: flex; justify-content: space-around; align-items: center;"> <div style="text-align: center;"> <p>(i)</p> </div> <div style="text-align: center;"> <p>(ii)</p> </div> <div style="text-align: center;"> <p>(iii)</p> </div> </div>	3	3,5	An,A	M
4	Give the chemical composition and uses of any two types of glasses. (i) Flint glass (ii) Borosilicate glass (iii) Hard glass	3	1, 4	An,R	F



5	Applying the concept of combustion technique, evaluate the weight of air needed for the combustion 60 kg of a coal sample, containing 50% carbon, 10% hydrogen, 10% oxygen, 10% Sulphur, 5% nitrogen and remaining ash.	3	5	A, E	M
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### Section – B

5 X 3 = 15 Marks

Attempt All Questions

No.	Detail of Question	Marks	CO	BL	KL
6	Elucidate the preparation, properties and uses of the following polymers (Any Two) (i) Buna-S (ii) PHB (iii) Nylon66	5	1, 4	U, R	F
7	The magnetic behavior of any chemical molecule depends upon the number of electrons present in its last orbital. Applying the same concept, create a molecular orbital diagram of Fluorine molecule, justifying its magnetic behavior and bond order.	5	5	A, C	F
8 A	Analyze the Lubricants for its following properties. (i) Flash Point and Fire point (ii) SEN (iii) Specific Heat	3	4	An	M
8 B	Draw the schematic labelled diagram to show synthesis of synthetic petrol by Fischer-Tropsch method.	2	2	U, R	P

XXXXXXXXXX

## **Course Name: Engineering Chemistry**

### **Course Outcome**

After studying this course students will be able to:

- CO1. Compute the calorific value of fuel by Bomb calorimeter and Dulong's formula.
- CO2. Identified the use of polymer, glass, ceramic, and lubricants in various Engineering applications.
- CO3. Apply various methods for the removal of hardness of water for both industrial and domestic applications.
- CO4. Interpret molecular structure based on spectroscopic analysis.
- CO5. Conceptual understanding of nanomaterials and their applications in the field of Engineering and medical sciences.

**Printed pages: 02**

**Univ. Roll No. ....**

**Mid Term Examination, Even Semester 2022-23**

**B. Tech. I Year (All Branches), Semester II**

**BCHS 0101: Engineering Chemistry**

**Time: 2 Hours**

**Max. Marks: 30**

### **Section – A**

**Note: All questions are compulsory**

**3 × 5 = 15 Marks**

No.	Detail of Question	Marks	CO	BL	KL
1	Draw conformational isomers of n-butane. Also compare their stability.	3	CO5	A	C
2	What are ceramic materials? Enlist important applications of ceramic materials. OR Name and draw the structure of monomers of (Any three): i. Nylon 66 ii. Teflon iii. Polystyrene iv. Buna-S	3	CO2	A	C
3	Describe the working principle of 'Bergius method' for synthesis of petrol with a well labelled diagram.	3	CO2	U	C
4	Define lubricants? How they are classified?	3	CO4	A	M
5	Enlist applications(at least three of each) of borosilicate and optical glass.	3	CO5	C	M

## Section – B

**Note: All questions are compulsory**

**5 × 3 = 15 marks**

Q. No.	Detail of question	Marks	CO	BL	KL
1	Draw MO diagram of O <sub>2</sub> molecule. Also, calculate bond order and assign magnetic character.	5	CO2	C	M
2	Write a short note on: i. Proximate analysis of coal ii. Neutralization number of lubricants iii. Cloud point iv. Calorific value v. Flash point of lubricants	5	CO4	A	F
3	Describe how the calorific value can be determined using the Bomb calorimeter? Mention the formula involved with all descriptors. In a bomb calorimeter experiment, following data was obtained: amount of coal = 0.85gm, W = 2.5kg, w = 0.5kg, observed rise in temperature = 2.25 °C, C <sub>A</sub> = 38.6 calories, C <sub>F</sub> = 6.8 calories, and T <sub>C</sub> = 0.05 °C. Calculate net calorific value if the coal contains 10 % hydrogen?	5	CO4	C	F

\*\*\*End of Question paper\*\*\*