MAHATMA GANDHI UNIVERSITY, KOTTAYAM

MGU-UGP (HONOURS)

FIRST SEMESTER EXAMINATION

(2024 ADMISSION ONWARDS)

MG1DSCCHE100– Fundamentals of Chemistry-1

Duration: 2 hrs Maximum Marks: 50

Students should attempt at least one question from each course outcome to enhance their overall outcome attainability.

Part A

Multiple Choice Questions

Answer **All** Questions

Each question carries **1** mark

1. Which of the following represents a spectral series in the hydrogen atom's emission line spectrum?

   a) Lyman series b) Rayleigh series c) Pauling Scale d) Pauli's series [K] [CO1]

2. What term describes a region around an atom's nucleus where there is a high probability of finding an electron?

   a) Energy level b) Orbital c) Proton cloud d) Electron path [K] [CO1]

3. Which among the following pair has a diagonal relationship

   a) Silicon and Boron b) Boron and Aluminium

   c) Lithium and Beryllium d) Sodium and Potassium [K] [CO1]

4. Choose the correct decreasing order of stability of carbanions

   a) primary > secondary > tertiary
   b) secondary > primary > tertiary
   c) tertiary > primary > secondary
   d) tertiary > secondary> primary [A] [CO3,4]

5. Which statement is true about hyperconjugation?

   a) Hyperconjugation involves the overlap of p-orbitals between adjacent atoms
   b) Hyperconjugation stabilizes carbocations by donating electron density from adjacent σ-bonds
   c) Hyperconjugation only occurs in aromatic compounds
   d) Hyperconjugation is a strong intermolecular force affecting boiling points [K] [CO3,4]

6. What is the maximum number of electrons allowed in an orbital

   2 b)3 c)1 d)4 [K] [CO1]

7. What is catenation

   a) cation formation b) anion formation
   b) c) bonding of atoms of same element into a chain d) chain shortening reaction [K] [CO2]

8. What is an example for metalloid?

   a) Carbon b) Sodium c) Boron d) Oxygen [K] [CO5]

9. What is an example of compound with covalent bond
   a) HCl b) NaCl c) KCl d) KBr [K] [CO5]

10. Which among the following has the highest electronegativity in Pauling's scale?
    a) Cl b) F c) Cs d) Ne [K] [CO5]

[1 x 10 = 10]

Part B

Short Answer Type Questions

Answer **4** Questions. Each question carries **3** marks

11. Explain Heisenberg's uncertainty principle [U] [CO1]
12. Why do Cu and Cr deviate from the expected electronic configurations of their respective groups? [A] [CO1]
13. Illustrate homolysis and heterolysis in C-Cl bond in CH_3-Cl, using curved arrows [A] CO[3,4]
14. Draw and explain the structure of carbocation [U] [CO3,4]
15. Differentiate between valency and oxidation state [U] [CO5]
16. What are the reasons behind the decrease in atomic radii across a period in the periodic table? [A] [CO5]

[3 x 4 = 12]

Part **C**

Short Essay Type Questions

Answer **4** Questions. Each question carries **7** marks

17. How does the inductive effect influence the acidity of carboxylic acids, and what role do electron-withdrawing and electron-donating groups play in this process? [A] [CO3,4]
18. Calculate the effective nuclear charge (Z_{eff}) for the outermost electrons in Li, B, N and Ne. [A] [CO5]
19. What are quantum numbers? Discuss the significance of quantum numbers. [U] [CO1]
20. What are the features of hybridisation? Explain hybridisation of Carbons in ethane and ethene [U] [CO2]
21. Explain the atomic spectra of Hydrogen atom using Bohr theory [U] [CO1]
22. Define ionisation enthalpy? Explain how it varies along a period and in a group? [U] [CO5]

[7 x 4 = 28]

MAHATMA GANDHI UNIVERSITY, KOTTAYAM

MGU-UGP (HONOURS)

FIRST SEMESTER EXAMINATION

(2024 ADMISION ONWARDS)

Model Question Paper

MG1DSCICH100– Fundamentals of Industrial Chemistry

Duration: 1.5 hrs Maximum Marks: 50

Students should attempt at least one question from each course outcome to enhance their overall outcome attainability.

Part A

Multiple Choice Questions Answer **All** Questions

Each question carries **1** mark

1. Which of the following processes is an example of a chemical unit process? [Understand] [CO 1]

a) Distillation b) Evaporation c) Hydrogenation d) Filtration

2. How can the selectivity of a chemical reaction be improved? [Analyze] [CO 1, 2]

a) By increasing the temperature b) By decreasing the pressure c) By using a more selective catalyst d) All of the above

3. The octane number of iso-octane is [Remember] [CO 2, 4]

a) 100 b) 90 c) 50 d) 0

4. Which property of mica allows it to be split into thin sheets? [Apply] [CO 1, 2, 3]

a) High density b) Electrical conductivity c) Layered structure with van der Waals forces d) Low thermal conductivity

5) What is the primary ore of iron? [Remember] [CO 3]

a) Bauxite b) Hematite c) Galena d) Malachite

6) Which of the following is an example of wet corrosion? [Understand] [CO 1]

a) Corrosion of metal in the water b) Corrosion of iron in calcium Chloride c) Corrosion of titanium in dry chlorine d) Corrosion due to furnace gases

7) Quantum dots are [Understand] [CO 1]

a) Zero- Dimensional b) One- Dimensional c) Two- Dimensional d) Three- Dimensional

8) Which of the following is an example of the 'top-down' approach? [Understand] [CO 5]

a) Sol-gel synthesis b) Ball milling c) Chemical vapor deposition d) Self-assembly

9) What is the primary characteristic of nanomaterials? [Remember] [CO 5]

a) Size greater than 1 micron b) Size between 1 and 100 nanometers c) Size smaller than 1 millimeter d) Size between 100 and 1000 nanometers

10) What makes nanocomposites advantageous over conventional composites in industrial applications? [Apply] [CO 1, 2, 6]

a) Enhanced thermal stability and mechanical properties b) Easier manufacturing process

c) Lower cost d) Improved color properties

[1 x 10 = 10]

Part **B**

Short Answer Type QuestionsAnswer any **four** Questions

Each question carries **3** marks

11) Explain why safety measures are important in a chemical manufacturing plant. [Understand] [CO 1, 2]

12) Differentiate between unit processes and unit operations in chemical processing [Understand] [CO 1]

13) Distinguish between Chemical (Dry) corrosion and Electrochemical (wet) corrosion. [Understand] [CO1]

14) What is the primary chemical structure of cellulose? [Remember] [CO 1, 2, 4]

15) What is Gecko effect? How can Gecko effect be used to design advanced adhesives for industrial applications? [Understand] [CO 5]

16) Write any two applications of fullerenes. [Apply] [CO 1,2]

[3 x 4 = 12]

Part **C**

Short Essay Type Questions

Answer **four** Questions

Each question carries **7** marks

17) Describe the chemical composition of petroleum and natural gas. Explain how the different fractions of crude oil are used in everyday life. [Analyze] [CO 2, 4]

18) Analyse the advantages and disadvantages of batch and continuous processes in terms of efficiency, cost, and product quality. [Analyze] [CO 1, 2]

19) Compare the structures of graphite and diamond and explain how these structures contribute to their contrasting physical properties. [Understand] [CO 1, 2, 3]

20) Discuss the methods used for the extraction of copper from its ores. [Understand] [CO1, 3]

21) Explain the important properties and applications of Carbon Nano Tubes (CNTs). [Understand] [CO 1, 2]

22) Describe the sol-gel process in detail, outlining each step from sol formation to final material synthesis. [Understand] [CO 5]

[7 x 4 = 28]

MAHATMA GANDHI UNIVERSITY, KOTTAYAM

MGU-UGP (HONOURS)

FIRST SEMESTER EXAMINATION

(2024 ADMISSION ONWARDS)

Model Question

MG1DSCPEG100- FUNDAMENTALS OF PETROLEUM GEOCHEMISTRY

Duration: 1.5 hrs. Maximum marks: 50

Students should attempt at least one question from each course outcome to enhance their overall outcome attainability

Part A

Multiple Choice Questions
Answer **All** Questions
Each question carries **1** mark

1. Which of the following processes is most associated with diagenesis? [Remember] [Course Outcome 1]
   a) Biodegradation b) Hydrocarbon migration c) Thermal cracking d) Pyrolysis
2. Which of the following is a primary factor influencing the occurrence of petroleum? [Understand] [Course Outcome 1]
   a) Atmospheric pressure b) Geological formations c) Ocean currents d) Solar radiation
3. Which of the following is a type of structural trap? [Remember] [Course Outcome 2]
   a) Fault trap b) Sandstone lens c) Carbonate reef d) Shale formation
4. Which of the following is a direct indicator of hydrocarbons during geological exploration? [Remember] [Course Outcome 3]
   a) Anticlines and synclines b) Salt domes c) Oil seeps d) Fault lines
5. Name a non-invasive method used for oil and gas exploration, especially in environmentally sensitive areas. [Remember] [Course Outcome 3]
   a) Core Sampling b) Seismic Survey c) Remote Sensing d) Magnetic Logging
6. Which logging method is particularly useful for detecting the presence of hydrocarbons in a reservoir? [Remember] [Course Outcome 3]
   a) Density Logging b) Gamma-Ray Logging c) Resistivity Logging d) Electromagnetic Logging
7. Select which of the following hydrocarbon is primarily found in natural gas? [Remember] [Course Outcome 4]
   a) Benzene b) Ethylene c) Methane d) Cyclohexane

8. Coal bed methane (CBM) is primarily derived from: [Understand] [Course Outcome 4]
   a) Coal seams b) Natural gas reservoirs c) Oil fields d) Gas hydrates
9. Low aniline point of hydrocarbon typically indicates: [Remember] [Course Outcome 5]
   a) High aromatic content b) Low volatility c) High paraffin content d) High density
10. Identify which of the following instruments is used to measure refractive index? [Remember] [Course Outcome 5]
    a) Bomb calorimeter b) Refractometer c) Flash point tester d) Thermometer

(1x10=10)

Part B

Short Answer Type Questions
Answer **4** Questions
Each question carries **3** marks

11. List out the benefits of deasphalting process. [Analyse] [Course Outcome 1]
12. Illustrate migration of hydrocarbons from carrier beds to reservoir rock. [Apply] [Course Outcome 2]
13. Compile electromagnetic methods with seismic surveys in oil exploration techniques. [Apply] [Course Outcome 3]
14. Explain radioactive logging and discuss how is it used in petroleum exploration. [Understand] [Course Outcome 3]
15. Explain the significance of understanding the composition of oxygen compounds in crude oil. [Understand] [Course Outcome 4]
16. Explain about surface tension, and why is it important for hydrocarbons? [Understand] [Course Outcome 5]

(3x4=12)

Part C

Short Essay Type Questions
Answer **4** Questions
Each question carries **7** marks

17. Justify that modern theory provides better explanation for origin of petroleum than other theories. [Evaluate] [Course Outcome 1]
18. Discuss the classification of structural trap [Remember] [Course Outcome 2]

19. Illustrate how does core sampling enhance the understanding of subsurface geology. Discuss its application in oil exploration. [Analyse] [Course Outcome 3]
20. Describe the importance of geochemical exploration in oil prospecting [Understand] [Course Outcome 3]
21. Discuss about Unconventional resources of hydrocarbons [Understand] [Course Outcome 4]
22. Discuss in detail about viscosity and viscosity reducers. [Understand] [Course Outcome 5]

(7x4=28)

MAHATMA GANDHI UNIVERSITY, KOTTAYAM

MGU-UGP (HONOURS)

FIRST SEMESTER EXAMINATION

(2024 ADMISSION ONWARDS)

MG1MDCCHE100: FOOD CHEMISTRY & NUTRITION

Duration: 45 min Maximum Marks : 35

Students should attempt atleast one question from each course outcome to enhance their overall outcome attainability

Part A

Multiple choice Questions

Answer **All** Questions

Each questions carries **1** mark

1 What is the function of food? [U] [CO1]

a) Nutrition b) Energy c) Hydration d) All of the above

2 What is the primary function of carbohydrates in the body? [U] [CO1]

a) Repair tissues b)Provide energy

c) Regulate body temp d)Produce hormones

3 Which hormone regulates blood sugar levels? [U] [CO1]

a) Insulin b) Glucagon c) Cortisol d)Thyroxine

4 What is the primary function of proteins in the body? [U] [CO1]

a)Provide energy b)Build and repair tissues

c)Store fat d)Regulate temperature

5 Which of the following is a source of omega-3 fatty acids? [U] [CO1]

a) Butter b) Fish oil c)Olive oil d)Coconut oil

6	Proteins are made up of smaller units called: a) Fatty acids b) Monosaccharides c)Amino acids d)Nucleotides	[U]	[CO1]
7	Which vitamin is responsible for blood clotting ? a) Vitamin K b)Vitamin C c)vitamin A d)Vitamin D	[U]	[CO1]
8	Mention the first natural product found to contain Cobalt a)Vitamin B5 b)Vitamin B6 c)Vitamin B12 d)Vitamin D	[U]	[CO1]
9	What is the primary function of calcium in the body? a) Blood clotting b) DNA synthesis c)Bone and teeth formation d) Energy metabolism	[K]	[CO1]
10	What is a food additive? a) A naturally occurring substance in food b) A substance added to food to improve its properties c) A food processing tool d) A substance used to preserve packaging	[K]	[CO2]
11	Which food additive has been used by ancestors for preserving food? a)Sodium Chloride b)Sodium Benzoate c)Sodium Nitrate d)Ethanoic Acid	[U]	[CO2]
12	Monosodium glutamate (MSG) is used as a a)Sweetener b)Flavour enhancer c)Emulsifier d)Preservative	[K]	[CO2]
13	What does the "E" in E numbers for food additives stand for? a)Essential b) Edible c)Europe d)Enzyme	[K]	[CO2]
14	Paraffin wax is a synthetic additive used as a:	[A]	[CO2]

a)Flavouring agent b)Glazing agent
c)Sweetener d)Preservative

15	Identify a synthetic food preservative among the following a) Salt b) Sugar c)Benzoic acid d)Vinegar	[K]	[CO2]
16	Identify the chemical name of 'Ajinomoto' a) Disodium guanalyte b)Tetrazine c)Monosodium glutamate d)Anthocyanin	[K]	[CO2]
17	Identify the main role of artificial sweeteners in food a)They preserve freshness b)They enhance color c)They thickens sauce d)They provide low-calorie sweetness	[K]	[CO2]
18	Name a stabilizer which is used in desserts and yogurts a) Gelatin b) MSG c) Sorbitol d) Citric acid	[K]	[CO2]
19	Select the substance which is applied to fruits and vegetables to maintain freshness and improve appearance a)Fruit Sugar b)Paraffin wax c)Silica gel d)Ethylene	[U]	[CO2]
20	Identify the WRONG statement about gelling agents a)Helps in controlling moisture b)Provides a firm and elastic structure c)Improves the stability of ingredients d)Contains high nutritional value	[K]	[CO2]
21	Identify the example of an intentional food adulterant from the following. a) Pesticide residue b) Chalk powder in flour c) Natural dirt in vegetables d) Insects in grains	[U]	[CO3]
22	Common adulterant used in Butter	[U]	[CO3]

a) Vanaspati b)Water c)Starch d)All of the above

23 Why is chalk powder often added as an adulterant in sugar? [U] [CO3]

a)To reduce weight b)To add sweetness

c)To make it appear whiter and bulkier d) To add minerals

24 Which substance is frequently added to salt as an adulterant to increase bulk? [U] [CO3]

a)Rice flour b)Washing soda

c)Chalk powder d) Sand particles

25 How can you test rice for plastic adulteration? [U] [CO3]

a) Burn a few grains and observe if they emit a plastic smell
b) b) Wash rice and check for residue
c) Taste for a different flavor
d) Freeze and check for brittleness

26 What test can be done to detect papaya seeds in black pepper? [U] [CO3]

a)Burning test b) Adding salt and water

c)Vinegar test d)Water floatation test

27 What simple test can help identify sand or dirt in wheat? [U] [CO3]

a) Soak wheat in water and observe settling
b) Boil wheat and check for impurities
c) Crush between fingers to feel for texture
d) Smell the wheat

28 What is the primary objective of the Food Adulteration Act? [U] [CO4]

a) To promote agricultural products
b) To prevent food adulteration and ensure food safety
c) To regulate food prices
d) To encourage food exports

29 The Food Adulteration Act requires food manufacturers to: [U] [CO4]

a) Label their products accurately
b) Use only approved food additives
c) Maintain hygienic manufacturing practices
d) All of the above

30 The Food Adulteration Act was enacted in which year? [K] [CO4]

a) 1954 b) 1960 c)1970 c)1980

31 What is the primary ingredient in most soft drinks? [U] [CO4]

a) Carbonated water b)Juice c) Alcohol d) Milk

32 In modern food habits, what trend has become increasingly popular? [U] [CO4]

a) Home-cooked meals
b) Meal prepping
c) Convenience and fast foods
d) Traditional cooking methods

33 Traditional food habits may include: [U] [CO4]

a) Local delicacies b) Cultural rituals
c)Medicinal properties d) All of the above

34 What is a primary health problem associated with the consumption of soft drinks? [U] [CO4]

a) Increased calcium intake b)Weight gain and obesity
c)Improved hydration d) Enhanced nutrient absorption

35 Which beverage is often high in sugar and calories? [A] [CO4]

a) Water b) Soft drinks c) Herbal Tea d) Black Coffee