

Reg. No. :

Code No. : 20554 B Sub. Code : SACH 21/
AACH 21

B.Sc. (CBCS) DEGREE EXAMINATION, APRIL 2021.

Second/Fourth Semester

Chemistry — Allied

ALLIED CHEMISTRY — II

(For those who joined in July 2017 onwards)

Time : Three hours

Maximum : 75 marks

PART A — (10 × 1 = 10 marks)

Answer ALL questions.

Choose the correct answer.

1. ஆந்தரஶீனில் உள்ள π எலெக்ட்ரான்களின் எண்ணிக்கை

(அ) 6 (ஆ) 10

(இ) 14 (ஈ) 18

The number of π electrons in anthracene

(a) 6 (b) 10

(c) 14 (d) 18

2. நிக்கல் முன்நிலையில், நாப்தலின் ஆக்கிஜன் ஒடுக்கம் அடைத்தலில் கிடைப்பது

(அ) டெக்காலின் (ஆ) டெட்ராலின்

(இ) டையாலின் (ஈ) எதுவுமில்லை

Naphthalene on Nickel catalytic reduction gives

(a) decalin (b) tetralin

(c) dialin (d) none

3. அணு உலையில் பயன்படும் யுரேனியம் ஐசோடோப்பு

(அ) U-235 (ஆ) U-236

(இ) U-237 (ஈ) U-238

Uranium isotope used in nuclear reactor is

(a) U-235 (b) U-236

(c) U-237 (d) U-238

4. β -கதிர் உமிழ்வினால் உருவாவது

(அ) ஐசோடோப் (ஆ) ஐசோடோன்

(இ) ஐசோபார் (ஈ) எதுவுமில்லை

Emission of a β -ray produces an

- (a) isotope (b) isotone
(c) isobar (d) none

5. பின்வருபவைகளில் பாலி சாக்கரைடு எது?

- (அ) குளுக்கோஸ் (ஆ) சக்ரோஸ்
(இ) லாக்டோஸ் (ஈ) ஸ்டார்ச்

Which of the following is a polysaccharide?

- (a) Glucose (b) Sucrose
(c) Lactose (d) Starch

6. புரதம் எதனுடன் வினைபுரியும்போது ஊதா நிறம் கொடுக்கும்?

- (அ) பெனிடிக்ஸ் கரைசல்
(ஆ) அயோடின் கரைசல்
(இ) நின்னஹட்ரின் கரைசல்
(ஈ) பையூரட் கரைசல்

Proteins give purple colour when treated with

- (a) Benedicts solution
(b) Iodine solution
(c) Ninhydrin solution
(d) Biuret solution

7. _____ ஒரு நைட்ரஜன் உரம்

(அ) யூரியா

(ஆ) சூப்பர் பாஸ்பேட்

(இ) மியூரியேட் ஆப் பொட்டாஷ்

(ஈ) எதுவுமில்லை

_____ is the nitrogenous fertilizer.

(a) Urea (b) Super phosphate

(c) Muriate of potash (d) None

8. கட்டுப்படுத்தி ஆற வைத்தல் என்ற செயல்முறை குறிப்பது

(அ) உடனடியாக கண்ணாடியை குளிர வைத்தல்

(ஆ) மெதுவாக கண்ணாடியை குளிர வைத்தல்

(இ) கண்ணாடியை சூடாக்குவது

(ஈ) கண்ணாடி தட்டுகளை அழுத்துவது

Annealing is a process of

(a) cooling glass suddenly

(b) cooling glass slowly

(c) heating glass

(d) pressing glass plates

9. BCG தடுப்பூசி இதைத் தடுக்க பயன்படுகிறது

(அ) காலரா (ஆ) மஞ்சள் காமாலை

(இ) TB (ஈ) டிப்தீரியா

BCG vaccine is used to prevent

(a) Cholera (b) Jaundice

(c) TB (d) Diphtheria

10. நீரிழிவு இதனால் கட்டுப்படுகிறது

(அ) ஹெப்பாடிடிஸ் B

(ஆ) இன்சலின்

(இ) BCG

(ஈ) குளோரோமைசெட்டின்

Diabetes is controlled by

(a) Hepatitis B

(b) Insulin

(c) BCG

(d) Chloromycetin

PART B — (5 × 5 = 25 marks)

Answer ALL questions, choosing either (a) or (b).

Each answer should not exceed 250 words.

11. (அ) ஹாவர்த் தொகுப்பு முறையில் நாப்தலீன் தயாரித்தலை விளக்குக.

Discuss Haworth Synthesis of naphthalene.

Or

- (ஆ) நாப்தலீனின் கருக்கவர் பதிலீட்டு வினைகளை விவரி.

Explain the electrophilic substitution reactions of naphthalene.

12. (அ) பின்வருபவைகளின் பண்புகளை எடுத்துக் காட்டுடன் விவரி.

(i) ஐசோடோப்புகள்

(ii) ஐசோபார்கள்.

Explain the characteristics of the following with examples.

(i) isotopes

(ii) isobars.

Or

(ஆ) கதிரியக்க கார்பன் (C-14) நாட்காட்டியை பற்றி எழுதுக.

Write on Radiocarbon (C-14) dating.

13. (அ) கார்போஹைட்ரேட்டுகளின் வகைகளை எடுத்துக்காட்டுடன் விவரி.

Discuss the classification of carbohydrates with examples.

Or

(ஆ) DNA மற்றும் RNA யை வேறுபடுத்துக.

Distinguish between DNA and RNA.

14. (அ) ஏதேனும் இரண்டு கண்ணாடி வகைகளை பயனுடன் எழுதுக.

Give any two types of glasses with uses.

Or

(ஆ) அம்மோனியம் சல்பேட்டின் தயாரித்தல், பண்புகள் மற்றும் பயன்களை எழுதுக.

Write the preparation, properties and uses of Ammonium sulphate.

15. (அ) இந்திய மருத்துவ தாவரங்களை தொகுத்து எழுது.

Give an account of Indian Medicinal Plants.

Or

(ஆ) குறிப்பு எழுதுக :

(i) வலி நிவாரணி

(ii) காய்ச்சல் முரணி.

Write a note on :

(i) Analgesics

(ii) Antipyretics.

PART C — (5 × 8 = 40 marks)

Answer ALL questions, choosing either (a) or (b).

Each answer should not exceed 600 words.

16. (அ) பென்சீனின் பண்புகளை விளக்குக.

Discuss the properties of benzene.

Or

(ஆ) ஆந்தரசீனின் அமைப்பை வருவி.

Explain the structural elucidation of anthracene.

17. (அ) விவரி (i) குழு இடப்பெயர்வு விதி (ii) கதிரியக்கத் தொடர்.

Explain (i) Group displacement law
(ii) Radioactive series.

Or

(ஆ) அணுப்பிணைப்பு என்றால் என்ன? அதன் பயன்பாடுகளை விவரி.

What is nuclear fusion? Explain its applications.

18. (அ) (i) அமினோ அமிலங்களின் பண்புகளை விளக்குக.

(ii) செயற்கை இனிப்பூட்டிகள் பற்றி எழுது.

(i) Discuss the properties of aminoacids.

(ii) Write a note on artificial sweeteners.

Or

(ஆ) புரதங்களை வெவ்வேறு விதங்களில் வகைப்படுத்துவதை விவரி.

Explain the different ways of classification of proteins.

19. (அ) ஏதேனும் மூன்று எரி வாயுக்களின் தயாரித்தல், பண்புகள் மற்றும் பயன்களை விளக்குக.

Discuss the composition, preparation and uses of any three fuel gases.

Or

- (ஆ) சோப் தயாரிக்கும் முறையை விளக்குக.

Discuss the manufacture of soap.

20. (அ) நீரால் பரவும் நோய்களை எழுதி அதற்கான காரணம் மற்றும் சுகப்படுத்தும் முறையையும் விவரி.

Write down the various water borne diseases and explain their causes and treatment.

Or

- (ஆ) நீரிழிவு நோயின் வகைகள், காரணங்கள், வராமல் காக்கும் முறைகள் மற்றும் சுகப்படுத்தும் முறைகளை எழுதுக.

Write about the types, causes, prevention and treatment of diabetes.

(6 pages)

Reg. No. :

**Code No. : 20554 E Sub. Code : SACH 21/
AACH 21**

B.Sc. (CBCS) DEGREE EXAMINATION, APRIL 2021.

Second/Fourth Semester

Chemistry — Allied

ALLIED CHEMISTRY — II

(For those who joined in July 2017 onwards)

Time : Three hours

Maximum : 75 marks

PART A — (10 × 1 = 10 marks)

Answer ALL questions.

Choose the correct answer.

1. The number of π electrons in anthracene
 - (a) 6
 - (b) 10
 - (c) 14
 - (d) 18
2. Naphthalene on Nickel catalytic reduction gives
 - (a) decalin
 - (b) tetralin
 - (c) dialin
 - (d) none

3. Uranium isotope used in nuclear reactor is
- (a) U-235 (b) U-236
(c) U-237 (d) U-238
4. Emission of a β -ray produces an
- (a) isotope (b) isotone
(c) isobar (d) none
5. Which of the following is a polysaccharide?
- (a) Glucose (b) Sucrose
(c) Lactose (d) Starch
6. Proteins give purple colour when treated with
- (a) Benedicts solution
(b) Iodine solution
(c) Ninhydrin solution
(d) Biuret solution
7. _____ is the nitrogeneous fertilizer.
- (a) Urea (b) Super phosphate
(c) Muriate of potash (d) None

8. Annealing is a process of
- (a) cooling glass suddenly
 - (b) cooling glass slowly
 - (c) heating glass
 - (d) pressing glass plates
9. BCG vaccine is used to prevent
- (a) Cholera
 - (b) Jaundice
 - (c) TB
 - (d) Diphtheria
10. Diabetes is controlled by
- (a) Hepatitis B
 - (b) Insulin
 - (c) BCG
 - (d) Chloromycetin

PART B — (5 × 5 = 25 marks)

Answer ALL questions, choosing either (a) or (b).

Each answer should not exceed 250 words.

11. (a) Discuss Haworth Synthesis of naphthalene.

Or

- (b) Explain the electrophilic substitution reactions of naphthalene.

12. (a) Explain the characteristics of the following with examples.
- (i) isotopes
 - (ii) isobars.

Or

- (b) Write on Radiocarbon (C-14) dating.

13. (a) Discuss the classification of carbohydrates with examples.

Or

- (b) Distinguish between DNA and RNA.

14. (a) Give any two types of glasses with uses.

Or

- (b) Write the preparation, properties and uses of Ammonium sulphate.

15. (a) Give an account of Indian Medicinal Plants.

Or

- (b) Write a note on :
- (i) Analgesics
 - (ii) Antipyretics.

PART C — (5 × 8 = 40 marks)

Answer ALL questions, choosing either (a) or (b).

Each answer should not exceed 600 words.

16. (a) Discuss the properties of benzene.

Or

- (b) Explain the structural elucidation of anthracene.

17. (a) Explain (i) Group displacement law
(ii) Radioactive series.

Or

- (b) What is nuclear fusion? Explain its applications.

18. (a) (i) Discuss the properties of aminoacids.
(ii) Write a note on artificial sweeteners.

Or

- (b) Explain the different ways of classification of proteins.

19. (a) Discuss the composition, preparation and uses of any three fuel gases.

Or

- (b) Discuss the manufacture of soap.

20. (a) Write down the various water borne diseases and explain their causes and treatment.

Or

- (b) Write about the types, causes, prevention and treatment of diabetes.
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Reg. No. :

Code No. : 20714 B Sub. Code : AMCH 11

B.Sc. (CBCS) DEGREE EXAMINATION, APRIL 2021.

First Semester

Chemistry — Core

PHYSICAL CHEMISTRY — I

(For those who joined in July 2020 onwards)

Time : Three hours

Maximum : 75 marks

PART A — (10 × 1 = 10 marks)

Answer ALL questions.

Choose the correct answer.

1. $PV =$ மாறிலி மாறா வெப்பநிலையில் என்பது

(அ) சார்லஸ் விதி (ஆ) அவகேட்ரோ விதி

(இ) பாயில்ஸ் விதி (ஈ) டால்ட்டன் விதி

$PV =$ Constant at constant temperature is called

(a) Charle's law (b) Avogadro's law

(c) Boyle's law (d) Daltos's law

2. $\sqrt{\frac{8RT}{\pi M}}$ என்பது

- (அ) சராசரி திசைவேகம்
(ஆ) அதிசாத்திய திசைவேகம்
(இ) இருமடிகளின் சராசரியின் இருமடி மூல திசைவேகம்
(ஈ) எதுவுமில்லை

$\sqrt{\frac{8RT}{\pi M}}$ is called

- (a) average velocity
(b) most probable velocity
(c) root mean square velocity
(d) none of these

3. மின்மினிப்பூச்சியிலிருந்து வெளிவரும் ஒளிவீச்சல் எந்த நிகழ்வினால் ஏற்படுகிறது?

- (அ) உடன் ஒளிர்ந்தல்
(ஆ) நின்று ஒளிர்ந்தல்
(இ) வெப்ப ஒளி உமிழ்தல்
(ஈ) உயிர்வேதி ஒளிர்ந்தல்

The emission of light from a fine fly is due to

- (a) Fluorescence
(b) Phosphorescence
(c) Thermo luminescence
(d) Bioluminescence

4. பின்வருவனவற்றுள் எது ஒளி வேதி விதியாகும்?

(அ) ஹென்றி விதி

(ஆ) ஸ்டார்க் ஐன்ஸ்டீன் விதி

(இ) ரௌலட் விதி

(ஈ) ஃபாரடே விதி

Which of the following law governs photochemical reaction?

(a) Henry's law (b) Stark-Einstein law

(c) Raoult's law (d) Faraday's law

5. நிறையற்ற பொருள் எது?

(அ) α -கதிர்கள் (ஆ) β -பொருட்கள்

(இ) காமாக் கதிர்கள் (ஈ) புரோட்டான்கள்

The massless particles are

(a) α -rays (b) β -particle

(c) gamma rays (d) protons

6. கதிரியிக்க சிதைவடைதல் வினை

(அ) இரண்டாம்படி (ஆ) முதல்படி

(இ) 3/2 படி (ஈ) பூஜ்ய படி

Radioactive disintegration follows

- (a) Second order (b) First-order
(c) 3/2 order (d) Zero-order kinetics

7. படிமற்ற பொருட்கள்

- (அ) ஐசோடிராபிக் (ஆ) ஆன்சைடிராபிக்
(இ) நீர்ம படிமம் (ஈ) ஒரு நீர்மம்

An amorphous substance is

- (a) isotropic (b) anisotropic
(c) liquid crystal (d) a liquid

8. படிமங்களில் உள்ள மொத்த பிராவைஸ் கூடுகளின் எண்ணிக்கை

- (அ) 7 (ஆ) 32
(இ) 230 (ஈ) 14

The total number of Bravais lattice in a crystal

- (a) 7 (b) 32
(c) 230 (d) 14

9. ஒரு கரைப்பானின் எபிலியோஸ்கோபிக் மாறிலி என்பது கொதிநிலை உயர்வுக்கும் மற்றும் _____ க்கும் உள்ள விகிதம் ஆகும்.

(அ) மோல் பின்னம் (ஆ) மோலரிட்டி

(இ) நார்மாலிட்டி (ஈ) மோலலிட்டி

The ebullioscopic constant of a solvent is the ratio of the elevation in Boiling Point to

(a) Mole fraction (b) Molarity

(c) Normality (d) Molality

10. முரணான மூலக்கூறு எடை பின்வருவனவற்றுள் ஏற்படுகிறது

(அ) மூலக்கூறுகளின் சேர்க்கை

(ஆ) மூலக்கூறுகளின் பிரிகை

(இ) (அ) மற்றும் (ஆ) இரண்டும்

(ஈ) எதுவுமில்லை

Abnormal molecular mass is due to

(a) Association of molecules

(b) Dissociation of molecules

(c) Both (a) and (b)

(d) None of these

PART B — (5 × 5 = 25 marks)

Answer ALL questions, choosing either (a) or (b).

Each answer should not exceed 250 words.

11. (அ) வாயுக்களின் இயக்கப் பண்புகள் கொள்கைகளை தருக.

Give the postulates of kinetic theory of gases.

Or

- (ஆ) பாகியல் குணகத்தின் மீது வெப்பத்தின் விளைவை விளக்குக.

Explain the effect of temperature of coefficient of viscosity.

12. (அ) வெப்பவினைகளுக்கும், ஒளிவேதி வினைகளுக்கும் உள்ள வித்தியாசத்தை தருக.

Distinguish between thermal and photochemical reactions.

Or

- (ஆ) HI-ன் சிதைவடைதல் வினையை விளக்குக. அவ்வினையின் குவாண்டம் விளைச்சலை தருக.

Explain the decomposition of HI and find its Quantum Yield.

13. (அ) கெய்கர் நட்டால் விதியை விளக்குக.

Explain Geifer Nattal Rule.

Or

(ஆ) C¹⁴ கால கணிப்பு பற்றி குறிப்பு வரைக.

Write a note C¹⁴ dating.

14. (அ) படிக்கங்களுக்கும், படிக்கமற்ற திண்மகளுக்கும் உள்ள வேறுபாட்டை தருக.

Give the difference between amorphous and crystalline solids.

Or

(ஆ) படிக்கங்களில் உள்ள சீர்மை வகைகளை விளக்கு.

Explain the elements of symmetry of crystal.

15. (அ) வாண்ட் ஹாப் கோர்வை பற்றி குறிப்பு வரைக.

Write a note on Van't Hoff factor.

Or

(ஆ) முரணான மூலக்கூறு எடை பற்றி குறிப்பு வரைக.

Explain Abnormal Molecular Mass.

PART C — (5 × 8 = 40 marks)

Answer ALL questions, choosing either (a) or (b).

Each answer should not exceed 600 words.

16. (அ) மாக்ஸ்வெல்லின் மூலக்கூறு திசைவேகங்களின் பங்கீடு பற்றி விளக்குக.

Discuss in detail Maxwell's distribution of molecular velocities.

Or

- (ஆ) வாயு மூலக்கூறுகளின் கட்டின்மை எண் என்றால் என்ன? அதன் வகைகளை உதாரணத்துடன் விளக்குக.

What is meant by degree of freedom of gaseous molecule? Discuss the three types of motion with examples.

17. (அ) (i) ஒளி வேதி சமமான விதியை வரையறுத்து விளக்குக.
(ii) ஒளி வேதி வினையின் குவாண்டம் விளைச்சலை தருக.
(i) State and explain law of photochemical equivalence.
(ii) Quantum yield of photochemical reaction.

(4 + 4)

Or

(ஆ) பின்வருவனப் பற்றி குறிப்பு வரைக

(i) லேசர்கள்

(ii) வேதி ஒளிர்ந்தல்.

Write a note on the following : (4 + 4)

(i) Lasers

(ii) Chemiluminescence.

18. (அ) (i) கதிரியக்க டிரேசர்கள் என்றால் என்ன? அதன் முக்கிய பயன்பாடுகளை தருக.

(ii) பாறை கால கணிப்பை பயன்படுத்தி பூமியின் வயதை எவ்வாறு கண்டறிவாய்?

(i) What are radioactive tracers? Discuss some of their important applications. (4)

(ii) Discuss briefly rock dating for determining the age of earth. (4)

Or

(ஆ) பின்வருவனவற்றை உதாரணத்துடன் விளக்கு.

(i) அணுக்கரு பிளவு

(ii) அணுக்கரு சேர்க்கை.

Write a note on the following with examples : (4 + 4)

(i) Nuclear Fission

(ii) Nuclear Fusion.

19. (அ) பிராக் சமன்பாட்டை வருவித்து அதன் பயன்பாடுகளை தருக.

Derive Bragg's equation and give its applications.

Or

- (ஆ) பின்வருவன பற்றி குறிப்பு வரைக.

- (i) ஸ்டாட்கி குறைபாடு
(ii) பிரங்கல் குறைபாடு.

Write note on the following :

- (i) Schottky defect
(ii) Frenkel defect.

20. (அ) ரௌலட் விதியின் ஆவி அழுத்த குறைவு எவ்வாறு கரைபொருளின் மோலார் எடையை கணக்கிட உதவுகிறது?

Explain how Raoult's law of lowering vapour pressure used to determine molar mass of a solute.

Or

- (ஆ) சவ்வூடு பரவல் அளவீடுகள் எவ்வாறு மோலார் எடையை கணக்கிட உதவுகிறது?

How are osmotic pressure measurements utilized for determining molar mass of a non volatile solute?

Reg. No. :.....

Code No. : 20715 B Sub. Code : AMCH 21

B.Sc. (CBCS) DEGREE EXAMINATION, APRIL 2021.

Second Semester

Chemistry — Core

INORGANIC CHEMISTRY - I

(For those who joined in July 2020 onwards)

Time : Three hours

Maximum : 75 marks

PART A — (10 × 1 = 10 marks)

Answer ALL questions.

Choose the correct answer.

1. ஷ்ரோடிங்கர் சமன்பாடு என்பது

(அ) $\frac{\partial^2 \psi}{\partial x^2} + \frac{\partial^2 \psi}{\partial y^2} + \frac{\partial^2 \psi}{\partial z^2} + \frac{8\pi^2 m^2}{h^2} (E - U) \psi = 0$

(ஆ) $\frac{\partial^2 \psi}{\partial x^2} + \frac{\partial^2 \psi}{\partial y^2} + \frac{\partial^2 \psi}{\partial z^2} + \frac{8\pi^2 m}{h^2} (E - U) \psi = 0$

(இ) $\frac{\partial^2 \psi}{\partial x^2} + \frac{\partial^2 \psi}{\partial y^2} + \frac{\partial^2 \psi}{\partial z^2} + \frac{8\pi^2 m}{h^2} (U - E) \psi = 0$

(ஈ) $\frac{\partial^2 \psi}{\partial x^2} + \frac{\partial^2 \psi}{\partial y^2} + \frac{\partial^2 \psi}{\partial z^2} + \frac{8\pi^2 m^2}{h^2} (U - E) \psi = 0$

Schrodinger wave equation is

(a) $\frac{\partial^2 \psi}{\partial x^2} + \frac{\partial^2 \psi}{\partial y^2} + \frac{\partial^2 \psi}{\partial z^2} + \frac{8\pi^2 m^2}{h^2} (E - U) \psi = 0$

(b) $\frac{\partial^2 \psi}{\partial x^2} + \frac{\partial^2 \psi}{\partial y^2} + \frac{\partial^2 \psi}{\partial z^2} + \frac{8\pi^2 m}{h^2} (E - U) \psi = 0$

(c) $\frac{\partial^2 \psi}{\partial x^2} + \frac{\partial^2 \psi}{\partial y^2} + \frac{\partial^2 \psi}{\partial z^2} + \frac{8\pi^2 m}{h^2} (U - E) \psi = 0$

(d) $\frac{\partial^2 \psi}{\partial x^2} + \frac{\partial^2 \psi}{\partial y^2} + \frac{\partial^2 \psi}{\partial z^2} + \frac{8\pi^2 m^2}{h^2} (E - U) \psi = 0$

2. ஒரு ஆர்பிட்டாலின் l ன் மதிப்பு இரண்டாக இருந்தால் n ன் மதிப்பு என்ன?

(அ) 1 (ஆ) 2

(இ) 3 (ஈ) 0

For an orbital $l = 2$ hence $n = ?$

(a) 1 (b) 2

(c) 3 (d) 0

3. பின்வருவனவற்றுள் எது அதிக அயனி ஆக்கும் ஆற்றலை கொண்டுள்ளது?

(அ) கார உலோகங்கள் (ஆ) கார மண் உலோகங்கள்

(இ) ஹேலஜன்சன் (ஈ) உயரிய வாயுக்கள்

Which among the following has the maximum ionization energy?

- (a) Alkali metals
- (b) Alkaline earth metals
- (c) Halogens
- (d) Nobel gases

4. பின்வருவனவற்றுள் எந்த தனிமம் கார உலோகத்தைச் சார்ந்தது?

- (A) K (B) Sr
- (C) Ca (D) Si

Which element belong to alkali metal?

- (a) K (b) Sr
- (c) Ca (d) Si

5. ஆக்ஸிஜன் மூலக்கூறுவின் பாராகாந்த பண்பு விவரிக்கப்படுவது

- (அ) MO கொள்கை (ஆ) VB கொள்கை
- (இ) VSEPR கொள்கை (ஈ) லூயிஸ் கொள்கை

The paramagnetic character of oxygen molecule is explained by

- (a) MO theory (b) VB theory
- (c) VSEPR theory (d) Lewis theory

6. PCl_5 மூலக்கூறில் பாஸ்பரஸ் அணு ஆனது
- (A) sp^3 hybridized (B) sp^3d hybridized
(C) sp^3d^2 hybridized (D) sp^2 hybridized

In PCl_5 molecule phosphorus atom is

- (a) sp^3 hybridized (b) sp^3d hybridized
(c) sp^3d^2 hybridized (d) sp^2 hybridized
7. ஒரு வரிசையில் கார உலோகத்தின் எலக்ட்ரான் கவர்தன்மை மற்றும் அயனிஆக்கும் ஆற்றலானது
- (அ) அதிகம் (ஆ) குறைவு
(இ) இடைப்பட்டது (ஈ) பூஜ்ஜியம்

In a period, the electronegativity and ionization energy of alkali metal is

- (a) Maximum (b) Minimum
(c) Intermediate (d) Zero
8. LiOH என்பது
- (அ) வீரியம் குறைந்த காரம்
(ஆ) வீரியமிக்க காரம்
(இ) ஈரியல்பு சேர்மம்
(ஈ) அமில சேர்மம்

LiOH is

- (a) Weak base
- (b) Strong base
- (c) An Amphoteric compound
- (d) An Acid compound

9. டைபோரானின் B-H-B பாலம் எத்தனை எலக்ட்ரான்கள் பங்கீடுவதால் உருவாகிறது?

- (அ) 2 எலக்ட்ரான்கள் (ஆ) 4 எலக்ட்ரான்கள்
- (இ) ஒரு எலக்ட்ரான் (ஈ) 3 எலக்ட்ரான்கள்

B-H-B bridge in diborane is formed by the sharing of

- (a) 2 electrons (b) 4 electrons
- (c) one electron (d) 3 electrons

10. எலக்ட்ரிக் மோட்டார்களில் சிலிக்கோன்கள் நல்ல மின்னோட்டிகளாக இருப்பதற்கு காரணம்

- (அ) அவை அதிக வெப்பத்தை தாங்கும்
- (ஆ) அவை அழுத்தத்தை தாங்கும்
- (இ) அவை நீரை எதிர்க்கும்
- (ஈ) (அ) மற்றும் (ஆ)

Silicones act as excellent insulators for electric motors because

- (a) they can withstand high temperature
- (b) they can withstand pressure
- (c) they are water repellent
- (d) both (a) and (b)

PART B — (5 × 5 = 25 marks)

Answer ALL questions, choosing either (a) or (b).

Each answer should not exceed 250 words.

11. (அ) ஆரப்பகிர்வு சார்பின் வரைபடத்தை எழுதுக.

Write a note on radial probability curve distribution.

Or

- (ஆ) காப்பர் அணுவின் எலக்ட்ரான் அமைப்பில் எது சரியானது?

[Ar]3d¹⁰4s¹ அல்லது [Ar]3d⁹4s²? பொருள் கொடு.

Which of the electronic configuration is correct for the copper atom [Ar]3d¹⁰4s¹ or [Ar]3d⁹4s²? Give(n) reason.

12. (அ) S தொகுதி தனிமங்களின் கால இடைவெளி பற்றி விவரி.

Explain the periodicity of S block elements.

Or

- (ஆ) எலக்ட்ரான் கவர்தன்மை என்றால் என்ன? அவை எவ்வாறு தொகுதியிலும் வரிசையிலும் வேறுபடுகிறது?

What is meant by electronegativity? How does it vary in a group and in a period?

13. (அ) படிகக்கூடு ஆற்றலை தீர்மானிக்கும் காரணிகள் யாவை?

What are the factors which affect Lattice energy?

Or

- (ஆ) VSEPR (இணைதிறன் எலக்ட்ரான் இரட்டை விலக்கல்) கொள்கையின் கோட்பாடுகளை விவரி.

State the postulates of VSEPR theory.

14. (அ) லித்தியம் எதனடிப்படையில் மற்ற கார உலோகங்களில் இருந்து வேறுபடுகிறது? விவரி.

In what respects does lithium differ from other alkali metals? Explain.

Or

- (ஆ) பெரிலியத்தின் தனித்துவமான பண்புகளை விவரி.

Discuss the anomalous behaviour of Beryllium.

15. (அ) டைபோரானின் பண்புகளை எழுதுக.

Give the properties of diborane.

Or

- (ஆ) P தொகுதி தனிமங்களின் பண்புகளை விவரி.

Describe the characteristics of P-block elements.

PART C — (5 × 8 = 40 marks)

Answer ALL questions, choosing either (a) or (b).

Each answer should not exceed 600 words.

16. (அ) ஆர்பிட்டால் மற்றும் கூடு வேறுபடுத்துக.

Differentiate orbit and orbital.

Or

- (ஆ) நான்கு குவாண்டம் எண்களை விவரி.

Explain the Four quantum numbers.

17. (அ) பின்வருவனவற்றை வரையறுத்து அதன் தொகுதி மற்றும் வரிசையில் ஏற்படும் மாற்றத்தை விளக்குக.

(i) $Aq\hat{A}\beta B\mu\textcircled{R}$

(ii) $A^{-}\hat{U} BUS\textcircled{R} B\textcircled{O}\hat{O}\hat{A}$

(iii) $G\textcircled{U}m\mu\textcircled{\beta} |\textcircled{r}mh\textcircled{R}$.

Define the following and explain their trends in a period and in a group.

(i) Atomic radius

(ii) Ionization energy

(iii) Electron affinity.

Or

(ஆ) எலக்ட்ரான் நாட்டத்தினை தீர்மானிக்கும் காரணிகள் என்ன?

What are the factors affecting the magnitude of electronegativity?

18. (அ) CO மற்றும் HF மூலக்கூறுகளின் பிணைப்பை விவரி.

Explain the bonding of CO and HF molecules.

Or

(ஆ) இனக்கலப்பு என்றால் என்ன? sp^2 , sp^3d^2 மற்றும் sp^3d^3 உதாரணங்களுடன் விவரிக்கவும்.

What is meant by hybridization? Explain sp^2 , sp^3d^2 and sp^3d^3 hybridization with suitable examples.

19. (அ) தனிம வரிசை அட்டவணையில் ஹைட்ரஜன் இடத்தை விவரி.

Discuss the position of hydrogen in the periodic table.

Or

(ஆ) S-தொகுதி தனிமத்தின் ஹைட்ரஜன்களின் தயாரிப்பு மற்றும் பண்புகளை விவரி.

Explain the preparation and properties of hydrides of S-block elements.

20. (அ) உப்பீனிகளின் இடைச்சேர்மங்களின் அமைப்புகளை விவரி.

Discuss the structures of interhalogen compounds.

Or

(ஆ) கார்பைடுகள் என்றால் என்ன? அவற்றின் தொழில்நுட்ப பயன்பாடுகளை விவரி.

What are carbides? Give a brief account of their applications in technology.

(6 pages)

Reg. No. :

Code No. : 6872

Sub. Code : PCHM 11

M.Sc. (CBCS) DEGREE EXAMINATION, APRIL 2021.

First Semester

Chemistry – Core

ORGANIC CHEMISTRY – I

(For those who joined in July 2017 onwards)

Time : Three hours

Maximum : 75 marks

PART A — (10 × 1 = 10 marks)

Answer ALL questions.

Choose the correct answer :

1. Cycloheptatriene is ———.
 - (a) aromatic
 - (b) nonaromatic
 - (c) antiaromatic
 - (d) benzenoid

2. Which of the following statement is true?
- (a) Naphthalene is an non alternant hydrocarbon
 - (b) Azulene and naphthalene are alternant hydrocarbon
 - (c) Azulene and naphthalene are nonalternant hydrocarbon
 - (d) Azulene is an non alternant hydrocarbon
3. Carbocations are trapped by _____.
- (a) Electrophiles
 - (b) Nucleophiles
 - (c) Both (a) and (b)
 - (d) None of these
4. In the energy profile diagram the higher the energy barrier _____ will be the reaction.
- (a) faster
 - (b) moderate speed
 - (c) slower
 - (d) none of these
5. The methylene hydrogens in ethyl alcohol are _____
- (a) enantiotopic
 - (b) diastereotopic
 - (c) homotopic
 - (d) none of these

6. Stereoisomer's due to restricted rotation about single bonds with high barriers which permit their isolation are called _____.
- (a) anomers (b) epimers
(c) atropisomers (d) enantiomers
7. O-acyl derivative of hydroxamic acid gives isocyanate when treated with bases is called _____ rearrangement.
- (a) Benzil-Benzilic (b) Lossen
(c) Dakin (d) None of these
8. When the carbocation is formed by diazotization of amine then the reaction is called _____.
- (a) Pincol Pinacolone rearrangement
(b) Fisher Indole synthesis
(c) Demjanove rearrangement
(d) Arndt Eistert synthesis
9. Tris triphenyl phosphine chloro rhodium is called _____ reagent.
- (a) Gilman's (b) Wilkinson's
(c) Fetizon's (d) Lemietx
10. DCC is a _____.
- (a) Reducing agent
(b) Oxidizing agent
(c) Dehydrating agent
(d) Dehydrogenating agent

PART B — (5 × 5 = 25 marks)

Answer ALL questions, choosing either (a) or (b).

Each answer should not exceed 250 words.

11. (a) What are fullerenes? Explain its structure.

Or

- (b) Describe the structure of congressane.

12. (a) Differentiate between transition state and intermediate.

Or

- (b) Write notes on microscopic reversibility.

13. (a) State and explain Prelog's rule.

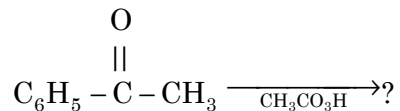
Or

- (b) What is asymmetric synthesis? Explain it with examples.

14. (a) Explain the memory effects with suitable example.

Or

- (b) Predict the product of the following and explain its mechanism.



15. (a) Explain the synthetic uses of DCC with examples.

Or

- (b) Give the mechanism for the preparation of a trans 1,2 diol and cis 1,2 diol from alkene under Prevost and Woodward conditions.

PART C — (5 × 8 = 40 marks)

Answer ALL questions, choosing either (a) or (b).

Each answer should not exceed 600 words.

16. (a) Discuss in detail about annulenes and hetero annulenes.

Or

- (b) Write an elaborate note on the preparation, properties and structure of sydnones.

17. (a) Summarize the kinetic and thermodynamic control of product formation.

Or

- (b) Describe the Hammond postulate and its implications.

18. (a) Explain the stereochemistry of ansa compound and paracyclophanes with any two examples.

Or

- (b) What are stereo selective and stereo specific reactions? Explain each with suitable examples.
19. (a) What is Curtius and Neber rearrangement? Explain it with suitable example and give their mechanism.

Or

- (b) Describe the mechanism of the following :
- (i) Pincol-picolone rearrangement
 - (ii) Dienone-phenol rearrangement
20. (a) How is LDA prepared? Discuss its synthetic uses with appropriate examples.

Or

- (b) Describe the preparation and synthetic uses of Gilman's reagent.

(6 pages)

Reg. No. :

Code No. : 6873

Sub. Code : PCHM 12

M.Sc. (CBCS) DEGREE EXAMINATION, APRIL 2021.

First Semester

Chemistry – Core

INORGANIC CHEMISTRY – I

(For those who joined in July 2017 onwards)

Time : Three hours

Maximum : 75 marks

PART A — (10 × 1 = 10 marks)

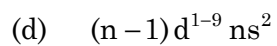
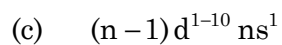
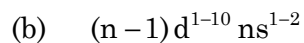
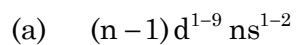
Answer ALL questions.

Choose the correct answer :

- The no. of π antibonding electrons in NO and CO according to the MO theory are responsible
(a) 1, 0 (b) 2, 2
(c) 3, 2 (d) 2, 3
- Which of the following has the highest lattice energy?
(a) KF (b) CsF
(c) NaF (d) RbF

3. According to Pearson, a hard base is one whose donor atom has
- (a) low electronegativity, low polarizability and which is difficult to oxidise
 - (b) High electronegativity, high polarizability and easy to oxidise
 - (c) High electronegativity, low polarizability and which is difficult to oxidise
 - (d) Low electronegativity, high polarizability and difficult to oxidise
4. Auto ionization of liq. NH_3 gives the ion
- (a) NH_4^+ (b) H_3O^+
 - (c) NO^+ (d) NO_3^-
5. The appearance of colour in solid alkali metal halides is generally due to
- (a) Schottky defect
 - (b) Frenkel defect
 - (c) Interstitial position
 - (d) F-centres
6. Co-ordination numbers of Zn^{2+} and S^{2-} in the crystal structure of Wurtzite are
- (a) 4, 4 (b) 6, 6
 - (c) 8, 4 (d) 8, 8

7. Which of the following is the general electronic configuration of transition elements



8. Lanthanide contraction is observed due to increase in _____.

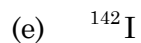
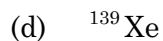
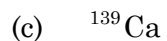
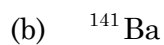
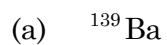
(a) Atomic radii

(b) Volume of 4f orbital

(c) Effective nuclear charge

(d) Atomic number

9. When ^{235}U is bombarded with one neutron fission occurs and the products are three neutrons, 94 Kr and _____.



10. The nuclear reaction ———.

${}_{29}\text{Cu}^{63} + {}_2\text{He}^4 \rightarrow {}_{17}\text{Cl}^{37} + 14{}_1\text{H}^1 + 16{}_0\text{n}^1$ is referred to as

- (a) Fusion reaction
- (b) Spallation reaction
- (c) Chain reaction
- (d) Fission reaction

PART B — (5 × 5 = 25 marks)

Answer ALL questions, choosing either (a) or (b).

Each answer should not exceed 250 words.

11. (a) Describe Walsh's approach to the discussion of the shape of an AB₂ triatomic molecule.

Or

- (b) Draw and explain the MO energy level diagram of NO.

12. (a) What are the factors affecting redox potential.

Or

- (b) Write notes on Levelling effect of solvents.

13. (a) Describe the structure of Fluorite.

Or

(b) What are high temperature superconductors? Explain their properties and applications.

14. (a) How are lanthanides separated using solvent extraction method?

Or

(b) Explain the magnetic characteristics of lanthanides and actinides.

15. (a) Write short notes on :

(i) Q-value

(ii) Threshold energy.

Or

(b) Describe the preparation of Radio isotopes.

PART C — (5 × 8 = 40 marks)

Answer ALL questions, choosing either (a) or (b).

Each answer should not exceed 600 words.

16. (a) Describe Bent's rule.

Or

(b) Draw and explain the M.O. diagram of triatomic molecule BeH_2 .

17. (a) Explain HSAB concept in detail.

Or

(b) Explain the types of reactions in liq. NH_3 .

18. (a) Describe crystal defects in solids.

Or

(b) Describe Band theory.

19. (a) Describe lanthanide contraction giving causes and its consequences.

Or

(b) Describe the separation of lanthanides by Ion exchange method.

20. (a) What are the different types of nuclear reactions depending upon the transformation of nucleus?

Or

(b) What is waste disposal? Explain the methods of waste disposal.

(6 pages)

Reg. No. :

Code No. : 6874

Sub. Code : PCHM 13

M.Sc. (CBCS) DEGREE EXAMINATION, APRIL 2021.

First Semester

Chemistry – Core

PHYSICAL CHEMISTRY – I

(For those who joined in July 2017 onwards)

Time : Three hours

Maximum : 75 marks

PART A — (10 × 1 = 10 marks)

Answer ALL questions.

Choose the correct answer :

1. The free energy change per mole of the substance is called
 - (a) Activity
 - (b) Fugacity
 - (c) Chemical potential
 - (d) None of these

2. _____ is the measure of effective concentration of a species in a mixture.
- (a) Activity
 - (b) Fugacity
 - (c) Partial pressure
 - (d) Entropy
3. The rule used to determine the composition of various phases in a phase diagram is
- (a) Gibbs phase rule
 - (b) Lever rule
 - (c) Both (a) and (b)
 - (d) None
4. Which is the correct unit for entropy?
- (a) kJ mol
 - (b) Jk⁻¹ mol⁻¹
 - (c) Jk⁻¹ mol
 - (d) kJ mol⁻¹
5. The wave function ψ in the Schrodinger wave equation represents
- (a) Probability of the electron
 - (b) Amplitude of the wave
 - (c) Frequency of the wave
 - (d) Speed of the wave

6. If A and B are non commuting Hermitian operators, all eigen values of the operator given by the commutator $[A, B]$ are
- (a) Complex (b) Real
(c) Imaginary (d) Zero
7. The plank proposed the relationship between the entropy of a system and the thermodynamic probability is given by the equation
- (a) $S = k \ln w$ (b) $S = kw$
(c) $S = -k \ln W$ (d) $S = k \ln T$
8. According to Fermi-Dirac statistics the number of particles in a phase cell can be
- (a) Any number
(b) Only two
(c) Only three
(d) Only one
9. The Doppler broadening mechanism dominates over other broadening mechanisms under
- (a) Low Pressure and high temperature
(b) High Pressure and low temperature
(c) Low temperature in Infrared
(d) High pressure in infrared

10. The rotational constant of a diatomic molecule is

- (a) $h/4\pi^2I$ (b) $h^2/4\pi^2I$
(c) $h^2/8\pi^2I$ (d) $h/8\pi^2I$

PART B — (5 × 5 = 25 marks)

Answer ALL questions, choosing either (a) or (b).

Each answer should not exceed 250 words.

11. (a) Derive Gibbs Duhem equation.

Or

(b) How will you determine fugacity by graphical method?

12. (a) Derive phase rule from the concept of chemical potential.

Or

(b) How will you determine the activity and activity co-efficients of non-electrolytes?

13. (a) Derive Boltzman Planck equation.

Or

(b) Explain the concept of negative Kelvin temperature.

14. (a) Explain photo electric effect.

Or

(b) Explain Heisenberg uncertainty principle.

15. (a) Explain the intensity of spectral lines.

Or

(b) Describe the effect of isotopic substitution.

PART C — (5 × 8 = 40 marks)

Answer ALL questions, choosing either (a) or (b).

Each answer should not exceed 600 words.

16. (a) Determine fugacity by compressibility factor method.

Or

(b) Derive Gibbs – Duhem Margulus equation.

17. (a) Draw the plots for a mixture of three liquids consisting of single pair of partially miscible liquid. Explain with example.

Or

(b) Discuss Onsagar reciprocal relations.

18. (a) Derive Schrodinger equation.

Or

(b) Discuss the postulates of Quantum mechanics.

19. (a) Derive Maxwell Boltzman distribution Law.

Or

(b) Derive Fermi Dirac distribution equation.

20. (a) Discuss the classification of molecular spectra.

Or

(b) Rigid rotator is a model of rotating diatomic molecules. Explain.

(6 Pages)

Reg. No. :

Code No. : 6875

Sub. Code : PCHE 11

M.Sc. (CBCS) DEGREE EXAMINATION, APRIL 2021.

First Semester

Chemistry

Elective – I — ADVANCED TOPICS IN
CHEMISTRY - I

(For those who joined in July 2017 onwards)

Time : Three hours

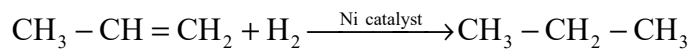
Maximum : 75 marks

PART A — (10 × 1 = 10 marks)

Answer ALL questions.

Choose the correct answer :

1. What is the atom economy in the following reaction?



(a) 100%

(b) 90%

(c) 60%

(d) 30%

2. _____ is an excellent green solvent as well as a green house gas.
- (a) Methanol (b) CFCs
(c) Carbon dioxide (d) Carbon monoxide
3. The size of nanoparticles is between _____ nm.
- (a) 0.01 to 1 (b) 1 to 100
(c) 0.1 to 10 (d) 100 to 1000
4. The most important property of nanomaterials is
- (a) Temperature (b) Pressure
(c) Friction (d) Force
5. Dry corrosion is also called as _____
- (a) Wet corrosion
(b) Oxidation corrosion
(c) Chemical corrosion
(d) Electrochemical corrosion
6. Corrosion along the grain boundaries is called as _____
- (a) Inter granular corrosion
(b) Stress corrosion
(c) Water line corrosion
(d) Pitting corrosion

7. Transducers employed in the bulk of enzyme electrodes use which of the following principles?
- (a) Optical (b) Colorimetric
(c) Amperometric (d) Magnetic
8. Which of the following is commonly used as the mobile phase in GC-MS?
- (a) He (b) H₂O
(c) Air (d) CH₃CN
9. Direct solar energy is used for
- (a) Drying (b) Distillation
(c) Water heating (d) All of the above
10. Only by – product of fuel cell is
- (a) Gas (b) Water
(c) Acid (d) Neutral chemicals

PART B — (5 × 5 = 25 marks)

Answer ALL questions, choosing either (a) or (b).

Each answer should not exceed 250 words.

11. (a) Narrate the advantages of microwave technique.

Or

- (b) Write an account of need of green chemistry.

12. (a) Write an account of optical properties of nanomaterials.

Or

(b) Describe physical vapour deposition method of preparation of metal nanoparticles.

13. (a) Narrate the classification of inhibitors based on electrode process.

Or

(b) Explain the electro chemical principles of corrosion.

14. (a) Explain the basic principle of coulometry.

Or

(b) Write briefly on theoretical aspect of colorimetry analysis.

15. (a) Give a brief account of splitting of water.

Or

(b) Write briefly about hydrogen economy.

PART C — (5 × 8 = 40 marks)

Answer ALL questions, choosing either (a) or (b).

Each answer should not exceed 600 words.

16. (a) Explain the twelve principles of green chemistry.

Or

- (b) Describe any five microwave assisted reactions.

17. (a) Discuss any three chemical approaches of preparation of metal nano particles.

Or

- (b) Discuss in detail the electronic properties of nanomaterials.

18. (a) Write notes on :

- (i) Cost of corrosion
(ii) Potentiodynamic polarization. (4 + 4)

Or

- (b) (i) Discuss briefly about any one corrosion monitoring method.
(ii) Write a brief note on the mechanism of inhibitor action in acidic medium.(4 + 4)

19. (a) Discuss briefly any three important applications of atomic absorption spectroscopy.

Or

(b) Describe the principle and technique of HPLC.

20. (a) Write brief notes on :

(i) Hydrogen storage materials

(ii) Batteries. (4+4)

Or

(b) (i) Write notes on solar energy.

(ii) Give a concise account of various types of nuclear reactors. (4+4)

(6 pages)

Reg. No. :

Code No. : 6876

Sub. Code : PCHM21

M.Sc. (CBCS) DEGREE EXAMINATION, APRIL 2021.

Second Semester

Chemistry

ORGANIC CHEMISTRY - II

(For those who joined in July 2017 onwards)

Time : Three hours

Maximum : 75 marks

PART A — (10 × 1 = 10 marks)

Answer ALL questions.

Choose the correct answer :

1. For a linear molecule such as HCl, the number of modes of vibrations are _____
 - (a) 4
 - (b) 1
 - (c) 2
 - (d) 3

2. Vibrational transition exists in _____
- (a) Infra red
 - (b) Micro wave
 - (c) Radio wave region of the spectrum
 - (d) Gamma rays
3. 1-Naphthol undergoes Birch Reduction to give _____
- (a) 5,8-dihydro-1-Naphthol
 - (b) 5,8-dihydro-2-Naphthol
 - (c) Phenol
 - (d) 4,8-dihydro-2-Naphthol
4. The reaction used to convert an aldehyde into alkene is known as _____
- (a) Wittig reaction
 - (b) Benzoin reaction
 - (c) Perkin reaction
 - (d) Bucherer reaction
5. Diazoketone can be converted into ketene by action of _____
- (a) Sulphuric acid
 - (b) Nitric acid
 - (c) Crinnamaldehyde
 - (d) Silver oxide

6. Benzamide reacts with sodium hypohalite to give _____
- (a) Benzene
 - (b) Aniline
 - (c) Benzoic acid
 - (d) Salicylic acid
7. The reaction used to convert an oxime functional group to substituted amides _____
- (a) Beckmann reaction
 - (b) Perkin reaction
 - (c) Wittig reaction
 - (d) Bucherer reaction
8. n-Heptyl penicillin is penicillin
- (a) F
 - (b) G
 - (c) X
 - (d) K
9. For camphor the calculated λ max value is _____
- (a) 290nm
 - (b) 219nm
 - (c) 229nm
 - (d) 331nm

10. Pyridoxine is Vitamin _____
- (a) B₆
 - (b) A
 - (c) B
 - (d) D

PART B — (5 × 5 = 25 marks)

Answer ALL questions, choosing either (a) or (b).

Each answer should not exceed 250 words.

11. (a) Explain various electronic transitions in UV-visible absorption spectroscopy.

Or

- (b) Explain the importance of finger print region.

12. (a) Explain sharpless asymmetric epoxidation.

Or

- (b) Explain synthetic applications NaBH₄.

13. (a) Explain the mechanism of Wolff rearrangement? What are its synthetic application?

Or

- (b) Explain the mechanism of Schmidt rearrangement.

14. (a) Draw the structures of chloramphenicol and cephalosporin.

Or

- (b) How is Lysergic acid synthesized.

15. (a) Discuss the synthesis of vitamin D.

Or

- (b) Explain the synthesis of α -santonin.

PART C — (5 × 8 = 40 marks)

Answer ALL questions, choosing either (a) or (b).

Each answer should not exceed 600 words.

16. (a) Explain various factors influencing absorption of hydroxyl groups in IR spectroscopy.

Or

- (b) State and explain Woodward-Fieser rule. Explain how λ_{max} values are calculated for α - β -unsaturated ketones.

17. (a) Explain the mechanism of birch reduction.

Or

- (b) Explain the mechanism of Smiles rearrangement.

18. (a) Discuss the mechanism of steven rearrangement. What are its applications?

Or

- (b) Discuss cine substitution with suitable example. What are its applications?

19. (a) Discuss the biosynthesis of tyrosine.

Or

- (b) Explain the synthesis of Reserpine and Quinine.

20. (a) Establish the structure of α -pinene. Confirm the structure by synthesis.

Or

- (b) Discuss the structure of camphor. Confirm the structure by synthesis.
-

(6 pages)

Reg. No. :

Code No. : 6878

Sub. Code : PCHM 23

M.Sc. (CBCS) DEGREE EXAMINATION, APRIL 2021.

Second Semester

Chemistry - Core

PHYSICAL CHEMISTRY II

(For those who joined in July 2017 onwards)

Time : Three hours

Maximum : 75 marks

PART A — (10 × 1 = 10 marks)

Answer ALL the questions.

Choose the correct answer :

1. Number of nodal planes for f-orbital are _____
(a) 3 (b) 2
(c) 1 (d) 0
2. The distance between 3rd and 2nd orbit of hydrogen atom is _____
(a) 1.058×10^{-8} cm (b) 2.116×10^{-8} cm
(c) 2.646×10^{-8} cm (d) 0.529×10^{-8} cm

3. An atom has four unpaired electrons. The total spin of this atom will be _____
- (a) 1 (b) 2
(c) 1.5 (d) 4
4. The lowest excited state of the helium atom has the term symbol
- (a) $2s^2$ (b) 3S_1
(c) 1S_0 (d) He^+
5. The increase in the conductance of an electrolytic solution when the applied voltage has a very high frequency is called as
- (a) Falkenhagen effect
(b) Wien effect
(c) Stark effect
(d) Raman effect
6. $\gamma_{\pm} = (\gamma_+ \gamma_-)^{1/2}$ this equation defines _____
- (a) Bronsted equation
(b) Tafel equation
(c) Mean activity coefficient
(d) Onsager equation

7. In the electro deposition of Ag, the silver ions are _____
- (a) Reduced at anode
 - (b) Reduced at cathode
 - (c) Oxidised at anode
 - (d) Oxidised at cathode
8. Which of the following is not an example of a fuel cell?
- (a) Hydrogen-oxygen cell
 - (b) Methyl-oxygen-alcohol cell
 - (c) Propane-oxygen cell
 - (d) Hexanone-oxygen cell
9. _____ states that only the light which is absorbed by a substance can bring about a photochemical change.
- (a) Grotthus-Draper law
 - (b) Stark- Einstein law
 - (c) Beer- Lambert's law
 - (d) Faraday's law
10. Which one of the following types of particles is the MOST highly penetrating to biological tissues?
- (a) α particles
 - (b) β particles
 - (c) Neutrons
 - (d) Posotron

PART B — (5 × 5 = 25 marks)

Answer ALL questions, choosing either (a) or (b).

Each answer should not exceed 250 words.

11. (a) Derive the schrodinger equation for a linear harmonic oscillator.
Or
(b) Write a note on space quantisation.
12. (a) Write the rules of mutual Exclusion principal for CO₂ molecule.
Or
(b) What is Slater determinant? Give the Slater determinant for the two electron wave function of helium.
13. (a) Describe the Debye-Huckle-Onsagar equation. Mention its validity for dilute solutions.
Or
(b) State the Debye-Falkenhagen and wein effects.
14. (a) Write a brief note on electrophoresis.
Or
(b) Give the principals and applications of polarography.

15. (a) Write a comprehensive note on radiolysis of water.

Or

- (b) Describe the photo physical pathways of excited molecular systems.

PART C — (5 × 8 = 40 marks)

Answer ALL questions, choosing either (a) or (b).

Each answer should not exceed 600 words.

16. (a) Derive the schrodinger equation.

Or

- (b) Give a brief account on quantum mechanical tunnelling.

17. (a) Give a brief account on Born Oppenheimer approximation.

Or

- (b) Calculate the delocalization energy for butadiene using HMO theory.

18. (a) Describe the Activity and Activity coefficient of non-ectrolytes.

Or

- (b) Write the Debye-Huckel theory. Derive and explain Debye-Huckel Theory of strong electrolyte with experimental verification.

19. (a) Define corrosion. Give the types of corrosion. What are the factors influencing corrosion? How will you prevent the corrosion?

Or

- (b) What are fuel cells? How will you classify them? How do fuel cells work?

20. (a) Draw and discuss the Jablonski diagram.

Or

- (b) (i) Give the difference between radiation chemistry and photochemistry.
(ii) Mention the application of radiation chemistry.
-

(6 pages)

Reg. No. :

Code No. : 6879

Sub. Code : PCHE 21

M.Sc. (CBCS) DEGREE EXAMINATION, APRIL 2021.

Second Semester

Chemistry

Elective — ADVANCED TOPICS IN CHEMISTRY — II

(For those who joined in July 2017 onwards)

Time : Three hours

Maximum : 75 marks

PART A — (10 × 1 = 10 marks)

Answer ALL questions.

Choose the correct answer :

1. For comparison of bullets, following microscope is used for identification
 - (a) Polarizing microscope
 - (b) Neutron microscope
 - (c) Comparison microscope
 - (d) Nuclear magnetic resonance

2. The control unit of a computer
 - (a) Perform arithmetic and logical operations on the data
 - (b) Controls the operation of output devices
 - (c) Is a device for manually operating the computer
 - (d) Directs the other units of the computer

3. One nanometer is
 - (a) One billionth of a meter
 - (b) One trillionth of a meter
 - (c) One billionth of a centimeter
 - (d) One billionth of a millimeter

4. The process of synthesis of nano powders is
 - (a) Sol-gel process
 - (b) Electro deposition
 - (c) Sputtering technique
 - (d) All are correct

5. Which of the following is a chain growth polymer?
 - (a) Nucleic acid
 - (b) Polystyrene
 - (c) Protein
 - (d) Starch

6. Which of the following is a polyamide?
- (a) Teflon (b) Nylon-6,6
(c) Terylene (d) Bakelite
7. Which of the following is not a viral disease?
- (a) Small pox (b) Typhoid
(c) Encephalitis (d) Rabies
8. The disease not caused by a bacteria is
- (a) Pneumonia (b) Meningitis
(c) Syphilis (d) Poliomyelitis
9. ATP is (stands for) —————.
- (a) An enzyme which brings about oxidation
(b) A hormone
(c) A protein
(d) A molecule which contain high phosphate bonds (adenosine triphosphate)
10. Importance of Krebs's cycle is —————.
- (a) Production amino acids
(b) Production of vitamins
(c) Production ATP molecules through oxidative phosphorylation
(d) To encourage glycolysis

PART B — (5 × 5 = 25 marks)

Answer ALL questions, choosing either (a) or (b).

Each answer should not exceed 250 words.

11. (a) What is meant by forensic science? Explain finger printing analysis.

Or

- (b) Explain the molecular modeling simulation and animation.

12. (a) Write the applications of nanomaterials in catalysis.

Or

- (b) Write a note on polyamide nano composites.

13. (a) Write a note on ion exchange resins.

Or

- (b) Give any three applications of engineering plastics.

14. (a) Write a short note on bioassay in medicinal chemistry.

Or

- (b) Explain chemical and process development of drugs.

15. (a) Write briefly about Chymotrypsin.

Or

(b) Write notes on urea cycle.

PART C — (5 × 8 = 40 marks)

Answer ALL questions, choosing either (a) or (b).

Each answer should not exceed 600 words.

16. (a) Briefly discuss about the forensic serology, hair and fiber analysis.

Or

(b) Describe the chemsketch and chemdraw.

17. (a) Write note on :

(i) Organic transformations and fuel cells

(ii) Environmental applications.

Or

(b) Write the synthesis, characterization and properties of Nylon 6.

18. (a) Explain the synthetic route, structure and applications of any two engineering plastics.

Or

(b) Write note on :

(i) Poly phenylene sulphide

(ii) Poly amides.

19. (a) Write a note on the identification of diseases and corresponding targets.

Or

- (b) Briefly explain about the preclinical trials of Toxicology and Pharmacology.

20. (a) Write the biological energy-ATP. NADH. NADPH, FADH₂ as electron carriers.

Or

- (b) Explain the link between glycolysis and citric acid cycle.
-

M.Sc. (CBCS) DEGREE EXAMINATION, APRIL 2021
THIRD SEMESTER
CHEMISTRY - CORE
INORGANIC CHEMISTRY - III
(for those who joined in July 2017 onwards)

Time : Three hours

Maximum: 75 marks

Part - A (10 X 1 = 10 marks)

Answer all question, choose the correct answer:

- Among the following the unstable carbonyl species is
a. $\text{Mn}(\text{CO})_5\text{Cl}$ b. $[\text{Mn}(\text{CO})_5]$ c. $[\text{Mn}(\text{CO})_5]^+$ d. $\text{Mn}(\text{CO})_5$ Ⓐ $\text{Mn}(\text{CO})_{10}$
- The number of M-M bond in $\text{Ir}_4(\text{CO})_{12}$ are
a. Four
b. Six
c. Eight
d. Zero
- During the oxidative addition, The oxidation state of a metal increased by
a. 0 b. 2 c. 1 d. 3
- Willkinson's catalyst is
a. $[\text{Rh}(\text{CO})_2\text{I}_2]^-$
b. $(\text{Ph}_3\text{P})_3\text{RhCl}$
c. $\text{Co}_2(\text{CO})_8$
d. $(\text{Ph}_3\text{P})_2\text{Rh}(\text{CO})\text{Cl}$
- NMR is the study of absorption of _____ by nuclei in a magnetic field?
a) Radioactive radiation
b) IR radiation
c) Radio frequency radiation
d) Microwaves

b. The number of EPR signals given by Ni^{+2} is _____
Ⓐ 1 Ⓑ 2 Ⓒ 3 Ⓓ 4

- Which of the following parameters can be used, using the DSC and DTA cells?
a) Catalytic properties of enzyme
b) Elasticity of crystals
c) Enthalpy of substances
d) Line positions of phases
- In Atomic Absorption Spectroscopy, which of the following is the generally used radiation source?
a) Tungsten lamp
b) Xenon mercury arc lamp
c) Hydrogen or deuterium discharge lamp
d) Hollow cathode lamp
- The emission of radiation due to the transition from the triplet excited state T_1 to the ground state S_0 is called
a. Phosphorescence
b. Fluorescence
c. Internal conversion
d. Inter system crossing
- The quantum yield of a photochemical reaction $A \rightarrow B$ was found to be 0.3. Light of wavelength 256 nm was used to irradiate A and 3×10^{-5} moles of B was formed at the end of the reaction. How should I calculate the absorbed in the process?
a. 25.24 J
b. 46.74 J
c. 76.45 J
d. 59.56 J

Answer ALL questions, choosing either (a) or (b) Each answer should not exceed 250 words.

11.(a) Write a note on synthesis of metal carbonyls.

OR

(b) Write a note on Preparation and Properties metallocenes.

12.(a) Give a brief note on Insertion reaction.

OR

(b) Write a short note on Wilkinson's catalyst.

13. (a) Explain the NMR of the paramagnetic molecule with example.

OR

(b) Explain the EPR Spectroscopy for iron proteins.

14 .(a) Explain the factors affecting TGA:-

OR

(b) Write a brief note on the principle and applications of Spectrophotometry.

15. (a) State and explain Frank Condon principle.

OR

(b) Explain TiO_2 as green catalyst.

Part C (5 x 8 = 40marks)

Answer ALL questions, choosing either (a) or (b) Each answer should not exceed 600 words.

16.(a) Account on the substitution reactions of metal carbonyls.

OR

(b) Give a detailed note on template synthesis of macrocyclic ligands.

17. (a) Write an essay on cyclometallation reactions.

OR

(b) Account on Fischer Tropsch and cyclo oligomerization of fluxional molecules:-

18. (a) Write an essay on NMR Spectroscopy.

OR

(b) Write an essay on the application of EPR in the study of covalent character of M-L bond in transition metal complexes.

19 .(a) Give an essay on theory and principle of TGA.

OR

(b) Account on AAS.

20. (a) Write an essay on the types of excited states.

OR

(b) Write an essay on the photochemical processes:-

M.Sc. (CBCS) DEGREE EXAMINATION, APRIL 2021

THIRD SEMESTER

CHEMISTRY - CORE

PHYSICAL CHEMISTRY - III

(for those who joined in July 2017 onwards)

Time : Three hours

Maximum: 75 marks

Part - A (10 X 1 = 10 marks)

Answer all question, choose the correct answer:

- Point group of benzene is
(a) C_{6h} (b) D_{6h} (c) D_{6d} (d) C_{6v}
- Which of the following corresponds to plane of symmetry?
(a) σ_h (b) σ_d (c) σ_v (d) All
- How many normal modes of vibration does NH_3 have?
(a) 12 (b) 9 (c) 6 (d) 3
- In ethylene molecule $n \rightarrow \pi^*$ is
(a) Electronically allowed (b) Electronically and magnetically allowed
(c) Electronically Forbidden (d) Electronically and magnetically forbidden
- Which of hydrogens(i-iv) in the following molecule gives a triplet signal in a normal 1H NMR spectrum?
 $CH^i_3COCH^{ii}_2CH^{iii}(OCH^{iv}_3)_2$
(a) i (b) ii (c) iii (d) iv
- Which carbon of (a)-(d) of hex-3-en-2-one $CH_3CH_2CH=CHCOCH_3$ shows the largest (most downfield) chemical shift in the NMR spectrum?
(a) C_1 (Methyl carbon) (b) C_2 (Carbonyl carbon)
(c) C_4 (vinylic carbon) (d) C_5 (Methylene carbon)
- NQR spectra is observed in state
(a) Solid (b) Liquid (c) Gaseous (d) Liquid crystalline
- ESR spectrum of *p*-benzosemiquinone radical anion consists of a
(a) 1:2:3:2:1 Quintet (b) 1:3:3:1 Quartet
(c) 1:4:6:4:1 Quintet (d) Equally intense quintet
- The electrons which contribute to isomer shift in Mossbauer spectroscopy are.
(a) *s*-electrons (b) *p*-electrons (c) *d*-electrons (d) *f*-electrons
- Mass spectrometer separates ions on the basis of which of the following?
(a) Mass (b) Charge (c) Molecular weight (d) Mass to charge ratio

PART- B (5x5=25 marks)

Answer All the questions choosing either (a) or (b) Each Answer should not exceed 250 words.

11. a. What is meant by similarity transformation? Illustrate the application of similarity transformation rule to find the classes of H_2O molecule.

OR

b. Do the set of integers $\{-1, 0, 1\}$ form a group under addition process. Explain your answer.

12. a. Obtain the symmetry species of the vibrational modes of ammonia molecule by using group theory.

OR

b. Explain how the projection operators could be used to construct SALCs by taking any one example.

13. a. Write notes on

^{13}C NMR

OR

b. An organic compound C_3H_6O contains a carbonyl group $C=O$. How will its spectrum decide whether it is an aldehyde or a ketone?

14. a. Discuss the ESR spectra of p-benzoquinone radical.

OR

b. Illustrate, using energy level diagram, Kramers' degeneracy.

15. a. Write notes on Doppler shift and recoil energy in Mossbauer.

OR

b. How is dissociation energy calculated using electronic spectroscopy?

PART- C (5X8=40 marks)

Answer All the questions choosing either (a) or (b) Each Answer should not exceed 600 words.

16. (a) State 'The Great Orthogonality theorem' and illustrate the important rules related to irreducible representations and their characters. **(OR)**
(b) Illustrate using group multiplication table that H_2O molecular point group is Abelian whereas NH_3 molecular point group is non-Abelian.
17. (a) (i) Give the symmetry selection rule for IR and Raman spectra.
(ii) Explain Mutual exclusion Principle. **(OR)**
(b) Deduce the electronic transition in Formaldehyde molecule.
18. (a) Write with examples, the shielding and the deshielding effects involved in NMR spectroscopy. **(OR)**
(b) Write notes on
(i) INDOR (ii) NOE and (iii) MRI
19. (a) Explain the significance of 'g' value in ESR spectroscopy. What are the factors which influence the 'g' value? Discuss them briefly with suitable examples. **(OR)**
(b) Explain the Theory, Principle and applications of NQR spectroscopy.
20. (a) (i) Discuss the Theory and Principle of Ultra-Violet Photoelectron Spectroscopy
(ii) Discuss the Theory and Principle of X-ray Photoelectron Spectroscopy. **(OR)**
(b) (i) Discuss Theory and Principle of Mössbauer spectra.
(ii) Explain Finger print application in Mass spectrometry.

Code No:6883

Reg. No.

Sub. Code: PCHM34

M.Sc. (CBCS) DEGREE EXAMINATION, APRIL 2021

THIRD SEMESTER

CHEMISTRY - CORE

SCIENTIFIC RESEARCH METHODOLOGY

(for those who joined in July 2017 onwards)

Maximum: 75 marks

Part - A (10 X 1 = 10 marks)

Answer all question, choose the correct answer:

Time : Three hours

- Bibliography means----
a) Foot Note
b) Quotations
c) List of Books referred
d) Biography
- Research is----
a) Working in a scientific way to search for truth of any problem
b) Searching again and again
c) To find solution for any problem
d) None of these
- Abstract comes under----
a) Research paper
b) Primary source
c) Secondary source
d) Journal
- A research paper is a brief report of research work based on----
a) Primary Data only
b) Secondary Data only
c) Both Primary and Secondary Data
d) None of the above
- Concepts are ----- of Research.
a) Guide
b) Tools
c) Methods
d) Variables
- Research conducted to find solution for an immediate problem is----
a) Fundamental Research
b) Analytical Research
c) Action Research
d) Survey

- Radiations in the X-ray region are emitted from some radioactive elements from the following mechanism-----
a) γ -radiation
b) Electron capture
c) K-capture
d) All of the above.
- The error between mean of finite data set and mean of infinite data set is known as----
a) True error of the mean
b) Standard error of the mean
c) Finite error
d) Infinite error
- ChemPort is a linking technology developed by -----
a) Biological Abstract service
b) Chemical Abstract service
c) Physical Abstract service
d) All of the above.
- In the following, which funding agency will announce for a minor/major research projects (MRP)?
a) UGC
b) CSIR
c) DST
d) ICMR

PART B - (5 x 5 = 25)

Answer ALL questions choosing either (a) or (b)
Each answer should not exceed 250 words

- a) Brief about current chemical reaction.
(or)
b) Write a brief note on Science Citation Index.
- a) Give a brief note on Chemical Substance Index.
(or)
b) How will you locate the specific references?
- a) How will you identify a research problem?
(or)
b) What is an abstract of a research paper
- a) Explain the "t" test and "f" test.
(Or)
b) Describe the "chi" square test.
- a) Describe about the SCiFinder.
(or)
b) What do you understand by the term Chemport?

PART C - (5 x 8= 40 Marks)

Answer ALL questions choosing either (a) or (b)

Each answer should not exceed 600 words.

- 16.a) Discuss the classical and comprehensive reference works in chemistry.
- (or)
- b) Explain briefly about primary, secondary and tertiary sources of chemical information.
- 17.a) Write a short note on the following:
(i) Service source index (ii) Collective Index
(iii) Author Index (iv) Patent index
- (or)
- b) Describe the following
(i) Index Guide (ii) General Subject Index (iii) Chemical Substance
- 18.a) How the abbreviation used in scientific writing?
- (or)
- b) Narrate the steps to publishing a scientific article in a journal.
- 19.a) Discuss the principle and sample preparation of AFM.
- (Or)
- b) Define the errors in chemical analysis. How will you classify these errors?
- 20.a) What are the internet services will be used for browsing and to download articles and reprints?
- (or)
- b) How will you write a project proposal to UGC and DST?

(7 Pages)

Reg. No. :

Code No. : 6885

Sub. Code : PCHM 42

M.Sc. (CBCS) DEGREE EXAMINATION, APRIL 2021.

Fourth Semester

Chemistry — Core

INORGANIC CHEMISTRY — IV

(For those who joined in July 2017 onwards)

Time : Three hours

Maximum : 75 marks

PART A — (10 × 1 = 10 marks)

Answer ALL questions.

Choose the correct answer :

1. The Mossbauer spectrum of $^{119}\text{SnCl}_4$ shows no quadrupole splitting, where as that of $^{119}\text{SnF}_4$ exhibits quadrupole splitting. Which of the following statements is correct?
 - (a) SnCl_4 is tetrahedral but SnF_4 is distorted octahedral
 - (b) SnCl_4 has field gradient but SnF_4 has no field gradient
 - (c) Quadrupole splitting is due to higher electronegativity of fluoride
 - (d) None of the above

2. The complex, $[\text{Co}(\text{en})_3]^{3+}$ shows positive cotton effect. What is the absolute configuration?
- (a) $\Lambda - (\text{D}) - [\text{Co}(\text{en})_3]^{3+}$
 - (b) $\Lambda - (\text{D}) - [\text{Co}(\text{en})_3]^{3+}$
 - (c) $\Delta - (\text{L}) - [\text{Co}(\text{en})_3]^{3+}$
 - (d) None of these
3. The 2 p XPS of Cu has two peaks at 952.7 and 932.7 eV due to _____.
- (a) Jahn-Teller distortion
 - (b) Spin-orbit coupling
 - (c) Chemical shift
 - (d) None of the above
4. In XPS, the binding energies of core electrons give rise to chemical shifts. Which of the following statements is true?
- (a) Chemical shift is the same irrespective of the particular core energy level studied
 - (b) For an atom in the same chemical environment, the shift increases with increasing positive charge on the atom
 - (c) The sensitivity of the chemical shift to charge varies roughly as the inverse of the valence shell radius
 - (d) All of the above

5. The cytochromes P-450 are regarded as oxidizing enzymes, yet they consume one equivalent of the reducing agent NADH for each catalytic cycle. Why?
- (a) NADH is required to provide energy to the catalytic cycle
 - (b) NADH is required to oxidize the Fe (II) to iron in the catalytic cycle
 - (c) NADH is required to re-reduce the iron to Fe(II) in the catalytic cycle
 - (d) None of the above
6. The expected exponent for the O_2 in the oxygenation (equilibrium) constant equation for hemoglobin _____.
- (a) 4
 - (b) 2
 - (c) 2.8
 - (d) 4.8
7. Which of the following complexes are used in cancer treatment?
- (a) Carboplatin
 - (b) Oxaliplatin
 - (c) Satraplatin
 - (d) All of these
8. Which of the following copper proteins is involved in oxygen transport?
- (a) Quercetinase
 - (b) Hemocyanin
 - (c) Tyrosinase
 - (d) Blue Cu proteins

9. A large single crystal of silicon is prepared by _____ process.
- (a) Hydrothermal method
 - (b) Czochralski process
 - (c) Sol-gel process
 - (d) Epitaxy method
10. Zeolitic structures with pore sizes of 2000 to 10000 pm are known as mesoporous solids. They can be prepared by
- (a) liquid crystal templating
 - (b) sealed tube method
 - (c) precipitation method
 - (d) none of the above

PART B — (5 × 5 = 25 marks)

Answer ALL questions, choosing either (a) or (b).

Each answer should not exceed 250 words.

11. (a) Describe the application of Mossbauer spectroscopy in determination of oxidation states and π - bonding.

Or

- (b) Discuss Mossbauer spectrum of the following compounds : $\text{Fe}_2(\text{SO}_4)_3$ (anhydrous) and $\text{K}_4[\text{Fe}(\text{CN})_6]$.

12. (a) What are satellite peaks in XPS? Describe the mechanisms of formation of such peaks. Give their applications in qualitative analysis.

Or

- (b) Describe the applications of photoelectron spectroscopy in explaining the structure and bonding of metal carbonyls.

13. (a) What are siderophores? Discuss the structures any two siderophores.

Or

- (b) Describe the structure and function of cytochrome c.

14. (a) Explain the structural features and function of blue copper proteins.

Or

- (b) How are the following chelating agents can be used therapeutically? Give their mode of actions.

(i) D-penicillamine and

(ii) cis-diamminedichloroplatinum(II)

15. (a) What are zeolites? Explain the structure and properties of zeolites.

Or

- (b) Write a note on fullerenes and fullerides.

PART C — (5 × 8 = 40 marks)

Answer ALL questions, choosing either (a) or (b).

Each answer should not exceed 600 words.

16. (a) Describe the applications of Mossbauer spectroscopy in determination of
- spin state crossover (SCO) and
 - cis-Trans isomers.

Or

- (b) Describe the application of Mossbauer spectroscopy in confirming the structures of $\text{Fe}_4^{\text{(III)}} [\text{Fe}^{\text{(II)}} (\text{CN})_6]_3$, Ferridoxin ($\text{Fe}_4\text{S}_4(\text{SCys})_4$) and $\text{Fe}_3(\text{CO})_{12}$.
17. (a) What is the origin of vibrational fine structures of PES? With examples illustrate its usefulness in identifying the nature of the molecular orbitals, predissociation and Jahn-Teller distortion.

Or

- (b) Discuss the photoelectron spectra of the following molecules :
- N(1s) XPS of $[\text{Co}(\text{en})_2(\text{NO}_2)_2]\text{NO}_3$ and C(1s) XPS of CCl_3CH_3 .
 - UV-PES of NH_3 and CO_2 .

18. (a) What are metalloporphyrins? Explain the structure and functions of hemoglobin.

Or

(b) Discuss the structure, redox properties and biological functions of vitamin B₁₂.

19. (a) Write a brief account of :

(i) Inhibition and poisoning of enzyme action

(ii) Chelate therapy.

Or

(b) Discuss the structure and role of superoxide dismutase.

20. (a) Discuss the structures and properties of pillared clays.

Or

(b) Explain the epitaxy, chemical vapour transport and solution methods for the preparation of single crystals with suitable examples.

(8 pages)

Reg. No. :

Code No. : 6352

Sub. Code : PCHM 31

M.Sc. (CBCS) DEGREE EXAMINATION,
NOVEMBER 2021

Third Semester

CHEMISTRY — CORE

ORGANIC CHEMISTRY — III

(For those who joined in July 2017 onwards)

Time : Three hours

Maximum : 75 marks

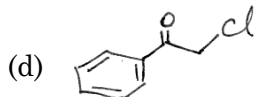
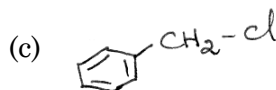
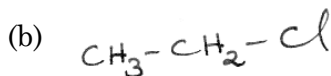
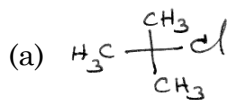
PART A — (10 × 1 = 10 marks)

Answer ALL questions.

Choose the correct answers :

1. Better leaving groups in elimination reaction favours ———— reaction.
 - (a) E1cB
 - (b) E2
 - (c) E1
 - (d) Both E1 and E2

2. Which one is an excellent substrate for S_N2 reaction?



3. In ¹H NMR spectrum, mesitylene gives _____ signals.

(a) 1 (b) 2

(c) 3 (d) 4

4. In ¹H NMR the aromatic protons appear in the region of _____

(a) 2 – 4 ppm (b) 4 – 5 ppm

(c) 7 – 8 ppm (d) 9 – 10 ppm

5. The most intense peak in the mass spectrum is called as _____

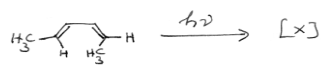
(a) meta stable peak (b) parent ion peak

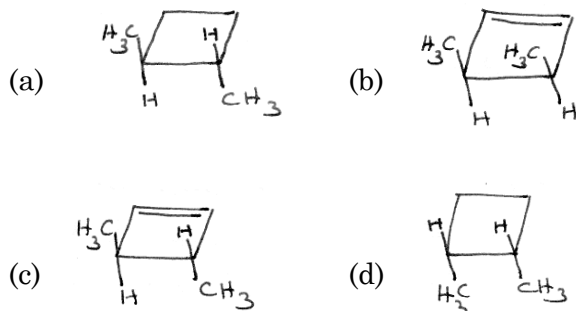
(c) molecular ion peak (d) base peak

6. Which species of the following is used to bombard with the sample for which mass spectroscopy has been performed?

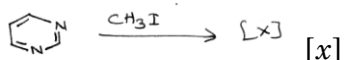
(a) Protons (b) Electrons

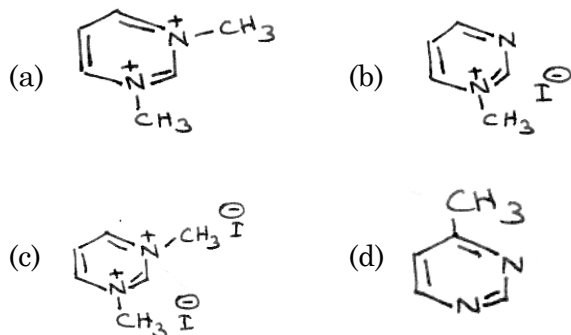
(c) Neutrons (d) Alpha particles

7. In the reaction sequence  [x] will be



8. Which of the following is an incorrect statement?
- (a) First step in photochemistry is excited state
- (b) It is possible for the excited state S_1 to undergo spin inversion
- (c) Photochemical reactions are caused by absorption of ultraviolet only
- (d) When a molecule or atom in the ground state absorbs light, one electron is excited to higher orbital level

9. In the reaction sequence  [x] [x] will be



10. Which is a di saccharide?
 (a) Cellulose (b) Fructose
 (c) Maltose (d) Glucose

PART B — (5 × 5 = 25 marks)

Answer ALL questions, choosing either (a) or (b) not exceeding 250 words.

11. (a) Narrate the mechanism with evidence of S_N1 reaction.

Or

- (b) Discuss the orientation of double bond in elimination reactions.

12. (a) (i) What do you understand by the term splitting of the signals? Explain with an example.
- (ii) Why is TMS used as an internal standard? (3+2)

Or

- (b) What is meant by coupling constant? Explain (i) geminal coupling (ii) vicinal coupling.

13. (a) Write notes on MALDI-MS technique.

Or

- (b) Write briefly on McLafferty rearrangement in mass spectrometry.

14. (a) Give a brief account of Paterno – Buchi reaction.

Or

- (b) Write short notes on photosensitization.

15. (a) What are the fragments obtained when flavone is boiled with conc.KOH? How does this process help in assigning structure of flavones?

Or

- (b) Give an account of the preparation and properties of pyridazine.

PART C — (5 × 8 = 40 marks)

Answer ALL questions, choosing either (a) or (b) not exceeding 600 words.

16. (a) (i) Write short notes on effect of solvents on aliphatic nucleophilic substitution reactions.
- (ii) Discuss the mechanism of neighbouring group participation involving σ and π bonds. (4+4)

Or

- (b) (i) Illustrate with an example E1cB mechanism.
- (ii) Write a note on Chugaev reaction. (4+4)
17. (a) Write brief note on :
- (i) Nuclear over hauser effect
- (ii) Off-resonance decoupled ^{13}C spectroscopy.

Or

- (b) Explain the following with example.
- (i) Fourier technique in NMR spectroscopy.
- (ii) DEPT – 135 spectrum. (4+4)

18. (a) (i) A compound $C_9H_{10}O$ has the spectral characteristics given below. Arrive at its structure.

UV : $\lambda_{\max}^{E, \theta H}$ 242, 279 nm

IR : 1680 cm^{-1}

$^1\text{H NMR}$: δ 0.9(t, 7Hz, 3H), 2.1(quartet, 7Hz, 2H) and 7.4(m, 5H) ppm.

- (ii) Give an account of retro – Diels alder reaction. (4+4)

Or

- (b) Benzaldehyde condenses with acetone in the presence of alkali to give compound A whose mass spectrum showed the molecular ion at m/z 146. There was a strong absorption band in the IR spectrum near 1650 cm^{-1} . The compound showed the following NMR signals.

$^1\text{H NMR} = \delta$ 2.3(3H, s), 6.7(1H, d, $J = 16 \text{ Hz}$)
7.4 (5H, m), 7.5(1H, d, $J = 16 \text{ Hz}$)

$^{13}\text{C}_{\text{NMR}} = \delta$ 27(q), 127(d), 128(2c, d), 129 (2c, d)
130 (d), 135(s), 144(d), 198(s)

Deduce the structure of A.

19. (a) (i) Using correlation diagram approach show that dimerisation of ethylene is a photochemically allowed process.
- (ii) Illustrate di- π methane rearrangement with an example. (5+3)

Or

- (b) (i) What are sigmatropic rearrangement reactions? Give an example. Discuss the sigmatropic reactions that involve migration of H atom.
- (ii) Write a note on Norrish type II reactions. (5+3)
20. (a) (i) Describe any two methods for determining the size of ring in sugars.
- (ii) Outline the synthetic step that leads to thiazole. (6+2)

Or

- (b) (i) Give the synthesis of quercetin.
- (ii) Discuss the biosynthesis of flavonoids. (4+4)

(8 Pages)

Reg. No. :

Code No. : 6353

Sub. Code : PCHM 32

M.Sc. (CBCS) DEGREE EXAMINATION,
NOVEMBER 2021

Third Semester

CHEMISTRY — CORE

INORGANIC CHEMISTRY — III

(For those who joined in July 2017 onwards)

Time : Three hours

Maximum : 75 marks

PART A — (10 × 1 = 10 marks)

Answer ALL questions.

Choose the correct answers :

1. Which among the following metallocenes is easily oxidized?
 - (a) $(\eta^5 - C_5H_5)_2 Ru$
 - (b) $(\eta^5 - C_5H_5)_2 Fe$
 - (c) $(\eta^5 - C_5H_5)_2 Co^+$
 - (d) $(\eta^5 - C_5H_5)_2 Co$

2. The reaction of $\text{Mn}_2(\text{CO})_{10}$ with Na/Hg can be monitored by IR spectroscopy in the region 2100–1800 cm^{-1} . The starting material show absorptions at 2046, 2015 and 1984 cm^{-1} , and whereas the product at 1896 and 1865 cm^{-1} , respectively. Suggest a likely product of the reaction
- (a) $[\text{Mn}(\text{CO})_6]^+$ (b) $\text{Na}[\text{Mn}(\text{CO})_5]$
(c) $[\text{Mn}_2(\text{CO})_8]$ (d) None of these
3. Reductive eliminations can sometimes be encouraged to take place by oxidizing the metal. Why do you think this is so?
- (a) Oxidized complex is kinetically favourable
(b) It is easier to reduce a more oxidized complex
(c) Oxidized complex would be more stable
(d) None of the above
4. The two products obtained by oxidative addition of Cl_2 to square planar complex $[\text{IrCl}(\text{Ph}_3\text{P})_3]$ are
- (a) fac and mer (b) cis and trans
(c) enantiomers (d) linkage isomers

5. How many lines are expected in the ^{31}P NMR spectrum of $\text{PH}_2\text{H}(^{15}\text{NH}_2)_2$? ($J_{\text{P-H}} > J_{\text{P-F}} > J_{\text{P-N}} > J_{\text{P-H}}$)
- (a) 15 (b) 30
(c) 45 (d) 90
6. The number of hyperfine lines in the EPR spectrum of a one electron reduced product of $[\text{Co}_3(\text{CO})_6\text{Se}]$ ($I = 7/2$ for Co nucleus) is
- (a) 22 (b) 19
(c) 15 (d) 18
7. Several spectrophotometers have scales in optical density/percent transmittance. What would be transmittance reading at 0.25 optical density?
- (a) 0.6989 (b) 0.7500
(c) 1.7780 (d) None of the these
8. Which of the following structural features in a molecule may make it fluorescent?
- (a) The presence of benzene ring
(b) Fused ring system
(c) Rigidity in the molecule
(d) All of the above

9. TiO_2 is used as a green photocatalyst in removing pollutants from air and water. The band gaps in anatase and rutile are
- (a) 5.2 eV and 5.1 eV
 - (b) 9.2 eV and 9.6 eV
 - (c) 3.2 eV and 3.0 eV
 - (d) 2.5 eV and 2.2 eV
10. The products of the aquation of the complex, $[\text{Cr}(\text{NH}_3)_5(\text{NCS})]^{2+}$ under thermal and photochemical reactions are
- (a) $[\text{Cr}(\text{NH}_3)_5(\text{H}_2\text{O})]^{3+}$ and $[\text{Cr}(\text{NH}_3)_4(\text{NCS})(\text{H}_2\text{O})]^{2+}$
 - (b) $[\text{Cr}(\text{NH}_3)_4(\text{NCS})(\text{H}_2\text{O})]^{2+}$ and $[\text{Cr}(\text{NH}_3)_5(\text{H}_2\text{O})]^{3+}$
 - (c) $[\text{Cr}(\text{NH}_3)_4(\text{H}_2\text{O})_2]^{3+}$ and $[\text{Cr}(\text{NH}_3)_4(\text{H}_2\text{O}_2)]^{3+}$
 - (d) $[\text{Cr}(\text{NH}_3)_3(\text{NCS})(\text{H}_2\text{O}_2)]^{2+}$ and $[\text{Cr}(\text{NH}_3)_5(\text{H}_2\text{O})]^{3+}$

PART B — (5 × 5 = 25 marks)

Answer ALL questions, choosing either (a) or (b)

Each answer should not exceed 250 words.

11. (a) Provide plausible reasons for the differences in IR stretching frequencies between each of the following pairs : (i) $[\text{Mo}(\text{CO})_3(\text{PF}_3)_3]$ 2040, 1991 cm^{-1} versus $[\text{Mo}(\text{CO})_3(\text{PMe}_3)_3]$ 1945, 1851 cm^{-1} , (ii) $[\text{Mn}(\eta^5\text{-C}_5\text{H}_5)(\text{CO})_3]$ 2023, 1939 cm^{-1} versus $[\text{Mn}(\eta^5\text{-C}_5\text{Me}_5)(\text{CO})_3]$ 2017, 1928 cm^{-1} .

Or

- (b) Metal-metal bonding in multinuclear species is not always clear-cut. Solely on the basis of the 18-electron rule, suggest whether $(\eta^5\text{-Cp})\text{Ni}(\mu\text{-PPh}_2)_2\text{Ni}(\eta^5\text{-Cp})$ might be expected to contain a metal-metal bond.

12. (a) With suitable examples explain nucleophilic and electrophilic attack of coordinated ligands in organometallic compounds.

Or

- (b) Write short note on Zeigler-Natta catalysis.

13. (a) Sketch and explain ^{31}P NMR of P_4S_3 .

Or

- (b) Explain the terms zero field splitting and Kramer's degeneracy. Applying these two phenomena, predict the number of EPR spectral lines for $[\text{Mn}(\text{H}_2\text{O})_6]^{2+}$.

14. (a) Explain thermometric titrations with example.

Or

- (b) Describe the applications of TGA/DTA in the analysis of minerals.
15. (a) Discuss the photochemical reactions that are useful in the solar energy conversion.

Or

- (b) Discuss the two principal mechanisms of energy transfer in excited states.

PART C — (5 × 8 = 40 marks)

Answer ALL questions, choosing either (a) or (b)

Each answer should not exceed 600 words.

16. (a) Draw the MO diagram for metallocene. Using the diagram, predict the stability and magnetic properties of manganocene, ferrocene and cobaltocene. What would happen to the M-L bond length if an electron is removed from $[\text{Co}(\eta^5\text{-Cp}_2)]$ to form $[\text{Co}(\eta^5\text{-Cp}_2)]^+$. Justify your answer.

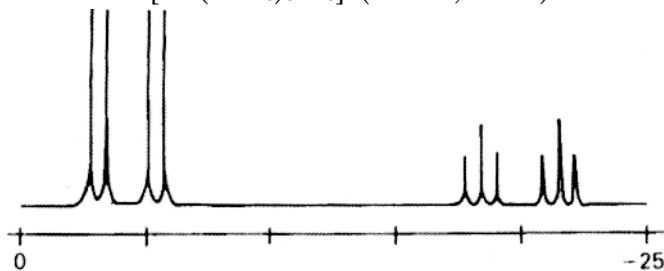
Or

- (b) (i) What are metal – metal bonds? With illustrative examples discuss the structures of carbonyls containing metal-metal bonds.
- (ii) Beryllocene has interesting sandwich structure with a strong shorter covalent bond and a longer weaker ionic bond. Substantiate the statement.

17. (a) What is Wilkinson catalyst? Describe the mechanism of homogenous hydrogenation of alkene using Tolman cycle. What modifications are to be made in the catalyst to bring about enantioselective hydrogenation of prochiral alkenes?

Or

- (b) (i) Describe the mechanistic aspect involved in the hydroformylation of olefins by $\text{CO}_2(\text{CO})_8$.
(ii) Explain the role of organometallic compounds in carbonylation of alcohols.
18. (a) (i) The ^{31}P -NMR spectrum of mer- $[\text{Rh}(\text{PPh}_3)_3\text{Cl}_3]$ is given below. Explain the features of the basis of its structure. How this spectrum differ from that of fac- $[\text{Rh}(\text{PPh}_3)_3\text{Cl}_3]$? (for Rh, $I = \frac{1}{2}$)



- (ii) What are fluxional molecules? How is NMR useful in the study of fluxionality in organometallic compounds?

Or

- (b) (i) Enumerate different factors affecting the magnitude of 'g' values.
- (ii) V(IV) system (^{51}V , $I = 7/2$), is expected to give eight line pattern in EPR but two overlapping eight line patterns are obtained at low temperature. Give reason.
19. (a) (i) Discuss inductively coupled Argon plasma source used in atomic emission spectroscopy.
- (ii) Describe spectral and chemical interferences in atomic absorption spectroscopic analysis.
- Or
- (b) (i) Bring out the relationship between fluorescence intensity and concentration.
- (ii) How will you estimate Al^{3+} and F^- ions in polluted water by fluorimetric method?
20. (a) Discuss the applications of semiconductor based photoelectrochemical cells in the storage of solar energy.
- Or
- (b) Discuss in detail the photochemical reactions of Co(III) complexes enumerating the role of different excited states involved in these reactions.
-

(7 Pages)

Reg. No. :

Code No. : 6354

Sub. Code : PCHM 33

M.Sc. (CBCS) DEGREE EXAMINATION,
NOVEMBER 2021

Third Semester

Chemistry — Core

PHYSICAL CHEMISTRY — III

(For those who joined in July 2017 onwards)

Time : Three hours

Maximum : 75 marks

PART A — (10 × 1 = 10 marks)

Answer ALL questions.

Choose the correct answers :

1. Which of the following principal axis correspond to benzene?
(a) C_2 (b) C_3
(c) C_6 (d) C_5
2. How many reflection planes do $[\text{PtCl}_4]^{2-}$ ions have?
(a) 1 (b) 4
(c) 3 (d) 5

3. Normal modes of vibration of CH_4 molecule is
- (a) 15 (b) 9
 (c) 6 (d) 3
4. Which of the following molecule have both IR and Raman active modes?
- (a) CO_2 (b) C_2H_2
 (c) trans- N_2F_2 (d) HCN
5. ${}^3J_{\text{HH}}$ coupling constants are dependent on
- (a) Magnetic field strength
 (b) Relative orientation of the coupled protons
 (c) Sample concentration
 (d) 90° pulse width
6. How many signals does the aldehyde $(\text{CH}_3)_3\text{CCH}_2\text{CHO}$ have in ${}^1\text{H}$ NMR and ${}^{13}\text{C}$ NMR spectra?
- (a) Five ${}^1\text{H}$ signals and six ${}^{13}\text{C}$ signals
 (b) Three ${}^1\text{H}$ signals and four ${}^{13}\text{C}$ signals
 (c) Five ${}^1\text{H}$ signals and four ${}^{13}\text{C}$ signals
 (d) Three ${}^1\text{H}$ signals and six ${}^{13}\text{C}$ signals

7. ESR spectrum of anthracene radical anion consists of
- (a) 25 lines (b) 50 lines
(c) 75 lines (d) 100 lines
8. NQR spectra is observed in ————— region.
- (a) Microwave (b) Radiofrequency
(c) X-ray (d) UV/Visible
9. What is the main factor on which chemical shift depends in Mössbauer spectra?
- (a) Electron density (b) Transition energy
(c) Intensity of light (d) All of these
10. In mass spectrometer, the sample that has to be analysed is bombarded with which of the following?
- (a) protons (b) electrons
(c) neutrons (d) alpha particles

PART B — (5 × 5 = 25 marks)

Answer ALL questions, choosing either (a) or (b).

Each answer should not exceed 250 words.

11. (a) Construct the multiplication table for water molecule.

Or

- (b) Differentiate between reducible and irreducible representations.

12. (a) Group theory is useful in constructing the hybrid orbit. Discuss it by taking CH₄ molecule.

Or

- (b) Discuss the electronic spectra of ethylene.

13. (a) What magnetic field strength must be applied to a free proton for spin transition to occur at 60 MHz? ($\gamma = 26.7522 \times 10^7 \text{rad T}^{-1}\text{S}^{-1}$).

Or

- (b) Discuss the nuclear spin-spin interaction taking the sample of ethyl alcohol.

14. (a) Explain the significance of 'g' value in ESR spectroscopy. Explain the factors which influence the 'g' value.

Or

- (b) Give a detailed note on the double resonance technique in ESR spectroscopy.

15. (a) State and explain the Franck – Condon principle.

Or

- (b) Draw and explain Fortrat diagram.

PART C — (5 × 8 = 40 marks)

Answer ALL questions, choosing either (a) or (b).

Each answer should not exceed 600 words.

16. (a) State and explain the great orthogonality theorem. By using the GOT construct C_{3v} character table.

Or

- (b) Find the symmetry elements and symmertry operations and determine the point groups of the following molecules.

- (i) Benzene
- (ii) Trans- N_2F_2
- (iii) Diborane

- (iv) BF_3
- (v) FeF_6^{3-}
- (vi) $\text{CHClBr}(\text{CH}_3)$
- (vii) IF_5
- (viii) Thiophene.

17. (a) Obtain the hybrid orbitals for the sigma bonds in BF_3 molecule.

Or

(b) Discuss the salient features of HMO. Apply the HMO, arrive at the delocalization energy for 1, 3 – butadiene system.

18. (a) (i) Discuss the principle and application of INDOR.
- (ii) Discuss the theory and principle of ^{19}F NMR.

Or

(b) How many kinds of protons are in the following molecules?

- (i) CH_3CH_3
- (ii) $\text{CH}_3\text{CH}_2\text{CH}_3$
- (iii) $(\text{CH}_3)_2\text{CHCH}_2\text{CH}_3$
- (iv) $\text{C}_6\text{H}_5\text{CH}_3$

- (v) $C_6H_5NO_2$
- (vi) $CH_2 = CH_2$
- (vii) $CH_3CH = CH_2$
- (viii) $CH \equiv CH$.

19. (a) Explain the theory, principle and applications of NQR spectroscopy.

Or

- (b) (i) In an ESR spectrometer operating at 9.233 GHz, the center of the spectrum of CH_3 radical occurred at 329.4 mT. Calculate the 'g'-value of the free radical.
- (ii) Illustrate Kramers' degeneracy using energy level diagram.

20. (a) Discuss the theory, principle application of photoelectron spectroscopy.

Or

- (b) Discuss the theory, principle and applications of Mössbauer spectroscopy.

(6 Pages)

Reg. No. :

Code No. : 6355

Sub. Code : PCHM 34

M.Sc. (CBCS) DEGREE EXAMINATION,
NOVEMBER 2021

Third Semester

Chemistry — Core

SCIENTIFIC - RESEARCH METHODOLOGY

(For those who joined in July 2017 onwards)

Time : Three hours

Maximum : 75 marks

PART A — (10 × 1 = 10 marks)

Answer ALL questions.

Choose the correct answers :

1. Which is not a primary source?
 - (a) monographs
 - (b) treatises
 - (c) patent
 - (d) none of the above

2. Merriam define the review of literature is
- (a) An interpretation and synthesis of published work
 - (b) Interpretation only
 - (c) Explanation of research work
 - (d) Report of research work
3. The contents of chemical abstract are
- (a) Title of the document
 - (b) Author's name
 - (c) Source information
 - (d) All the above
4. Which is not in the volume and collective indexes?
- (a) Author
 - (b) Keyword
 - (c) Molecular formula
 - (d) Patent
5. Which is not an element of scientific report?
- (a) Abstract
 - (b) Result and discussion
 - (c) References
 - (d) Patent

6. CASSI expands into
- (a) Chemical Abstracts Service Source Index
 - (b) Chemical Authers Service Source Index
 - (c) Chemical Abstracts Service Source Identification
 - (d) Chemical Abstracts Service Source Index
7. The spectral range of IR ban is _____ cm^{-1} .
- (a) 200–2000
 - (b) 300–3000
 - (c) 400–4000
 - (d) 100–1000
8. The confidence limit is given as : confidence limit = $x \pm ts\sqrt{N}$, where t is
- (a) statistical weigtage factor
 - (b) number of tests
 - (c) limit
 - (d) number of data
9. ChemPort is a linking technology developed by
- (a) biological abstract service
 - (b) physical abstract service
 - (c) chemical abstract service
 - (d) all the above

10. The _____ of an academic journal is a measure of reflecting the yearly average number of citations to recent articles published in a journal.
- (a) Notational factor (b) Correlation factor
(c) Impact factor (d) All the above

PART B — (5 × 5 = 25 marks)

Answer ALL questions, choosing either (a) or (b).

Each answer should not exceed 250 words.

11. (a) Explain the sources of chemical information.

Or

- (b) Discuss about monographs and patents.

12. (a) Write the uses of CAS.

Or

- (b) State and explain collective index and patent index.

13. (a) Give the differences between the qualitative and quantitative research problems.

Or

- (b) Write the steps to publishing a scientific article in a journal.

14. (a) Give the principle and sample preparation of SEM analysis.

Or

- (b) Explain the systematic errors.

15. (a) How to submit a research article through online?

Or

- (b) Write a project proposal to receive the funds from the funding agencies.

PART C — (5 × 8 = 40 marks)

Answer ALL questions, choosing either (a) or (b).

Each answer should not exceed 600 words.

16. (a) Explain the following :
- (i) Technology index and
 - (ii) Science citation index.

Or

- (b) Discuss the following :

- (i) Treatises and
- (ii) Reviews.

17. (a) Explain the steps involved in the CAS.

Or

- (b) Write about the ZETOC.

18. (a) Give the responsibility for supervisors.

Or

(b) How will you write a research report?

19. (a) Discuss about the characterization of sample by AFM and XRD analysis.

Or

(b) Write the following :

t – test and Q – test.

20. (a) What are the search engines will be used for locating information and chemical data base?

Or

(b) Explain briefly about the instruction to the authors.

(6 pages)

Reg. No. :

Code No. : 6529

Sub. Code : ZCHE 11

M.Sc. (CBCS) DEGREE EXAMINATION,
NOVEMBER 2021

First Semester

Chemistry

Elective – GREEN CHEMISTRY – TECHNIQUES AND
APPLICATIONS

(For those who joined in July 2021 onwards)

Time : Three hours

Maximum : 75 marks

PART A — (10 × 1 = 10 marks)

Answer ALL questions.

Choose the correct answer :

1. Green chemistry also called
 - (a) Life chemistry
 - (b) Environmental chemistry
 - (c) Organic chemistry
 - (d) Sustainable chemistry

2. One of the principles of green chemistry says that to produce _____ goods.
- (a) Harmful
 - (b) Commercial
 - (c) Safer
 - (d) Most used
3. Which one of the following is used as Phase-transfer catalyst?
- (a) primary amine
 - (b) quaternary ammonium salt
 - (c) tertiary amine
 - (d) secondary amine
4. Which of these enzymes are not proteinaceous?
- (a) Kinases
 - (b) Endonucleases
 - (c) Ligases
 - (d) Ribozymes
5. The _____ reactions involves reorganisation of the atoms of the molecules.
- (a) Addition reactions
 - (b) Rearrangement reactions
 - (c) Reorganised reactions
 - (d) Elimination reactions

6. The following is often referred to as the universal solvent and is a preferred green solvent
- (a) Water (b) Methanol
(c) Ethyl Acetate (d) Benzene
7. _____ is the fundamental advantage of the sono chemistry in organic synthesis without solvents.
- (a) High yields
(b) High energy requirements
(c) Use of solvents
(d) High wastes
8. Green chemistry synthesis could involve which of the following?
- (a) High temperature
(b) Dichloromethane
(c) Fossil fuels
(d) Microwave
9. Which of the following converts energy from the combustion of fuel directly to the electrical energy?
- (a) Ni-Cd cell
(b) Dynamo
(c) Fuel cell
(d) Electrolytic cell

10. Which of the following is continuously replaced in a fuel cell?
- (a) Oxidiser
 - (b) Fuel
 - (c) Both fuel and oxidizer
 - (d) None of the above

PART B — (5 × 5 = 25 marks)

Answer ALL questions, choosing either (a) or (b).

Each answer should not exceed 250 words.

11. (a) Explain waste minimization and atom economy.

Or

- (b) Explain reduction of non-renewable raw materials usage.

12. (a) Discuss the microbial production of ethyl alcohol.

Or

- (b) Explain the importance of phase transfer catalysis.

13. (a) Explain the role of solvents in synthesis.

Or

(b) Discuss about the tunable solvent systems.

14. (a) What are photochemical reactions? Give example.

Or

(b) Explain photochemical ring closure of dienes.

15. (a) What is renewable energy? Explain types of renewable energy resources.

Or

(b) What are solar cells? Explain basic principle of solar cells. What are their applications?

PART C — (5 × 8 = 40 marks)

Answer ALL questions, choosing either (a) or (b).

Each answer should not exceed 600 words.

16. (a) Discuss the process intensification.

Or

(b) Explain the energy efficient improvements.

17. (a) Explain the use of crown ethers in organic synthesis.

Or

- (b) Explain the role of enzymes as catalysts.

18. (a) What are ionic liquids? Explain their uses and disadvantages.

Or

- (b) Explain the significance of super critical carbon dioxide.

19. (a) What are photoreduction reactions? Give example and mechanism.

Or

- (b) Explain use of Microwaves in green chemistry. Discuss merits and demerits of microwaves in green chemistry.

20. (a) What are Fuel cells? What are the types of Fuel cells? Explain their applications.

Or

- (b) What are Biofuel cells? How does biofuel cell function? Explain their applications.

(6 pages)

Reg. No. :

Code No.: 6530

Sub. Code: ZCHE 12

M.Sc (CBCS) DEGREE EXAMINATION,
NOVEMBER 2021

First Semester

Chemistry

Elective - CHEMISTRY OF INDUSTRIAL PRODUCTS
AND FORMULATION

(For those who joined in July 2021 onwards)

Time : Three hours

Maximum : 75 marks

PART A — (10 × 1 = 10 marks)

Answer ALL questions.

Choose the correct answer:

1. Which of the following is not a vehicle in paints?
(a) Linseed oil (b) Tung oil
(c) Poppy oil (d) Turpentine oil
2. Which type of varnish is used on hardwood substance to hide grain defect?
(a) Wax polish (b) asphalt polish
(c) Flat varnish (d) French Polish

3. Classification of cosmetic based on physical form.
- (a) Emulsion
 - (b) Powder
 - (c) Jellies
 - (d) All the three
4. Zinc pyrithine in shampoo is used as, _____.
- (a) Conditioner
 - (b) Cleansing
 - (c) Antidandruff agent
 - (d) Detergent
5. _____ is a process whereby the pulp is separated from large shives, knots, etc.
- (a) Shredding
 - (b) Cutting
 - (c) Picking
 - (d) Screening
6. Which process is used to treat all types of wood for pulping process?
- (a) Mechanical pulping
 - (b) Kraft process
 - (c) Chemical mechanical pulping
 - (d) All

7. Butter milk is a fluid product resulting from the manufacture of _____.
- (a) Butter
 - (b) Cheese
 - (c) Yogurt
 - (d) Ice cream
8. Energy value of a food is measured in terms of _____.
- (a) Carbohydrates
 - (b) Fats
 - (c) Proteins
 - (d) Calories
9. The fibers from petroleum are known as
- (a) Dirty fibers
 - (b) Synthetic fibers
 - (c) Artificial fibers
 - (d) Natural fibers
10. What fabric is made with the fibers of flax plant?
- (a) Linen
 - (b) Silk
 - (c) Polyester
 - (d) Cotton

PART B — (5 × 5 = 25 marks)

Answer ALL questions, choosing either (a) or (b).

Each answer should not exceed 250 words.

11. (a) Write a note on general characteristics of pigments.

Or

- (b) Give a short note on luminous paints.

12. (a) Define cosmetics and its classifications.

Or

- (b) Write a note on the formulation of dentifrices.

13. (a) Give a note on the raw materials used for paper production.

Or

- (b) Explain briefly about paper making.

14. (a) Define milk and explain its composition.

Or

- (b) Write a note on the advantages of sterilized milk.

15. (a) Give a brief note on viscose rayon.

Or

(b) Explain about the plasma treatment involved in the enhancement of textile fiber properties.

PART C — (5 × 8 = 40 marks)

Answer ALL questions, choosing either (a) or (b)

Each answer should not exceed 600 words.

16. (a) Give a detailed note on the types of pigments.

Or

(b) Explain oil and alkyd paints in detail.

17. (a) Explain additives and its role in cosmetics in detail.

Or

(b) Give a detailed note on the formulation of cosmetic and medicated soaps.

18. (a) Write a detailed note on pulp manufacturing.

Or

(b) What is paper? Explain their properties in detail.

19. (a) Write a detailed note on methods involved in milk processing.

Or

- (b) Give a detailed note on the various milk products produced.

20. (a) Account on textile fibers and its classifications.

Or

- (b) Write a detailed note on the various treatments used in the enhancement of fiber properties.
-

(6 pages)

Reg. No. :

Code No.: 6531

Sub. Code: ZCHE 13

M.Sc (CBCS) DEGREE EXAMINATION,
NOVEMBER 2021

First Semester

Chemistry

Elective-FORENSIC CHEMISTRY

(For those who joined in July 2021 onwards)

Time : Three hours

Maximum : 75 marks

PART A — (10 × 1 = 10 marks)

Answer ALL questions.

Choose the correct answer:

1. Which system is intrusive to someone's medical privacy?
 - (a) Iris scanner
 - (b) Voice analysis
 - (c) Fingerprint
 - (d) Retina scanner

2. _____ are the components of face recognition.
 - (a) Enrollment module
 - (b) Database
 - (c) Identification module
 - (d) All the above

3. Finger prints dissolved in _____ only glow back with scars on them making them unique.
- (a) Acid
 - (b) Water
 - (c) Base
 - (d) All the above
4. At what age does human beings acquire finger prints
- (a) At 3 weeks of age
 - (b) At 8 months gestation
 - (c) After birth
 - (d) At 3 months gestation
5. The most suitable solvent system for TLC of inks is
- (a) N-butanol: pyridine: water
 - (b) Amyl alcohol: acetic acid: pyridine
 - (c) Ethanol: acetone: acetic acid
 - (d) None of the above
6. Chemical etching is a method for restoration of erased marks on
- (a) Wood
 - (b) Leather
 - (c) Metal
 - (d) Plastic

7. The brick red color of post mortem lividity is seen is poisoning due to
- (a) Carbon monoxide
 - (b) Hydrogen sulphide
 - (c) Phosphrous
 - (d) Cyanide
8. Color of blood is cherry due to
- (a) Hydrogen sulphide
 - (b) Methane
 - (c) Carbon monoxide
 - (d) Carbon tetrachloride
9. DNA fingerprint was developed by
- (a) Francis crick
 - (b) Khorana
 - (c) Alec Jeffery
 - (d) James Watson
10. A paint database can help identify the year, make and color of a motor vehicle form a chip paint left at the scene CH₃
- (a) True
 - (b) False
 - (c) Not correct
 - (d) None

PART B — (5 × 5 = 25 marks)

Answer ALL questions, choosing either (a) or (b).
Each answer should not exceed 250 words.

11. (a) Write a note on the concepts of biometric authentication.

Or

- (b) Write a short note on hand geometry.

12. (a) Write a brief note on finger printing system.

Or

- (b) State and explain the chemical test methods in finger print detection.

13. (a) Write a note on analysis of marijuana drug.

Or

- (b) Write about the TLC method involved in the analysis of ink and paper in forensic.

14. (a) Give a note on forensic toxicology.

Or

- (b) Discuss about DNA fingerprinting briefly.

15. (a) Write a short notes on uses of computer in forensic sciences.

Or

- (b) Write about the computer related crimes and its types.

PART C — (5 × 8 = 40 marks)

Answer ALL questions, choosing either (a) or (b)
Each answer should not exceed 600 words.

16. (a) Define forensic science and give a detailed note on the role of forensic laboratory.

Or

- (b) Write a detailed note on techniques and technologies used in person identification.

17. (a) Write a note on the optical methods involved in finger print detection.

Or

- (b) State and explain testing of saliva in forensic serology and blood stain patterns.

18. (a) How does GHB and GBL analyzed? Explain in detail.

Or

- (b) Write a note on the physical and chemical analysis involved in forensic analysis of inks and paper.

19. (a) Give a detailed note on the analytical methods in forensic toxicology.

Or

- (b) Write a detailed note on the application of DNA testing.

20. (a) Write a detailed note on the uses of computer in forensic science.

Or

(b) Discuss about the computer related crime.

(7 pages)

Reg. No. :

Code No.: 6526

Sub. Code: ZCHM11

M.Sc. (CBCS) DEGREE EXAMINATION,
NOVEMBER 2021

First Semester

Chemistry - Core

AROMATICITY AND ORGANIC REACTION
MECHANISM

(For those who joined in July 2021 onwards)

Time : Three hours

Maximum : 75 marks

PART A — (10 × 1 = 10 marks)

Answer ALL questions.

Choose the correct answer:

1. Which of the following is a characteristic of an aromatic compound?
(a) Cyclic (b) Planar
(c) $(4n+2)\pi$ electrons (d) All of the above

2. Which of the following is not a characteristic property of arenes?
- (a) Delocalisation of π -electrons
 - (b) Resonance
 - (c) Greater stability
 - (d) Electrophilic additions
3. The number of transition states in a two step reaction is _____.
- (a) None
 - (b) 1
 - (c) 2
 - (d) 4
4. Which pair of isotopes are likely to result in the greatest isotope effect?
- (a) Carbon-12 and carbon-14
 - (b) Carbon-12 and carbon-13
 - (c) Hydrogen and deuterium
 - (d) Nitrogen-14 and nitrogen-15
5. Which types of isomers are formed in rearrangement reactions?
- (a) Structural isomers
 - (b) Geometrical isomers
 - (c) Optical isomer
 - (d) Conformational isomers

6. What is the main difference between Hofmann and Curtius rearrangement?
- (a) Products are different
 - (b) Intermediate formed is different
 - (c) Reactants are different
 - (d) Isomers
7. Which of the following statements regarding the E1 mechanism is wrong?
- (a) Reactions by the E1 mechanism are unimolecular in the rate-determining step.
 - (b) Reactions by the E1 mechanism are generally first order.
 - (c) Reactions by the E1 mechanism usually occur in one step.
 - (d) Reactions by the E1 mechanism are multi-step reactions.
8. Which of the following statements regarding the E2 mechanism is wrong?
- (a) Reactions by the E2 mechanism are always bimolecular.
 - (b) Reactions by the E2 mechanism are generally second order.
 - (c) Reactions by the E2 mechanism usually occur in one step.
 - (d) Reactions by the E2 mechanism usually occur in two steps.

9. The compound below that would react fastest in a nucleophilic aromatic substitution reaction is
- (a) p-nitrobromobenzene
 - (b) m-nitrobromobenzene
 - (c) 2,4-dinitrobromobenzene
 - (d) 3,4-dinitrobromobenzene
10. Using the benzyne mechanism for substitution of m-chlorotoluene by NaNH_2 , the possible products are
- (a) o-methylaniline (b) m-methylaniline
 - (c) p-methylaniline (d) All of the above

PART B — (5 × 5 = 25 marks)

Answer ALL questions, choosing either (a) or (b).

Each answer should not exceed 250 words.

11. (a) What are the differences between benzenoid and non-benzenoid compounds?

Or

- (b) Explain delocalization and resonance.

12. (a) Explain Hammond postulates.

Or

(b) Explain principle of microscopic reversibility.

13. (a) What is Wolff rearrangement? Explain the mechanism of Wolff rearrangement.

Or

(b) What is Schmidt rearrangement? Explain the mechanism of Schmidt rearrangement.

14. (a) Explain the mechanism of S_N1 reaction with an example.

Or

(b) Explain the mechanism of S_N2 reaction with an example.

15. (a) Explain benzyne mechanism with example.

Or

(b) What is Bucherer Reaction? Explain the mechanism of Bucherer Reaction.

PART C — (5 × 8 = 40 marks)

Answer ALL questions, choosing either (a) or (b)

Each answer should not exceed 600 words.

16. (a) What is Frost Musulin diagram? How does aromaticity affect the NMR spectra?

Or

- (b) Explain aromaticity of annulenes and heteroannulenes. Explain Anternant and nonalternant hydrocarbons.

17. (a) Explain primary and secondary kinetic isotopic effects.

Or

- (b) Explain the significance of Hammett equation.

18. (a) What is Beckmann rearrangement? Explain the mechanism of Beckmann rearrangement. Mention the applications of Beckmann rearrangement.

Or

- (b) What is Hoffmann rearrangement? Explain the mechanism of Hoffmann rearrangement. Mention the applications of Hoffmann rearrangement.

19. (a) Explain the mechanism of S_Ni reaction with an example.

Or

- (b) Write the mechanism of E1CB reaction with example. Compare Hoffmann elimination and Saytzeff elimination reactions.
20. (a) What is Smiles rearrangement? Discuss the mechanism of Smiles rearrangement.

Or

- (b) What is Mannich reaction? Write the mechanism of Mannich reaction.
-

(6 pages)

Reg. No. :

Code No. : 6527

Sub. Code : ZCHM 12

M. Sc (CBCS) DEGREE EXAMINATION,

NOVEMBER 2021

First Semester

Chemistry - Core

FUNDAMENTALS OF INORGANIC CHEMISTRY
NUCLEAR CHEMISTRY AND INORGANIC
POLYMERS.

(For those who joined in July 2021 onwards)

Time : Three hours

Maximum : 75 marks

PART A — (10 × 1 = 10 marks)

Answer ALL questions.

Choose the correct answer :

1. How many periods and groups are present in the modern periodic table?
(a) 7 periods, 18 groups (b) 8 periods, 7 groups
(c) 7 periods, 7 groups (d) 8 periods, 8 groups

6. As per Lewis concept, a molecule in which the central atom has an incomplete octet is
- (a) Base (b) acid
(c) Alkali (d) neutral solvent
7. The source of stellar energy is
- (a) Nuclear fission (b) nuclear fusion
(c) Nuclear decay (d) None
8. Who was the first person to win two nobel prices?
- (a) Ernest Rutherford (b) Henri Becquerel
(c) Marie Curie (d) Rosalind
9. Which of the following is an inorganic polymer?
- (a) teflon (b) perspex
(c) Silicones (d) bakelite
10. Pick out the wrong statement?
- (a) Protein is a natural polymer
(b) Neoprene is natural rubber
(c) Polystyrene is thermoplastic
(d) polythene is copolymer.

PART B — (5 × 5 = 25 marks)

Answer ALL questions, choosing either (a) or (b).

Each answer should not exceed 250 words.

11. (a) State and explain electron affinity and electronegativity.

Or

- (b) Write about ion-dipole forces.

12. (a) State concepts of VB theory.

Or

- (b) Describe the s-s and p-p overlapping.

13. (a) State and explain Lewis acid and bases.

Or

- (b) What are protic and aprotic solvents? Give examples also.

14. (a) Discuss the nuclear fission and fusion reaction with example.

Or

- (b) State and explain nuclear transmutation reactions.

15. (a) Explain the following with example catenation and hetrocatenation.

Or

- (b) Explain polyatomic anions.

PART C — (5 × 8 = 40 marks)

Answer ALL questions, choosing either (a) or (b)

Each answer should not exceed 600 words.

16. (a) Write a note on slater rules explain them in detail.

Or

- (b) Discuss the factors which affecting the redox potentials.

17. (a) State VSEPR theory and write their postulates.

Or

- (b) Explain Walsh diagrams.

18. (a) Discuss the solvation effects and acid base anomalies in detail.

Or

- (b) Explain the general characteristics of solvents.

19. (a) Write about atomic power projects in India.

Or

(b) What are radioisotopes? Write a note on radiometric titration's.

20. (a) What are polyacids? Write in detail.

Or

(b) Discuss about the poly atomic zintl ions.

(6 pages)

Reg. No. :

Code No. : 6528

Sub. Code : ZCHM 13

M.Sc. (CBCS) DEGREE EXAMINATION,
NOVEMBER 2021

First Semester

Chemistry — Core

QUANTUM MECHANICS AND SPECTROSCOPY — I

(For those who joined in July 2021 onwards)

Time : Three hours

Maximum : 75 marks

PART A — (10 × 1 = 10 marks)

Answer ALL questions.

Choose the correct answer :

1. Hamiltonian is an operator for
 - (a) Energy
 - (b) Momentum
 - (c) Time
 - (d) Eigen value

2. If two operators commute, then
- (a) they are linear
 - (b) they are Hermitian
 - (c) they have the same eigen values
 - (d) they have the same eigen functions
3. What is the degeneracy of particle in 3D box when $E=6h^2/8m\alpha^2$
- (a) 1
 - (b) 2
 - (c) 3
 - (d) 4
4. The l value of valence electron of K is
- (a) 0
 - (b) 1
 - (c) 2
 - (d) 3
5. In ethylene molecule total π -electron energy is equal to
- (a) 2α
 - (b) 2β
 - (c) $2(\alpha+\beta)$
 - (d) 0
6. The Pauli's exclusion principle states that two electrons in the same orbitals have
- (a) same spins
 - (b) different spins
 - (c) opposite spins
 - (d) vertical spins

7. Which is spherical top molecule?
- (a) CH_4 (b) H_2O
(c) CH_3OH (d) $\text{C}_2\text{H}_5\text{OH}$
8. What happens to Doppler broadening of a spectral line when the r.m.s. speeds of the atoms in the light sources increases?
- (a) Spectral width does not change
(b) Spectral width increases
(c) Spectral width decreases
(d) Overall spectrum shifts without changing the width
9. The selection rule for observing the rotational Raman spectra is
- (a) $\Delta J = \pm 1$ (b) $\Delta J = \pm 2$
(c) $\Delta J = 0$ (d) $\Delta J = \pm 3$
10. The elastic scattering of photons is called as
- (a) Atmospheric scattering
(b) Rayleigh scattering
(c) Conserved scattering
(d) Raman scattering

PART B — (5 × 5 = 25 marks)

Answer ALL questions, choosing either (a) or (b).

Each answer should not exceed 250 words.

11. (a) Explain Orthogonality and normalization wave functions.

Or

- (b) Discuss about the Hamiltonian operator.

12. (a) What are Radial Distribution functions? Write the radial distribution functions of various orbitals.

Or

- (b) Discuss solution of schrodinger wave equation for hydrogen atom.

13. (a) State and explain Pauli exclusion principle.

Or

- (b) Discuss about the variation methods.

14. (a) Explain signal to noise ratio in spectroscopy.

Or

- (b) Discuss the effect of isotopic substitution on a rigid rotor diatomic molecule.

15. (a) Discuss Rayleigh scattering and Raman scattering.

Or

- (b) Discuss the energy levels of diatomic molecules as simple harmonic oscillator.

PART C — (5 × 8 = 40 marks)

Answer ALL questions, choosing either (a) or (b).

Each answer should not exceed 600 words.

16. (a) Describe the time independent Schrodinger wave Equation.

Or

- (b) State and explain the postulates of quantum mechanics.

17. (a) Derive the schrodinger wave equation for a particle in a three-dimensional box. Write the solution of energy and wave function.

Or

- (b) Discuss the solution of Schrodinger Wave Equation for Rigid Rotator.

18. (a) Apply the Hückel molecular theory to 1,3-butadiene molecule.

Or

- (b) Explain the LCAO method for hydrogen molecule ion.

19. (a) Discuss the rotational spectra of rotors symmetric top polyatomic molecules.

Or

- (b) Write in detail about the doppler broadening of spectral lines.

20. (a) Discuss the applications of IR spectroscopy.

Or

- (b) Write the applications of Raman Spectroscopy.
