

17-112-1MOD

ABIA STATE UNIVERSITY
FACULTY OF PHYSICAL SCIENCES
DEPARTMENT OF PURE AND INDUSTRIAL CHEMISTRY
SECOND SEMESTER EXAM. 2022/2023
CHE 102 : GENERAL CHEMISTRY II

INSTRUCTION; ANSWER 6 QUESTIONS IN ALL, ATLEAST TWO QUESTIONS FROM EACH SECTION

SECTION A:

✓ 1a. Explain in 15-20 lines why we study organic chemistry, stating their applications in pharmaceuticals, medicine, food, plastic and paint industries. [8mks]

✓ 1b. Carbon compounds and their derivatives are widespread in Nature and their uses vast. Based on these, state six functional groups and give one example in each case [9.5mks]

✓ 2. Define the following terms and terminologies and the basis for each phenomenon. Give and example in each case

i. Catenation

ii. Topological isomers

iii. Conformational isomers

iv. Optical isomers

v. Geometrical isomer [17.5mks]

COMP. SIR J.K

SECTION B

4a. mention the two methods of bond fission and the products of such fission [5mks]

4b. Arrange the following in order of increasing -ve inductive effect

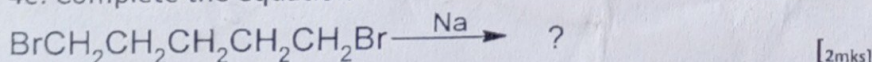
F^- , $^-OCH_3$, NO_2 , C_2H_5 , Br^- [3mks]

4c. Arrange the following in order of increasing +ve inductive effect

CH_3C^+ , CH_3^+ , $CH_3CH_2^+$, $(CH_3)_2CH$, H^+ [3mks]

4d Explain why benzoic acid ($Pka=4.2$) is more stronger acid than ethanoic acid ($Pka=4.8$) [5mks]

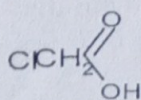
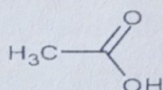
4e. Complete the equation



5. Explain the reason for the following observations

(i) NH_3 CH_3NH_2 $(CH_3)_2NH$
 $Pkb=4.75$ $Pkb=3.36$ $pkb=3.23$ [5mks]

(ii)

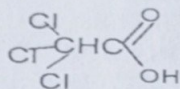
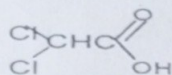


Electron withdrawing group (EWG)

COMR. SIR JK

10 Ka= 1.75

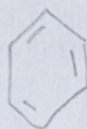
155



[5mks]

5100

120000



5c Write out the canonical structure of benzene

6a. Define resonance energy [3mks]

6b. Explain why allyl cation is more stable than the propyl cation [5mks]

6c. Define an acid and a base in terms of reagents [8mks]

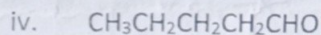
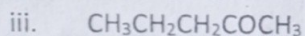
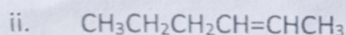
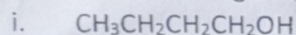
6d. Write out the canonical structures of CO [2mks]

SECTION C

7a. Write the structural formula and give IUPAC names for all aldehydes and ketones of the molecular formula $C_5H_{10}O$ [5mks]

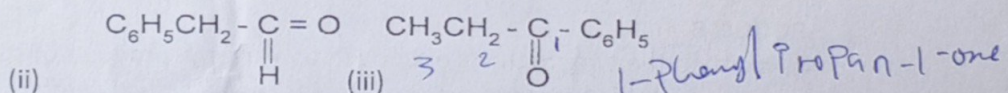
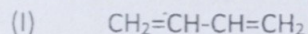
b. State Saytzeff rule [3mks]

c. Name the following compounds



D Using a chemical equation, identify the products of hydrolysis of fats and oil with alkali [4.5mks]

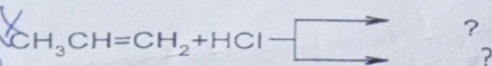
8a Give the names to the following carbonyl compounds [6mks]



8b. How can will distinguish between Primary, Secondary and Tertiary alcohol [6mks]

c. Write the structural formulas for isomeric alkenes with the formula C_5H_{10} . Name each according to IUPAC System [5 mks]

9a. Complete the equation below to illustrate (i) & (ii)

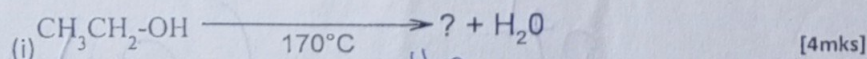


i. Markovnikov addition (ii) Anti-Markovnikov addition [4mks]

9b. Write structures of specific examples of (i) monohydric alcohol, (ii) trihydric alcohol (iii) dihydric [3mks]

C. Explain alcohols have high boiling point than alkanes of comparable molecular weight [5mks]

9d. Complete the reaction and identify the names of methods used in preparing the alkenes in (i)



COMR - SIR J.K

ABIA STATE UNIVERSITY, UTURU
FACULTY OF BIOLOGICAL SCIENCES
SECOND SEMESTER EXAMINATIONS 2022/2023 SESSION
BIO 102: Introductory Biology II
(SECTION B)

Instructions: Answer questions i---x (Give answers only)

_____ i _____ governs the nomenclature of and classification of plants.

The system that uses two different terms to name plants is known as _____ ii _____

A group of individuals having a very close resemblance with one another both structurally and functionally is called _____ iii _____

The main characteristic feature of gymnosperms is _____ iv _____

_____ v _____ transports water and minerals in angiosperms

Plant reproductive strategy which involves seed formation without fertilization is _____ vi _____

A permanent increase in size, mass or weight of an organism accompanied by irreversible change in form or structure is referred to as _____ vii _____

Growth movement that occurs in response to an external stimulus which is not unidirectional but diffused is called _____ viii _____

Positive tropism occurs when the movement or growth of a plant is towards the _____ ix _____

_____ x _____ is the process by which pollen grains are transferred from the anther to the stigma of the same flower or a different flower on the same plant

Instructions: Answer any two questions

1a. Explain the concept of alternation of generations in plants, detailing the phases involved (Hint: Diagram is necessary)

b. List any five methods of natural method of vegetative propagation in plants

2. What do you understand by the following terms?

- (a.) Photonasty (b.) Geotropism (c.) Hydrotropism (d.) Thigmotropism
(e.) Chemotropism (f.) Seismonasty

3a. Define the term Nomenclature.

b. State five (5) purposes of plant taxonomy.

c. Write the scientific name of any five plants including their common names

ABIA STATE UNIVERSITY UTURU
FACULTY OF BIOLOGICAL SCIENCES
SECOND SEMESTER EXAMINATION 2022/2023 SESSION
BIO 102: INTRODUCTORY BIOLOGY II

Answer objective questions (i to x) and any other two questions from this section

(i) ----- helps in the coagulation of protein. (ii) The hinge joint is also known as ----- (iii) Pepsinogen converts protein to----- (iv) Urea, salt, and excess water are the excretory products from the----- (v) The period of inactivity due to drought is termed (vi) Glands that release their secretion into ducts or tubes are called-----? (vii) Lizards and snakes belong to the order----- (viii) -----is the process of feather replacement. (ix) Eggs that hatch outside the mother's body are said to be----- (x) ----- were the first vertebrates with mineralized

COMR. SIR JK

THEORY ATTEMPT ANY TWO QUESTIONS

- 1a. List and explain any three functions of the air bladder in fishes. 1b. Outline any three factors that influence migration in fishes.
- 2a. Define a joint. (b) List and explain any three types of joints you know.
3. Using a labelled diagram, concisely describe any Cephalochordate you have studied.

ATONNE PRECIOUS

ABIA STATE UNIVERSITY UTURU
DEPARTMENT OF PHYSICS

SECOND SEMESTER EXAMINATION 2022/2023 SESSION.

PHY 104: OPTICS, WAVES AND THERMAL PHYSICS. TIME Allowed: 2 HOURS

SECTION ONE:)

INSTRUCTION: **SECTION ONE:** answer from nos 1-7 and any other two from 8-10.
(30 marks)

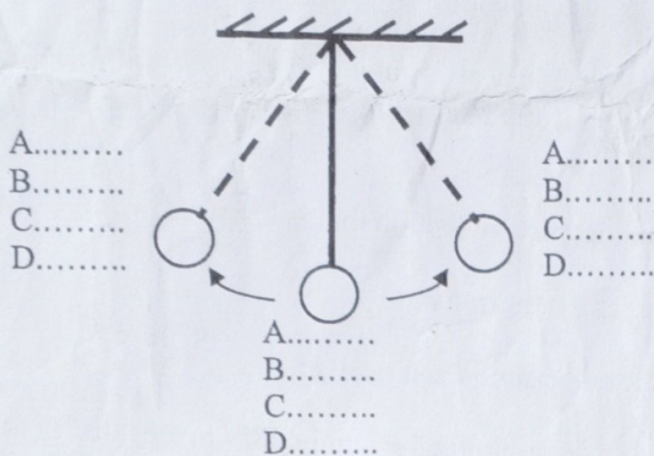
- 1 Consider a ray of light in air that is incident at an angle of 42° on the boundary with water. Determine the angle of refraction if the relative refractive index of air to water is 0.75 (2 MRKS)
- 2 List out any three applications of total internal reflection that is known to you. (3 MRKS)
- 3 State any one law of geometrical optics that is known to you. (1 MRKS)
- 4 Write out any one factor that can affect aberration and explain. (1 MRKS)
- 5 Write out the expression that is used in determining the number of images that is formed by a plane mirror. (1 MRKS)
COMPR. SIR JK
- 6 Determine the value of glancing angle if the deviation in a plane mirror is 75° . (2 MRKS)
- 7 A man 2m 50cm tall stands a distance of 3m in front of a large vertical plane mirror. Find the size of the image of the man that is formed by the mirror. (6 MRKS)
- 8 Two thin lenses of focal lengths 5cm and 10cm respectively are in contact. (a) Determine the value of the combined focal length, F. (3 MRKS) (b) if the two lenses in (a) above are separated by a distance of 7.5cm, determine the effective focal length. (2 MRKS)
- 9 a) A man use a concave mirror as a shaving mirror. If the magnification of 4 is obtained when the man stands one metre in front of the mirror, a) find the radius of curvature of the mirror. b) The difference between the apparent and the real depth of a swimming pool filled with water is 5m. calculate the depth of the swimming pool if the refractive index of water is 33. c) A prism has a refracting angle of 60° , if the refractive index of the material is 5 calculate the angle of minimum deviation. (6 MRKS)
- 10 A monochromatic beam of light illuminates Young's experiment producing a fringe pattern with 5mm separation between consecutive bright bands. If the distance between the plane containing the slits and the plane of observation is 20m and if the two slits are separated by 2mm, find the wavelength of the light. (3 MRKS)

SECTION TWO: ANSWER ALL

- 1 a) Define the following wave characteristics a) intensity b) loudness c) timbre d) pitch (2 MRKS)
- b) A governor's siren has a frequency of 900Hz. Assume the velocity of sound in air to be 346m/s, find the frequencies that are heard by drivers of vehicles moving at a velocity of 20m/s (i) towards the siren (ii) away from the siren. (4 MRKS)

COMR. SIR J.K

- c) Determine the 3rd overtone if the fundamental frequency of a closed pipe is 50Hz. (3 MRKS)
- d) what happened at the various position of a Simple Harmonic Oscillation as shown below.



(3 MRKS)

- 2 a) Radio Nigeria transmits music on a wavelength of 1500 metres and a frequency of 200kHz. i) Calculate the velocity of the radio waves that carry the music. ii) Determine also the frequency of the local programme transmitted on a wavelength of 330m. (3 MRKS)
- b) An elastic wave on a string has an amplitude of 4.0 cm, a wavelength of 2.4cm, and a velocity of 12 ms⁻¹ in the positive x-direction. At t=0, and a crest at x=0. i) what is the mathematical equation describing the wave as a function of x and t. ii) determine the period, frequency, angular frequency, and wave number of this wave. (5 MRKS)

SESSION THREE

INSTRUCTION: ANSWER ONE QUESTION FROM THIS SECTION

- 1 a. Define diverging and converging lens and state one clear difference between them. 3marks
- b. State any three (3) formulas, expressions and rules used in solving convex and concave lenses problems. 5marks
- c. An object placed 50cm away from the focus of an emerging lens of focal length 15cm, produces a focused image on a screen. Calculate the distance between the object and the screen. 5marks
- d. i. A converging lens of focal length 5cm is used as a magnifying glass by a man whose near point is 35cm. calculate the magnification given by the lens. 5marks
- ii. State two (2) applications of light waves. 2marks
- 2a. Define Oscillation, state clear the difference between Damped harmonic oscillation, over damping, critical damping and underdamping. 5marks
- bi. State the equation of motion for damped harmonic oscillation. 2marks
- ii. Using illustration, explain coupled oscillators. 3marks
- c. Define wave energy and state the merits and demerits of wave energy. 5marks
- d. define wave power and state the formula for wave power (explain all relevant terms) 5 marks

GOOD LUCK AND HAPPY EASTER IN ADVANCE