

Seat No.	
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M.Phil./Ph.D. Entrance Examination, September - 2022

**CHEMISTRY/APPLIED CHEMISTRY/INDUSTRIAL
CHEMISTRY**

Sub. Code : 58806

Day and Date : Thursday, 22-09-2022

Total Marks : 100

Time : 1.00 p.m. to 3.00 p.m.

- Instructions :**
- 1) All questions are compulsory.
 - 2) Each question carries 2 marks.
 - 3) Answers should be marked in the given OMR answer sheet by darkening the appropriate option.
 - 4) Use black ball point pen only for marking the cricle. Do not make any stray mark on the OMR Answer sheet.
 - 5) Follow the instructions given on OMR Sheet.
 - 6) Rough work shall be done on the sheet provided at the end of question paper.
 - 7) Only non-programmable calculators are allowed.

SECTION-I

- 1) Many journals and editors encourage to use_____ voice because it is less verbose and unambiguous.
A) Simple
B) Complex
C) Active
D) Passive
- 2) Abstract should be ~_____ words, stand alone and representative of the work.
A) 150
B) 200
C) 300
D) one page
- 3) Punishment for copyright violation is_____.
A) 3 years and 3 lakhs
B) 1 year and 1 lakh
C) 5 years and 5 lakhs
D) 3 years and 5 lakhs

P.T.O.

- 4) Which of the following is an example of a nonverbal message?
 - A) Mumbling
 - B) Yelling
 - C) Jargon
 - D) Eye contact
- 5) Which of the three components are parts of human communication process?
 - A) Feedback, message, critiquing
 - B) Message, recording, feedback
 - C) Message, noise, feedback
 - D) Noise, feedback, jargon
- 6) What is Bibliometry?
 - A) Function of Library Network
 - B) Information Management Service
 - C) Information Management Tool
 - D) Library Service
- 7) In the communication process, a receiver is
 - A) A message pathway
 - B) The person who decodes a message
 - C) Message interference
 - D) The person who encodes an idea
- 8) A researcher divides the populations into PG, graduates and 10+2 students and using the random digit table, he/she selects some of them from each. This is technically called
 - A) Stratified sampling
 - B) Stratified random sampling
 - C) Representative sampling
 - D) None of these

- 9) The purpose of research is:
- A) To produce work of publishable quality.
 - B) That the empirical work should be testing a theory.
 - C) Primarily to get more data.
 - D) To extend the conceptual understanding of a topic.
- 10) Learning to communicate with others is key to
- A) Never being misunderstood.
 - B) Eliminating all of your listeners' physiological noise
 - C) Establishing rewarding relationship.
 - D) Winning the approval of everyone around you
- 11) CAS refers to an organization under the ACS which is a source of...
- A) Chemical information
 - B) Physical information
 - C) Abstracts and indexes
 - D) Both (A) and (C)
- 12) Formulation of the research problem and literature review are the most key points of_____
- A) Research design
 - B) Research process
 - C) Research review
 - D) All of these
- 13) When academician is called to deliver lecture to an audience on certain topic of education nature, it is called_____
- A) Training program
 - B) Seminar
 - C) Workshop
 - D) Symposium

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- 14) Which of the following is an initial mandatory requirement for pursuing research?
- A) Developing a research design
 - B) Formulating research questions
 - C) Deciding about the data analysis
 - D) Formulating a research hypothesis
- 15) Silicon single crystal prepared by Czocharski method; the temperature of melt held just_____
- A) Below melting point
 - B) Above melting point
 - C) Near melting point
 - D) No consideration of melting point
- 16) Bridgman method of single crystal is based on_____
- A) Solution
 - B) Melt
 - C) Fluid
 - D) All of these
- 17) Hydrothermal method is used when precursors have _____ solubility in water.
- A) Higher solubility
 - B) Lower solubility
 - C) Medium solubility
 - D) None of these
- 18) The Shapiro reaction is organic reaction in which ketone or aldehyde is converted to an
- A) Alkene
 - B) Alkane
 - C) Acids
 - D) Both alkene and alkane
- 19) Lithium diisopropylamide is used in aldol condensation reaction which acts as_____
- A) Acid
 - B) Base
 - C) Neutral
 - D) None of these

- 20) The diameter of particles in colloidal system is_____
 - A) 10^{-9} to 10^{-6} m
 - B) 10^{-10} to 10^{-4} m
 - C) 10^{-12} to 10^{-9} m
 - D) 10^{-7} to 10^{-5} m
- 21) Which of the following properties of colloids do not depend on the charge of particles?
 - A) Coagulation
 - B) Electroosmosis
 - C) Electrophoresis
 - D) Tyndall effect.
- 22) X-ray fluorescence spectrometer is used to provide chemical analysis in which sample is
 - A) Intact
 - B) Sample cannot recover
 - C) Changes in state of sample
 - D) None of these
- 23) Which X ray source is used commonly in XPS
 - A) $\text{CuK}\alpha$
 - B) $\text{AlK}\alpha$
 - C) $\text{MgK}\alpha$
 - D) Both (B) and (C)
- 24) In heterogeneous photocatalysis generally which material is used as a catalyst?
 - A) Insulator
 - B) Semiconductor
 - C) Superconductor
 - D) Metal
- 25) Dynamic light scattering technique is based on the principle of_____
 - A) Absorption of light
 - B) Scattering of light
 - C) Transmission of light
 - D) Emission of light

SECTION-II

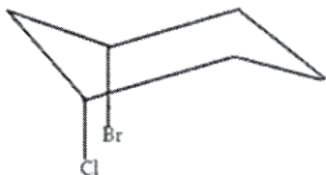
- 26) _____ of following is bottom up approach to synthesis of nanostructures.
- A) Vacuum evaporation B) Chemical bath deposition
C) Sputtering technique D) LASER ablation
- 27) Van deemter's equation is
- A) $H=A + Bu + Cu$ B) $H = A + \frac{B}{u} + Cu$
C) $H = A + B^2 + Cu$ D) $H = A + \frac{B}{u} + Cu$
- 28) The detector commonly used in liquid chromatography are ____
- A) Flame ionization detector B) Thermal conductivity detector
C) Refractive index detector D) Photodetector
- 29) In the gas chromatography of complex samples, weakly-retained solutes may be separated poorly or not at all, while strongly-retained solutes may exhibit long retention times. These problems are often solved experimentally by which of the following procedures?
- A) Increasing the diameter of the column
B) Decreasing the solid support particle size
C) Gradient elution
D) Temperature programming
- 30) Which of the following tests can be considered specific in itself for identification purposes?
- A) Thin-layer chromatography B) Mass spectrometry
C) Gas chromatography D) Electromagnetic radiation

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- 31) The isobaric interference is not caused in which of the following elements?
A) Argon
B) Oxygen
C) Helium
D) Nitrogen
- 32) The Henry's law gives the relationship between_____
A) The pressure and solubility of a gas in a particular solvent
B) The temperature and solubility of a gas in a particular solvent
C) The composition of the mixture and solubility of a gas in a particular solvent
D) None of these.
- 33) Statistical thermodynamics provide multiplicative interpretation of concept of _____
A) Entropy
B) Thermodynamics probability
C) Sum of thermodynamics probability for macrostates
D) Energy of system
- 34) The process of removing ions (or molecules) from a sol by diffusion through a permeable membrane is called
A) Ultra-filtration
B) Dialysis
C) Electrophoresis
D) Osmosis
- 35) The non-metal used in the vulcanization of rubber is_____
A) Phosphorus
B) Sulphur
C) Graphite
D) Iodine

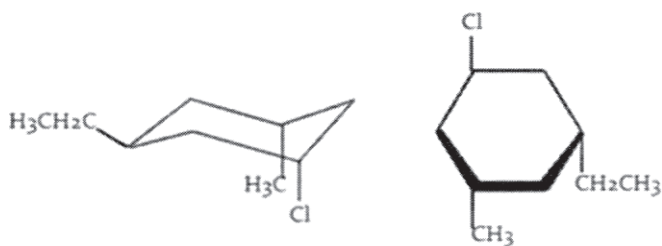
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- 36) The fact that the fluorescence wavelength is often much longer than the irradiation wavelength (Stokes shift) is a consequence of which phenomenon?
- A) Lambert-Beer Law B) Kasha's rule
C) Frank-Condon Principle D) El-Sayed rule
- 37) Which one of the following statements is true for all real symmetric matrices?
- A) All the Eigen values are real
B) All the Eigen values are +ve
C) All the Eigen values are distinct
D) Sum of all the Eigenvalues is zero
- 38) The excitation of molecule without spin inversion gives rise to the
- A) Singlet excited state B) Triplet excited state
C) Both (A) and (B) D) None of the above.
- 39) What is the relationship between the two groups in the following molecule?



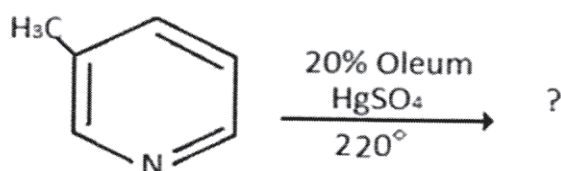
- A) They are equatorial to one another.
B) They are non-axial to one another.
C) They are cis to one another.
D) They are trans to one another.

40) What is the stereochemical relationship between the following two molecules?



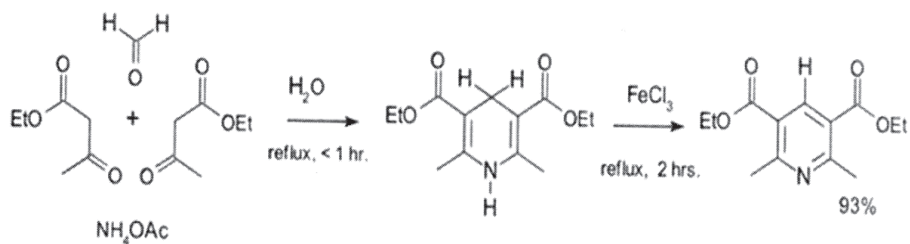
- A) Geometrical isomers B) Enantiomers
C) Diastereomers D) Identical

41) Predicts the product in the following conversion.



- A) 3-Methyl-5-sulphonic acid pyridine
B) 5-methyl-4- sulphonic acid pyridine
C) 3-Methyl-4-sulphonic acid pyridine
D) 4-methyl-4-sulphonic acid pyridine

42) What is name of the following reaction?



- A) Hantzsch Synthesis B) Chichibabin Reaction
C) Dealkylation of Pyridine D) Bonnemann Cyclization

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- 43) Salicylaldehyde can be prepared from which of the following reactants?
- A) Phenol and chloroform
 - B) Phenol, carbon tetrachloride and NaOH
 - C) Phenol, chloroform and NaOH
 - D) Phenol and Carbon tetrachloride.
- 44) In Ter Meer reaction, a method of preparation of nitro compound, which of the following used as reagent?
- A) HNO_2
 - B) HNO_3
 - C) Alkyl halides
 - D) NaNO_2
- 45) The recoil energy of a Mossbauer nuclide of mass 139 amu is 2.5 MeV. The Energy emitted by the nucleus in keV is _____
- A) 12.5
 - B) 15.0
 - C) 20.5
 - D) 25.0
- 46) How many ESR hyperfine split lines observed in methyl radical?
- A) 1
 - B) 4
 - C) 6
 - D) 8
- 47) Which of the following element cannot be identified using XPS method?
- A) Helium
 - B) Hydrogen
 - C) Sodium
 - D) Both (A) and (B)

- 48) _____ is the commonly used catalyst used in photocatalysis.
- A) Gold B) Raney Ni
- C) TiO₂ D) Al₂O₃
- 49) The point group of staggered and eclipsed ethane is _____ respectively.
- A) D_{3d} and D_{3h} B) D_{3h} and D_{3h}
- C) D_{3d} and D_{3d} D) D_{3h} and D_{3d}
- 50) Orgel diagram is applicable for _____ Complexes.
- A) Strong field B) Strong to weak field
- C) Weak field D) Weak to strong



Rough Work