

Seat No.	
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M.Phil./Ph.D. Entrance Examination, August - 2018**CHEMISTRY****Applied Chemistry/Industrial Chemistry**

Day and Date : Friday, 10 - 08 - 2018

Total Marks : 100

Time : 10.00 a.m. to 12.00 noon

- 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 circle. 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.

- 1) Which of the following is used to estimate the like hood that some factor other than chance accounts to the observed relationship?
 - A) Regression Analysis
 - B) Correlation methods
 - C) Chi squared test
 - D) None of the above

- 2) Concordance of a series of measurements of same quantity is called as _____.
 - A) Accuracy
 - B) Sample mean
 - C) Precision
 - D) Student t-test

P.T.O.

- 3) Significant figures in a number are _____.
- A) All of the certain digits plus first uncertain digit
 - B) All of the uncertain digits plus first two certain digit
 - C) All of the certain digits plus first two uncertain digit
 - D) All of the uncertain digits plus first certain digit
- 4) Sequence of essential steps in a typical quantitative analysis is _____.
- A) Select method → Eliminate interference → Sampling → Measure property and calculate results → Estimate reliability of results
 - B) Select method → Sampling → Eliminate interference → Estimate reliability of results → Measure property and calculate results
 - C) Select method → Eliminate interference → Sampling → Estimate reliability of results → Measure property and calculate results
 - D) Select method → Sampling → Eliminate interference → Measure property and calculate results → Estimate reliability of results
- 5) Errors that affects the precision of measurements are called as _____.
- A) Relative errors
 - B) Random errors
 - C) Absolute errors
 - D) Systematic errors
- 6) An interval around mean \bar{x} within which the population mean μ lies with a given degree of probability is called as _____.
- A) Confidence interval
 - B) Confidence limits
 - C) Confidence level
 - D) Confidence average

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- 7) Divya made a profit of 25% when selling a salwar Kameez at Rs. 6000. If she has to now pay Rs. 600 more for the same dress, what should be her new selling price in order to make the same percentage profit?
- A) 8250
B) 7500
C) 6750
D) 6600
- 8) With an average speed of 50 km/hr a train reaches its destination in time. If it goes with an average speed of 40 km/hr, it is late by 24 minutes. The total journey is _____ Km.
- A) 40
B) 70
C) 30
D) 80
- 9) 15 men take 21 days of 8 hours each to do a piece of work. How many days of 6 hours each would 21 women take, if 3 women do as much work as 2 men?
- A) 20
B) 18
C) 25
D) 30
- 10) The average age of a husband and wife at the time of their marriages was 25 years. A son was born to them two years after their marriage. The present average age of all three of them is 24 years. How many years is it since the couple got married?
- A) 5
B) 6
C) 8
D) 9
- 11) Ram Singh goes to Pushkar Mela with Rs. 10,000 to buy exactly 100 animals. He finds that cows are sold at Rs. 1,000, horses at Rs. 300 and chicken at Rs. 50. How many chicken should be buy to meet his target of 100 animals?
- A) 94
B) 90
C) 92
D) 88

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- 12) A train of length 700 m starts overtaking another train of length 800 m running on a particular track. What is the distance that should be gained by the first train over the second train to take the train completely?
- A) 100 m B) 1500 m
C) 1550 m D) 1650 m
- 13) Which of the following molecules has the minimum number of lone pairs?
- A) ICl_3 B) BF_4^-
C) SnCl_2 D) XeF_4
- 14) Chooses the correct order of radius for the following species.
- A) $\text{Na}^+ < \text{N}_a < \text{N}_a^-$ B) $\text{N}_a^- > \text{N}_a^+ > \text{N}_a$
C) $\text{Na} < \text{N}_a^- < \text{N}_a^+$ D) $\text{N}_a^- > \text{N}_a^+ > \text{N}_a$
- 15) Borazine is isoelectric with _____.
- A) Pentene B) Borane
C) Benzene D) $(\text{BN})_x$
- 16) Which of the following element is used in the treatment of Cancer?
- A) Uranium B) Thorium
C) Cerium D) Plutonium
- 17) Mention the sequential reactions occurred in Robinson annulations.
- A) Michael addition followed by aldol condensation
B) Aldol condensation followed by Michael addition
C) Aldol condensation followed by Mannich reaction
D) Mannich reaction followed by aldol condensation

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- 18) The reaction for the preparation of phenolic aldehydes [ortho as well as para] by the action of chloroform on phenols is known as _____.
- A) Diels - Alder
B) Robinson annulations
C) Reimer - Tieman
D) Chichibabin
- 19) Racemic mixture contains _____.
- A) E and Z isomers in 1:1 ratio
B) E and Z isomers in 2:1 ratio
C) R and S isomers in 2:1 ratio
D) R and S isomers in 1:1 ratio
- 20) The sulphonation of benzene is _____.
- A) Aromatic electrophilic substitution
B) Aliphatic electrophilic substitution
C) Aliphatic nucleophilic substitution
D) Aromatic nucleophilic substitution
- 21) 'Raman lines on the high frequency side of the excitation frequency are called _____.
- A) Stokes lines
B) Anti-Stokes lines
C) Rayleigh line
D) All of them
- 22) In X-ray Fluorescence spectroscopy the energy of the exciting radiation must be greater than the _____ energy of the atom of the material.
- A) Rotational
B) Vibrational
C) Ionization
D) Kinetic
- 23) In stripping voltammetry the first step is _____.
- A) Electrode stripping
B) Electrodeposition
C) Absorption
D) Desorption

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- 24) In quantitative Polarographic analysis which of the following is to be determined?
- A) Half wave potential
 - B) Electrode potential
 - C) Diffusion current
 - D) Migration current
- 25) The parent absorption band for homoannular conjugated diene system is _____ nm.
- A) 253
 - B) 217
 - C) 224
 - D) 230
- 26) The intensity ratio of EPR signals obtained by methyl radical is _____.
- A) 1:2:2:1
 - B) 1:3:3:1
 - C) 1:4:4:1
 - D) 1:1:1:1
- 27) The isomer shift and quadruple splitting values of FeF_3 are usually _____ to that of FeF_2 .
- A) Linear
 - B) Higher
 - C) Equal
 - D) Lower
- 28) What is the composition of lean oxygen atmosphere used in thermal analysis?
- A) 10-15% O_2 + N_2 or He
 - B) 1-5% O_2 + N_2 or He
 - C) 10-15% N_2 + O_2 or He
 - D) 1-5% N_2 + O_2 or He

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29) In CVD process, _____ is a very common source of silicon used for deposition of SiO₂ thin films.

- A) Silane
 B) Elemental silicon
 C) Silicon tetrachloride
 D) Silicon carbide

30) XRF spectrum of an analyte gives information about

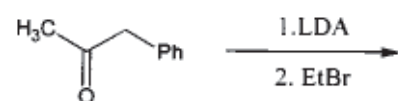
- i) Surface characterization of materials,
 ii) Qualitative analysis,
 iii) Quantitative analysis and
 iv) Nature of surroundings. Correct answer is _____.
- A) i, ii, and iii
 B) ii and iii
 C) i and ii
 D) ii and iv

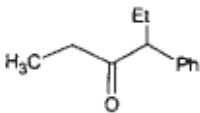
31) Electron spectroscopy for Chemical Analysis is also called as _____ photoelectron spectroscopy.

- A) Gamma
 B) UV
 C) Beta
 D) X-ray

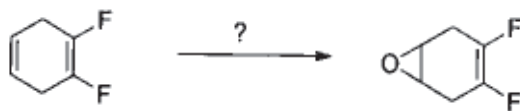
32) Standard deviation equation is best represented as S = _____.

- A) $\sqrt{\frac{\sum (\bar{x} - x)^2}{n-1}}$
 B) $\sqrt{\frac{\sum (\bar{x} - x)^2}{n}}$
 C) $\sqrt{\frac{\sum (x - \bar{x})^2}{n}}$
 D) $\sqrt{\frac{\sum (x - \bar{x})^3}{n-1}}$

33)  ?

- A) 
 B) 
 C) 
 D) 

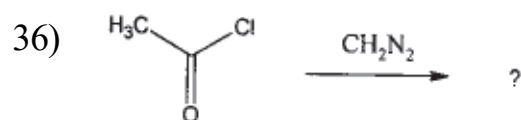
34) Write the suitable reagent in the following reaction



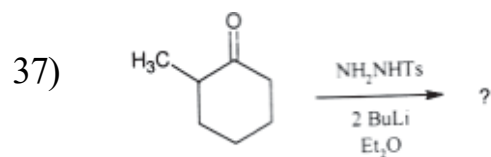
- A) DCC
 B) NaBH_4
 C) $\text{HIO}_4/\text{H}_2\text{O}$
 D) TMSI

35) In Arndt-Eistert reaction which of the following intermediate generated from diazomethane?

- A) Carbanion
 B) Ketene
 C) Carbonium ion
 D) Carbene



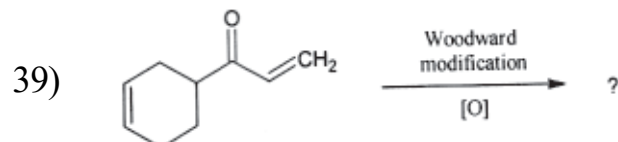
- A) CC(=O)N
 B) CC(=O)C=[N+]=[N-]
 C) CC(=O)C
 D) CC(=N)C

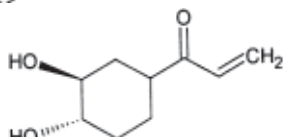
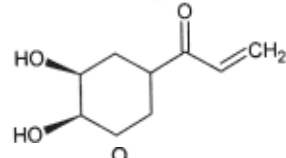
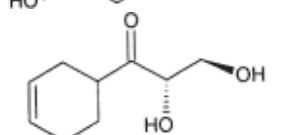
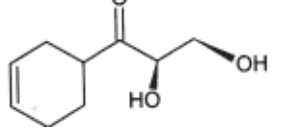


- A) CC1=CCCCC1
 B) CC1=CN=C1
 C) CC1=CC(=O)CCC1
 D) CC1=CCCCC1

38) Diazomethane needs a lewis acid catalyst to react with _____.

- A) Amine
 B) Carboxylic acid
 C) HCl
 D) Phenol



- A) 
- B) 
- C) 
- D) 

40) The SI unit of specific surface area of solid is _____.

- A) cm^2 / g
 B) m^2 / g
 C) N / m^2
 D) N / cm^2

41) Under HMO theory, energies of the π - orbitals of the allyl radical system C_3H_4 are _____.

- A) $\alpha + \beta, \alpha, \alpha - \beta$
 B) $\alpha + 2\beta, \alpha, \alpha - 2\beta$
 C) α, α, α
 D) $\alpha + \sqrt{2}\beta, \alpha, \alpha - \sqrt{2}\beta$

42) "Only light absorbed by the molecule cause a chemical change". This is the statement of _____ law.

- A) Einstein
 B) Grotthus-Draper
 C) Stoke's
 D) Stern - Volmer

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- 43) Observables are represented by _____ operations.
A) Hamiltonian B) Hermitian
C) Born D) Gaussian
- 44) Free valence index is measure of _____.
A) π -bond energy
B) Delocalization energy
C) Bond order
D) Chemical reactivity
- 45) Two different functions are orthogonal if the integral (over all spaces) of their product is _____.
A) Unity B) Zero
C) Infinity D) Half of Infinity
- 46) Differential thermal analysis (DTA) is a technique in which the _____ difference between the sample tested and a reference material is measured while both are subjected to the controlled temperature program.
A) Heat B) Mass
C) Temperature D) Enthalpy
- 47) The glass transition temperature of polymer can be best analyzed by _____.
A) TGA B) DTA
C) DSC D) DTG

- 48) XPS instrument measures _____.
- A) kinetic energy of the collected electrons
 - B) kinetic energy of the collected photons
 - C) X-ray produced from the material
 - D) potential energy of the electrons and photons
- 49) _____ is zero dimensional nanostructure.
- A) Thin film
 - B) Nano wire
 - C) Fullerene
 - D) Carbon Nanotube
- 50) The ideal characteristics expected in a detector used in GC are _____.
- A) Good sensitivity and stability
 - B) Good linearity and versatility
 - C) Universal detector and selective response
 - D) All the above



Rough Work