

Question Booklet Code

**A**

Question Booklet  
Serial Number

**M.Sc. III Semester (CBCS) Degree Examination, April/May - 2023**

**Skill Enhancement Courses (SEC)**

**INDUSTRIAL CHEMISTRY**

**Paper No. : SEC-3 : Instrumental Methods of Analysis**

Time : 1 Hour

Maximum Marks : 30

**INSTRUCTIONS TO CANDIDATES**

1. The Question Paper will be given in the form of a Question Booklet. There will be four/two/one versions of Question Booklets with Question Booklet Code viz. **A, B, C & D / A & B / A**.
2. The Question Booklet Serial Number is printed on the top right margin of the facing sheet. If your Question Booklet is un-numbered, please get it replaced by new Question Booklet with same Code.
3. Immediately after the commencement of the examination, the candidate should check that the Question Booklet supplied to him contains all the 30 questions in serial order. The Question Booklet does not have unprinted or torn or missing pages and if so he/she should bring it to the notice of the Invigilator and get it replaced by a complete booklet with same Code. This is most important.
4. A blank sheet of paper is attached to the Question Booklet. This may be used for Rough Work.
5. **Please read carefully all the instructions on the top of the Answer Sheet before marking your answers.**
6. Each question is provided with four choices **(A), (B), (C)** and **(D)** having one correct answer. Choose the correct answer and darken the bubble corresponding to the question number using **Black Ball-Point Pen** in the OMR Answer Sheet.
7. No candidate will be allowed to leave the examination hall till the end of the session and without handing over his/her Answer Sheet to the Invigilator.
8. Strict compliance of instructions is essential. Any malpractice or attempt to commit any kind of malpractice in the Examination will result in the disqualification of the candidate.
9. First fifteen minutes is provided to fill the general information of the Student. Eg. Student Name, Student ID, etc. in the OMR Answer Sheet.
10. Without the instruction of the Invigilator do not open the Question Paper Booklet Seal.



1. NMR spectroscopy indicates the chemical nature of the \_\_\_\_\_ and spatial positions of \_\_\_\_\_.  
(A) Electrons, Protons (B) Neutrons, electrons  
(C) Nuclei, electrons (D) Nuclei, neighbouring nuclei
2. In chromatography, the stationary phase can be \_\_\_\_\_ supported on a solid.  
(A) Solid or liquid (B) Liquid or gas  
(C) Solid only (D) Liquid only
3. In chromatogram, the area under the peak can be used to determine which of the following ?  
(A) Components of the sample (B) Amount of component in the sample  
(C) Column efficiency (D) Column resolution
4. Which of the following steps takes place after injection of feed in Column chromatography ?  
(A) Detection of components (B) Separation in the column  
(C) Elution from the column (D) Collection of eluted component
5. When energy is absorbed by the sample, the absorption can be observed as a change in signal developed by which of the following components ?  
(A) Amplifier (B) Photodetector  
(C) GM counter (D) Radiofrequency detector
6. Interaction between matter and electromagnetic radiation can be observed by subjecting a substance to magnetic fields in which of the following manner ?  
(A) Both fields should be stationary  
(B) Both fields should be varying  
(C) One field should be stationary and the other should be varying  
(D) It must be subjected to only one field
7. NMR spectrometer provides \_\_\_\_\_ and \_\_\_\_\_ method of determining structure in soluble chemical compounds.  
(A) Accurate, destructive (B) Accurate, non-destructive  
(C) Inaccurate, destructive (D) Inaccurate, non-destructive



8. Which of the following is the commonly used support material for the packed column in gas chromatography ?
- (A) Glass (B) Metal  
(C) Diatomaceous earth (D) Stainless steel
9. Lambert's law states that the intensity of light decreases with respect to \_\_\_\_\_.
- (A) Concentration (B) Distance  
(C) Composition (D) Volume
10. What is the unit of absorbance which can be derived from Beer Lambert's law ?
- (A)  $L \text{ mol}^{-1} \text{ cm}^{-1}$  (B)  $L \text{ gm}^{-1} \text{ cm}^{-1}$  (C) Cm (D) No unit
11. Which of the following types of chromatography involves the process, where the mobile phase moves through the stationary phase by the influence of gravity or capillary action ?
- (A) Column Chromatography (B) High Pressure Liquid Chromatography  
(C) Gas Chromatography (D) Planar Chromatography
12. What happens during the 'elution from the column' phase in chromatography ?
- (A) Components with greatest affinity elute first  
(B) Components with least affinity elute first  
(C) Components elute in a random manner  
(D) Components elute according to their concentration in the mixture
13. The representation of Beer Lambert's law is given as  $A = abc$ . If 'b' represents distance, 'c' represents concentration and 'A' represents absorption, what does 'a' represent ?
- (A) Intensity (B) Transmittance  
(C) Absorptivity (D) Admittance
14. In which of the following ways, absorption is related to transmittance ?
- (A) Absorption is the logarithm of transmittance  
(B) Absorption is the reciprocal of transmittance  
(C) Absorption is the negative logarithm of transmittance  
(D) Absorption is a multiple of transmittance



15. Which of the following cannot be used as an adsorbent in Column adsorption chromatography ?
- (A) Magnesium oxide (B) Silica gel  
(C) Activated alumina (D) Potassium permanganate
16. In chromatogram, the position of peaks on the time axis can be used to determine which of the following ?
- (A) Components of the sample (B) Amount of component in the sample  
(C) Column efficiency (D) Column resolution
17. NMR spectroscopy is used for determining structure in which of the following materials ?
- (A) Radioactive materials (B) Insoluble chemical compounds  
(C) Liquids (D) Gases
18. In chromatography, which of the following can the mobile phase be made of ?
- (A) Solid or liquid (B) Liquid or gas  
(C) Gas only (D) Liquid only
19. In NMR spectroscopy, the spinning nuclei in a strong magnetic field must be irradiated by which of the following ?
- (A) Perpendicular and stronger field  
(B) Perpendicular and weaker field  
(C) Parallel and stronger field  
(D) Parallel and weaker field
20. Chromatography is a physical method that is used to separate and analyse \_\_\_\_\_.
- (A) Simple mixtures (B) Complex mixtures  
(C) Viscous mixtures (D) Metals
21. Which of the following statement is false about double beam absorption instruments ?
- (A) It is similar to single beam instruments except two beams are present  
(B) Tungsten bulb is used as a source  
(C) Reference beam must have a higher intensity than sample beam  
(D) Both the beams after they pass through respective samples are compared



22. What is the unit of molar absorptivity or absorptivity which is used to determine absorbance  $A$  in Beer Lambert's formula ?  
(A)  $L mol^{-1} cm^{-1}$  (B)  $L gm^{-1} cm^{-1}$  (C)  $Cm$  (D) No unit
23. NMR is the study of the absorption of \_\_\_\_\_ by nuclei in a magnetic field.  
(A) Radioactive radiation (B) IR radiation  
(C) Radio frequency radiation (D) Microwaves
24. Beer's law states that the intensity of light decreases with respect to \_\_\_\_\_.  
(A) Concentration (B) Distance  
(C) Composition (D) Volume
25. For the separation of which of the following substances, Gas-solid chromatography is being used ?  
(A) Thermally stable organic components  
(B) Volatile organic components  
(C) Thermally stable inorganic components  
(D) Low molecular weight gaseous species
26. In which type of chromatography, the stationary phase is held in a narrow tube and the mobile phase is forced through it under pressure ?  
(A) Column chromatography (B) Planar chromatography  
(C) Liquid chromatography (D) Gas chromatography
27. Which of the following statements is false about single beam absorption instruments ?  
(A) Tungsten bulb is used as a source  
(B) Beam splitter is used to get parallel beam  
(C) Test tube is used as sample holder  
(D) Photovoltaic cell as detector
28. Which of the following is the disadvantage of helium, which can be used as carrier gas in gas chromatography ?  
(A) Dangerous to use (B) Expensive  
(C) Reduced sensitivity (D) High density



29. Beer Lambert's law gives the relation between which of the following ?
- (A) Reflected radiation and concentration
  - (B) Scattered radiation and concentration
  - (C) Energy absorption and concentration
  - (D) Energy absorption and reflected radiation
30. Using Chromatogram as detector in Chromatography, a graph is obtained between \_\_\_\_\_ and time.
- (A) Quantity
  - (B) Density
  - (C) Concentration
  - (D) Specific gravity

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**SPACE FOR ROUGH WORK**

**A**

