[44] SEAT No._____ No. of Printed Pages: 02

[44] SARDAR PATEL UNIVERSITY

M.Sc. Examination, Second Semester (CBCS) (NC)

Saturday, Time: 10.00 a.m. to 1.00 p.m. Date: 23-11-2019

Subject: Analytical Chemistry Paper: PS02ECHE21

[Total Marks: 70]

N.B. (1) Figures to the right indicate full marks.
(2) Attempt all questions.

Q. 1 Select the correct answer from each of the following: **(08)**

1. How will the reaction rate change in $4A + B \Leftrightarrow 2C + D$ if the concentration of substance A and B increase two times.
   (a) 9 (b) 32 (c) 64 (d) 128

2. Fused silica column which have a thin layer of a stationary phase coated directly on the inner wall is called_____ column.
   (a) WCOT (b) WWOT (c) IFSOT (d) PLOT

3. Which one is based on emission phenomenon methods
   (a) NMR (b) AES (c) AAS (d) Above all

4. The closeness of agreement between successive results obtained from heterogenous conditions with different operators using different equipment is called as
   (a) reproducibility (b) repeatability (c) confidence level (d) variance

5. The wavelength range for the UV-Visible region of the electromagnetic spectrum is _____.
   (a) 200-800 Å (b) 200-800 μm (c) 200-800 nm (d) 200-800 mm

6. Electromagnetic radiation is characterized by _____
   (a) amplitude (c) periodicity
   (b) wavelength and wave number of frequency (d) All of above

7. The magnitude of the random errors determines the ____ of analytical results.
   (a) relative (b) precision (c) accuracy (d) above all

8. The Handbooks cover information in the form of
   (a) General method of preparation, properties, use and references
   (b) Describe research work done by scientist
   (c) Comprehensive work with authors name, journal name etc.
   (d) All of above

Q. 2 Answer the following: **(Any Seven)** **(14)**

(i) Discuss the principle of gas liquid chromatography.

(ii) What is electromagnetic radiation? Explain electromagnetic spectrum.

(iii) Explain: Standard error and Determinant error.

(iv) Discuss the relationship between energy, wavelength, and frequency of radiation.

(v) Enlist the basic components of optical instruments.

(vi) Define: elution and eluate.

(vii) Explain the term retrospective validation.

(viii) Differentiate accuracy and precision.

(ix) Classify the analytical techniques based on size of sample.

3 **[a]** What is cGMPs? Explain in brief about its components. **(6)**

[b] Answer the following: **(6)**

(i) Differentiate validation and verification. Discuss the aspects of validation

(ii) Write a note on quality management system (QMS).

OR

[b] Discuss the steps involved in typical quantitative analysis with suitable example. **(6)**

4 **[a]** Answer the following: **(6)**

(i) The rules for representing SI units.

(ii) Describe basic characteristics of primary standard.

[b] Solve the following: **(6)**

(i) How many mL of 50 and 20% solution of NaOH should be used to prepare 500 ml of 40% solution of NaOH. [density of NaOH: $\delta_{50\%}$ = 1.525 g/cc; $\delta_{20\%}$ = 1.219 g/cc; $\delta_{40\%}$= 1.430 g/cc]

(ii) If 1 liter of a 4 M solution of substance A and 1 liter of 6 M solution of substance B take part in the reaction A + B $\Leftrightarrow$ C + D. Determiner the % yield of product D. (Consider K = 9).

OR

[b] Aluminium alloy is analyzed and determined, it contain 98.72, 96.89, 99.69, 97.99% of Al. Calculate (a) the standard deviation of the mean (b) the relative standard deviation of the mean (c) co-efficient of variation. **(6)**

5 **[a]** Discuss in brief the following: **(8)**

(i) Photoelectric effect and Compton effect.

(ii) Interaction of EMR with matter.

[b] Explain the importance of wavelength selection in quantitative techniques and methods used for the selection of wavelength. **(4)**

OR

[b] Describe in brief on radiation sources used in optical instruments. **(4)**

6 **[a]** Answer the following: **(6)**

(i) Explain principle of paper chromatography and methods used for detection of spot in paper chromatography.

(ii) Discuss on various adsorbents used in TLC and detail account on various methods for preparation of thin layer on plates.

[b] Describe various methods of separation along with their principle of working. **(6)**

OR

[b] Draw neat and labeled schematic diagram of gas chromatograph and explain briefly each and every component of it. **(6)**

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