( ) SARDAR PATEL UNIVERSITY

M.Sc. Semester-III: Analytical Chemistry Examination (CBCS)

**October-2018, Max. Marks: 70**

**Thursday**, Date: 25.10.2018

Time: 02.00 p.m. to 05.00 p.m., **Paper:** PS03CANC22

**Subject:** Elements of Analytical Chemistry

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N.B.: i)  The numbers of the marks carried by each question is indicated at the end of the question
   ii)  Assume suitable data if considered necessary and indicate the same clearly.

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**Q.1**  Answer by highlighting the right response                                [08]

i)  Which of the following is seven segment displays?
   a) LED                          b) LCD
   c) CRT                          d) α-numeric

ii)  Which is true for diffusion?
   a) $D = C_0/C$                   b) $C = D$
   c) $D = C / C_0$                 d) $C_0 = C/D$

iii)  Which of the following is measure of Random error?
   a) Accurate measurements         b) Statistical treatment
   c) Precision                     d) Median

iv)  Select the true relation.
   a) $C_m < LOQ$                   b) $C_m > LOQ$
   c) $C_m = LOQ$                   d) $C_m > LOL$

v)  Which of the following is convert form of energy to another form?
   a) Transformer                   b) Transducer
   c) Transistor                    d) Amplifier

vi)  In automation, which of the following act(s) as separator(s)
   a) GC                            b) HPLC
   c) Extraction                    d) All

vii)  Which of the flowing is deals with rejection of data?
   a) 2d                            b) Student t
   c) 4d                            d) Both (a) and (c)

viii)  $F = S_2^2 / S_1^2$ is _____
   a) analytical sensitivity        b) average stander deviation
   c) calibration sensitivity       d) variance ration

**Q.2**  a) Attempt only **SEVEN**                                               [14]
i)  What is the hyphenated technique? Give its examples.
ii)  Discus the data sampling and its importance.
iii)  For the following set of data, calculate the mean and standard deviation. Data set: 9.990, 9.993, 9.973, 9.980, 9.982
iv)  What is confidence limit?
v)  Give the brief note on transformer.
vi)  Discus the importance of computers in data handballing.
vii)  Discus the validation of methods.
viii)  Discus the advantage of stopped flow method over FIA.
ix)  Explain the objective of automaton in chemical analysis.

**Q.3**   **a)** Explain the sensitivity of analytical method and advantages and disadvantages of its figure of merit.   [06]

**b)** Explain the 'Bias' and 'Precision'. What is the significance of these parameter?   [06]

**OR**

**b)** Describe the characteristic properties of analyte and instruments use for its analysis.

**Q.4**   **a)** Describe the data domain map. Why digital domain is under the electrical and non-electrical span?   [06]

**b)** Answer the followings   [06]
i) Give the introduction of p-type an n-type of semiconductor materials. Explain diodes and its application.
ii) Explain the transducers and its various applications.

**OR**

i) Explain the 'In-line and On-line' computerized instruments. How computers are involving in advance analytical instruments?
ii) Discus the active and passive applications of computers in analytical instruments.

**Q.5**   **a)** Give the introductory note on automation and its merits and demerits. Expalin the unit operations and its possible automations.   [06]

**b)** Give the schematic of automated elemental analyzer and describe its working.   [06]

**OR**

**b)** Describe the FIA and its applications. How it is different than SIA.

**Q.6**   **a)** Discus the student t test and its importance. A chemist obtained the following data for the alcohol content of a sample of the blood: % $C_2H_5OH$: 0.084, 0.089 and 0.079. Calculate the 95% confidence interval for the mean assuming (a) the three results obtained are the only indication of the precision of the method and (b) from previous experience on hundred of samples, we know that the standard deviation of the method s = 0.005% $C_2H_5OH$ and is a good estimation of σ (for 95% t table values 4.30 and 1.96 for 2 and ∞ degree of freedom respectively)   [06]

**b)** Discus the frequency distribution and its significance. What is 'histogram' and 'frequency polygon'?   [06]

**OR**

**b)** Answer the followings
i) Discus the 'blind analysis of standard sample' and 'robustness'.
ii) Discus the Q test and its function. Can the value of 216 be rejected from the following set of results? Data: 192, 216, 202, 195, 204. (Q table is 0.64)

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