[47] SEAT No._____ *No. of Printed pages: [3]*

SARDAR PATEL UNIVERSITY

M. Sc. Analytical Chemistry- 3rd SEMESTER Examination

Course – PS03CANC22, **Subject**: Elements of Analytical Chemistry,

Saturday, 2nd January 2021, 10:00 a.m. to 12:00 p.m.

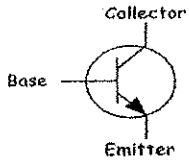
N.B.: *i) Figure to the right indicate marks.*
ii) Assume the suitable data if necessary and indicate clearly.

Q. 1. [A]. Answer with highlighting the appropriate option. **[8]**

i. Which of the following deal(s) with the absorption of radiation?
   a). Spectrophotometer b). Amperometry
   c). X-ray d). None

ii. An internal standard used in NMR spectroscopy is _____.
   a). THF b). TMS
   c). DMF d). DMSO

iii. Which of the following options is suitable for the figure shown below?



   a). pnp BJT transistor
   b). np transistor
   c). npn BJT transistor
   d). pn transistor

iv. Which of the following is/are material(s) of thermocouples?
   a). Nickel alloy b). Platinum/rhodium alloy
   c). Tungsten/rhenium alloy d). All of these

v. Which of the following is/are factor(s) responsible, when analyte is injected into a carrier solution which mixes through radial and convection diffusion with a reagent.
   a). flow rate b). coil length
   c). coil diameter d). All of these

vi. Which of the following has the mechanism to inject bubble of air periodically?
   a). Spectroscopy method b). Segmented flow method
   c). Flow injection method d). Gravimetric method

vii. The process of evaluating a method to determine those factors for which a small change in value has a significant effect on the method's results is known as_____.
   a). blind Analysis b). equivalency Testing
   c). ruggedness testing d). None

viii. Which of the following is/are test(s) for rejection of the value?
   a). Dixon's test b). Q-test
   c). Grubbs's test d). All of these

Q. 1. [B]. Write the answer of following in one or two sentence. [16]

(i). In calibration curve method, The range of concentration between LOQ and LOL is known as _____.

(ii). Selectivity of an analytical method refers the degree to which the method is free from interference by other species contained in the sample matrix. True or False?

(iii). In NDC, What percentage of scores falls within three standard deviations from the mean?

(iv). Samples collected from the target population using available information about the analyte's distribution within the population is called ___.

(v). What are the devices used **in Digital Domain for** Information encoding in the form of a number?

(vi). The various parts of a computers, its memory and peripheral devices are joined by ____, each of which is a no. of transmission lines.

(vii). Match Column 1 (Domains) with appropriate option in Column 2 (signal output):

Column 1	Column 2
1. Electrical Time domains	a. Voltage
2. Non-electrical domain	b. Pulse width
	c. Charge
	d. Scale position

(viii). List atleast two common names of microprocessors.

(ix). State the term automation.

(x). What are the demerits of automation?

(xi). Draw Reversible pump sampling diagram.

(xii). Give the names of continuous flow methods?

(xiii). Show the mathematical expression of Confidence limit.

(xiv). What do you mean by Sensitivity of balance?

(xv). Degree of mutual agreement among data obtained in the same way is called ____.

(xvi). Assign the number of significant figures to the answer of $\log_{10} 2.3\times10^{3}$

Q. 2. Answer the following : (Attempt any seven). [14]

i. Enlist the basic components of pH meter instrument.

ii. Describe in brief sources of instrumental errors.

iii. What is the role of transformer?

iv. Explain analog domains.

v. Explain the demerits of discrete instruments.

vi. Illustrates the principle of reversible pump samplers.

vii. Explain student's *t*-test.

viii. Write down the equation for NDC.

ix. Differentiate: accuracy and precision.

Q. 3. **Answer the following :**

1. Draw the ideal calibration curve showing S/N, Noise Region, Poor Quant, Dynamic Range, LOD, LOQ, LOL appropriately. [4]
2. Name the basic components of instruments for chemical analysis. [4]

OR

Q. 3. **Answer the following :**

1. Explain composite sampling and its advantages. [4]
2. A quantitative analysis for an analyte gives a mean concentration of 12.6 ppm. The standard deviation for the method is found to be 1.1 ppm, and that due to sampling is 2.1 ppm. (a) What is the overall variance for the analysis? (b) By how much does the overall variance change if s_m is improved by 10% to 0.99 ppm? (c) By how much does the overall variance change if s_s is improved by 10% to 1.9 ppm? [4]

Q. 4. **Answer the following :**

1. What is 'capacitor'? [4]
2. Explain the characteristics of semiconductors and discuss p-n junction. [4]

OR

Q. 4. **Answer the following :**

1. Digital domain span is in both electrical and non-electrical domains! Explain. [4]
2. Discus the operational modes of computerized instruments. [4]

Q. 5. **Answer the following :**

1. State and distinguish between discrete and continuous instruments. [4]
2. Discuss block diagram of automated laboratory devices. [4]

OR

Q. 5. **Answer the following :**

1. What are continuous flow methods? Write a note on flow injection analysis. [8]

Q. 6. **Answer the following :**

1. Describe in brief Methods of rejecting out-lier. [4]
2. Describe in brief various categories of validation. [4]

OR

Q. 6. **Answer the following :**

1. List out the steps of verifying the method of analysis. Write a note on 'ruggedness testing'. [8]