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Seat No. \_\_\_\_\_

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**SARDAR PATEL UNIVERSITY**  
Vallabh Vidyanagar

Examination : B. Sc. Instrumentation (Vocational)  
US05CINV04 – Analytical Instrumentation

Monday, 18<sup>th</sup> November, 2019, 10:00 AM – 1:00 PM

Total Marks: 70

Note: The figures to the right indicate maximum marks.

Q-1. **Multiple Choice Questions-** [10]

- (1) The variation of ..... is proportional quantity to pH.  
(a) current (b) resistance (c) potential (d) inductance
- (2) pH of water is 7 because number of hydrogen ions are.....hydroxyl ions.  
(a) greater than (b) less than (c) equal to (d) none
- (3) pH measurement is ..... dependent.  
(a) flow (b) pressure (c) level (d) temperature
- (4) The name of chromatography is defined from its.....  
(a) two phases (b) stationary phase (c) three phases (d) mobile phase
- (5) Flame Ionization Detection is a type ..... technique  
(a) mixing (b) destructive (c) non destructive (d) equalizing
- (6) In GC Column is kept in ....  
(a) Cylinder (b) Detector (c) Injector (d) Oven
- (7) If mobile phase is liquid and stationary phase is solid it is .....chromatography.  
(a) Partition (b) adsorption (c) thin film (d) paper
- (8) Response time of any detector should be .....  
(a) very long (b) very short (c) long (d) not required
- (9) RI detector depends on ..... at the interface between cell wall and the flowing liquid to deflect a light beam.  
(a) Fresnel's law (b) Ohms law (c) Snell's law (d) none
- (10) Refractive Index and UV absorbance detector can achieve universal detecting capability.  
(a) True (b) False (c) both (d) none

Q-2. **Short answer type (attempt any ten)** [20]

- (1) Draw neat labeled diagram of Glass electrode.
- (2) Explain in brief Hydrogen Electrode.
- (3) Enlist the property of carrier gas in GC.
- (4) Why helical tube columns are used?

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- (5) What do understand by Paper Chromatography?
- (6) What are the criteria for selection of Liquid chromatography?
- (7) Draw diagram of sample injector in Chromatography.
- (8) Enlist drawbacks of large diameter column?
- (9) What are the requirements for detector in chromatography?
- (10) List different types of Laser detectors.
- (11) Explain briefly electrical conductivity detector principle.
- (12) Give the examples of Bulk property and Solute property detectors.
- Q-3. (a) Draw neat diagram of Reference electrode and explain it in detail. [6]
- (b) Write brief note about buffer. [4]
- OR
- Q-3. (a) Explain Zero corrected dc Amplifier type pH meter. [6]
- (b) Write Nernst equation and list design consideration of pH meter. [4]
- Q-4. (a) Draw block diagram of Gas Chromatography and discuss its components in brief. [6]
- (b) Briefly explain types of column. [4]
- OR
- Q-4. (a) Describe working principle of Flame Ionization Detector with its limitations. [6]
- (b) Explain working principle of Electron Capture Detector (ECD). [4]
- Q-5. (a) Draw block diagram of HPLC system. Describe its flow measurement and control. [7]
- (b) Explain Syringe type pump. [3]
- OR
- Q-5. (a) Discuss different types of Liquid Chromatography in brief. [7]
- (b) Write a note on modes of gradient elution. [3]
- Q-6. (a) Explain working of Refractive Index detector. [5]
- (b) With neat figure explain Fluorescence Detector. [5]
- OR
- Q-6. (a) Discuss working of UV absorbance detector. [5]
- (b) Describe working of Mass detector. [5]