***Final Assignment: - Medical Lab instumentation.***

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**Q1 Answer**

**Define the following terms.**

**PH METER.**

**A pH meter is a scientific instrument that measures the hydrogen-ion activity in water-based solutions, indicating its acidity or basicity expressed as pH.**

**VORTEX METER.**

**One type of fluid meter that requires little or no maintenance is the vortex flowmeter.Vortices The vortex flowmeter Flowconsists of a blunt,unstreamlined object,such as a strut or a bar,which is placed in the flow path of the fluid.**

**Vortex Flow meter Animation**

**The number of vortices that form in a given period of time is**

**directly proportional to the volumetric flow rate. Therefore, it is**

**possible to convert the frequency of electrical pulses from the**

**pressure detector into velocity, and from velocity into a**

**volumetric flow rate.**

**BALANCE**

**Definition: The quality of a floral arrangement that gives a sense of equilibrium and repose (position).**

**As humans, we can tell when things arenot balanced and we tend to avoid**

**imbalance (ladders, shelves, branches, and other things that may be a physical**

**threat).**

**STILL WATER.**

**Still waters run deep. That usally refers to a person of**

**few words who has a lot brewing under the surface.**

**Thoughts, feelings, and emotions.**

**DEIONIZER.**

**Deionized water, also known as DI water, is a**

**form of water that is deeply demineralized.**

**Highly pure.**

**Produced using ionexchange resins that can remove ions from water.**

**Highly reactive and deionization cannot remove uncharged particles,molecules from water.**

Q2 Answer

**★ Electrophoresis -**

**→Electrophoresis is the study of movement of charged**

**particles in an electric field.**

**→ Biomolecules, like- DNA, RNA, Amino acid and**

**Proteins etc carry positive or negative charge with**

**them.**

**→ When these biomolecules placed in an electric field**

**then charged molecules move towards the electrode of**

**opposite charge due to the phenomenon of electrostatic**

**attraction.**

**→ Molecules with positive charge moves toward Cathode and**

**with negative charge molecules moves toward Anode.**

**→ Term electrophoresis means 'Migration with electricity**

**or 'Migration of charged particles under the influence**

**of electricity'.**

**→ For the first time in 1807 Ferdinand fredevice reuss**

**observed clay particle dispersed in water to migrate on**

**applying electric field.**

**→ The sample is applied into the medium as a**

**narrow zone or band|and the molecule with a**

**different mobility travel as distinct zone which**

**|gradually separate from each other, this technique**

**is widely used for separation and analysis of a large**

**number of biomolecules. like- Amino acid, Proteins,**

**Nucleotides and Nuclic acid.**

**★ Purpose of electrophoresis -**

**→ The main purpose of electrophoresis is to**

**separate and identify compounds, Like-**

**Protein, Amino acid, Nucleic acid, Nucleotide**

**or those which can be given weak charges,**

**Example-|Phosphate and Borate.**

**OR**

**Electrophoresis is a “powerful and inexpensive molecular separation technique,” as stated by Dr. William H. Heidcamp, in the Cell Biology Laboratory Manual. Various reasons exist for carrying out electrophoresis including non-invasive binding to molecules and visualization of molecule separation. Overall, electrophoresis aims to provide an accurate way of analyzing substances, such as your blood and DNA (deoxyribonucleic acid, which are difficult to separate using conventional methods.**

Q**3 Answer**

**What is Flow Cytomcry?**

**cytometry refers to the measurement of physical/chemical characteristics of cells or**

**other biological particles.**

**Flow Cytometry is the process whereby such measurements are made upon**

**cells/particles as they pass through a measuring apparatus (hopefully in single file)**

**suspended in a fluid stream.**

**1968, Wolfgang Gohde from the University of Munster (Patent No. DE1815352)**

**named pulse cytophotometry 1978, the name was changed to tlow cytometry.**

**Flow Cytometry:**

 **Definition o**

**Flow " in motion**

**> Cyto " cell**

**Metry ~ measure**

**• Measuring properties of single cells in a**

**fluid stream**

**Gives us the ability to analyze many**

**properties of many cells in very little time**

**Uses of Flow cytometry**

**Flow cytometry is routinely used in the diagnosis of health disorders, especially blood cancers.**

**The technology has applications in a number of fields,**

**including molecular biology, pathology, immunology, plant**

**biology and marine biology.**

**It has broad application in medicine (especially in**

**transplantation, hematology, tumor immunology and**

**chemotherapy, genetics and sperm sorting for sex**

**preselection).**

**In protein engineering, flow cytometry is used in**

**conjunction with yeast display and bacterial display to**

**identify cell surface-displayed protein variants with desired**

**properties.**

**PRINCIPLE**

**The basic principle of flow cytometry is the**

**passage of cells in single file in front of a**

**laser so they can be detected, counted**

**and sorted. Cell components are**

**fluorescently labelled and then excited by**

**the laser to emit light at varyingg**

**wavelengths. The fluorescence can then**

**be measured to determine the amount**

**and type of cells present in a sample.**

**Principle of Flow Cytety**

**a Flow cytometer is composed of three main**

**Components:**

**The Flow system (fluidics)**

**Cells in suspension are brought in single file past**

**The Optical system (light sensing)**

**a focused laser which scatter light and emit**

**fluorescence that is filtered and collected**

**The Electronic system (signal processing)**

**emitted light is converted to digitized values that**

**are stored in a file for analysis.**

Q.4**Answer**

**BEER LAMBART LAW**

**Beer's law, also called Lambert-**

**Beer law or Beer-Lambert law, in spectroscopy, a relation concerning**

**the absorption of radiant energy by an absorbing medium. Formulated**

**by German mathematician and chemist August Beer in 1852, it states**

**that the absorptive capacity of a dissolved substance is directly**

**proportional to its concentration in a solution. The relationship can be**

**expressed as A = elc where A is**

**absorbance, e is the molar extinctioncoefficient (which depends on the**

**nature of the chemical and the wavelength of the light used), l is the**

**length of the path light must travel in the solution in centimetres, and c is**

**the concentration of a given solution.**

**Uses of Beer lambart law**

**The Beer-Lambert law relates the attenuation of light to the properties of the material through which the light is traveling. This page takes a brief look at the Beer-Lambert Law and explains the use of the terms absorbance and molar absorptivity relating to UV-visible absorption spectrometry.**

**PRINCIPAL**

**Beer (alcoholic beverage)**

**Beer, alcoholic beverage produced by**

**extracting raw materials with water, boiling**

**(usually with hops), and fermenting. In some**

**countries, beer is defined by lawas in .Cultural life from the article Belgium**

**Beer is Belgiums national beverage; the**

**country has several hundred breweries and**

**countless cafes where Belgians enjoy a great**

**array of local brews, including the.Alcohol and society from the article Alcohol Consumption In England and Ireland, the pub maintains its popularity as a main locus of drinking. In both countries, beer is the most popular**

**alcoholic beverage. ..Anheuser-Busch Inbev (Belgian**

**company) InBevwhich was founded through the merger**

**(2004).**

Q**5 Answer**

**Autoclave**

**Autoclave is a pressurized device**

**designed to heat aqueous solutions**

**above their boiling point at normal**

**atmospheric pressure to achieve**

**sterilization.**

**Auto >>> self**

**Clavis >>>self locking device.**

**Uses**

**1. To prepare materials for bacteriological cell**

**cultures (test tubes, pipettes, Petridishes,etc.)**

 **in order to avoid their contamination.**

**2. Prepare elements used for taking samples.**

**(All must be in sterile conditions: needles,**

**tubes, containers).**

**3. Sterilize contaminated material.**

**MAIN COMPONENTS**

**Heating Elements**

**1Temperature Controller**

**3.Pressure Sensor**

**4. Chamber**

**5. Door gasket**

**6. Solenoid valve**

**7. Water level Sensor**

**8. Steam generator**

**9. Vaccum pump**