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PAPER :BIO MEDICAL INSTRUMENTATION

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QNO 1

ANS (A) PH meter :- the ph meter was introduced in 1934 by the American chemist Arnold O. Beckman to measure the sourness of lemons.

- It is a device used for the measurement of pH of solution
- A simple and speedy device to measure the acidity and alkalinity of a fluid.

(b) Vortex mixer : it is a device used commonly in laboratory to mix small vial of liquid

Components : power supply

Electric motor

Drive shaft

Cupped rubber piece

(c) Balance : A weighing scale is a device for measuring weight

- Balance measures the mass of an object and are used in science

(d) water still : it is a device used in laboratories for purification

Principle : it works on the principle of distillation

Component :

- A source of heat
- Still pot
- Still head
- Condenser
- Cooling water in
- Cooling water out
- Distillate
- Vacuum /gas inlet
- Heat control
- Stirrer
- Heating (oil sand)bath

- Stirring means e.g boiling chips or mechanical stirrer
- Cooling bath.

(e) deionizer : it is a device used in laboratory for purification of water.

Principle :

- In work on principle of deionization
 - Deionization is a chemical process the uses specially manufactured ion exchange resins ,which exchange hydrogen and hydroxide ions for dissolved mineral ,and then recombine to form water .water that has had almost all of its mineral iron and copper ,and anions such as chloride and sulfate .
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QNO 2

ANS :- ELECTROPHORESIS :-

- Term means migration with electricity .
- Involves the separation of components of a sample by differential rate of migration in the presence of electric field .
- Theory was first proposed by prof Ferdinand F reuss by doing experiment on migration of colloidal clay particals .

Principle : it is used in laboratories to separate macro molecule based on size .

- Separation of protein DNA or RNA
 - Purification of analysis of vaccine and antibiotics .
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QNO 3

ANS :- FLOWCYTOMETRY :- it is a device that is used to analyse physical and chemical characteristics of particles in a fluid as it passes through at least one laser .

- Cell components are fluorescently labeled and then excited by the laser to emit light at varying wavelengths.
- Up to thousands of particles per second can be analysed as they pass through liquid stream .

Components :-

- Fluidics
- Optics
- Detectors
- Electronic

(Field of application) :-

Molecular biology ,pathology ,immunology

Especially in transplantation hematology tumorimmunology and chemotherapy prenatal diagnosis and genetics

- Extensively used in research for detection of DNA damage

Parameter :-

- Scattering of light can be used to measure volume (by forward scatter) and morphological complexity (by side scatter)cells or other particles ,even those that are non –fluorescent .these are conventionally abbreviated as FSC and SSC respectively .
 - Cell pigments such as chlorophyll.
 - Total DNA content (cell cycle analysis ,cell ,kinetics, proliferation ,ploidy ,aneuploidy , endoreduplication , etc
 - Total RNA content
 - DNA copy number variation (by flow –fish technology)
 - Protein expression and localization
 - Cell surface antigens (cluster of differentiation (cd)markers)
 - Intracellular antigens (various cytokines secondary mediators ,etc
 - Nuclear antigens
 - Enzymatic activity .
 - PH intracellular ionized calcium ,magnesium ,membrane potential
 - Membrane fluidity
 - Apoptosis (quantification ,measurement of DNA degradation ,mitochondrial ,membrane potential ,permeability changes ,caspase activity
 - Oxidative burst .
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QNO 5

ANS : - AUTO CLAVE :- Auto clave is a pressurized device designed to heat aqueous solutions above their boiling point at normal atmospheric pressure to achieve sterilization

Auto self

Clavisself locking device

- Autoclave is a pressure chamber used for the sterilization .
- The instruments is also termed as sterilizer .
- This instrument was first developed in its crude form by dr Denis papin and named it as a steam digester.

- The steam digester was the forerunner of laboratory autoclave invented in 1879 by dr Charles chamberland .

Uses :-

- Surgical instruments
- Plastic sharps containers
- Glassware
- Plastic tubes and pipette tips
- Solutions and water
- Animal food and bedding
- Biohazardous waste

Components :-

- Pressure guage
- Safety valve
- Autoclave lid
- Handle
- Auto clave body
- Steam release valve
- Vacuum valve
- Outer stand .

QNO 4

ANS :- BEER 'S LAW :- when a monochromatic light passes through a colored solution, amount of light transmitted decreases exponentially with increase in concentration of colored substance .

- e .g the amount of light absorbed by a colored solution is directly proportion to the concentration of substance in the colored solution .

lambert 's law :- the amount of light transmitted decreases exponentially with increase in pathlength (diameter)of the cuvette or thickness of colored solution through which light passes .

- e. g the amount of light absorbed by a colored solution depends on pathlength of curvette or thickness or dept of the colored solution .

principle :-

- the principle of calorimeter indicate the law of conservation energy .

uses :- used for measuring the amount of heat released or absorbed in chemical or physical reactions .it can determine heat content, latent heat ,special heat ,and other thermal properties of substance .

THE END OF THE PAPER