(D) Q.P. Code :- 57767

5. Growth curve: Define, Phase of growth

BASIC LIFE SCIENCES II

F.Y.B.Sc. Biotechnology semester I examination 2018-19

SET 3

Q.1 Do as directed.

1. Condenser- The purpose of the condenser lens is to focus the light onto the specimen. Condenser lenses are most useful at the highest powers (400x and above).
2. Viruses, Chlamydia, Rickettsia
3. Aberration- An ideal lens would focus all colors of light to the same point. In reality, all lenses have chromatic aberration, a property in which different colors of light are focused to different points.
4. Dark-Field microscope- A type of microscopic examination in which the microscopic field is dark and any objects such as bacteria, are brightly illuminated.
5. Synthetic Dyes- Most of these are in Aniline base and derived from coal tar. These aniline dyes offer wide range of colour and action. These aniline dyes offer wide range of colour and action. Chemical compostion may be basic, acidic, amphoteric (neutral). According to these characters stain different components of tissue.
6. Single type of culture obtained after isolation technique is called as Pure culture.
7. Chromogen- A substance which can readily converted into a dye or other colored compound that can be visualized under bright field microscope.
8. Peptones, meat extract, yeast extract
9. Fixatives (chemicals causing fixation) generate chemical bonds between proteins and other substances within the sample, increasing their rigidity. Common fixatives include formaldehyde, ethanol, methanol, and/or picric acid.
10. Acid fast bacteria- Retaining the initial stain and difficult to decolorize with acid alcohol. A property of certain bacteria, surrounded by covering composed of fatty or waxy substance. Eg. *M. tuberculosis, M. leprae*
11. Direct microscopic count is the technique used for the microscopic enumeration of micro organisms.
12. Milk, cream, and certain alcoholic beverages are subjected to controlled heat treatment called as pasteurization.
13. Hot air oven
14. The laboratory apparatus designed to use steam under regulated pressure is known as autoclave.
15. Organotrophs: Organisms that use organic compounds as the sole source of energy.
16. Laminar air flow uses HEPA filter.
17. Iodophors are mixture of iodine with carriers and solubilizers.
18. False
19. Glutaraldehyde

20. Stock culture: Collection microbiological laboratories maintaining a large collection of strains.

Q.2(A)

Two or more reagents used in staining process. Difference observable between cells or parts of cells.

1. Gram straining- Primary strain (crystal violet) applied to the film and then treated with iodine solution (mordant), alcohol (a decolorizer) and counter strained with safranin. Characterized bacteria in one of two groups; gram positive- deep violet and gram negative- red
2. Acid fast straining- Film strained with carbolfuchsin, decolorized and counter strained with methylene blue; separate acid fast bacteria, those not decolorized when acid solution is applied (eg. Mycobacterium) from non-acid fast bacteria, which are decolorized by acid (acid alcohol).

Q.2 (B) Microscopy is the technical field of using microscopes to view objects and areas of objects that cannot be seen with the naked eye (objects that are not within the resolution range of the normal eye).

There are two basic types of lenses in a compound microscope. These two types of lenses are called ocular lenses and objective lenses. Objective lenses can have magnification levels of 4X, 10X, 43X, 93X and 100X. The objective lens and ocular lens work together to create a detailed, magnified image of an object.

The ability of a microscope (or eye) to see detail is a function of its resolving power. Resolving power is defined as the minimum distance between two objects at which the objects can just be distinguished as separate and is a function of the wavelength of light used and the quality of the optics.

OR

Q.2(C) Stains and dyes are frequently used in microscopy to highlight structures in biological tissues for viewing, often with the aid of different microscopes. Stains may be used to define and examine bulk tissues (highlighting, for example, muscle fibers or connective tissue), cell populations (classifying different blood cells, for instance), or organelles within individual cells.

Gram straining- Primary strain (crystal violet) applied to the film and then treated with iodine solution (mordant), alcohol (a decolorizer) and counter strained with safranin. Characterized bacteria in one of two groups; gram positive- deep violet and gram negative- red.

Q.2 (D) More sophisticated techniques will show proportional differences in optical density. Phase contrast is a widely used technique that shows differences in refractive index as difference in contrast. It was developed by the Dutch physicist Frits Zernike in the 1930s. The nucleus in a cell for example will show up darkly against the surrounding cytoplasm. Contrast is excellent; however it is not for use with thick objects. Frequently, a halo is formed even around small objects, which obscures detail. The system consists of a circular annulus in the condenser, which produces a cone of light. This cone is superimposed on a similar sized ring within the phase-objective. Every objective has a different size ring, so for every objective another condenser setting has to be chosen. The ring in the objective has special optical properties: it,

first of all, reduces the direct light in intensity, but more importantly, it creates an artificial phase difference of about a quarter wavelength. As the physical properties of this direct light have changed, interference with the diffracted light occurs, resulting in the phase contrast image. One disadvantage of phase-contrast microscopy is halo formation (halo-light ring).

Q.3(A) Microbiological media, chemicals and biological materials cannot be heated above 100°C but if they can withstand the temperature of free flowing steam (100°C). possible to sterilize them using fractional sterilization (tyndallization). Heating at 100°C for 3 successive days with incubation periods in between. Resistant spores germinate during the incubation periods, on subsequent to heat. the vegetative clls will be destroyed. Apparatus used is steam Arnold.

Q.3(B) usage and limitations.

Reference: Microbiology by Pelczar 5th edition page number: 485-486

OR

Q.3(C) phenol coefficient method

Reference: Microbiology by Pelczar 5th edition page number: 505-506

Q.3(D) factors

Reference: Microbiology by Pelczar 5th edition page number: 490-491

Q.4(A)

Simple media – example nutrient medium provides minimum growth requirement for growth of all organisms

Complex media – example Mac Conkey's Agar used for growth of fastidious organisms used for enrichment of micro organisms

Selective media – example Mac Conkey's Agar

Sodium taurocholate present in the media supports the growth of enteric organism whereas non enteric organisms do not use this requirement.

Differential media:eg: blood agar

Differentiates between hemolytic (zone of inhibition) and non hemolytic (no zone of clearance) organisms.

Eg. Mac Conkey's agar: differentiates between lactose fermenters (pink colonies) and lactose non fermenters(pale yellow coloured colonies).

Q.4(B) **Explain the method and significance**

Direct Microscopic count

Hemocytometer

Breed's count

OR

4 marks each

Q.4 (C)

Standard plate count can be explained with the help of procedure and significance of SPC and pour plate technique

MPN – method and significance.

(4)

Q.4(D) Dissolve the dehydrated ingredients(defined / crude) in distilled water, Adjust the pH, agar.

Q.5 Write short notes

1. Numerical aperture- The measure for the resolving power of an objective is the numerical aperture. The larger the NA, the greater the resolving power of the objective and finer the detail it can reveal.
2. Mordant -Any substance that forms an insoluble compound with a stain and serves to fix the color of bact. Cells. Ex. Various flagella stains
3. Pasteurization : definition , LTH,HTST
4. Reference: Microbiology by Pelczar 5th edition page number: 500-501
5. Direct microscopic count- Method , 2 significances.