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E-Content for of M.Sc. 3rd sem Botany

(Elective Course-1: Industrial Microbiology Course Code: BOT3003-EL1)

Unit-I "Instrumentation used for Microbiology and Plant Pathology"

developed by

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Hot air oven

It is a vertical still works with double or triple world body of aluminium or stainless steel. partition with wire mess trace inside full stop the body of the device is provided with heating element between the walls either at the bottom of the box bottom heated Bottom heated or on all three sides of the body Universal heating the outside of the body painted with the epoxy powder coating some Womens are also provided with system of system for circulating hot air in between the inner chamber and insulation through post forced air moved by motorised blower so as to minimize the temperature variation at any points in working space Oven are available in wearing capacity. thermothermostate control is provided to Mini maintain the temperature inside with the sensitivity of or less the door is provided with synthetic rubber gas kit to make it air tight That the range of temperature inside where is from 50^0C to 300^0C or more. The front of the oven is provided with a digital temperature controller come in indicator and power switch for power switch for on of full stop in oven the temperature is maintained above the ambient temperature. this This device is commonly used for dry heat sterilization of many objects such as glassware like Vetri plates puppets flask and other usable without graduation during many biological exercises full stop the temperature required for sterilization me very with the time of exposure to the dry heat. time 120^0C for 8-hour ,140^0C for 3-hour, 160^0C for 1-hour and 180^0C for 20 minutes.

BOD incubator

The biological oxygen demands incubator maintains a range of temperature below and above the ambient temperature required for growth and multiplication of various microorganisms full stop it is a vertical and steel chamber shaped as an almirah made up of

double or triple world body full stop outer surface is painted for stop incubators are Available in wearing capacity. temperature inside maybe maintained from 5 to 50^0C with accuracy of plus minus 1^0C full stop incubator is provided with both heating and cooling systems full stop heating maybe of two types bottom heated and universal heated in which the heating element is placed in all three side walls with a With a thermostatic control while cooling is maintained by compressors full stop it is provided with air circulation fans for uniform distribution of temperature inside. if required in fluorescence light of 60 CM may be installed comma vertical along the back wall of device for illumination full stop these lights are incorporated with the timer 0 to 24 hour for regulating aluminiation period me also be installed for Install for monitoring CO_2 air mixture concentration inside and humidsitate for control of humidity 52 to 95% by natural mist

outside, on the front surface is it is provided with switches for manual public automatic temperature controller, heat energy regulator digital temperature indicator cooling oblique heating indicators and mains .The culture demands and ambient temperature humidity and oxygen for its isolation and multiplication full stop the required conditions are adjusted in the incubators following the instructions for growth and multiplication of organism which may vary from one organism to another full stop the culture plate are does incubated for desired period in incubator

Laminar Air Flow Cabinet

The cabinet is fabricated out of thick Board of sunmica or is of stainless steel. interior surface of working platform public table is of stainless steel with the sunmica played at the top full stop sites of the panels are optic transparent Flexi oblic acrylic glass during frame the unit is fit and with both Pre filter and high efficiency particular air HEPA HP filter full stop air is drawn through pre filter and is made to pass through Highly Effective HEPA filters having efficiency rating as high as 99.99% does retaining all the particulars all the particles of size 0.3 0.3 Micron or larger full stop a blower and motor assembly of 1.5 HP dynamically and statistically balanced is fixed

the working area is illuminated by inflorescent light fitted with the unit height of the working table is adjusted to be comfortable to sit down for operator. Are you be light is also fixed underneath the Sunmica played at the top and it is cyst on 10 to 20 minutes before working. for gas vacuum line is also provided at the outer layer of the top played. laminar flow provides and its septic or microorganism free environment for performing various activity such as boring of sterile media in Sterlite plates isolation and transfer of Pathogens during application of different methodology require a septic or sterilized environment.

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centrifuge various methodology require centrifugation of suspensions for separation of various particles of different density's through centrifugal forces. the body of the device is micro operation microprocessor controller for regulating the speed in RPM it has got an auto cleavale rotor with 12 positions for 15 ml d i n tubes full stop the RPM varies in different Centrifuges. the simplest and commonly used is the table centrifuge which has 3000 RPM and is generally used for washing test and for other routine work. ultracentrifuge may have speed as high as 15000 RPM or even more. It is used for isolation of protein DNA RNA and Virus particles from the samples

Refrigerator Deep Freezer

there is need to maintain the culture in pure form for further studies. it may be DNA sample protein RNA virus particles fungi bacteria etc. the maintenance of culture in a general is carried out at low temperature 02 5 degree centigrade because at lower temperature all like processes slow down and culture may be maintained without losing their identity for a longer period. this is carried out in a refrigerator. apparently, refrigerator resembles to the incubator but the basic difference is that the temperature maintained inside refrigerator is always below the ambient temperature unlike incubator where temperature will be maintained below and above ambient temperature ranging from 5^0C to 50^0C.

Weighing Balance

many types of balances such as single Pan balance top loading electrical balance analytical balance are available for weighing different ingredients required during the course of experimentation. the accuracy of weighing is determined by the sensitivity of balance is which may be as low as 0.0001 gram. electrical valences are easy to handle and are more accurate and sensitive.

electronic balance are highly sensitive and even fans or friends are many effect the accuracy of measurements

after every use Clean Pan with dry clean tissue paper and keep in dust proof chamber

Microscopy

Microscopy is a composite instrumental technique for making very tiny object visible to the unaided eye. An instrument used to make the tiny object visible with naked (unaided) eye is called a microscope. There are two structurally different types of microscopes based on the use of light: the light microscope and electron microscope. The two compound the word compound refers to the fact that two lenses, the objective lens and the eyepiece work together to produce the final magnified image.

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Light Microscope

light or optical microscope uses which will light as a source of illumination. because the light travels through the specimen this instrument can also be called transmission light microscope. the simplest form of light microscope consist of a single lens, magnifying glass. microscope made up of more than one glass lens in combination is termed compound microscope full stop compound microscope includes condenser lens, the objective lens and eye piece lens. condenser lens focuses the light from the light source at the specimen. the one face the object is called objective and the one close to the eye is called eyepiece. the objective has a smaller aperture and smaller focal length than those of the eye pieces also referred to as the ocular. a compound microscope with single eyepiece it said to Monu cooler and one with two eyepieces is called binocular. Objective lens may have 40 x 10 x 20 X 40 x 60 x 100 x while eyepieces usually have 10 x or 15 x.

Phase Contrast

most objects seen under a microscope are either coloured our dark, absorbing sufficient incident light show that their density and colour are aluminated as amplified objects. Although specimens which are thin and colourless appear transparent, their contours and details can be clearly seen in a dark field phase object. within the internal focal plane of the objective. this cause shift to revert to that given by and amplitude object as the phase control is converted to amplitude contrast. when using a face contrast microscope means without thick membrane can be examined providing the cover only part of the field. the optical surface of both microscope and preparation of absolutely clean and the light source is more intense than that used for bright field microscope. the face contrast microscope is also known as the one rape interference microscope.

Electron Microscopy

All to a compound light microscope is usually adequate for examination fungal pathogens The detailed microscopic examination of tissue for viruses and sometimes bacteria require the use of a transmission electron microscope. electron microscope relay on a beam of electrons produced from a hot filament Tungsten rather than light as the source of illumination and their power of resolution is consequently very much greater as it is not limited by the wavelength of light. after the electron are accelerated down the microscope by a potential difference accelerate voltage between the cathode the filament and the anode electromagnetic lens comparable to condenser in light microscope focus them into a narrow Bheem. however, since gas has molecules in the year of electron microscopes must be maintained under vacuum. electron microscopes are of two types transmission electron

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microscope (TEMs) scanning electron microscopes (SEMs). while a time is analogous to compound light microscope and SPM is more similar to Binocular stereo microscope are rather costly for ordinary use and unless the pathogen is abundant the task of finding it in a section be very tedious and time consuming, so immunological or is other specific staining techniques may be used. computer processing of electron microscope images is also potentially valuable technique.

Transmission Electron Microscopy (TEM)

When using a beam of focus electron is passed through a thin section of the specimen. electromagnetic lenses magnifying the images formed in the beam like a objective and IPS in a light microscopy before the final image is project screen where it can be seen and photograph.

Scanning Electron Microscopy (SEM)

The beam of focus electron in and SEM is stand across the specimen by and process similar to farming television picture when the beam of electron Strike the specimen emitting secondary electrons which are attracted towards a positively charged grill and direction system. these generate variable strength electronic signals which after amplification and processing produce the final image on cathode ray tube screen that can be photograph. space means exam and with the semi often coated with the thin film of electrical conductors such as carbon or Gold applied with stupid both reduce charging and increase electron emission. all the most material for the For the SEM is sanctioned, frozen host issue can be fractured so that internal hyphae and other structures are exposed

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