Model Answers: M.Sc. (I semester) Biotechnology Examination 2014-2015
LBTM 103: Bioinstrumentation

1. Answer following questions in one word or sentence.

(i). What is formula for numerical aperture? NA=n sinθ

(ii). How you will determine applied centrifugal field (G) using angular velocity (ω) and radial distance for centrifugation (r)? $G=\omega^2 r$

(iii). Among microwave, radio-waves and ultraviolet rays, which has lower wave length? UV Rays

(iv). Write down Beer's law? $A \alpha c$

(v). What is full form of HPLC? High Performance liquid Chromatography

(vi). Which chromatography technique utilizes electrostatic interaction? Ion-exchange Chromatography

(vii). Which counter is used to analyze double isotope? Liquid Scintillation Counter (LSC)

viii). In GM counter, if voltage is too low, what will happen? Recombination will occur

(ix). Write the full form of TEMED. Tetra methyl ethylene diamine

(x). Due to which chemical, we are able to visualize DNA in agarose gel under UV light? DNA binding fluorescent chemical (EtBr, PI etc)

Section B: Attempt any four questions.

2. What are benefits of phase microscopy? How phase differences of deviated and un-deviated light are converted into intensity difference? Briefly discuss applications?

Benefits in terms of high contract and ability to visualize unstained/living object must be discussed. Discuss the basic principle of condensing lens to collect deviated/un-deviated light for intensity difference using light path diagram. Application in microscopic observations to see thin, unstained, living object must be discussed.

3. What is mass spectrometry? How it can be used for analysis of different types of analytes in given mixture?

Define mass spectrometry as tool which utilizes spectrometric techniques to differentiate between mass. It operates on difference in m/z ratio. Using appropriate figure, discuss different components of MS to analyze different analytes in mixture i.e. Qudrapole/hexapole/octapole, MALDI-TOF, Reflectors, dyanodes, phosphorescent film, Zn film etc.

4. Discuss about partition and adsorption chromatography? Describe about operation and application of thin layer chromatography.

Partition and adsorption chromatography operate on solute distribution and adsorption affinity respectively. Using line diagrams, discuss about theoretical plates, retention time, retention factor, kd, Rf etc.

5. How many methods can be employed to for measurement of radioactivity? Explain any one in brief?

Measurement of radioactivity can be done by 3 methods: Ionization (GM counter), Excitation (LSC counter) and photographic emulsion (Autoradiography). Write any one with principle, diagram, quenching, disadvantages and advantages.

6. Write descriptive notes on RIA and ELISA?

Focus on discoverer, principle based on interaction of Ab and Ag and measurement as radioactivity and enzyme activity respectively. Discuss about types of assays and various application of techniques.

7. Give a brief account on Southern blotting and western blotting with their applications?

Southern blotting is for DNA and western blottingis for protein estimation. Explain on following points:discoverer, principle, procedure, advantages and disadvantages.

8. Write short notes on photo-multiplier tube (PMT) and Immunoelectrophoresis?

Photomultipler tube (PMT) with diagram indicating photocathodes, anode, dynodes and high voltage and its uses. Immunoelectrophoresis is combination of electrophoresis and immunodiffusion.

24.11.14