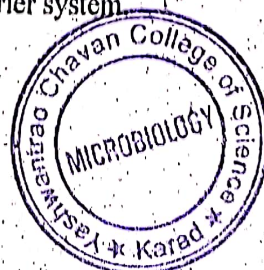
Shivaji University, Kolhapur
Yashwantrao Chavan College of Science Karad
Department of Microbiology
Class – M.Sc. I, Subject Name: Techniques in Microbiology

True / False type questions

1. Dark field microscope produces a bright image of the object against a dark background.
2. Dark field microscope enhances the phase contrast between intracellular structures having slight differences in refractive index.
3. Differential Interference contrast microscope (DIC) creates images by detecting differences in refractive indices & thickness of different parts of the specimen.
4. In a DIC microscope specimens are stained with fluorochrome.
5. Fluorescent microscope shows a bright image of the object resulting from the fluorescent light emitted from a specimen.
6. Objects having size between 100µm to 1A^0 can be observed by using an electron microscope.
7. In an electron microscopy electrons are emitted by a heated filament of Tungsten.
8. In an electron microscopy electrons are emitted by a cold filament of tungsten which acts as an anode.
9. Fluorescent microscope shows a bright image of the object resulting from the electrons emitted from a specimen.
10. Laser beam is used to illuminate the spots on a specimen in case of confocal microscopy.
11. Hungate roll tube technique employed in an attempt to cultivate a minimal portion of the organism in the gingival crevice area of man.
12. Sodium thioglycolate is an example of an oxidizing agent in the cultivation of anaerobes.
13. Sodium thioglycolate is an example of a reducing agent in the cultivation of anaerobes.
14. Many specimens are too thick to be mounted directly onto a slide, and hence these are cut into thin sections using a device called acrotome.
15. Rhodamine is an example of flurochrome used in FISH.
16. Enrichment culture technique is the use of certain growth media to favour the growth of a particular bacterium over the others.
17. Laboratories with short-time cultivations follow the techniques like sub-cultivation, storage under mineral oil and by cooling to 4 – 8°C.
18. Sporulating fungi stored for 7-18 years in silica gel and can remain morphologically stable.
19. Silica gel storage is a technique that involves the inoculation of a suspension of fungal propagules onto a cold silica gel.
20. In a lyophilization technique recrystallization of ice can occur at temperatures above -139°C and this can cause a structural damage during storage.
21. Good Laboratory Practices was first introduced in New Zealand and Denmark in 2009.
22. Good Laboratory Practices is a formal regulation created by USFDA.
23. Good Laboratory Practices were initially implemented to prohibit hygenic environment in the laboratories.
24. Animal care facilities should be located away from the testing laboratories.
25. If a personnel is exposed to acids and alkalies, such type of hazard is called biological hazard.
26. Contamination risk is reduced by barrier system.



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27. Reagents used in the operation should be specified in the SOPs.
28. Archieves should be there for orderly storage and expedient of all documents.
29. GLP is a FDA regulation which is accepted and approved as international standards by QECD.
30. Exposure of personnel to contaminated body fluids is a biological type of hazard.
31. Risk assessment of each laboratory task is conducted by OSHA.
32. The full form of ACDP is Advisory Committee on Dangerous pathogens.
33. The first thing for implementation of action plan for safety practices is to access level of risks.
34. In case, if personnel exposed to a hazard, one should immediately report the incidence.
35. In a laboratory, alcohol used for disinfection of hands is of 34% concentration.
36. Wrappers should be dumped of in different dust bins and not mixed with normal domestic waste.
37. PPO kit should be used while handling highly transmissible pathogen.
38. For general laboratory disinfection, hypochlorite solution should be diluted at 1% concentration.
39. Ultrasonication method is used for cell disruption.
40. Cation exchange chromatography retains cations and has negatively charged stationary phase functional group.
41. Conventional analytical columns in GC usually use flow rates in the range from 20-50 mL/min.
42. In SDS PAGE, one SDS molecule binds for every four amino acid residues.
43. Gels containing 0.3% agarose will separate double-stranded DNA molecules of between 5 and 60 kb size.
44. The polymerization of acrylamide is an example of free-radical catalysis.
45. If one is aiming to detect a particular protein often an enzyme on the basis of its biological activity, SDS PAGE is used.
46. For capillary electrophoresis, reagents are required at larger quantity.
47. Sample for agarose gel electrophoresis are in a buffer solution that contains ficoll.
48. Differential centrifugation is based upon the differences in the sedimentation rate.
49. Percoll is gradient material used in density gradient centrifugation.
50. The target analyte retained on the stationary phase can be eluted by increasing the concentration of a similarly charged species.
51. The most frequently used capillary column in GC, is the fused silica open tubular column.
52. Photo-polymerisation is an alternative method that can be used to polymerise acrylamide gels.
53. High percentage of epichlorohydrin gives large pore size for sephadex.
54. Stationary phase in GLC is a solid like silica or alumina.
55. The carrier gas pressure ranges from 1-5 psi.
56. The most frequently used capillary column is the fused support coated open tubular.
57. In cation exchange chromatography, the negatively charged analyte could be displaced by the addition of positively charged sodium ions.
58. Columns used in HPLC should withstand high pressure of up to 1.5×10^7 Pa.
59. In isocratic elution, separation of target analyte is done by using more than two solvent.
60. In photo-polymerisation ammonium persulphate are replaced by riboflavin.
61. SDS is cationic detergent.
62. Stacking gel is poured on top of the separating gel contain 14% acrylamide.
63. Pure protein gives two bands on an SDS–PAGE, unless the molecule is made up of two unequal subunits.

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64. In native gels, polyacrylamide gels are used normally at concentration of 7.5%.
65. Much greater range of protein with Mr values can be separated on a fixed-percentage gel.
66. Bio-Lyte is an example of ampholyte used in isoelectric focusing.
67. Fluorescence is an emission phenomenon where an energy transition from a lower to a higher state is accompanied by radiation.
68. Proteins possess three intrinsic fluorophores as tryptophan, tyrosine and phenylalanine.
69. Bioluminescence is the reaction leading to a fluorescent product which involves enzyme in luciferase.
70. The main application of bacterial luciferase is the determination of electron transfer co-factors.
71. Luminometry essentially measures the angle through which the plane of polarisation is changed.
72. Optically active molecule has a positive CD then its enantiomer will have a negative CD.
73. The absorption of infrared light by a molecule results in transition to higher levels of vibration.
74. The criterion for a peak to appear in the Raman spectrum is a change in polarisability of the molecule.
75. NMR spectroscopy is the main method of structure determination for organic compounds.
76. The basic principles of NMR can be applied to imaging of dead samples.
77. Some isotopes decay by emitting positively charged b-particles referred to as positrons.
78. An alpha particle is a helium nucleus which consists of one proton and one neutron.
79. Radioactive decay is measured as destructions per minute.
80. The International Unit of the radioactivity is Becquerel.

Long answer type questions. Each question carries 16 marks.

1. Discuss in detail general principles of isolation and cultivation of anaerobes.
2. Describe in detail principles and working of transmission and scanning microscopes.
3. Explain in detail general principles, methods and selective factors used in enrichment culture technique.
4. Discuss in detail principles and methods of preservation of bacteria, viruses, yeasts and molds.
5. Describe in detail principles and working of dark field and phase contrast microscopy.
6. Explain in detail principles and methods of cell disruption.
7. Explain in detail general principles of Good laboratory practices.
8. Explain in detail common hazards in the laboratory.
9. Discuss in detail safety measures used in the microbiology laboratory.
10. Explain in detail general principle, working and applications of ion exchange chromatography.
11. Explain in detail general principle, working and applications of gas chromatography.
12. Explain in detail general principle, working and applications of high performance liquid chromatography.
13. Give the detailed account of principle, working and applications of polyacrylamide gel electrophoresis.
14. Explain in detail SDS polyacrylamide gel electrophoresis. Add note on its applications.
15. Give the detailed account of principle, working and applications of agarose gel electrophoresis.

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16. Describe in detail general principles of radioisotopic techniques. Add a note on GM counter.
17. Explain in detail principles of IR and Raman spectrophotometry.
18. Describe in detail different methods of using radioisotopes.
19. Describe in detail different methods of detection of radioactivity.
20. Give the detailed account of principle, working and applications of X – ray crystallography.

Medium answer type questions (Each question carries 08 marks)

1. Give principles and methods of preservation of viruses.
2. Give principles and methods of preservation of yeast and molds.
3. Describe in detail principles and working of transmission microscopes.
4. Describe in detail principles and working of scanning microscopes.
5. Explain in brief reducing agents and indicators used in cultivation of anaerobic bacteria.
6. Give principles and methods of preservation of bacteria.
7. Explain in detail principles and selective factors used in enrichment culture technique.
8. Methods and media used for the isolation of human and animal pathogenic fungi.
9. Describe in brief principles, working and applications of dark field microscopy.
10. What is Good laboratory practice? Explain GLP in microbiology laboratory.
11. What is safety? Discuss various safety measures used in the laboratory.
12. Discuss in brief qualifications of equipment.
13. Explain in brief validation and calibration.
14. Discuss in brief methods of disruption of microbial cells.
15. Discuss in brief methods of disruption of plant and animal cells.
16. Explain in brief common chemical hazards in the laboratory.
17. Explain in detail working and applications of gel exclusion chromatography.
18. Explain in brief SDS polyacrylamide gel electrophoresis.
19. Discuss in detail principle and working of differential and density gradient centrifugation.
20. Explain in detail types of gas chromatography and add note on components of gas chromatography.
21. Explain in detail working and applications of capillary gel electrophoresis.
22. Discuss in brief working mechanism of ion exchange chromatography.
23. Explain in brief nature, types and characteristics of gels used in gel electrophoresis.
24. Explain in brief general principles of column chromatography.
25. Give general principles of electrochemical cells and potentiometry.
26. Explain in brief principles and applications of circular dichroism and optical rotational dichroism.
27. Describe in detail any two methods of detection of radioactivity.
28. Explain in detail principle and working of Raman spectrophotometry.
29. Explain in detail principles and applications of IR spectrophotometry.
30. Explain in brief principles and applications of the pH and oxygen electrodes.

Short answer type questions (Each question carries 04 marks).

1. Hungate's roll tube technique
2. Open enrichment system.
3. Differential interference contrast
4. Single cell isolation
5. Preservation of yeast and mold

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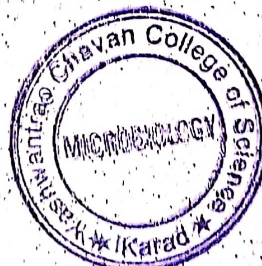
6. Closed enrichment system
7. Preservation of bacteria
8. Preservation of viruses
9. Reducing agents and indicators used in anaerobic media
10. Anaerobic jar method
11. Anaerobic glove box
12. Media used for isolation of human pathogenic fungi
13. Atomic force microscopy
14. Confocal scanning
15. Selective factors used in enrichment technique
16. Performance qualifications
17. Design qualifications
18. Installation and operational qualifications.
19. Types and significance of validation.
20. Accuracy in preparation of solutions and media.
21. Ionizing radiations as hazards
22. Infectious materials as hazards
23. Gas and fire hazards
24. Personal protection in laboratory
25. Waste disposal
26. Use of First aid box in laboratory.
27. Concept of Documentation
28. Need and types of Documentation.
29. Microbial cell disruption.
30. Plant cell disruption.
31. Applications of gel exclusion chromatography.
32. Isoelectric focusing
33. Density gradient centrifugation
34. Native and gradient gels
35. Electrophoresis of RNA
36. Diagrammatic representation of capillary electrophoresis
37. Applications of ion exchange chromatography
38. Cation and anion exchangers
39. Detectors used in HPLC
40. Carrier gas used in gas chromatography
41. Gas chromatography columns
42. Formation of Polyacrylamide gels.
43. Applications of SDS-PAGE
44. Two-dimensional polyacrylamide gel electrophoresis
45. Pulsed-field gel electrophoresis
46. Turbidimetry
47. Nephelometry
48. Fluorimetry
49. Luminometry
50. Circular dichroism
51. Optical rotational dichroism
52. Spectrophotometry
53. ESR
54. NMR
55. Gas ionization chamber



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56. Radioisotope tracer technique,
57. Isotope dilution assay
58. pH electrode
59. Ion selective electrode
60. Oxygen electrodes

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