**Dayanand Science College, Latur**

**Department of Biotechnology**

**Class: M.Sc. BT F.Y. (sem-I)**

**Subject: Technique in biology (BT-IV)**

**Teacher – Bansode S. M.**

**\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

1. **Which part of the compound microscope helps in gathering and focusing light rays on the specimen to be viewed?**
a) Eyepiece lens
b) Objective lens
c) Condenser lens
d) Magnifying lens
2. **What is the minimum distance for the eye to focus any object?**
a) 11 cm
b) 25 cm
c) 32 cm
d) 42 cm
3. **Resolving power of a microscope is a function of \_\_\_\_\_\_\_\_\_\_\_\_**
a) Wavelength of light used
b) Numerical aperture of lens system
c) Refractive index
d) Wavelength of light used and numerical aperture of lens system
4. **The greatest resolution in light microscopy can be obtained with \_\_\_\_\_\_\_\_\_\_\_**a) Longest wavelength of visible light used
b) An objective with minimum numerical aperture
c) Shortest wavelength of visible light used
d) Shortest wavelength of visible light used and an objective with the maximum numerical aperture
5. **Oil immersion objective lens has an NA value of\_\_\_\_\_\_\_\_\_\_\_\_**
a) 0.65
b) 0.85
c) 1.33
d) 1.00
6. **In fluorescence microscopy, which of the following performs the function of removing all light except the blue light?**
a) Exciter filter
b) Barrier filter
c) Dichroic mirror
d) Mercury arc lamp
7. **Total Magnification is obtained by \_\_\_\_\_\_\_\_\_\_**
a) Magnifying power of the objective lens
b) Magnifying power of eyepiece
c) Magnifying power of condenser lens
d) Magnifying power of both the objective lens and eyepiece
8. **In light microscopy, which of the following is used as fixatives prior to staining technique?**a) Osmic acid
b) Glutaraldehyde
c) Heat
d) Osmic acid, glutaraldehyde, heat
9. **In Phase contrast microscopy, the rate at which light enters through objects is \_\_\_\_\_\_\_\_\_\_**
a) Constant
b) Inversely proportional to their refractive indices
c) Directly proportional to their refractive indices
d) Exponentially related to their refractive indices
10. **Which part of the light microscope controls the intensity of light entering the viewing area?**
a) Coarse adjustment screw
b) Fine adjustment screw
c) Diaphragm
d) Condenser lens
11. **When separating proteins using gel filtration chromatography, the first proteins to be eluted will be \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.**

a. smallest

b. largest

c. negatively charged

d. positively charged

1. **The centrifugation is based on the principle of when a force is less than the gravity desired.**
a) True
b) False
2. **In 500 × g, what does g represent in accordance to centrifugation?**
a) Gravitational force
b) Centrifugal force is 500 times greater than earthly gravitational force
c) Centrifugal force is 500 times less than earthly gravitational force
d) Centrifugal force is 500 times same as that of earthly gravitational force
3. **Which of the following is not a type of centrifugation?**
a) Hydro cyclone
b) Tubular centrifuge
c) Microfiltration
d) Disk stack separator
4. **By increasing the feed rate of the liquid in tubular centrifuge the performance is increased.**
a) True
b) False
5. **At what speed do you centrifuge blood?**
a) 2200-2500 RPM
b) 3000-3200 RPM
c) 1000-1500 RPM
d) 4000 RPM
6. **Which of the following centrifugation is used to separate certain organelles from whole cell?**a) Rate-zonal centrifugation
b) Normal centrifugation
c) Differential centrifugation
d) Isopycnic centrifugation
7. **Which of the following is used as a media for density gradient?**a) Agarose
b) Ficoll
c) Luria broth
d) Propylene glycol
8. **What is rate-zonal centrifugation?**
a) Based on separation of particles by mass
b) Based on separation of particles by density
c) Based on separation of particles on solubility
d) Based on separation of particles on size
9. **Which of the following is not the characteristic of ion selective electrodes?**
10. It is fragile
11. Easy to use
12. Available in different sizes and shapes
13. It is insensitive to many ions
14. **In liquid membrane electrode, the liquid ion exchanger is held in a porous disc of \_\_\_\_\_\_\_\_\_\_\_\_\_**

a) Solid material
b) Semi-permeable membrane
c) Hydrophobic material
d) Water absorbing material

1. **A pH meter is an example of:**
2. an electrolytic cell.
3. an ion-selective electrode.
4. a reference electrode.
5. a fuel cell.
6. **Chromatography is a physical method that is used to separate and analyse \_\_\_\_\_\_\_\_\_\_**

a) Simple mixtures
b) Complex mixtures
c) Viscous mixtures
d) Metals

1. **In which type of chromatography, the stationary phase held in a narrow tube and the mobile phase is forced through it under pressure?**

a) Column chromatography
b) Planar chromatography
c) Liquid chromatography
d) Gas chromatography

1. **In chromatography, the stationary phase can be \_\_\_\_\_\_\_\_\_\_\_ supported on a solid.**

a) Solid or liquid
b) Liquid or gas
c) Solid only
d) Liquid only

1. **In chromatography, which of the following can the mobile phase be made of?**

a) Solid or liquid
b) Liquid or gas
c) Gas only
d) Liquid only

27. **Which of the following cannot be used as adsorbent in Column adsorption chromatography?**

a) Magnesium oxide
b) Silica gel
c) Activated alumina
d) Potassium permanganate

28. **Which of the following types of chromatography involves the separation of substances in a mixture over a 0.2mm thick layer of an adsorbent?**

a) Gas liquid
b) Column
c) Thin layer
d) Paper

29. **Chromatography cannot be used to purify volatile substances.**

a) True
b) False

30. **In Column chromatography, the stationary phase is made of \_\_\_\_\_\_\_\_\_ and the mobile phase is made of \_\_\_\_\_\_\_\_\_**

a) Solid, liquid
b) Liquid, liquid
c) Liquid, gas
d) Solid, gas

**31. **Chromatography cannot be used to separate delicate products.****

a) True
b) False

32. **In Thin layer chromatography, the stationary phase is made of \_\_\_\_\_\_\_\_\_ and the mobile phase is made of \_\_\_\_\_\_\_\_\_**

a) Solid, liquid
b) Liquid, liquid
c) Liquid, gas
d) Solid, gas

33. **In which of the following type of paper, chromatography does the mobile phase move horizontally over a circular sheet of paper?**

a) Ascending paper chromatography
b) Descending paper chromatography
c) Radial paper chromatography
d) Ascending – descending chromatography

**34. **Liquid chromatography can be performed in which of the following ways?****

a) Only in columns
b) Only on plane surfaces
c) Either in columns or on plane surfaces
d) Neither in columns nor on plane surfaces

35. **Gas chromatography can be performed in which of the following ways?**

a) Only in columns
b) Only on plane surfaces
c) Either in columns or on plane surfaces
d) Neither in columns nor on plane surfaces

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| **36. Thin layer chromatography is** |
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| A. | partition chromatography |
| B. | electrical mobility of ionic species |
| C. | adsorption chromatography |
| D. | none of the above |

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| **37. In gas chromatography, the basis for separation of the components of the volatile material is the difference in**1. partition coefficients
2. conductivity
3. molecular weight
4. Molarity
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| **38. Ion exchange chromatography is based on the**a) electrostatic attractionb) electrical mobility of ionic speciesc) adsorption chromatographyd) partition chromatography**39. HPLC stands for** |
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| A. | High Pressure Liquid Chromatography |
| B. | High Performance Liquid Chromatography |
| C. | both (a) and (b) |
| D. | Highly Placed Liquid Chromatography |

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| **40. The eluent strength is a measure of** |
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| A. | solvent adsorption energy |
| B. | solvent absorption energy |
| C. | solvent diffusivity |
| D. | solvent mixing index |

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| **41. HPLC methods include** |
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| A. | liquid/liquid (partition) chromatography |
| B. | liquid/solid (adsorption) chromatography |
| C. | ion exchange and size exclusion chromatography |
| D. | all of the above |

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| **42. Column efficiency is measured in terms of number of plates which is** |
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| A. | inversely related to the square of the peak width |
| B. | directly related to the square of the peak width |
| C. | inversely related to the cube root of the peak width |
| D. | directly related to the square of the peak width |

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| **43. For a typical adsorbent such as silica gel, the most popular pore diameters are** |
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| A. | 10 and 50 A° |
| B. | 60 and 100 A° |
| C. | 100 and 150 A° |
| D. | 150 and 200 A° |

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| **44. An isocratic elution in HPLC is one in which the composition of the solvent** |
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| --- | --- |
| A. | remains constant |
| B. | changes continuously |
| C. | changes in a series of steps |
| D. | none of these |

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| **45. In reversed phase HPLC, there is a** |
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| A. | non polar solvent/polar column |
| B. | polar solvent/non-polar column |
| C. | non polar solvent/non-polar column |
| D. | any of the above |

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| **46. Which of the following statements is true for a refractive index detector in HPLC?** |
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| A. | It is more sensitive than a UV detector |
| B. | It can only be used for isocratic elutions |
| C. | It does not respond to many solutes |
| D. | none of above |

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| **47. A gradient elution in HPLC is one in which the composition of the solvent** |
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| --- | --- |
| A. | remains constant |
| B. | is changed continuously or in a series of steps |
| C. | both (a) and (b) |
| D. | none of the above |

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| **48. An eluotropic series** |
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| A. | ranks solvents by their relative abilities to displace solutes from a given absorbent |
| B. | ranks column packing material by their relative abilities to retain solutes on the column |
| C. | is a measure of the solvent adsorption energy |
| D. | none of the above |

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**49. The technique electrophoresis, for the separation of charged molecules was developed by**

1. Tswett
2. Svedberg
3. Tiselius
4. Sanger

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| **50. In electrophoresis, DNA will migrate towards** |
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1. cathode or positive electrode
2. anode or negative electrode
3. cathode or negative electrode
4. anode or positive electrode

51. **The polymerase chain reaction is\_\_\_\_\_\_\_\_\_.**

(a) It is a DNA sequencing technique.

(b) It is a DNA degradation technique

(c) It is a DNA amplification technique

(d) All of the above

**52. The speed of migration of ions in an electric field depends on**

1. magnitude of charge and mass of molecules
2. magnitude of charge and shape of molecules
3. shape and size of the molecule
4. magnitude of charge, shape and mass of molecules

**53. Which of the following statement is true regarding migration of bio molecules?**

a) the rate of migration is directly proportional to the current

b) the rate of migration is inversely proportional to current

c) the rate of migration is directly proportional to the resistance of the medium

d) Low voltage is used for the separation of high molecular weight compounds

**54. Electrophoresis cell or electrophoresis apparatus consists of**

1. power pack and electrophoresis unit
2. Elctrophoresis unit and DNA separator
3. buffer chamber and Elctrophoresis unit
4. Gel, buffer chamber and power pack

**55. The most common type of gel used for DNA separation is**

a) Agar

b) Polyacrylamide

c) Agarose

d) All of the above

**56. Which is the technique suited for the separation of large DNA fragments**

a) AGE

b) PAGE

c) PFGE

d) SDS-PAGE

**57. In SDS-PAGE, separation is based on**

a) molecular weight

b) shape

c) charge

d) all of the above

**58. The electrophoresis technique that used isoelectric focusing is**

a) AGE

 b) PFGE

 c) 2D-PAGE

d) SDS-PAGE

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| **59. Molar absorbtivities of compounds exhibiting charge transfer absorption are** |
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| A. | small |
| B. | moderate |
| C. | large |
| D. | none of these |

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**60. Molar absorbtivity is the measure of the**

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| A. | amount of light absorbed per unit length |
| B. | amount of light absorbed per unit concentration |
| C. | amount of light reflected and absorbed per unit concentration |
| D. | None of the above |

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**61. Which of the following wavelength ranges is associated with UV spectroscopy?**

****a)****0.8 - 500µm

****b)****400 - 100nm

****c)****380 - 750nm

****d)****0.01 - 10nm

**62. Which of the following assays could not be performed by gas chromatography?**

1. Characterisation of volatile oils
2. Measurement of drugs and metabolites in biological fluids
3. Characterisation of raw materials for drug synthesis
4. Analysis of intravenous sodium chloride infusion

**63. Geiger-Muller counter is used to detect:**

a) Protons

b) Neutrons

c) Photons

d) None

**64. Which of the following is not a type of radiation detectors?**

a) Geiger Muller counter
b) Proportional counter
c) Semiconductor detector
d) Flame emission detector

**65. ‘When nuclear radiations pass through, gas ionization is produced.’ This is the principle of which of the following detectors?**

a) Proportional counter
b) Flow counter
c) Geiger Muller counter
d) Scintillation counter

**66. Which of the following acts as quenching gas in Geiger Muller counter?**

a) Alcohol
b) Argon gas
c) Krypton
d) Hydrogen

**67.  Which of the following acts as ionising gas in Geiger Muller counter?**

a) Alcohol
b) Argon gas
c) Krypton
d) Hydrogen

**68. Which of the detectors is similar to Geiger Muller counter in construction but is filled with heavier gas?**

a) Proportional counter
b) Flow counter
c) Semiconductor detector
d) Scintillation counter

**69. Scintillation detector is a large flat crystal of which of the following materials?**

a) Sodium chloride
b) Sodium iodide
c) Sodium sulphate
d) Sodium carbonate

**70. Liquid samples must be counted using ionization chamber by placing them in which of the following?**

a) Test tube
b) Curvette
c) Ampoules
d) Flask

**71. Gaseous compounds containing radioactive sources can be directly introduced into the ionization chamber.**

a) True
b) False

**72. Liquid Scintillators are used for which of the following materials?**

a) Low energy beta materials
b) High energy beta materials
c) Low energy gamma materials
d) High energy gamma materials

**73. ELISA (enzyme-linked immunosorbent assay) allows for rapid screening and quantification of the presence of \_\_\_\_\_\_\_ in a sample.**

1. amino acid
2. DNA
3. Antigen
4. protein

**74. Which technique is used to assay drug concentration in plasma** **?**

A. IR sepctroscopy

B. UV sepctroscopy

C.Non aqueous titration

D. RIA

**75. RIA was developed by**

A.  Berson& Yalow

B. chals&wastone

C. vector&logan

D. lewis&bronstand

**76. How many microgram antigen detected in sample by RIA ?**

A.0.1 μg/ml

B.0.0001 μg/ml

C.0.001 μg/ml

D.0.01 μg/ml

**77. Which sentence is not true about RIA?**

A.The most commonly used radiolabels in RIA are tritum and iodine.

B.Centrifugation rpm is 1200-2500.

C.Thistechinque is very sensitivity it can detected 0.001 μg/ml

D.Thistechinque is very sensitivity it can detected 0.01 μg/ml

**78. RIA standarded graph as**

A. X-axis = % Radioactivity and Y.-axis = unlabledAg(ng)

B.X-axis = unlabledAg(ng) and Y.-axis = % Radioactivity

C.X-axis = % Radioactivity and Y.-axis = unlabledAg(mg)

D.X-axis = Radioactivity and Y.-axis = unlabledAg(ng)

**79. Which is not application of RIA ?**

A.It is used to assay the presence of hepatitis B surface anti gen in donated blood.

B.In analysis of vitamine like riboflavin

C. T4 &  T3 measurement

D.Digitoxin or digoxin in patients receiving these drugs and measurement its concentration.

**80. Which of the following is not a characteristic of the immobilized enzymes?**
a) They cannot be re-used
b) It produces reproducible results
c) Stability exists
d) Same catalytic activity is present for number of analysis

**81. Which of the following is the physico-chemical component?**
a) Enzymes
b) Anti-bodies
c) Transducer
d) Cells or tissues

**82. An example of biosensor, urea electrode makes use of which of the following electrodes?**
a) Carbon dioxide electrode
b) Ammonia electrode
c) Fluoride electrode
d) Ammonium electrode

**83. In glucose electrode, glucose oxidase has been coupled to an electrode by which of the following materials?**a) Ferrocene derivatives
b) Urease
c) Polyacrylamide
d) Biochips

**84. Biosensors measure glucose concentrations between which of the following ranges?**
a) 10-1 to 10-2 M
b) 10-2 to 10-4 M
c) 10-1 to 10-4 M
d) 10-1 to 10-7 M

**85. Transducers employed in the bulk of enzyme electrodes use which of the following principles?**
a) Amperometric
b) Optical
c) Magnetic
d) Colorimetric

**86. Which of these biosensors use the principle of heat released or absorbed by a reaction?**
a) Potentiometric biosensor
b) Optical biosensors
c) Piezo-electric biosensors
d) Calorimetric biosensors

**87. Which of the following biosensors use the movement of electrons produced during redox reactions?**
a) Amperometric biosensor
b) Potentiometric biosensors
c) Piezo-electric biosensors
d) Optical biosensors

**88.  Nanoscopic optical biosensors have fast response time but the sensitivity is reduced.**a) True
b) False

**89. In glucose sensor, a measure of change in oxygen value is a measure of the glucose value.**
a) True
b) False

**90. For constructing the glucose sensor, which of the following is used as a gel?**
a) Urea
b) Urease
c) Acrylamide
d) Polyacrylamide

**91.  \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ converts biochemical events into measurable signals**.
a) amplifier
b) opamp
c) rectifier
d) transducer

**92. The biological response of the biosensor is determined by \_\_\_\_\_\_**
a) biocatalytic membrane
b) physio-chemical membrane
c) chemical membrane
d) artificial membrane

**93. Home blood glucose sensor works on which principle?**a) electro-physiological
b) electrochemical
c) physio-chemical
d) chemical

**94. The chemical reaction of glucose with oxygen is catalyzed in the presence of \_\_\_\_\_\_\_\_**
a) glucose oxidase
b) monoglucosecarbodase
c) glusocedioxidase
d) biglucose oxidase

 **95. Home blood glucose measurement devices measure the glucose level through non-invasive method.**a) True
b) False

**96. Blood glucose level measurement device uses a biosensor works on the principle of electrochemical.**
a) True
b) False

**97. Biochips are made up of**

1. semi-conducting molecules inserted into the protein frame work
2. conducting molecules inserted into the protein frame work
3. non-conducting molecules inserted into the protein frame work
4. any of the above

**98. Which of the following technology is used for micro array manufacturing?**

1. Photolithography
2. Ink jetting
3. Contact printing
4. All of these

**99. A micro array is an ordered array of microscopic elements on a planer substrate that allows the specific binding of**

1. gene or gene products
2. whole genome
3. both (a) and (b)
4. none of these

**100. Hypoxanthine can be measured by**

1. hypoxanthine sensor
2. amorphous silicon ISFET
3. urea sensor
4. alcohol sensor

**Answer key:-**

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| --- | --- | --- | --- | --- |
| 1 – c | 21 – c | 41 –d | 61 – b | 81 – c |
| 2 – b | 22 – b | 42 –a | 62 – d | 82 – d |
| 3 – d | 23 – b | 43 – b | 63 – d | 83 – a |
| 4 – d | 24 – a | 44 – a | 64 – d | 84 – c |
| 5 – c | 25 – a | 45 – b | 65 – c | 85 – a |
| 6 – a | 26 – b | 46 – c | 66 – a | 86 – d |
| 7 – d | 27 – d | 47 – b | 67 – b | 87 – a |
| 8 – c | 28 – c | 48 – a | 68 – a | 88 – b |
| 9 – b | 29 – b | 49 – c | 69 – b | 89 – a |
| 10 - c | 30 – a | 50 – d | 70 – c | 90 – d |
| 11 – b | 31 – b | 51 – c | 71 – a | 91 – d |
| 12 – b | 32 – a | 52 – b | 72 – a | 92 – a |
| 13 – b | 33 – c | 53 – a | 73 – c | 93 – b |
| 14 –c | 34 – c | 54 – a | 74 – d | 94 – a |
| 15 – b | 35 – a | 55 – c | 75 – a | 95 – b |
| 16 – a | 36 – c | 56 – c | 76 – c | 96 – a |
| 17 – c | 37 – a | 57 – a | 77 – d | 97 – a |
| 18 – b | 38 – a | 58 – c | 78 – a | 98 – d |
| 19 – d | 39 – c | 59 – c | 79 – c | 99 – a |
| 20 – a | 40 – a | 60 – b | 80 – a | 100 – a |