

3 Hours

Total Marks: 100

1. Attempt **all** questions.
2. **All questions** carry **equal** marks.
3. Draw **neat labeled diagrams** wherever necessary.
4. Use of **log tables** and **non-programmable calculator** is **allowed**.

**Q.1 a. Select the correct alternative (Any six)****06**

1. Which of the following does the virus lack?
  - a. Nucleic acid
  - b. Ribosome
  - c. Glycoprotein
  - d. Phospholipid
2. Baltimore's classification of viruses has \_\_\_\_\_ groups.
  - a. 5
  - b. 6
  - c. 7
  - d. 8
3. The replication of hepatitis B includes which of the following stages?
  - a. Movement of the intact virus to the cellular cytoplasm for replication.
  - b. Conversion of relaxed circular viral DNA into covalently closed circular (CCC) DNA in the nucleus.
  - c. Virions produced in the cytoplasm by cellular DNA polymerase.
  - d. Oncogenic activity to transform liver cells.
4. Which of the following is the example of a negative single-stranded RNA animal virus?
  - a. Tobacco Mosaic Virus
  - b. Influenza virus
  - c. Herpes Simplex Virus
  - d. Pox Virus
5. Plaque is formed by \_\_\_\_\_
  - a. animal virus
  - b. plant virus
  - c. Bacteriophage
  - d. both bacteriophage and plant virus
6. A positive strand of RNA virus \_\_\_\_\_
  - a. should be converted to m-RNA before it can be translated.
  - b. is not recognized by host ribosomes.
  - c. should convert to double-stranded DNA and then be expressed.
  - d. can be directly translated to produce viral protein.
7. An infection that results in cell death is referred to as \_\_\_\_\_.
  - a. exocytosis
  - b. cytotoxic effect
  - c. cytopathic effect
  - d. bacteriostatic effect
8. Nucleocapsid of a virus is made up of \_\_\_\_\_.
  - a. Nucleus and capsomers
  - b. Envelope and protein
  - c. Protein and Nucleic acid
  - d. viral nucleus
9. Icosahedron symmetry of the capsid has \_\_\_\_\_.
  - a. 20 sides and 12 corners
  - b. 12 sides and 6 corners
  - c. 8 sides and 4 corners
  - d. 10 sides and 5 corners

**Q.1 b. Answer the following questions: (Any Two)****14**

1. Describe the three main techniques for cultivating viruses.
2. Explain any two ways by which animal viruses are released by a host cell.
3. How are prions different from viruses, and what are viroids?

**Q.2 a. Select the correct alternative (Any six)**

**06**

1. Which of these is a Beta-lactamase inhibitor?  
a. Chloramphenicol    b. Clavulanic acid    c. Ampicillin    d. Tetracycline
2. Which of the following classes of antibiotics bind to the 30S subunit of rRNA?  
a. Cephalosporins    b. Aminoglycosides    c. Rifampin    d. Sulphonamides
3. Which of the following is a drug that resembles deoxy-GTP and inhibits the virus DNA polymerase?  
a. Amantadine    b. Acyclovir    c. Rimantadine    d. Zidovudine
4. Quinolones are responsible for \_\_\_\_\_.  
a. cell membrane disruption    b. inhibition of cell wall synthesis  
c. inhibition of DNA synthesis    d. inhibition of protein synthesis
5. \_\_\_\_\_ is the agent when added to a colony, inhibits its growth and on removal the colony regrows.  
a. Bacteriostatic    b. Bactericidal    c. Antibiotic    d. Antiseptic
6. Nystatin is a drug used for the treatment of diseases caused by  
a. bacteria    b. viruses    c. fungi    d. protozoa
7. Which antimicrobial agent binds to DNA-dependent RNA polymerase and blocks the synthesis of mRNA?  
a. Rifampicin    b. Penicillin    c. vancomycin    d. streptomycin
8. Which of the following is used as a reverse transcriptase inhibitor in the treatment of HIV?  
a. Acyclovir    b. Rimantadine    c. Adenine-arabinside    d. Azidothymidine
9. All of the following are true regarding metronidazole EXCEPT \_\_\_\_\_.  
a. It inhibits alcohol dehydrogenase    b. It is used to treat giardia  
c. It causes a metallic taste in the mouth    d. It is useful against trichomonas

**Q.2 b. Give an account on the following questions: (Any Two)**

**14**

1. The action of metabolic pathway inhibitors with a suitable example.
2. Mechanism of drug resistance in bacteria.
3. Mode of action of Penicillin and Cephalosporins on bacteria.

**Q.3 a. Select the correct alternative (Any six)**

**06**

1. Due to rotation and translation, macromolecules move into and out of a very small region in the solution this is called \_\_\_\_\_.  
a. Brownian motion    b. Inertia    c. Forward motion    d. Backward motion
2. Applications of dynamic light scattering include \_\_\_\_\_.  
a. Determination of diffusion coefficients    c. Both a and b  
b. Assessment of protein aggregation    d. Neither a nor b
3. The atoms in atomic spectroscopy are vaporized by  
a. Flame    b. Electric energy    c. Inductively coupled plasma (ICP)  
d. All of these

4. In Atomic emission spectroscopy, small part of the sample is vaporized so that \_\_\_\_\_.
  - a. Every atomic component emits light at wavelengths corresponding to changing energy levels
  - b. Every atomic component emits light at no wavelength
  - c. Every atomic component does not emit light
  - d. Neither of these
5. The primary filter in spectrofluorimetry is placed in between \_\_\_\_\_.
  - a. Source and cell
  - b. Cell and detector
  - c. Source and detector
  - d. Anywhere
6. The detection of non-fluorescent compounds can be achieved by coupling a fluorescent probe, this is called \_\_\_\_\_.
  - a. Extrinsic fluorescence
  - b. Intrinsic fluorescence
  - c. Auto fluorescence
  - d. Semi fluorescence
7. The commonly used enzyme in bioluminescence is \_\_\_\_\_.
  - a. Amylase
  - b. Luciferase
  - c. Protease
  - d. Hexokinase
8. The major disadvantage of spectrofluorimetry is \_\_\_\_\_.
  - a. Time required
  - b. Quenching
  - c. Use of two monochromators
  - d. Inaccuracy
9. When the incident light beam hits a molecule in its ground state, there is a low probability that the molecule is excited and occupies the \_\_\_\_\_.
  - a. Next higher vibrational state
  - b. Next lower vibrational state
  - c. Heat energy
  - d. Neither of these

**Q.3 b. Discuss the following: (Any Two)**

14

1.
  - a. Elastic light scattering
  - b. How molecular mass can be determined by multi-angle light scattering?
2. Explain the principle and applications of fluorescence spectroscopy.
3. Principle and applications of luminometry.

**Q.4 a. Select the correct alternative: (Any six)**

06

1. A material that fluoresces when struck by a charged particle or high energy photon is known as \_\_\_\_\_.
  - a. Scintillator
  - b. Inert gas
  - c. Halogen
  - d. Chemiluminescence
2. Decay by negatron emission: Neutron  $\rightarrow$  \_\_\_\_\_ + Negatron
  - a. Electron
  - b. Positron
  - c. Proton
  - d. Helium
3. In \_\_\_\_\_ process, changes occur in the atomic nucleus, and particles and/or electromagnetic radiation are emitted.
  - a. fluorescence
  - b. radioactive decay
  - c. transformation
  - d. scattering

4. In \_\_\_\_\_ chromatography, separation relies on the attraction between oppositely charged stationary phase.
  - a. size exclusion
  - b. gel filtration
  - c. ion exchanger
  - d. affinity
5. \_\_\_\_\_ can be used as a matrix in ion exchange chromatography.
  - a. inert gas
  - b. water
  - c. mineral solution
  - d. cellulose
6. Relative molecular mass determination can be done by \_\_\_\_\_ chromatography.
  - a. Affinity
  - b. Ion exchange
  - c. Size exclusion
  - d. Paper
7. \_\_\_\_\_ exploits the unique property of extremely specific biological interactions to achieve separation and purification.
  - a. Affinity chromatography
  - b. Centrifugation
  - c. Size exclusion chromatography
  - d. Ion exchange chromatography
8. In Affinity chromatography, select a ligand that \_\_\_\_\_.
  - a. displays poor specificity
  - b. poor stability
  - c. displays group selectivity
  - d. do not displays group selectivity
9. In affinity chromatography, purified compound is recovered from the ligand by \_\_\_\_\_.
  - a. by dilution
  - b. by water wash
  - c. by reloading sample
  - d. by either specific or non-specific elution

**Q.4 b. Describe the following questions: (Any Two)**

**14**

1. Principle, working, and applications of size exclusion chromatography
2. Steps in HPLC method development and add a note on any three parameters for method validation
3. GM counters and their applications in the detection of radioactivity.

**Q.5 Write Short notes on the following: (Any four)**

**20**

- a. Virus purification and assays.
- b. Mode of action of macrolides.
- c. Selective toxicity.
- d. Principle of Raman spectroscopy.
- e. Atomic fluorescence spectrophotometry.
- f. Autoradiography.