Savitribai Phule Pune University

ICMR-NIV, M.Sc. Virology Entrance Exam Syllabus 2025

Under the aegis of Department of Biotechnology SPPU.

Syllabus for OEE:

Section A: Mental ability related to numerical aptitude, logic and reasoning, general knowledge

Section B: Graduate level Life Science subjects (Biotechnology, Botany, Chemistry, Life Sciences, Medical Sciences, Microbiology, Veterinary Sciences and Zoology) **please refer detailed syllabus**

Question paper Pattern

Section A: Mental ability related to numerical aptitude, logic and reasoning, general knowledge

Number of questions to be asked	Total marks
20	20

Section B: Basic questions from Graduate level Life Science subjects (Biotechnology, Botany, Chemistry, Life Sciences, Medical Sciences, Microbiology, Veterinary Sciences, Zoology, Biochemistry etc.)

Number of questions to be asked	Total marks
80	80

Duration of the Online Entrance Exam : 02 Hrs (inclusive of both the sections)

Negative marking system will be applied for evaluation. For every wrong answer 1/4 (one fourth) of the allotted marks of the question will be deducted.

Detailed Syllabus for M.Sc. Virology Online Entrance Examination

Section A:-

Questions based on mental ability, related to numerical aptitude, logic, reasoning and general knowledge.

Section B:-(Subject specific syllabus)

1) **Chemistry**: Atomic Structure, Water, acids, bases, salts, solutions, concentrations, pH and buffers, chemical bonds, functional groups, elements, periodic table, basic concepts and laws of thermodynamics, basics of nuclear chemistry and radioisotopes.

2) **Biomolecules**: Chemistry, structure and functions of amino acids, proteins, nucleic acids, carbohydrates, lipids & vitamins.

3) **Cell Biology**: Structure of prokaryotic and eukaryotic cells, Organelles, membrane structure and function. Chromatin structure and function: organization of chromosomes in prokaryotes and eukaryotes, chromatin types, cell division, concept of gene, Apoptosis.

4) **Biochemistry**: Bioenergetics and metabolism, Glycolysis, TCA cycle, Electron Transport System and ATP synthesis, oxidation of fatty acids, Classification of enzymes and enzyme kinetics, co-factors and inhibitors of enzymes.

5) **Microbiology:** History, diversity of microbes, bacterial reproduction, Isolation, culture and identification of microbes, Disinfection, sterilization, antimicrobial agents, significance of microbes in the industry and agriculture, Fermentation, and environmental microbiology. Bacterial, protozoan and fungal diseases of public health importance: Transmission, diagnosis, treatment and vaccines.

6) **Plant Sciences**: Bryophytes, Pteridophytes, Gymnosperms, Angiosperms, Vascular system in plants, Secondary metabolites and economically important plants, Photosynthesis, and Nitrogen fixation.

7) **Ecology**: Ecosystems and its types, Food chain, Food web, energy flow through the ecosystem, Ecological pyramids, Biogeochemical cycles, Pollution, Global warming and green house effects, Wild life conservation

8) **Zoology/Animal Sciences**: Classification and characteristics of invertebrates and vertebrates, zoonotic disease, insects of economical importance, animal diseases of national importance, livestock products-egg, meat and milk.

9) **Human physiology**: circulatory system, respiratory system, digestive system, excretory system, nervous system and reproductive system, endocrinology, human diseases, cancer, and inherited diseases.

10) **Molecular Biology and Genetics**: Principles of inheritance, linkage & crossing over, chromosomal aberrations, extrachromosomal inheritance, DNA replication, transcription, genetic code, and translation, post transcriptional and post translational modifications. Gene transfer: transformation, transduction, and conjugation. Gene regulation in prokaryotes and eukaryotes, DNA mutations and repair.

11) **Virology**: Structure and classification of viruses, viruses of public health importance: Disease, transmission, diagnosis, treatment and vaccines.

12) **Immunology**: History, Cells and organs of the immune system, Complement, Major histocompatibility complex, types of immunity, antigen, antibody, antigen-antibody interactions, immunological techniques, hybridoma technology, hypersensitivity, transplantation and autoimmunity.

13) **Biotechnology**: Recombinant DNA technology, principles of gene cloning, cloning and expression vectors, Blotting techniques, DNA fingerprinting, DNA sequencing,PCR, Applications of biotechnology in medicine, industry and agriculture, transgenic plants and animals, animal & plant cell culture, environmental biotechnology.

14) **Techniques**: Principles and applications of chromatography, spectroscopy, microscopy, electrophoresis, centrifugation, and radioisotope techniques.

15) Basic Biostatistics:- Mean, Median, Mode, Standard Deviation.

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