FOR THE YEAR 2026

Biology/Biological Science/Biotechnology/ Biochemistry (304) Syllabus for NCET

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Note:

There will be one Question Paper which will have 28 questions out of which 25 questions need to be attempted.

Unit- I: Reproduction

1. **Sexual Reproduction in Flowering Plants:** Pre-fertilisation: structure and events – stamen, microsporangium and pollen grain, pistil, megasporangium and embryo sac; Development of male (microsporogenesis) and female gametophyte (megasporogenesis); Pollination – types, agents and examples; Out breeding devices; Pollen-pistil interaction; Double fertilisation; Post fertilisation: structure and events – development of endosperm and embryo; Formation of seed and fruit and parthenocarpy; Significance of seed in angiosperms; Apomixis and polyembryony.

2. **Human Reproduction:** Male and female reproductive system; Microscopic anatomy of testis and ovary; Gametogenesis – spermatogenesis and oogenesis; Menstrual cycle; Fertilisation, embryo development up to blastocyst formation, implantation; Pregnancy and embryonic development and placenta; Parturition and lactation.

3. **Reproductive Health:** Problems and strategies – amniocentesis; Population stabilisation and birth control – various methods of contraception; Medical termination of pregnancy (MTP); Sexually transmitted infections (STIs); Infertility – Assisted reproductive technologies (IVF, ZIFT, GIFT, ICSI and IUI).

Unit- II: Genetics and Evolution

1. **Principles of Inheritance and Variation:** Mendel's law of inheritance: Inheritance of one gene – Law of dominance, law of segregation (test and back cross); Deviation from Mendelism – incomplete dominance and co-dominance; Multiple alleles and inheritance of blood groups; Inheritance of two genes – law of independent assortment, dihybrid cross; Chromosomal theory of inheritance; Linkage and recombination; Polygenic inheritance; Pleiotropy; Sex determination in humans, birds and honey bee; Mutation; Genetic disorders – pedigree analysis, Mendelian disorders (colour blindness, haemophilia, sickle-cell anaemia, phenylketonuria and thalassemia), chromosomal disorders in humans (aneuploidy, polyploidy, Down's syndrome, Turner's syndrome and Klinefelter's syndrome).

2. **Molecular Basis of Inheritance:** Structure and packaging of DNA helix; Search for genetic material (transforming principle and Hershey-Chase experiment); Properties of genetic material; Replication (Meselson and Stahl's experiment); Transcription – transcription unit and gene; RNA world – types of RNA and process of transcription; Genetic code and mutations; tRNA; Translation; Regulation of gene expression – Lac operon; Human Genome Project (goals, salient features and applications); DNA fingerprinting (polymorphism and VNTR).

3. **Evolution:** Origin of life – Miller's experiment; Concepts of evolution (Darwin's contribution); Evidences for evolution (embryology, paleontology, comparative anatomy, divergent and convergent evolution and industrial evolution); Adaptive radiation; Biological evolution; Natural selection; Mechanism of evolution; Hardy-Weinberg principle and affecting factors (gene migration, genetic drift, mutation, recombination and natural

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selection); Evolution of plants and vertebrates through geological periods; Origin and evolution of man.

Unit- III: Biology and Human Welfare

1. **Human Health and Disease:** Introduction about health; Common diseases in humans (typhoid, pneumonia, common cold, malaria, amoebiasis, ascariasis, filariasis and ringworms); Immunity – innate and acquired immunity, active and passive immunity, vaccination and immunisation, allergies, auto-immunity and immune system in human; AIDS; Cancer; Drugs and alcohol abuse - adolescence, addiction, effects of drug abuse, prevention and control.

2. **Microbes in Human Welfare:** Microbes in household products; Microbes in industrial products – beverages, antibiotics, enzymes and bioactive molecules; Microbes in sewage treatment and production of biogas, Microbes as biocontrol agents and biofertilisers.

Unit-IV: Biotechnology and its Applications

1. **Biotechnology: Principles and Processes:** Principles of biotechnology; Tools of recombinant DNA technology – restriction enzymes, cloning vectors, competent host; Processes of rDNA technology – isolation, amplification of gene (PCR), insertion of rDNA in host and bioreactors; Downstream processing.

2. **Biotechnology and its Applications:** Application of biotechnology in agriculture – tissue culture, genetically modified organisms, *Bt* cotton, RNA interference; Biotechnology in medicine – insulin, gene therapy and molecular diagnosis; Transgenic animals; Ethical issues – biopiracy and patents.

Unit-V: Ecology and Environment

1. **Organisms and Populations:** Population attributes – birth and death rate, age pyramids; Population growth – exponential and logistic growth; Life history variation; Population interactions – predation, competition, parasitism, commensalism, mutualism and amensalism.

2. **Ecosystem:** Structure and function; Productivity; Decomposition; Energy flow – different trophic levels, food chain and food web; Ecological pyramids – pyramid of energy, biomass and number.

3. **Biodiversity and Conservation:** Biodiversity – concept, patterns and importance; Causes of biodiversity loss; Biodiversity conservation – approaches (narrowly utilitarian, broadly utilitarian and ethical); Methods of biodiversity conservation – *in situ* (endemism, hotspots and sacred groves etc.), *ex situ* (Wildlife safaris, zoological parks and cryopreservation etc.).

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