

PG DIPLOMA IN ENVIRONMENTAL HEALTH & HYGINE

(Non-Semester)

(With effect from the academic year 2013-14)

Eligibility for the Course

Candidates for admission to PG Diploma In Environmental Health & Hygiene could possess a Bachelors degree in Zoology, Botany, Chemistry, Biochemistry, Microbiology Biotechnology/Environmental/ Animal/plant Food sciences, Dietetics & Nutrition, Bioinformatics, BE in Chemical Engineering & Biotechnology; B.Tech in Biotechnology & Bioinformatics/Nanotechnology; BDS; MBBS; B.Sc in Agri/Agri Biotechnology;B.V.Sc., B.F.Sc., .Pharm and BPT.

Duration of the Course

One year PG Diploma In Environmental Health & Hygiene course non-semester for One Year duration

Examination

All the theory paper are of 3hours duration each for maximum of 100 marks with passing minimum of 50 marks Practical examinations are also for 3 hours duration for a maximum of 100 marks and passing minimum of 50 marks.

Question Paper Pattern

Maximum marks: 100

Time: 3 hours

Part A (5 x 3 = 15)

Five short answer questions (One question from each unit)

Part B (5 x 8 = 40)

Paragraph questions (Total questions 8, out of which answers are to be given for any five questions;

Part C (3x 15 = 45)

Total questions 5, out of which answers are to be given for any Three questions;

S.No	Theory & Practicals	Maximum Marks	Minimum Marks
1.	Basics of Environmental Science	100	50
2.	Environmental Microbiology	100	50
3.	Environment Impact Assessment & Waste Management	100	50
4.	Environmental Molecular Epidemiology	100	50
P1	Practical -I Environmental Diagnostics	100	50
P2	Practical –II Molecular Diagnostics	100	50

PAPER – 1- BASICS OF ENVIRONMENTAL SCIENCE

UNIT - I:

Environment: Definition, scope and importance Environmental Factors, Environment and its segments – atmosphere, hydrosphere, lithosphere and biosphere.

UNIT- II:

Atmosphere: Origin and composition, Thermal structure and atmospheric stratification, Water vapour and Green house gases in atmosphere, Solar radiation and terrestrial heat balance, Atmosphere as a heat engine Atmospheric variables and their vertical profile, Hydrostatic balance of the atmosphere, Temperature lapse rate, Temperature inversion and atmospheric stability

UNIT- III:

Hydrosphere : Importance and characteristics, Zones of hydrosphere, Different kinds of sources of water – Ice-cap, glaciers, oceans, rivers, lakes, pond and ground water; Inventory of World's water, Hydrologic cycle, Water as a resource, Water resources of soil profile in India. Lithosphere: Earth's layers, Earth's crust and its composition, Different kinds of rocks and minerals, Major landforms, Soil – composition and classification, Soil horizon; Major physiographic divisions of India

UNIT- IV:

Introduction to Environmental Pollution: Definition, causes and types – air, water, soil, noise, radiation and thermal. Air Pollution: Causes of air pollution, Some important pollutants of air their sources and effects on living and non-living organisms; Photochemical Smog - Definition, formation, types and effects; vehicular pollution; Case study – Bhopal gas tragedy.

UNIT- V:

Monitoring and control of Air pollution: Monitoring of Air Quality Parameters – Methods, Equipments, Units and Standards; Air pollution control techniques.

REFERENCES:

1. Environmental Science – Richard T. Wright .
2. Environmental Pollution and Control – S.A. Abbasi
3. Air Pollution and Health – Stephen T. Holgave, Jonarthan M. Samet, Hillel S. Koren and Robert L. Maynard.

PAPER – 2- ENVIRONMENTAL MICROBIOLOGY

UNIT-I: MICROORGANISMS

Classification of Organisms – Eubacteria: Cell Envelope, cytoplasm, Glycocalyx, Appendages, Endospores – Archaea: Archaean Habitats & Function – Fungi: Structure, Diversity & Ecological Considerations – Protozoa – Algae: Cell structure and considerations – Viruses: infective Nature of Viruses, prokaryotic & Eucaryotic viruses –Viroids – Prions – Bacterial Growth.

UNIT – II: MICROBIAL ENVIRONMENTS

Earth Environments: Physicochemical characteristics of the Earth Environment – Distribution of Microorganism in Soil – Aeromicrobiology: Pathways – Bioaerosol Control – Aquatic Environment - Planktonic Environment – Benthic habitat – Biofilms – Aquatic Microbes: Food for the future – Low & High temperature Environments – Acidic Environments.

UNIT –III : DEDUCTION, ENUMERATION AND IDENTIFICATION

Microscopic Techniques: History, Light, Phase contrast, Fluorescence, Electron and Scanning probe microscopy imaging – cultural methods – Enumeration and Isolation techniques – Plating methods – Most probable Number Techniques – physiological methods: Carbon Respiration, Adenylate Energy charge – Enzyme assays –Functional Genomics and Proteomics based approaches – Immunological Methods: Polyclonal and Monoclonal Antibodies, Immunoassays, ELISA, Westernblotting – Immunoprecipitation assays – Nucleic acid – based methods: Extraction of Nucleic acids – Microarrays – PCR – Real Time PCR – RFLP – Gel Electrophoresis - FISH

UNIT – IV: REMEDIATION OF ORGANIC AND METAL POLLUTANTS

Environmental Law – Toxicity – Biodegradability – Environmental factors affecting Biodegradation – Biodegradations of Organic pollutants – Metal Toxicity effects on the microbial cell – physicochemical methods of metal remediation

UNIT – V: WATER AND FOOD BORNE PATHOGENS

Environmentally transmitted pathogens: Bacteria, Parasitology, Viruses – Fecal coliforms and *E. Coli* - Bacteriophage – wastewater treatment and Disinfection: Primary, Secondary Tertiary treatment – Oxidation ponds – Drinking water treatment

REFERENCES:

1. Raina M. Maier, Lan L. Pepper, Charles P. Gerba, Second Edition. Academic press, 2009. Environmental Microbiology.
2. Park and Park, Social and Preventive Medicine
3. Kuby, Immunology – 6th edition.

PAPER -3 ENVIRONMENTAL IMPACT ASSESSEMENT AND WASTE MANAGEMENT

UNIT - I

Types of waste- Solid - Semi solid - Biodegradable and Non degradable wastes - Chemical wastes- Sources of Pollution of surface and Ground water – Water Pollution Parameter – Physical , Chemical, Biological –Typical of water pollutants –Effects of water pollution water bodies – aquatic life – vegetation – Human Health –Control water pollution

UNIT - II

Methods of waste management-Vermicompost; Compost Preparation – Effluent storage pond – Eutrophication- Hospital Wastes - Agricultural and Food Industry waste – Impact Assessment Methodologies – Various methods of EIA and their relative advantages.

UNIT - III

Radioactive waste – Source of Radioactive wastes – Characteristics – Implementation –Disaster – Health effects –Assessment –Government Regulations –Radioactive Waste Management.

UNIT – IV

Principles of Recycling – Types – Uses- Applications –Detoxification.

UNIT – V

Agencies and Organizations – EIA- UNDP – EPA – NEERI – CPCB – TNSPCB – Roles of agencies – selected case studies.

REFERENCE

1. Impact of Hazardous waste on Human Health, Hazard, Health Effects, Equity and Communications Issues (1999): Barry L.Johnson, Lewis Publishers.
2. Environment Management and Administration (2007): Dr Kamal S.Srivastava, APH Publishing Corporation.
3. Environmental Management in Healthcare Facilities (1998): Kathryn D.Wagner, W.B Saunders Company.

PAPER-4 ENVIRONMENTAL MOLECULAR EPIDEMIOLOGY

UNIT- I

Overview and introduction – Definition – Targets of molecular epidemiology – Everything perspectives - Bacterial Pathogens – Transmission and Dissemination – Bacterial Infections –Diphtheria- Anthrax – Neustria – Detection Methods

UNIT- II

History and geography of TB and Leprosy – Epidemiology of Mycobacterium TB in lepta – HIV- TB co infection Co Infection – Transmission Process - Host factors - – Detection methods –Serological and Molecular method – Tropical Discharges (TDR).

UNIT- III

History of Geography of Prentice diseases Parasite infections –Malaria – Leshmaniasis – Trypanosomiasis – Transmission mode –Methods of Detection – Vectors – Indian status – Global scenario

UNIT- IV

History and Geography of warm infections; Tapeworms - Schistosomiasis – Filariasis – Vectors and Modes of Transmission –Diagnosis and Detection – Indian status – Global scenario.

UNIT- V

Tools in molecular epidemiology Sociology – PCR – RAPD -PCR-RTPCR-PFGE-16sRNA-16s DNA analysis-Microarray based screening – multilocus enzyme electro s retri (MLET) and multilocus sequence typing (MLST).

REFERENCES:

1. Dominique A. Cangant. Molecular Epidemiology of Microorganisms; methods and protocol; Human press. 2009.
2. Microbiology, 5th edition- Lansing M. Prescott, 2002
3. Microbiology, II edition – I. Nicklin, K. Graema – Cook

PAPER – 5: PRACTICALS – I ENVIRONMENTAL DIAGNOSTICS

1. Assessment of Air Pollutant – CO, CO₂ and SO₂
2. Identification of Air Borne diseases
3. Environmental Simulation Software Usage
4. Microbial analysis of Soil.
5. Plasmid DNA extraction (Demo)

PAPER – 6: PRACTICALS – II ENVIRONMENTAL DIAGNOSTICS

1. Water analysis – toxicants and microbes.
2. Toxicity testing of drinking water.
3. Testing for coliforms
4. Bacterial DNA extraction.
5. PCR RELP for pathogens (Demo)