

Total No. of Questions : 8]

SEAT No. :

P527

[Total No. of Pages : 2

[4235] - 101

M.Sc.

ENVIRONMENTAL SCIENCE

ENV - 101 : Environmental Geoscience

(Semester - I) (2008 Pattern)

Time : 3 Hours]

[Max. Marks : 80

Instructions to the candidates:

- 1) *All questions are compulsory.*
- 2) *All questions carry equal marks.*
- 3) *Neat diagrams must be drawn wherever necessary.*
- 4) *Answers to the two sections should be written in separate answer books.*

SECTION - I

Q1) Attempt any two from the following : **[10]**

- a) Describe the structure and chemical composition of atmosphere.
- b) Explain solar radiation? Add a note on its effects on atmosphere.
- c) Discuss dry and wet adiabatic lapse rate.

Q2) Answer any two from the following : **[10]**

- a) Explain geostrophic wind and gradient wind with examples.
- b) Differentiate between Thunderstorm and cyclones.
- c) Describe the effect of terrestrial radiation on seasonal variation.

Q3) Attempt any two from the following : **[10]**

- a) Explain the role of pressure measurement and distribution in atmospheric studies.
- b) Describe green house effect to earth radiation balance.
- c) Explain the various effects of heat budget.

P.T.O.

- Q4)** Write short notes on (any two) : **[10]**
- a) Jet stream
 - b) Evolution of atmosphere
 - c) Human use of surface water

SECTION - II

- Q5)** Attempt any two from the following : **[10]**
- a) Discuss in brief about internal structure of earth.
 - b) What are igneous rocks? Give any one classification of igneous rocks.
 - c) Explain “Big Bang Theory” of Earths Origin.

- Q6)** Answer any two from the following : **[10]**
- a) Describe the different soils of India.
 - b) Explain Hydrologic cycle. Add a notes on types of water.
 - c) What are minerals? Give any four minerals of aluminium.

- Q7)** Attempt any two from the following : **[10]**
- a) Explain Ice sheets melting and Sea level fluctuations.
 - b) Describe in brief an ideal soil profil.
 - c) Surface water is the main source of water to Human. Explain.

- Q8)** Write short notes on (any two) : **[10]**
- a) Mitigation measures related to Earthquake.
 - b) Trace element and health.
 - c) Origin and composition of sea water.



Total No. of Questions : 8]

SEAT No. :

P528

[Total No. of Pages : 2

[4235] - 102
M.Sc. - I
ENVIRONMENTAL SCIENCE
ENV - 102 : Environmental Chemistry
(2008 Pattern) (Semester - I)

Time : 3 Hours]

[Max. Marks : 80

Instructions to the candidates:

- 1) *All questions are compulsory.*
- 2) *All questions carry equal marks.*
- 3) *Neat diagrams must be drawn wherever necessary.*
- 4) *Answers to the two sections should be written in separate answer books.*

SECTION - I

Q1) Attempt any two from the following : **[10]**

- a) Explain the carcinogenic potential of various chemical compounds with suitable examples.
- b) What are gaseous cycles? Explain CO₂ cycle suitable example.
- c) Define :
 - i) Photosensitizer additives
 - ii) Synergistic effects
 - iii) LD50
 - iv) Biomagnification
 - v) Builders in detergents

Q2) Answer any two from the following : **[10]**

- a) How water properties are changes by addition of solute?
- b) What are the environmental and health effects of hydrocarbon pollutants?
- c) Explain structure of atmosphere. Add a note on stratospheric ozone layer.

Q3) Attempt any two from the following : **[10]**

- a) Explain the degradation of pesticides with suitable examples.
- b) How proteins are synthesized in cell?
- c) Comment on the microbial decomposition of polymers.

P.T.O.

- Q4)** Write short notes on any two : **[10]**
- a) Modified Detergents.
 - b) Types of Mutations.
 - c) Lead Toxicity.

SECTION - II

- Q5)** Attempt any two from the following : **[10]**
- a) Explain principle of gas chromatography with diagrammatic representation.
 - b) Explain the merits and demerits of gas chromatography and HPLC with reference to environmental pollutants.
 - c) Explain oxidation and reduction with suitable examples.

- Q6)** Answer any two from the following : **[10]**
- a) Explain the principle and applications of analytical technique used in determination of Heavy metals.
 - b) Comment on the quantitative and qualitative estimation of pesticides.
 - c) Explain the working and applications of ion exchange chromatography.

- Q7)** Attempt any two of the following : **[10]**
- a) Comment on the methods used for destruction of Aflatoxins.
 - b) Explain destruction procedures for alkali metals with precautionary measures.
 - c) What are radionuclides? Add a note on its environmental consideration.

- Q8)** Write short notes on any two : **[10]**
- a) Structure and types of aflatoxins.
 - b) Solubility of gases in water.
 - c) Neutron Activation Analysis.



Total No. of Questions : 8]

SEAT No. :

[Total No. of Pages : 2

P529

[4235] - 103
M.Sc. (Semester - I)
ENVIRONMENTAL SCIENCE
ENV - 103 : Environmental Biology
(2008 Pattern)

Time : 3 Hours]

[Max. Marks : 80

Instructions to the candidates:

- 1) All questions are compulsory.*
- 2) All questions carry equal marks.*
- 3) Neat diagrams must be drawn wherever necessary.*
- 4) Answers to the two sections should be written in separate answer books.*

SECTION - I

Q1) Attempt any two from the following : **[10]**

- a) What are the issues involved in conservation of wetlands?
- b) Explain the role of microorganisms in environmental conservation.
- c) Discuss the characteristics of grassland biome.

Q2) Attempt any two from the following : **[10]**

- a) Give an account on ecological status of forests in India.
- b) Explain with the help of a diagram the nitrogen cycle.
- c) Discuss the process of ecological succession on xerosere.

Q3) Attempt any two from the following : **[10]**

- a) Comment upon the unidirectional flow of energy in an ecosystem.
- b) What are wetlands? Explain the productive nature of wetlands.
- c) Give an account on characteristic features of tundra biome.

P.T.O.

- Q4)** Write short notes on (any two) : **[10]**
- a) Ecological niche.
 - b) Faunal biodiversity of India.
 - c) Classification of biomes.

SECTION - II

- Q5)** Attempt any two from the following : **[10]**
- a) What are the problems involved in conservation of biodiversity?
 - b) Describe the characteristics of coastal environment.
 - c) What are the various criterias used in defining protected areas in India?

- Q6)** Attempt any two from the following : **[10]**
- a) Comment upon Indian biodiversity with special reference as a megabiodiversity nation.
 - b) Explain the contribution of global environmental agreements in overall biodiversity conservation.
 - c) What are the salient features of wildlife protection act, 1972?

- Q7)** Attempt any two from the following : **[10]**
- a) Explain the role of local communities in wildlife management.
 - b) Mention various data collection techniques used in wildlife management.
 - c) Discuss the applications of biotechnology in species conservation.

- Q8)** Write short notes on (any two) : **[10]**
- a) Red data book.
 - b) Ex-situ conservation.
 - c) National forest policy.



Total No. of Questions : 4]

SEAT No. :

[Total No. of Pages : 3

P530

[4235] - 104

M.Sc.

ENVIRONMENTAL SCIENCE

ENV - 104 : Statistical & Research Methods

(2008 Pattern) (Semester - I)

Time : 3 Hours]

[Max. Marks : 80

Instructions to the candidates:

- 1) Answers to the two sections should be written in separate answer books.*
- 2) Neat diagrams must be drawn wherever necessary.*
- 3) All questions carry equal marks.*
- 4) Figures to the right indicate full marks.*
- 5) Statistical tables will be provided on request.*
- 6) Pocket calculators are allowed.*

SECTION - I

Q1) Solve any two from the following :

[20]

- a) Explain in brief the following terms :
 - i) Quartiles
 - ii) Variance
 - iii) Skewness
 - iv) Scatter plot
- b) Following table gives the data on rainfall (in mm) at a metrological station for 100 days of a rainy season of a year. Compute quartile deviation.

Rainfall (in mm)	Number of days
00-15	5
15-35	12
35-60	19
60-90	25
90-125	18
125-150	12
150-175	9

- c) Explain the utility of dispersion. What is the demerit of range as a measure of dispersion? Explain the difference standard deviation and coefficient of variation.

P.T.O.

Q2) Solve any two from the following : **[20]**

- a) Partial calculations using data of X and Y for 10 days gives the following results.

$$\Sigma X = 654.25, \Sigma Y = 302.73, \Sigma X.Y = 20975.22, \Sigma X^2 = 46928.72, \Sigma Y^2 = 11600.86.$$

Compute the correlation coefficient between Y and X.

- b) Explain the method of least square to fit the regression line of Y on X.
c) Explain the term kurtosis. State the types of kurtosis and draw the sketch of each.

SECTION - II

Q3) Solve any two of the following : **[20]**

- a) Write short notes on
- i) Time series models
 - ii) Independent Events
 - iii) Type I and Type II Errors
 - iv) Parameter
- b) State the probability mass function of Poisson distribution and Binomial distribution. State mean and variance of both.
- c) The data below is number of leaves observed on 90 days after germination.

Treatment	Replication		
	I	II	III
Control	19	18	17
A	17	16	15
B	18	14	16
C	13	17	19

Test at 5% level of significance whether there is any effect of treatment on number of leaves.

Q4) Solve any two of the following : **[20]**

- a) i) Explain the procedure of 't' test for equality of means of two populations. Mention clearly the assumptions also.
ii) Explain the difference between p-value and level of significance.
- b) The following data on number of school buses (in'00) over the period 2005 to 2010.

Year (t)	2005	2006	2007	2008	2009	2010
No. of Buses (Y)	29	32	38	42	47	52

Fit the trend line $Y = a + b.t$

- c) Obtain a solution of the following system of linear equations.

$$X - 3Y + 2Z = 0$$

$$3X - 4Y - 2Z = 0$$

$$-2X + 4Y + 3Z = 0$$



Total No. of Questions : 8]

SEAT No. :

[Total No. of Pages : 2

P531

[4235] - 201

M.Sc.

ENVIRONMENTAL SCIENCE

ENV - 201 : Environmental Economics

(Semester - II) (2008 Pattern)

Time : 3 Hours]

[Max. Marks : 80

Instructions to the candidates:

- 1) Answers to the two sections should be written in separate answer books.*
- 2) Neat diagrams must be drawn wherever necessary.*
- 3) All questions carry equal marks.*
- 4) All questions are compulsory.*

SECTION - I

Q1) What are the reasons for market failure? Add a note on its impact on environmental aspects. **[10]**

Q2) Justify the statement (any two) : **[10]**

- a) Subsidies are essential to stabilize and propagation of environmental policies.
- b) Environmental quality significantly affects in renewable energy programmes.
- c) Functional role of economic instruments in environmental policies.

Q3) Answer any two from the following : **[10]**

- a) Explain the role of public participation in environmental programmes.
- b) Explain the effectiveness of environmental laws in sustainable development.
- c) Explain the approaches for sustainable development.

P.T.O.

- Q4)** Write short notes on (any two) : **[10]**
- a) Demand and supply.
 - b) Cost-benefit analysis.
 - c) Carbon-credit

SECTION - II

- Q5)** Attempt any two from the following : **[10]**
- a) Differentiate between short term and long term impacts of climate change.
 - b) What are the adaptive options used in facing climate change?
 - c) Elaborate on the significance of environmental Kuznet's Curve.

- Q6)** Justify the statement (any two) : **[10]**
- a) Environmental quality matters for foreign direct investment.
 - b) Strategic planning is necessary to achieve goals of sustainable development.
 - c) Climate change is responsible for regional vulnerability.

- Q7)** Answer any two of the following : **[10]**
- a) What are the limitations to sustainable development?
 - b) Mention the negative short term impacts of climate change in India.
 - c) How adaptive options are significant in combating climate change?

- Q8)** Write notes on (any two) : **[10]**
- a) Economic reforms.
 - b) Population vulnerability.
 - c) Climate change.



Total No. of Questions : 8]

SEAT No. :

P532

[Total No. of Pages : 2

[4235] - 202

M.Sc.

ENVIRONMENTAL SCIENCE

ENV - 202 : Water & Waste Water Engineering

(Semester - II) (2008 Pattern)

Time : 3 Hours]

[Max. Marks : 80

Instructions to the candidates:

- 1) Answers to the two sections should be written in separate books.
- 2) Neat diagrams must be drawn wherever necessary.
- 3) All questions carry equal marks.
- 4) All questions are compulsory.

SECTION - I

Q1) Answer any two from the following : **[10]**

- a) Draw a flow sheet showing various treatment units for river as source of water.
- b) Which are the various water demanding sector?
- c) With the help of neat diagram explain the principle and working of a Grit Chamber.

Q2) Solve any two from the following : **[10]**

- a) A rectangular tank (L - 15m W - 6m and D - 3m) is used as sedimentation tank for 2.4 MLD water
Calculate :
 - i) horizontal velocity through tank
 - ii) detention time
- b) Explain in detail the process of sewage filtration.
- c) Write a note on disposal of screenings.

Q3) Attempt any two from the following : **[10]**

- a) Draw a neat and labelled diagram of diffused aeration system.
- b) Design a plain sedimentation tank to treat 10 MLD water assuming horizontal velocity of 0.2 m/min. The depth of tank 3m. Note that the larger diameter make the structure unstable.
- c) Explain in detail the mechanism of chlorination.

P.T.O.

- Q4)** Write short note on any two : **[10]**
- a) Water quality standard.
 - b) Intake well.
 - c) Iron removal.

SECTION - II

- Q5)** Answer any two of the following : **[10]**
- a) What are the objectives of wastewater treatment? Add a note on biological treatment.
 - b) Design a Grit Chamber to treat 5MLD of wastewater. Take a peak factor of 3, specific gravity - 2.6 and minimum water temperature - 20°C.
 - c) Describe the various types of screens used as preliminary treatment. How are screenings disposed.

- Q6)** Attempt any two of the following : **[10]**
- a) Discuss the factors which go into the design of an aerobic treatment unit like ASP or anaerobic treatment process.
 - b) Explain the significance of determination of solids in sewage treatment. How are solids estimated.
 - c) What are the major sources of wastewater generation in any process industry?

- Q7)** Answer any two of the following : **[10]**
- a) What are the characteristics of effluent from galvanising industry. Draw the flowsheet of ETP of this industry.
 - b) What are the different phases in anaerobic digestion? Add a note on UASB.
 - c) Write a note on the working of aerated lagoon.

- Q8)** Write short notes on : **[10]**
- a) Sewage pumping station.
 - b) Plastic media for trickling filter.
 - c) Stabilisation pond.



Total No. of Questions : 8]

SEAT No. :

[Total No. of Pages : 2

P533

[4235] - 203

M.Sc.

ENVIRONMENTAL SCIENCE

ENV - 203 : Environmental Pollution : Water & Soil

(2008 Pattern) (Semester - II)

Time : 3 Hours]

[Max. Marks : 80

Instructions to the candidates:

- 1) Answers to the two sections should be written in separate answer books.*
- 2) Neat diagrams must be drawn wherever necessary.*
- 3) All questions carry equal marks.*
- 4) All questions are compulsory.*

SECTION - I

Q1) Attempt any two from the following : **[10]**

- a) What are the consequences of marine water pollution?
- b) Elaborate on the purpose of sampling for water quality analysis.
- c) Discuss the methods used to estimate water pollution.

Q2) Justify the statement (any two) : **[10]**

- a) Treatment to domestic effluent/sewage is a must.
- b) Ballast water causes biological hazard.
- c) Frequent sampling from different locations is important to comment on water quality.

Q3) Answer any two of the following : **[10]**

- a) What are the consequences of water pollution on human health?
- b) Elaborate on water quality parameters.
- c) Mention the characteristics of wastewater.

P.T.O.

- Q4)** Write a note on any two : **[10]**
- a) Radioactive pollution.
 - b) Temporal & spatial sampling.
 - c) Agricultural run off as a source of pollution.

SECTION - II

- Q5)** Attempt any two of the following : **[10]**
- a) “Municipal and industrial solid waste are responsible for water and soil pollution”. Justify the statement.
 - b) Classify the solid waste and add a note on its disposal.
 - c) What are the sources of radiation in environment? Explain in brief the effects of radiation.

- Q6)** Answer any two of the following : **[10]**
- a) Write informative note on ‘different industrial waste and its effect on land’.
 - b) Describe in detail essential feature of secure land fill.
 - c) Draw schematic diagram of G.M. Counter. Explain its working in details.

- Q7)** Attempt any two of the following : **[10]**
- a) Write with suitable example “restoration of land for soil conservation”.
 - b) What are characteristics of municipal solid waste?
 - c) Draw and discuss working of semiconductor detector.

- Q8)** Write short notes on any two of the following : **[10]**
- a) Disposal technique of solid waste.
 - b) Composting.
 - c) Radioactive decay.



Total No. of Questions : 8]

SEAT No. :

P534

[Total No. of Pages : 2

[4235] - 204

M.Sc.

ENVIRONMENTAL SCIENCE

ENV - 204 : Environmental Law, Ethics & Policy

(2008 Pattern) (Semester - II)

Time : 3 Hours]

[Max. Marks : 80

Instructions to the candidates:

- 1) Answers to the two sections should be written in separate books.*
- 2) Neat diagrams must be drawn wherever necessary.*
- 3) All questions carry equal marks.*
- 4) All questions are compulsory.*

SECTION - I

Q1) Answer any two of the following :

- a) Explain in brief the principles adopted by the stockholm conference.
- b) What is the impact of hazardous waste at global scale? Explain with reference to International conventions.
- c) Discuss the legal feature of Montreal Protocol.

Q2) Answer any two of the following :

- a) Explain the Directive Principles of state policy relating to environment protection.
- b) What are the provision of the Indian Penal code to prevent and control pollution.
- c) State the objectives of the Environment Protection Act 1986.

Q3) Answer any two of the following :

- a) Write a comparison between rate of utilization and regeneration of natural resources.
- b) Explain the requirement for Environmental Audit.
- c) What are the drawback of traditional evaluation of development.

P.T.O.

Q4) Write notes on any two of the following :

- a) Future of Environmental Laws.
- b) CITES
- c) International cases on acid rain.

SECTION - II

Q5) Answer any two of the following :

- a) Write in brief about the contribution of Rio Conference in the development of International Environmental Laws.
- b) Explain the provision of Kyoto Protocol with reference to global warming.
- c) Comment upon the provisions of the Factories Act for protection of human environment.

Q6) Answer any two of the following :

- a) What are the legal provisions in India for the control of noise pollution.
- b) Explain the role of Public Interest Litigation in Environment Protection.
- c) What are the powers and function of State Boards.

Q7) Answer any two of the following :

- a) Explain the objectives and role of United Nations Environmental programme.
- b) Write a critical note on National Environment Policy.
- c) Define and explain the concept of Sustainable Development with reference to Indian Legal System.

Q8) Write notes on any two of the following :

- a) Ganga Pollution Cases.
- b) Panchayat Raj System and Environment Protection.
- c) Natural and man made growth.



Total No. of Questions : 8]

SEAT No. :

P535

[Total No. of Pages : 2

[4235] - 301
M.Sc. (Semester - III)
ENVIRONMENTAL SCIENCE
ENV - 301 : Air Pollution and Climate Change
(2008 Pattern)

Time : 3 Hours]

[Max. Marks : 80

Instructions to the candidates:

- 1) *All questions are compulsory.*
- 2) *All questions carry equal marks.*
- 3) *Neat diagrams must be drawn wherever necessary.*
- 4) *Answers to the two sections should be written in separate answer books.*

SECTION - I

Q1) Attempt any two from the following :

- a) Discuss in detail sources of air pollution.
- b) Discuss the reactions in stratosphere.
- c) Describe classification of air pollutant.

Q2) Answer any two from the following :

- a) Define air pollution and add a note on their effects on plant.
- b) Describe the methods for control of air pollution.
- c) Enlist the preventive methods of industrial pollution control.

Q3) Attempt any two from the following :

- a) What are the sources of green house gases? Discuss their effect on climate.
- b) Write in detail classification and effect of aerosols.
- c) What are the principle causes of industrial air pollution?

P.T.O.

Q4) Write short notes on any two :

- a) Effect of SPM on human.
- b) Earth Umbrella.
- c) Monitoring methods of particulate matter.

SECTION - II

Q5) Attempt any two from the following :

- a) Write principle of ESP and add a note on its working.
- b) Discuss the principle and working of cyclone collectors.
- c) Discuss the criteria to control the air pollution.

Q6) Answer any two from the following :

- a) How filters remove the particulate matter?
- b) What are the different steps involved in absorption of gases?
- c) Describe dry scrubber in detail.

Q7) Attempt any two from the following :

- a) What is global warming? Give the reasons for it.
- b) What is IPCC? Write its background and working.
- c) What is Kyoto protocol? How it help to maintain the climate?

Q8) Write short notes on any two :

- a) Advantages and disadvantages of ESP.
- b) Effect of air pollution on climate.
- c) Role of UNFCCC.



Total No. of Questions : 8]

SEAT No. :

P536

[Total No. of Pages : 2

[4235] - 302

M.Sc.

ENVIRONMENTAL SCIENCE

ENV - 302 : EIA and Environmental Audit

(2008 Pattern) (Semester - III)

Time : 3 Hours]

[Max. Marks : 80

Instructions to the candidates:

- 1) *All questions are compulsory.*
- 2) *All questions carry equal marks.*
- 3) *Neat diagrams must be drawn wherever necessary.*
- 4) *Answers to the two sections should be written in separate answer books.*

SECTION - I

Q1) Attempt any two from the following : **[10]**

- a) With reference to latest EIA notification, which are the stages of the Environment clearance process.
- b) Describe principles of National Environmental Policy-2006.
- c) Describe the factors generally considered while studying socio-economic Environment.

Q2) Answer any two from the following : **[10]**

- a) Explain the procedure of constitution of state level expert appraisal committee (SEAC) & EIA Authority (SEIAA).
- b) Describe general objectives of an EIA study.
- c) Explain the parameters considered for meteorological environment of an EIA study.

Q3) Attempt any two from the following : **[10]**

- a) Broadly explain any three methods of impact assessment.
- b) Explain significance of land use & geographical data in an EIA study.
- c) How hydrological data is utilized while assessing an impact with respect to thermal power project.

P.T.O.

- Q4)** Write short notes on (any two) : **[10]**
- a) Categorization of projects/activities with reference to EIA notification -2006.
 - b) Air aspect for establishing baseline status of the site.
 - c) Brief history of EIA procedure.

SECTION - II

- Q5)** Attempt any two from the following : **[10]**
- a) Design an environment management plan for highway project.
 - b) Explain significance of environmental monitoring programmes safety measures in an EIA study.
 - c) Design an EIA report structure for an industrial project.

- Q6)** Answer any two from the following : **[10]**
- a) Describe a generic plan for risk & disaster management for an industry.
 - b) Describe various impacts of distillery industry on environment.
 - c) Public hearing procedure and its advantages/disadvantages.

- Q7)** Attempt any two from the following : **[10]**
- a) Describe the impact of sugar industry on ecology as well as socio-environmental aspects.
 - b) Which are the treatment & disposal options considered, in an environmental audit?
 - c) Explain the significance of audit and describe methodology for an environmental audit.

- Q8)** Write short notes on (any two) : **[10]**
- a) Consumption & pollution audit.
 - b) Matrices method of impact assessment.
 - c) Pre and post audit activities.



Total No. of Questions : 8]

SEAT No. :

P537

[Total No. of Pages : 2

[4235] - 303

M.Sc.

ENVIRONMENTAL SCIENCE
ENV - 303 : Remote Sensing & GIS
(2008 Pattern) (Semester - III)

Time : 3 Hours]

[Max. Marks : 80

Instructions to the candidates:

- 1) All questions are compulsory.*
- 2) All questions carry equal marks.*
- 3) Neat diagrams must be drawn wherever necessary.*
- 4) Answers to the two sections should be written in separate answer books.*

SECTION - I

Q1) Attempt any two from the following : **[10]**

- a) Explain the principle of aerial photography.
- b) Write briefly about the history and development of Remote sensing.
- c) Discuss the energy interactions with earth surface features and spectral responses.

Q2) Answer any two from the following : **[10]**

- a) Describe the thermal infrared remote sensing along with its radiation properties.
- b) Describe the operating principle of multispectral scanners.
- c) Discuss of types of resolution considered in remote sensing work.

Q3) Attempt any two from the following : **[10]**

- a) Explain the principle used in global positioning system.
- b) Discuss the steps involved in data acquisition and interpretation.
- c) Describe the importance of photographic scale in photogrammetry.

P.T.O.

- Q4)** Write short notes on (any two) : **[10]**
- a) Types of remote sensing platforms.
 - b) Image parallax.
 - c) Hyperspectral sensing.

SECTION - II

- Q5)** Attempt any two from the following : **[10]**
- a) Describe the components of GIS.
 - b) Describe the spatial data representation.
 - c) Discuss the various techniques of digitisation.

- Q6)** Answer any two from the following : **[10]**
- a) Describe the stages in GIS data modelling.
 - b) Explain the relationships between spatial objects.
 - c) Explain the database in GIS.

- Q7)** Attempt any two from the following : **[10]**
- a) Describe the spatial objects in GIS.
 - b) Discuss application of RS-GIS in Environmental and Disaster Management.
 - c) Explain the GIS work flow.

- Q8)** Write short notes on (any two) : **[10]**
- a) Digital elevation model.
 - b) DBMS (Data Base Management System)
 - c) Software used in GIS.



Total No. of Questions : 8]

SEAT No. :

[Total No. of Pages : 2

P538

[4235] - 304

M.Sc.

ENVIRONMENTAL SCIENCE

ENV - 311 : Restoration Ecology

(2008 Pattern) (Semester - III)

Time : 3 Hours]

[Max. Marks : 80

Instructions to the candidates:

- 1) All questions are compulsory.*
- 2) All questions carry equal marks.*
- 3) Neat diagrams must be drawn wherever necessary.*
- 4) Answers to the two sections should be written in separate books.*

SECTION - I

Q1) Attempt any two from the following : **[10]**

- a) Briefly explain biotic and abiotic interaction in ecosystem.
- b) Explain the criteria for selection of species in restoration.
- c) What is the significance of rhizosphere micro flora in degradation?

Q2) Answer any two from the following : **[10]**

- a) What is phytoremediation? Enlist the name of species used for it.
- b) How the odour is removed by using bioscrubber?
- c) Write the management practices used for restoration of saline soil.

Q3) Attempt any two from the following : **[10]**

- a) Explain the role of agroforestry in ecological balance.
- b) Write the significance of biofertilizers in agrarian environment.
- c) What are the ill, effects of leachates from dumping site.

P.T.O.

- Q4)** Write short notes on (any two) : **[10]**
- a) River restoration.
 - b) Bio augmentation
 - c) Mangrooves in coastal environment.

SECTION - II

- Q5)** Attempt any two from the following : **[10]**
- a) Explain the role of physical parameters in watershed programme.
 - b) What is sustainable agriculture development.
 - c) Briefly explain the role of watershed development committee.

- Q6)** Answer any two from the following : **[10]**
- a) Explain in brief silviculture practices in agro-forestry.
 - b) What are the advantages of co-operative lift irrigation?
 - c) Narrate the importance of hydrological characteristics in watershed.

- Q7)** Attempt any two from the following : **[10]**
- a) Write the importance and techniques used for roof top harvesting.
 - b) Briefly explain the land use classification.
 - c) Explain the role of public participation in watershed programme.

- Q8)** Write short notes on (any two) : **[10]**
- a) Self-help Group.
 - b) Drain-line Treatment.
 - c) Silvopastoral system.



Total No. of Questions : 8]

SEAT No. :

P539

[Total No. of Pages : 2

[4235] - 305

M.Sc.

ENVIRONMENTAL SCIENCE

ENV - 312 : Biodiversity & Conservation

(Semester - III) (2008 Pattern)

Time : 3 Hours]

[Max. Marks : 80

Instructions to the candidates:

- 1) *All questions are compulsory.*
- 2) *All questions carry equal marks.*
- 3) *Answers to the two sections should be written in separate books.*
- 4) *Neat diagrams must be drawn wherever necessary.*
- 5) *Figures to the right indicate full marks.*

SECTION - I

Q1) Attempt any two from the following : **[10]**

- a) Explain the need for assessment of Biodiversity.
- b) What is characterization of biodiversity?
- c) Explain the magnitude of biodiversity. Enlist the approximate number of enlisted species of various taxa.

Q2) Answer any two of the following : **[10]**

- a) Explain the centers of diversification.
- b) Define 'endemism'. Describe the factors responsible for endemism.
- c) Explain the reasons for loss of agro-biodiversity.

Q3) Attempt any two from the following : **[10]**

- a) Describe the functional properties of biodiversity.
- b) Explain the global patterns of biodiversity distribution.
- c) What are the characteristics of biodiversity expressed at population level.

P.T.O.

- Q4)** Write short notes on any two : **[10]**
- a) Integrated approaches towards monitoring of biodiversity.
 - b) Drivers and dynamics of biodiversity changes.
 - c) Management of biodiversity.

SECTION - II

- Q5)** Attempt any two of the following : **[10]**
- a) Explain the role of biotechnology in the assessment of biodiversity.
 - b) What is ex-situ conservation? Explain any two methods with examples.
 - c) Discuss the problems and perspective of participatory management of biodiversity.

- Q6)** Attempt any two of the following : **[10]**
- a) “Environmental protection act 1986 is known as umbrella act for biodiversity conservation”. Comment on the statement.
 - b) Describe any two methods of ecological restoration.
 - c) Elaborate on ethical and aesthetic values of biodiversity.

- Q7)** Justify the following (any two) : **[10]**
- a) “Biotechnology is blessing and curse to the biodiversity”.
 - b) “Bioprospecting is need of an hour”.
 - c) Global biodiversity conservations show impact on national initiatives.

- Q8)** Write short notes on (any two) : **[10]**
- a) International biodiversity laws.
 - b) Global environment facility.
 - c) Sacred groves.



Total No. of Questions : 8]

SEAT No. :

P540

[Total No. of Pages : 2

[4235] - 401

M.Sc. (Semester - IV)

ENVIRONMENTAL SCIENCE

**ENV - 401 : Environmental Toxicology Health & Safety
(2008 Pattern)**

Time : 3 Hours]

[Max. Marks : 80

Instructions to the candidates:

- 1) Answers to the two sections should be written in separate books.*
- 2) Neat diagrams must be drawn wherever necessary.*
- 3) All questions carry equal marks.*
- 4) All questions are compulsory.*

SECTION - I

Q1) Attempt any two of the following :

- a) Explain the safety and health aspects related to development projects.
- b) Comment on the policies related to industrial health and safety.
- c) What is health and safety risk management? Explain briefly.

Q2) Answer any two of the following :

- a) Explain the guidelines for national policy for preparedness plan.
- b) Describe the various emission standards for chemical industries.
- c) What are the safety standards for development project?

Q3) Justify any two of the following :

- a) Participatory responsibilities of workers in awareness program.
- b) The role of ESI in workers safety.
- c) The prospectives and interactive approach in safety program.

Q4) Write short notes on any two of the following :

- a) Risk Identification.
- b) Industrial environmental conditions.
- c) Public awareness and participation in prevention procedures.

P.T.O.

Total No. of Questions : 8]

SEAT No. :

P541

[Total No. of Pages : 2

[4235] - 402

M.Sc.

ENVIRONMENTAL SCIENCE

ENV - 402 : Watershed Management

(2008 Pattern) (Semester - IV)

Time : 3 Hours]

[Max. Marks : 80

Instructions to the candidates:

- 1) *Answers to the two sections should be written in separate books.*
- 2) *Neat diagrams must be drawn wherever necessary.*
- 3) *All questions carry equal marks.*
- 4) *All questions are compulsory.*

SECTION - I

Q1) Attempt any two of the following :

- a) What are objectives of watershed management?
- b) What is the scheme of land capability classification?
- c) Explain the techniques of watershed resource appraisal.

Q2) Justify any two of the following :

- a) Watershed development is an environmentally sensitive activity.
- b) Soil characteristics is basic indicator of land capability.
- c) Incentives are necessary to encourage peoples participation.

Q3) Answer any two of the following :

- a) What are the different parameters of environmental assessment in watershed management?
- b) What are the process of plan formulation in watershed planning?
- c) Discuss the role women in watershed management.

Q4) Write note on any two of the following :

- a) Relief aspect.
- b) Resource map.
- c) Environmental Impact Assessment.

P.T.O.

SECTION - II

Q5) Attempt any two from the following :

- a) Explain the processes of interception and infiltration in watershed.
- b) Elaborate on the concept, process & significance of mulching.
- c) What is erosion? Mention various types and methods of erosion control.

Q6) Justify the statement (any two) :

- a) Watershed management is successful with participatory approach.
- b) Consideration of hydrological processes is significant in watershed planning.
- c) Improvement of grassland successfully controls soil & water erosion.

Q7) Answer any two from the following :

- a) What is sericulture? How it can be correlated with watershed management?
- b) Elaborate on the need for water harvesting and management in watershed program.
- c) Discuss various mechanical methods to control soil & water erosion.

Q8) Write notes on any two :

- a) Conservation forestry.
- b) Traditional water harvesting
- c) Self help group.



Total No. of Questions : 8]

SEAT No. :

P542

[Total No. of Pages : 2

[4235] - 403

M.Sc.

ENVIRONMENTAL SCIENCE

ENV - 411 : Forestry and Habitat Management

(2008 Pattern) (Semester - IV)

Time : 3 Hours]

[Max. Marks : 80

Instructions to the candidates:

- 1) *Answers to the two sections should be written in separate books.*
- 2) *Neat diagrams must be drawn wherever necessary.*
- 3) *All questions carry equal marks.*

SECTION - I

Q1) Attempt any two of the following :

- a) Enlist and explain any five important terms used in forestry.
- b) Discuss the problem of tree improvement.
- c) Elaborate on the methods of gene conservation.

Q2) Justify any two of the following statements :

- a) Participatory approach is significant in agroforestry.
- b) Forestry encourages soil conservation.
- c) Cost benefit ratio is important for silviculture analysis.

Q3) Answer any two of the following :

- a) Discuss the need for consideration of biotic and abiotic factors in forestry.
- b) Mention the properties of tree species preferred for silviculture in India.
- c) Discuss the impact of forest fire on the forest resource.

Q4) Write notes on any two of the following :

- a) Ex-situ gene conservation.
- b) Nutrient cycling in forest.
- c) Wood felling activity.

P.T.O.

SECTION - II

Q5) Attempt any two of the following :

- a) How remote sensing and GIS used in forestry surveying.
- b) Discuss the control measures for forest fire.
- c) What are forest services? How are they evaluated?

Q6) Justify any two of the following statements :

- a) Consideration of stand structure is necessary in forest management.
- b) Sampling plots play important role in forest monitoring.
- c) Discuss the need for participatory approach in forestry.

Q7) Answer any two of the following :

- a) Discuss the limitation of Indian Forest Act, 1927.
- b) Elaborate on the history of forestry development in India.
- c) Mention the processes in shifting cultivation.

Q8) Write notes on any two of the following :

- a) Engineering principles in forestry.
- b) Wood processing.
- c) Joint Forest Management.



Total No. of Questions : 8]

SEAT No. :

P543

[Total No. of Pages : 2

[4235] - 404

M.Sc.

ENVIRONMENTAL SCIENCE

ENV - 412 : Environmental Planning & Management

(Semester - IV) (2008 Pattern)

Time : 3 Hours]

[Max. Marks : 80

Instructions to the candidates:

- 1) Answers to the two sections should be written in separate books.*
- 2) Neat diagrams must be drawn wherever necessary.*
- 3) All questions carry equal marks.*
- 4) All questions are compulsory.*

SECTION - I

Q1) Solve any two from the following : **[10]**

- a) State the significance of understanding baseline status of resource.
- b) 'Political Willingness is important for planning process' Justify the statement.
- c) 'No development is possible without natural resource planning'. Justify.

Q2) Attempt any two from the following : **[10]**

- a) 'Development is population dependent process'. Discuss.
- b) What is urban planning? Explain significant parameters considered in urban planning.
- c) Discuss the significance of rehabilitation & resettlement.

Q3) Answer any two from the following : **[10]**

- a) What is the historical importance of planning?
- b) Comment on 'Industrial development depends on natural resources'.
- c) 'Willingness play important role in planning'. Discuss.

P.T.O.

- Q4)** Write notes on (any two) : **[10]**
- a) Adverse impact of planning.
 - b) Importance of national law in planning.
 - c) Rehabilitation problems.

SECTION - II

- Q5)** Attempt any two from the following : **[10]**
- a) 'Development is a necessary evil'. Discuss.
 - b) Enlist the legislation framework for environmental management in India.
 - c) What are the specifications of disposal of solid waste in urban planning?

- Q6)** Solve any two from the following : **[10]**
- a) What is environmental impact assessment? Provide the process diagramme of EIA.
 - b) What is biomedical waste? Mention the details of its disposal.
 - c) Highlight the need for sustainable development.

- Q7)** Justify the statement (any two) : **[10]**
- a) Environmental policies are important for sustainable development.
 - b) Pollution control boards are playing crucial role in betterment of environmental conditions.
 - c) Water conservation is key parameter for urban planning.

- Q8)** Write notes on (any two) : **[10]**
- a) Environment protection act.
 - b) Solid waste management in rural areas.
 - c) Urban developmental issues.



Total No. of Questions : 8]

SEAT No. :

[Total No. of Pages : 2

P544

[4235] - 405

M.Sc.

ENVIRONMENTAL SCIENCE

ENV - 413 : Environmental Management Systems

(Theory & Job Licensing)

(2008 Pattern) (Semester - IV)

Time : 3 Hours]

[Max. Marks : 80

Instructions to the candidates:

- 1) Answers to the two sections should be written in separate books.*
- 2) Neat diagrams must be drawn wherever necessary.*
- 3) All questions carry equal marks.*
- 4) All questions are compulsory.*

SECTION - I

Q1) Answer any two of the following :

- a) Write about the various tools used in environmental management.
- b) Who are the participants in environmental management?
- c) What are the different international standards in Environmental management systems?

Q2) Attempt any two of the following :

- a) What are the goals and purposes of EMS? What is the ISO 14000 standard for EMS. Give its advantages.
- b) What is Environmental design? and What are the benefits of environmental design?
- c) How does EMS help in improving environmental quality?

Q3) Answer any two of the following :

- a) Describe the procedure for carrying out life cycle assessment explain with a case study.
- b) What are the benefits and costs associated with LCA?
- c) Give the importance of inventory analysis in LCA.

P.T.O.

Q4) Write short notes on any two :

- a) Energy efficiency in building.
- b) Cradle to grave concept of LCA.
- c) ED for manufactured products.

SECTION - II

Q5) Answer any two of the following :

- a) What is solid waste management? Give the environmental impacts of solid waste.
- b) Write a note on the collection of solid waste in India.
- c) What are the characteristics of solid waste?

Q6) Answer any two :

- a) Justify the statement 'Waste is wealth'.
- b) What is the significance of transfer stations in solid waste management?
- c) Differentiate between industrial and agricultural solid waste.

Q7) Attempt any two of the following :

- a) What is a sanitary landfill? What are the limitations of disposal of solid waste by landfill?
- b) What are the parameters to be considered for site selection for hazardous waste disposal?
- c) Give the classification of hazardous wastes.

Q8) Write short notes on any two :

- a) Fluidized bed incineration
- b) Significance of recycling.
- c) Hydrolysis.



Total No. of Questions : 8]

SEAT No. :

[Total No. of Pages : 2

P545

[4235] - 11

M.Sc.

ENVIRONMENTAL SCIENCE

ENV - 101 : Fundamental of Environmental Science

(2004 Pattern)

Time : 3 Hours]

[Max. Marks : 80

Instructions to the candidates:

- 1) Attempt not more than 5 questions of which at least 2 questions must be from each section.*
- 2) Answers to the two sections should be written in separate books.*
- 3) Neat diagrams must be drawn wherever necessary.*
- 4) All questions carry equal marks.*

SECTION - I

- Q1)* a) Discuss in detail need for studying environmental issues.
b) Explain the scope and importance of environmental education.
[16]

- Q2)* a) Write an account on structure and composition of atmosphere.
b) Give a detail account on evolution of atmosphere and different views regarding origin of atmosphere.
[16]

- Q3)* a) Explain the process of hydrological cycle with suitable diagram. Also mention the environmental significance of it.
b) Discuss in detail physical and chemical composition of ocean water.
[16]

- Q4)* Write short notes on the following :
- a) Role of non-governmental organizations in environmental protection.
 - b) Composition of lithosphere.
- [16]**

P.T.O.

SECTION - II

- Q5)** a) Define ecosystem. Give an account of the structure and function of ecosystem.
b) Describe various energy flow models of an ecosystem. **[16]**
- Q6)** a) What are food chains and food webs? Give examples and discuss their significance.
b) Discuss the process of evolution and development in ecosystem. **[16]**
- Q7)** a) What are biogeochemical cycles? Explain with the help of a diagram nitrogen cycle.
b) Give an account on biogeographical zones of India. **[16]**
- Q8)** Write short notes on the following : **[16]**
a) Ecological pyramids and their significance.
b) Characteristics of estuarine ecosystem.



Total No. of Questions : 8]

SEAT No. :

P546

[Total No. of Pages : 2

[4235] - 12
M.Sc.
ENVIRONMENTAL SCIENCE
ENP - 103 : Environmental Biology
(Semester - I) (2004 Pattern)

Time : 3 Hours]

[Max. Marks : 80

Instructions to the candidates:

- 1) Attempt not more than 5 questions of which at least 2 questions must be from each section.*
- 2) Answers to the two sections should be written in separate books.*
- 3) Neat diagrams must be drawn wherever necessary.*
- 4) All questions carry equal marks.*

SECTION - I

- Q1)** a) What are the different methods of classification of microorganisms?
b) Describe various applications of micro-organisms in environmental science.

[16]

- Q2)** a) What are biomes? Elaborate on any 4 biomes with respect to floral and faunal elements.
b) Explain the biogeographical history of India.

[16]

- Q3)** a) Differentiate between population and community ecology with suitable examples.
b) What are the impacts of climate change on biological diversity? Support your answers with suitable examples.

[16]

- Q4)** a) Define wetlands, elaborate on their distribution and ecological status in India.
b) Explain the term - extremophilic micro-organisms. Write about their characteristic features and applications.

[16]

P.T.O.

SECTION - II

- Q5)** a) Define the terms - i) Endangered ii) Endemic and iii) Extinct species with suitable examples from India.
- b) Differentiate various threatened categories proposed by IUCN. Add a note on reasons for these threats.

[16]

- Q6)** a) What do you mean by wildlife management? Elaborate on the goals and strategies of wildlife management.
- b) Describe any two successful projects of wildlife conservation in India. Add a note on significance of local participation in such projects.

[16]

- Q7)** a) Differentiate the biology of open sea and coastal environment with respect to distribution of species.
- b) What are various adaptations observed in marine system? Comment on the productivity of coastal & open water aquatic ecosystem.

[16]

- Q8)** a) What are various global agreements related to biodiversity conservation? Discuss its relevance with national concerns.
- b) Mention the global agreement for wetland conservation. What are the parameters considered for such internationally recognized sites? Support your answer with suitable examples.

[16]



Total No. of Questions : 8]

SEAT No. :

P547

[Total No. of Pages : 2

[4235] - 31

M.Sc.

ENVIRONMENTAL SCIENCE

**ENV - 301 : Environmental Planning Rural and Urban
(2004 Pattern)**

Time : 3 Hours]

[Max. Marks : 80

Instructions to the candidates:

- 1) Attempt not more than 5 questions of which at least 2 questions must be from each section.*
- 2) Answers to the two sections should be written in separate books.*
- 3) Neat diagrams must be drawn wherever necessary.*
- 4) All questions carry equal marks.*

SECTION - I

- Q1)* a) What is planning? Give its importance in developmental project.
b) What is natural resources? How they are helpful for any development?
- Q2)* a) “Population explosion is obstacle in development”. Justify the statement.
b) Write important concept and parameter in brief.
- Q3)* a) Write in brief parameters required for urban planning.
b) “Social willingness play important role in planning”. Comment on the statement.
- Q4)* Write short notes on :
a) Rural planning.
b) Exploitation of natural resources.

P.T.O.

SECTION - II

- Q5)** a) “Environment and development are two side of same coin”. Justify the statement.
b) What is solid waste? How you can plan for its disposal?
- Q6)** a) “EIA is essential tool for planning”. Comment the statement.
b) “Biomedical waste doesn’t require planning for its disposal”. Justify the statement.
- Q7)** a) What is national policy? How policy helps for any development?
b) “Pollution control boards play important role in protection of environment in India”. Comment on statement.
- Q8)** Write short notes on :
- a) Exploitation and safeguard of environment.
b) Public participation.



Total No. of Questions : 8]

SEAT No. :

P548

[Total No. of Pages : 2

[4235] - 41

M.Sc.

ENVIRONMENTAL SCIENCE

ENV - 402 : Environmental Health and Safety

(2004 Pattern)

Time : 3 Hours]

[Max. Marks : 80

Instructions to the candidates:

- 1) Attempt not more than 5 questions of which at least 2 questions must be from each section.*
- 2) Answers to the two sections should be written in separate books.*
- 3) Neat diagrams must be drawn wherever necessary.*
- 4) All questions carry equal marks.*

SECTION - I

- Q1)** a) Briefly explain mercury contamination problems. Add a note on health effects of mercury.
b) Explain in brief role of public participation in mitigating environmental risks.
- Q2)** a) Discuss in short potential health hazards associated with mining industry.
b) Explain salient features of 'Hazardous waste management and handling rules'.
- Q3)** a) Discuss the metabolic effects of 'As' on fauna.
b) Explain in brief methods of hazardous waste disposal.
- Q4)** Write a short note on any two :
- a) LC₅₀, TLM
 - b) Off site risk mitigation strategies.
 - c) Guidelines of ISO 18000 (OSHAS).

P.T.O.

SECTION - II

- Q5)** a) What are epidemic diseases? Discuss sources and effects of any one epidemic disease.
b) Discuss in brief WHO's health and sanitation programs.
- Q6)** a) Give Earth's radiation balance. Discuss green house effect.
b) What is Lapse Rate? Explain its types.
- Q7)** a) Discuss 'social empowerment programs' in rural India.
b) Give sources and effects of ground water contamination.
- Q8)** Write a short note on any two :
- a) Effects of global warming.
 - b) Causes of airborne diseases.
 - c) Pulse polio eradication programs.



Total No. of Questions : 8]

SEAT No. :

[Total No. of Pages : 2

P549

[4235] - 42

M.Sc.

ENVIRONMENTAL SCIENCE

ENV - 403 : Information Technology &

Bio-informatics for Environmental Sciences

(2004 Pattern)

Time : 3 Hours]

[Max. Marks : 80

Instructions to the candidates:

- 1) Attempt not more than 5 questions of which at least 2 questions must be from each section.*
- 2) Neat diagrams must be drawn wherever necessary.*
- 3) All questions carry equal marks.*
- 4) Answers to the two sections should be written in separate books.*

SECTION - I

- Q1)** a) Enumerate different elements of GIS, giving their significance.
b) Describe Raster and Vector data.
- Q2)** a) Define the term scattering and describe the process of Raleigh scatter with it's significance in remote sensing.
b) What are "atmospheric windows"? Explain their significance with reference to remote sensing systems.
- Q3)** a) Explain different distortions/discrepancies occurring in aerial photos due to flight irregularities. How do they affect photo interpretation process?
b) Explain the factors controlling scale of an aerial photograph.
- Q4)** a) Give the orbital characteristics of land sat 7 and comment on ETM⁺.
b) Discuss the use of remote sensing in hazard management.

P.T.O.

SECTION - II

- Q5)** a) Describe the tonal characteristics of thermal image, with reference to principles involved.
b) Explain the principles and applications of microwave remote sensing.
- Q6)** a) List the advantages of using a Database Management System over traditional file system. Explain the roles and responsibilities of a database administrator.
b) What are the various components of a website? Design a simple website for the environmental science department of your college.
- Q7)** a) Discuss the various software tools, which you would be using for forest cover mapping. Explain the use of each tool.
b) List the different types of computer networks and add a note on the principal differences between them.
- Q8)** Write in detail the research proposal for conducting study of bio-diversity of western ghats, Maharashtra.

