Deccan Education Society's
Fergusson College (Autonomous), Pune-4
M.Sc. II (Semester III)
Subject: Environmental Science
(EVS5301) Environmental Statistics (2019 pattern)

Time: 3 Hrs   **Max. Marks: 50**
Instruction to candidates:

   i)   **All questions are compulsory**
   ii)   **Figures to the right indicate full marks**
   iii)   **Use of statistical tables and scientific calculators is allowed.**

Q.1   **Answer the following questions (Any Five).**   **[2 x 5 =10]**
    a)   Define: Population and Sample.
    b)   What is Median?
    c)   Write about Skewness.
    d)   What is degree of freedom?
    e)   Explain types of hypothesis.
    f)   What is Level of significance?

Q.2   **Answer the following questions (Any Four).**   **[3 x 4 =12]**

    a)   Calculate Geometric mean of 9.6, 7.7, 11.5, 10.6, and 12.8

    b)   What is acceptance and rejection region?

    c)   Draw **Frequency polygon** for following data.

Class	0-5	5-10	10-15	15-20	20-25	25-30	30-35
Frequency	6	12	18	25	32	21	11

    d)   Outline the concept of carrying capacity.

    e)   Calculate **Arithmetic Mean** for following frequency distribution.

Class	15-25	25-35	35-45	45-55	55-65	65-75
Frequency	4	11	20	15	2	5

Q.3   **Answer the following questions (Any Three)**   [3 x 3 =9]

a)   Calculate **Mode** for following frequency distribution.

Income	0-100	100-200	200-300	300-400	More than 400
persons	10	24	53	37	22

b)   Calculate **Standard deviation** for following frequency distribution.

Class	0-5	5-10	10-15	15-20	20-25	25-30	30-35
Frequency	4	6	8	10	7	5	2

c)   Explain the approaches for mathematical modelling

d)   Explain properties of Normal distribution.

Q.4   **Answer the following questions (Any Two).**   [3 x 2 =6]

a)   Explain types of random sampling.
b)   Explain in brief Lotka-Voltera model used in biological studies
c)   Justify the steps for constructing composite indicators.

Q.5   **Answer the following questions (Any Two)**   [4 x 2 =8]

a)   Explain applications of Chi-square test.
b)   Differentiate between exponential growth and logistic growth
c)   Explain concept of Principal component analysis with suitable example.

Q.6   **Answer the following questions (Any One)**   [5 x 1 =5]

a)   Calculate coefficient of correlation.

X	1	2	3	4	5	6	7	8	9
Y	9	8	10	12	13	14	14	16	15

b)   What is ANOVA? Discuss method of calculation of ANOVA by any one method.

Deccan Education Society's
Fergusson College (Autonomous), Pune-4
M. Sc. II (Semester III)
Subject: Environmental Science
(EVS5303) Climate Change and Sustainability (2019 pattern)

Time: 3 Hrs   Max. Marks: 50

Instructions to candidate:
1) All questions are compulsory
2) Figures to the right indicate full marks
3) Use of statistical tables and scientific calculators is allowed.

Q.1		Answer the following questions (Any Five).	Two Marks Each	[2 x 5 =10]
	a)	Describe the important working areas of IPCC		
	b)	Outline the major impacts associated with climate change		
	c)	State the important considerations under sustainable development in industries?		
	d)	Describe external climate change forces?		
	e)	Outline the requirements for sustainable forest management?		
	f)	Describe about the need for sustainable transport in developing countries?		
Q.2		Answer the following questions (Any Four)	Three Marks Each	[3 x 4 =12]
	a)	Explain criticisms associated with sustainable development in developing countries?		
	b)	What is the UN Sustainable Development Knowledge Platform?		
	c)	Illustrate the importance of public engagement for solutions of environmental issues		
	d)	Summarise on the various methodologies and tools used to measure sustainability in industries		
	e)	Explain the outcomes of important Conferences of the Parties to mitigate climate change		
Q.3		Answer the following questions (Any Three)	Three Marks Each	[3 x 3 =9]
	a)	Examine the advanced technologies used to reduce carbon emissions		
	b)	Carry out a review on technical skills required by experts for environmental conservation and sustainable practices?		
	c)	Outline the focus areas under National Carbonaceous Aerosols Programme (NCAP) to face climate change		
	d)	Illustrate the challenges associated with Energy, Food and Agriculture sectors in relation with sustainability		
Q.4		Answer the following questions (Any Two)	Three Marks Each	[3 x 2 =6]
	a)	Explain the importance of public engagement in sustainable development		
	b)	Integrate the significance of economic and social policies for environmental conservation		
	c)	Structure any three advanced technologies used to reduce carbon emissions		
Q.5		Answer the following questions (Any Two)	Four Marks Each	[4 x 2 =8]
	a)	Assess methods for implementation and monitoring of sustainable development?		
	b)	Write a short review on National Action Plan on Climate Change		
	c)	Evaluate the future scope associated with agriculture sustainability?		
Q.6		Answer the following questions (Any One)	Five Marks Each	[5 x 1 =5]
	a)	Prepare a detailed account on consequences and challenges associated with climate change in India.		
	b)	Develop a plan of appropriate technologies used to achieve sustainability practices in industries?		

Deccan Education Society's
Fergusson College (Autonomous), Pune-4
M.Sc. I (Semester I)
Subject: Environmental Science
(EVS4102) Environmental Chemistry (2019 pattern)

Time: 3 Hrs   Max. Marks: 50

Instruction to candidates:

i.   All questions are compulsory
ii. Figures to the right indicate full marks
iii. Use of statistical tables and scientific calculators is allowed

Q.1 **Answer the following questions (Any Five).**   **Two Marks Each**   [2 x 5 =10]
a) Recall the concept of PCBs
b) Define the term Aflatoxins
c) Describe the concept of synthetic polymers
d) Identify the disease caused by lead toxicity
e) State the principle of Gas chromatography
f) What is meant by builders used in detergent? write example

Q.2 **Answer the following questions (Any Four).**   **Three Marks Each**   [3 x 4 =12]
a) Describe concept of Eutrophication and associated problems.
b) Illustrate the significance of Neutron activation analysis
c) Write merits and demerits of polarography
d) Classify the herbicides and its examples
e) What are aflatoxins? Give its classification

Q.3 **Answer the following questions (Any Three)**   **Three Marks Each**   [3 x 3 =9]
a) Demonstrate different techniques used for destruction of alkali metals
b) Comment on the health effects of mercury
c) Explain environmental problems of synthetic polymer.
d) Comment on the DDT problem

Q.4 **Answer the following questions (Any Two).**   **Three Marks Each**   [3 x 2 =6]
a) Differentiate point, nonpoint sources of pollutants
b) Draw and explain the structure of water molecule and explain is properties
c) Explain the concept of vehicular pollution

Q.5 **Answer the following questions (Any Two)**   **Four Marks Each**   [4 x 2 =8]
a) Review the Principles of Green Chemistry
b) Explain the working mechanism of HPLC with suitable diagram
c) Explain the importance of micro and macro nutrients in soil

Q.6 **Answer the following questions (Any One)**   **Five Marks Each**   [5 x 1 =5]
a) Write a note on criteria pollutant
b) Write a note on hydrocarbon degradation

Deccan Education Society's
Fergusson College (Autonomous), Pune-4
M.Sc. (Semester III)
Subject: Environmental Science
(EVS5302) Remote Sensing and GIS (2019 pattern)

Time: 3 Hrs   Max. Marks: 50
Instruction to candidates:

   i)   All questions are compulsory
   ii)   Figures to the right indicate full marks
   iii) Use of statistical tables and scientific calculators is allowed.

Q.1   Answer the following questions (Any Five).   Two Marks Each   [2 x 5 =10]
   a)   Describe Optical remote sensing
   b)   Define GIS
   c)   Describe Electromagnetic radiation
   d)   Define Active remote Sensing
   e)   Describe DEM
   f)   Define Georeferencing

Q.2   Answer the following questions (Any Four).   Three Marks Each   [3 x 4 =12]
   a)   Explain Characteristics of sensors
   b)   Discuss key features of satellite - Resourcesat I
   c)   Explain types of Remote sensing platforms
   d)   Discuss the benefits of infrared radiations
   e)   Explain Rayleigh scattering.

Q.3   Answer the following questions (Any Three)   Three Marks Each   [3 x 3 =9]
   a)   How to execute Supervised Classification methods?
   b)   Outline the applications of various bands
   c)   Illustrate the Accuracy assessment techniques
   d)   How to carry our network analysis?

Q.4   Answer the following questions (Any Two).   Three Marks Each   [3 x 2 =6]
   a)   Distinguish between LISS sensor and PAN sensor
   b)   Explain the Spectral signature of Vegetation
   c)   Explain the attribute data types

Q.5   Answer the following questions (Any Two)   Four Marks Each   [4 x 2 =8]
   a)   Review functions and advantages of GIS
   b)   Justify the need of Pre-processing of satellite images
   c)   Assess the Remote Sensing process

Q.6   Answer the following questions (Any One)   Five Marks Each   [5 x 1 =5]
   a)   Write a note on Spatial data models
   b)   Specify applications of remote sensing in Coastal regions

Deccan Education Society's
Fergusson College (Autonomous), Pune-4
End Semester Examination (ESE)
S. Y. B. Sc. (Environmental Awareness) Semester IV (2016 Pattern)
EVA 2401: Environmental Awareness

Time: 2 Hrs   **Max. Marks: 50**

Instruction to candidates:
  i)   *All questions are compulsory.*
  ii)   *Figures to the right indicate full marks.*
  iii) *Draw neat diagrams wherever necessary.*

1.   Attempt **any five** questions   2x5=10
  a)   Define environment with its factors.
  b)   Enlist any two components of forest ecosystem.
  c)   Define decomposers. What is their role in ecology?
  d)   Define pollution with suitable example.
  e)   Enlist any two factors responsible for soil pollution.
  f)   Define ecosystem with suitable example.
  g)   Define disasters with suitable example.

2.   Attempt **any five** questions   3x5=15
  a)   Explain the term natural resources. Give their brief uses.
  b)   Write short note on ecosystem structure with suitable diagram.
  c)   Differentiate between food chain and food web.
  d)   What are endangered species? Give an example of endangered species and reason for it being endangered.
  e)   Write a note on marine pollution and its impact on marine environment.
  f)   Define population explosion and its impact on environment.
  g)   Write a short note on exotic and invasive species and its impact on ecosystem.

3.   Attempt **any five** questions   5x5=25
  a)   What is biodiversity? Explain its types.
  b)   Write in detail about values of biodiversity.
  c)   Explain the term sustainable development and write about various ways to achieve it.
  d)   Explain the role of an individual in preventing pollution.
  e)   Write about the role of an individual in conservation of natural resources.
  f)   What is climate change? What are its impacts on environment?
  g)   Write a note on environmental awareness and its importance in today's world.

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Time: 2 Hrs

Max. Marks: 50

Instruction to candidates:
   i) *All questions are compulsory.*
   ii) *Figures to the right indicate full marks.*
   iii) *Draw neat diagrams wherever necessary.*

1. Attempt **any five** questions   2x5=10
   a) पर्यावरण जागृतीचे स्तर सांगा .
   b) आण्विक संसाधने यांविषयी माहिती द्या.
   c) अन्नसाखळी – व्याख्या लिहा.
   d) भारताचा राष्ट्रीय प्राणि कोणता? त्यांचा संवर्धन कार्यक्रमाचे नाव आणि सुरु झालेले साल काय?
   e) प्रदूषण म्हणजे काय? व्याख्या लिहा.
   f) पर्यावरणविषयक कोणतेही तीन कायदे नावे सांगा.
   g) पर्यावरण लोकजागृती - याख्या लिहा.

2. Attempt **any five** questions   3x5=15
   a) घन कचरा व्यवस्थापन - टिप लिहा.
   b) मृदा संसाधने आणि जंगल संसाधने – टिपा लिहा.
   c) परिसंस्थांचे पर्यावरणातील महत्व सांगा.
   d) भारतातील तीन जैवविविधता/भुजैवशास्त्रीय भाग व त्याचे महत्व आणि स्थान सांगा.
   e) भूकंपादरम्यान घेण्याची काळजी आणि उपाययोजना .
   f) पर्यावरण संरक्षण कायदा याविषयी माहिती द्या.
   g) पर्यावरणआणि लोकसंख्यावाढ यांचा संबंध स्पष्ट करा.

3. Attempt **any five** questions   5x5=25
   a) पर्यावरण आणि त्याचे घटक यांविषयी माहिती लिहा.
   b) टिप लिहा – मृदा, जल आणि उर्जा संसाधने यांचा संबंध.
   c) अन्नजल आणि अन्नसाखळी यांतील फरक लिहा आणि अन्नसाखळी उदाहरणासह स्पष्ट करा.
   d) जैवविविधता Hotspots याविषयी माहिती लिहा.
   e) आण्विक प्रदूषण आणि तापमान प्रदूषण याविषयी टिप लिहा.
   f) जागतिक तापमानवाढ, आम्लपर्जन्य यांविषयी माहिती लिहा.
   g) पर्यावरण जागरूकतेत वैयक्तिक योगदान कसे करू शकता?

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Deccan Education Society's
Fergusson College (Autonomous), Pune-4

MSc I (Semester I)
Subject: Environmental Science

(EVS4101) Environmental Biology (2019 pattern)

Time: 3 Hrs.   Max. Marks: 50

Instruction to candidates:

   i)   All questions are compulsory
   ii)   Figures to the right indicate full marks
   iii)   Use of statistical tables and scientific calculators is allowed.

Q.1   **Answer the following questions (Any Five).**   **[2 x 5 =10]**
   a)   What is RCC?
   b)   What are infauna?
   c)   What is Oxygen Sag curve?
   d)   What is riparian vegetation?
   e)   Define Permafrost

   f)   Define Euhaline

Q.2   **Answer the following questions (Any Four).**   **[3 x 4 =12]**

   a)   Describe the ecosystem services provided by wetlands.
   b)   Give examples of nekton organisms
   c)   Explain the plan for monitoring of urban waterbodies.
   d)   What are the different parts of Estuaries?
   e)   What are characteristic features of Chaparral Biome

Q.3   **Answer the following questions (Any Three)**   **[3 x 3 =9]**
   a)   Explain the types of lentic Ecosystems other than lakes and ponds
   b)   State the threshold law of tolerance
   c)   Explain the types of Biomes
   d)   Write the importance of microbes in remediation processes

Q.4   **Answer the following questions (Any Two).**   **Three Marks Each**   **[3 x 2 =6]**
   a)   Outline the process of management of urban water bodies
   b)   Explain different classes of water with respect to its designated best use
   c)   Explain different zones associated with mangrove Ecosystem

Q.5   **Answer the following questions (Any Two)   Four Marks Each**   [4 x 2 =8]
  a)   Explain the community characters in brief.
  b)   Describe the process of Ecological succession with suitable diagram.
  c)   Explain the River Continuum Concept

Q.6   **Answer the following questions (Any One)   Five Marks Each**   [5 x 1 =5]
  a)   Describe the process of Ecological succession with suitable diagram.
  b)   Explain ethno biological importance in conservation of species

Deccan Education Society's
Fergusson College (Autonomous), Pune-4
M.Sc I (Semester I)
Subject: Environmental Science
(EVS4103) Environmental Geo and Atmospheric Science (2019 pattern)

Time: 3 Hrs   Max. Marks: 50

Instruction to candidates:

i)   All questions are compulsory
ii)   Figures to the right indicate full marks
iii)   Use of statistical tables and scientific calculators is allowed.

Q.1		Answer the following questions (Any Five). Two Marks Each	[2 x 5 =10]
	a)	Describe plutonic rocks with examples.	
	b)	Illustrate morine and enlist its types.	
	c)	Describe percolation and infiltration.	
	d)	Describe equinoxes.	
	e)	Draw pressure belts of earth.	
	f)	Illustrate Ekman's spiral currents.	
Q.2		Answer the following questions (Any Four). Three Marks Each	[3 x 4 =12]
	a)	Explain Stefen-Boltman's law.	
	b)	Discuss types of humus in soil.	
	c)	Explain the structure of the volcano with diagram.	
	d)	Discuss various types of droughts.	
	e)	Explain factors for ozone depletion.	
Q.3		Answer the following questions (Any Three) Three Marks Each	[3 x 3 =9]
	a)	Give the evidences for continental drift.	
	b)	Demonstrate formation of tropical thunderstorms.	
	c)	Explain the mechanism of Artesian well.	
	d)	Generalize general circulation of wind.	
Q.4		Answer the following questions (Any Two). Three Marks Each	[3 x 2 =6]
	a)	Differentiate adiabatic and diabetic cooling.	
	b)	Arrange periods of the Mesozoic era from old to recent.	
	c)	Give the classification of air masses.	
Q.5		Answer the following questions (Any Two) Four Marks Each	[4 x 2 =8]
	a)	Evaluate factors supporting jet streams.	
	b)	Determine factors supporting land capability class 1-4 for cultivation.	
	c)	Justify presence of low latitudinal deserts.	
Q.6		Answer the following questions (Any One) Five Marks Each	[5 x 1 =5]
	a)	Write a note on identification of minerals.	
	b)	Give an account of ocean currents.	