28/11/2022 O/C 2:30pm

Deccan Education Society's
Fergusson College (Autonomous), Pune-4
F.Y.B.Sc. (Semester I)
Subject: Environmental Science
(EVS1101) Earth and Earth Surface Processes (2019 pattern)

Time: 2.5 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) Enlist eras of Phanerozoic eon
b) Describe physical properties for identification of minerals.
c) Define water holding capacity of soil
d) Outline the microflora present in the soil
e) Enlist types of wind.
f) Outline temperature measurement methods.

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

a) Summarize the agents of weathering
b) Discuss the process of humification
c) Outline composition of atmosphere.
d) Illustrate factors controlling atmospheric pressure.
e) Discuss composition of prehistoric earth's atmosphere.

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

a) Classify the soil horizons and explain its characters
b) Outline the soil textural classes.
c) Draw a suitable diagram for global pressure belts.
d) Generalize characteristics of seismic waves

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

a) Differentiate between mor and mull humus. Add a note on moder humus.
b) Explain the concept of inversion of temperature.
c) Explain the concept of the sea floor spreading

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

a) Explain Environmental Science is a multidisciplinary subject.
b) Explain types of lapse rate.
c) Compare the mechanism of formation of plutonic and volcanic rocks.

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

a) Explain the concept of Biosphere.
b) Construct thermal stratification of the atmosphere with a suitable diagram.

29/11/2022
2:30 pm

Deccan Education Society's
Fergusson College (Autonomous), Pune-4
F.Y.B.Sc. (Semester I)
Subject: Environmental Science
(EVS1102) Physics and Chemistry of Environment (2019 pattern)

Time: 2.5 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) Define Lamberts Beer's law
b) Describe concept of light
c) Define the term Biomagnification
d) Recall the concept of builders used in detergents
e) Describe any two photochemical reactions
f) State the two main causes of climate change

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

a) Explain first law of thermodynamics
b) Explain concept of heat transfer
c) Differentiate classes of surfactants
d) What are two types of plastics? Explain with suitable examples
e) Discuss the sources for formation of various atmospheric pollutants

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

a) Interpret the concept of dry adiabatic lapse rate.
b) Interpret the concept of Entropy
c) Interpret the threat associated with chemical pesticides
d) What are environmental applications of chelating agents?

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

a) Explain Scattering of light with example
b) What is meant by colouring agents? Explain with suitable examples
c) Explain the hydrogen bonding in water

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

a) Review the concept of solubility product
b) Explain adverse health effects of lead
c) Evaluate the pollution potential of aerosols

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

a) Write the types of chemical reactions
b) Write a note on environmental impact of soaps and detergents

14/11/2022 O/C

Deccan Education Society's
Fergusson College (Autonomous), Pune-4
F.Y.B.Sc. (Semester II)
Subject: Environmental Science
(EVS1201) Systematics and Biogeography (2019 pattern)

Time: 2.5 Hrs.
Instruction to candidates: **Max. Marks: 50**

i) **All questions are compulsory**
ii) **Figures to the right indicate full marks**

Q.1 **Answer the following questions (Any Five)** **[2 x 5 =10]**

a) Define biological spectrum.
b) Enlist Environmental conditions for epiphytes.
c) What is paleontology?
d) Define Biogeography
e) State the principle of taxonomy
f) What are three domains?

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

a) Explain characteristics of halophytic adaptations.
b) Explain the significance of fossils.
c) Explain the process of mineralization.
d) Give distinguishing characters Aves.
e) Write components of systematics.

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

a) Distinguish between xerophytes and halophytes.
b) Classify the types of fossils.
c) Provide classification for any two species (kingdom to species).
d) Distinguish between Pteridophytes and Gymnosperms.

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

a) Explain the concept of carrying capacity of Ecosystems.
b) Organize the Geological Time scale.
c) Explain the concept of Index fossils.

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

a) Evaluate parameters of Natural selection.
b) Justify the anthropogenic extinction will have more impact as compared to other types of extinction.
c) Review concept of Species.

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

a) Discuss about the anthropogenic Extinction.
b) Discuss Bentham and Hooker system of classification.

15/11/2022 o/c

Deccan Education Society's
Fergusson College (Autonomous), Pune-4
F.Y.B.Sc. (Semester II)
Subject: Environmental Science
(EVS1202) Water and Water Resources (2019 pattern)

Time: 2.5 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) Define: Precipitation.
b) Describe: Aquifer.
c) Define: Carbon Footprint.
d) State the importance of water quality standards.
e) Write full form of DO and write factors affecting do level in water.
f) Recall the concept of ballast water.

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

a) Compare the process of evaporation and precipitation.
b) Illustrate the vertical stratification in the Marine Ecosystem.
c) Illustrate various clouds with diagram.
d) Compare the terms COD and BOD.
e) Describe the need for protection of water resources.

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

a) Classify the forms of precipitation.
b) Give an outline of national water policy of India.
c) Write an example of anyone biological water quality test and discuss its application.
d) Write principles and scope of Oceanography.

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

a) Explain the factors affecting condensation.
b) Explain the technological solutions to reduce water shortages in India.
c) Discuss objectives of water quality monitoring.

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

a) Compare water resources on the basis of availability and physical state.
b) Evaluate the importance of water management practices.
c) Evaluate the threats associated with marine ecosystems.

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

a) Write note on water budget of the globe.
b) Explain the traditional water harvesting techniques used in India.

12/12/2022 10:30 AM

Deccan Education Society's

Fergusson College (Autonomous), Pune-4

S.Y.B.Sc. (Semester III)

Subject: Environmental Science

(EVS2301) Ecology and Ecosystems (2019 pattern)

Time: 2.5 Hrs. **Max. Marks: 50**

Instruction to candidates:

i) **All questions are compulsory**

ii) **Figures to the right indicate full marks**

Q.1 **Answer the following questions (Any Five)** **[2 x 5 =10]**

a) Define community.

b) Mention the types of succession.

c) Describe concept of landscape.

d) Define concept of biosphere.

e) Define Net primary productivity.

f) Mention any two food chains.

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

a) Explain ecosystem resilience.

b) Explain population dispersion.

c) Write a note on ecological pyramids.

d) Explain: Hydrosere.

e) Explain the process of construction of Polygraphs.

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

a) Mention structural elements of the Grassland ecosystem.

b) Write about a single channel energy flow model.

c) Write about Raunkier's frequency distribution classes and its application.

d) Illustrate exponential growth of population.

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

a) Explain factors affecting size of population.

b) Draw the diagram for vertical stratification in communities.

c) Draw a suitable diagram for the Phosphorus cycle.

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

a) Review concept and scope of ecology.

b) Write a note on different growth forms.

c) Write a note on Ecological efficiency.

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

a) Write a note on functions of the ecosystem and enlist the food web of the forest ecosystem.

b) Write a note on functional changes in the process of succession.

17 DEC 2022 10:30 OK

Deccan Education Society's

Fergusson College (Autonomous), Pune-4

S.Y.B.Sc. (Semester II)

Subject: Environmental Science

(EVS2302) Land and Soil Conservation and Management (2019 pattern)

Time: 2.5 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) Enlist physical properties of soil.
b) Define resource and comment on land resource.
c) Recall the concept of soil erosion.
d) Describe concept of food security.
e) State the importance of Eco-farming.
f) Describe any two changes associated with land degradation.

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

a) Explain ecological importance of land resources.
b) Classify land use practices on economic basis.
c) Compare the process of soil resistance and resilience.
d) Discuss the concept of loss ecosystem services.
e) Discuss the importance of LULC studies.

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

a) Illustrate role temperature in plant growth.
b) Give the textural classification of soil.
c) Examine the causes of soil pollution.
d) Carry out assessment on advanced techniques of water management.

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

a) Explain mechanism of ion exchange in soil.
b) Identify the different causes of soil erosion.
c) Explain the concept and applications of soil solarization technique.

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

a) Determine basic forms of organic matters in the soil.
b) Evaluate the threats associated with the loss of ecosystem services of soil resource.
c) Evaluate the importance of bioremediation techniques.

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

a) Give the account of soil colloids and their importance.
b) Analyze ecological and economical importance of soil

15/11/2022 O/C

Deccan Education Society's

Fergusson College (Autonomous), Pune-4

S.Y.B.Sc. (Semester II)

Subject: Environmental Science

(EVS2401) Urban Ecosystems (2019 pattern)

Time: 2.5 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 Urban sprawl
b) Describe Urban ecosystem with example
c) Enlist issues of urban dwelling.
d) Enlist parameters of urban sustainability.
e) Define Green cities.
f) Enlist the parameters for EPI.

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

a) Give example of food chain in agricultural ecosystem.
b) Discuss concept of controlled nature.
c) Illustrate slum issues in Urban Environments.
d) Give examples of housing scenarios in large scale cities.
e) Discuss the concept of Urban Heat Islands.

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

a) Illustrate the concept of urban woodlands.
b) Write a note on ecological footprint.
c) Write a note on 15 minutes City.
d) Outline the consequences of Urbanization.

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

a) Explain the concept and role of green belts.
b) Explain about Environmental cost of urban infrastructure.
c) Explain the concept of Livability Index.

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

a) Review benefits of urban management
b) Discuss challenges associated with sustainability.
c) Discuss the role of green and blue corridors in the city.

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

a) Write plan and policy for green cities
b) Explain the concept of Eco-housing.

16/11/2022 O/C

Deccan Education Society's

Fergusson College (Autonomous), Pune-4
S.Y.B.Sc. (Semester II)
Subject: Environmental Science
(EVS2402) Natural resource management and sustainability (2019 pattern)

Max. Marks: 50

Time: 2.5 Hrs

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) Enlist types of resources with example.
b) Describe nonferrous minerals.
c) Recall the Concept of Solar Cells.
d) Describe concept of biofuel.
e) State the need for conservation of natural resources.
f) Discuss the ecological importance of forests.

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

a) Give examples of non-metallic minerals.
b) Explain types of deep sea mining.
c) Discuss principle of hydropower generation.
d) Explain process of formation of fossil fuels.
e) Explain the strategies for water conservation.

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

a) Illustrate the role of law in conservation of marine resources.
b) Illustrate the benefits and limitations of geothermal energy.
c) Examine the world food problem.
d) Outline a framework of Sustainability Science and Development.

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

a) Explain impact of humans on natural resources.
b) Analyze the environmental problems of nonrenewable energy resources.
c) Compare the resources availability in developed and developing countries.

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

a) Determine environmental impacts of mining.
b) Classify types of wind turbines.
c) Explain the strategies for energy conservation.

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

a) Integrate steps involved in mining operations.
b) Analyze the challenges and opportunities of renewable energy resources.

Special Exam O/C
20/12/22
Morning

Deccan Education Society's
Fergusson College (Autonomous), Pune-4
S.Y.B.Sc. (Semester IV)
Subject: Environmental Science
(EVS2402) Natural resource management and sustainability (2019 pattern)

Time: 2 1/2 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 **Attempt any five questions:** **[2 x 5 =10]**

a) Define the term natural resource
b) List non metallic minerals
c) What is meant by sustainable forestry?
d) What is the need to conserve resources?
e) Explain hydropower generation process in short
f) Explain any two strategies followed for energy conservation
g) Describe polymetallic nodules

Q.2 **Attempt any five questions:** **[3 x 5 =15]**

a) Explain ecological importance of forests
b) Discuss on the freshwater shortages and issues in India
c) Explain causes of reduced fertility of soil.
d) Explain the changes in agricultural practices caused by green revolution
e) Compare the VAWT and HAWT used in wind energy production.
f) Describe threats of marine ecosystem
g) Explain energy generation from dry steam geothermal plant

Q.3 **Attempt any five questions:** **[5 x 5 =25]**

a) Write note on water resources of globe
b) Write a detailed account on world food problem
c) Discuss different strategies used for water conservation
d) Elaborate on ecological and economic approaches used resource management
e) Explain environmental impact of mineral resource extraction
f) Discuss environmental problems of fossil fuels
g) Explain methods used for energy production using biomass

28/11/2022

2:30pm

Deccan Education Society's

Fergusson College (Autonomous), Pune-4

T.Y.B.Sc. (Semester V)

Subject: Environmental Science

(EVS3501) Natural Ecosystems Management (2019 pattern)

Time: 2.5 Hrs **Max. Marks: 50**

Instruction to candidates:

All questions are compulsory

Figures to the right indicate full marks

Q.1 **Answer the following questions (Any Five).** **[2 x 5 =10]**

a) Define Limnology
b) Define Euhaline
c) What is Holard?
d) What is CRZ?
e) What are Infauna?
f) Give examples of any two meroplanktonic forms
g) What is source region of a river

Q.2 **Answer the following questions (Any Five).** **[3 x 5 =15]**

a) Explain different zones in Estuarine region
b) Give examples of functional group of soil organisms
c) What are the functions of lotic Ecosystems
d) What are the different types of Lakes, explain with examples?
e) Explain with a diagram the zonation in mangroves
f) What is the River Continuum Concept?
g) Give examples of holoplanktonic forms

Q.3 **Answer the following questions (Any Five)** **[5 x 5 =25]**

a) Explain the adaptations of mangroves
b) Write different types of forests in India.
c) Outline the process of Lake turnover
d) Explain Oxygen sag curve with diagram
e) Explain the values associated with mangrove Ecosystem
f) Explain the types of lentic Ecosystems other than lakes and ponds
g) Explain with diagram the vertical stratification in oceans

A/C special Exam. 21/12/22. Morning

Deccan Education Society's
Fergusson College (Autonomous), Pune-4
T.Y.B.Sc. (Semester V)
Subject: Environmental Science
(EVS3501) Natural Ecosystems Management (2019 pattern)

Time: 2.5 Hrs **Max. Marks: 50**

Instruction to candidates:

All questions are compulsory

Figures to the right indicate full marks

Q.1 **Answer the following questions (Any Five).** **[2 x 5 =10]**

a) Define Limnology
b) Define stenohaline
c) What is echard?
d) What is CRZ?
e) What are epifauna?
f) Give examples of any two mangrove species
g) What is source region of a river

Q.2 **Answer the following questions (Any Five).** **[3 x 5 =15]**

a) Give examples of lentic and lotic Ecosystems
b) Give examples of soil organisms
c) What are the functions of wetlands
d) What are the different types of Estuaries?
e) What are the biological communities of a Lake
f) Write down the physicochemical parameters of a lake
g) Give examples of any two special types of lakes

Q.3 **Answer the following questions (Any Five)** **[5 x 5 =25]**

a) Explain the types of lakes.
b) Write different zones of a river
c) Outline the process of lake turnover
d) Explain with diagram the vertical stratification in oceans
e) Explain the values associated with Mangrove Ecosystem
f) Explain the types of lentic Ecosystems other than lakes and ponds
g) Explain Oxygen sag curve with diagram

23/11/2022
2:30pm

Deccan Education Society's
Fergusson College (Autonomous), Pune-4
T.Y.B.Sc. (Semester V)
Subject: Environmental Science
(EVS3502) Environmental Monitoring (2019 pattern)

Time: 2.5 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 **Attempt any five questions:** **[2 x 5 =10]**

a) Enlist instrumental methods in environmental monitoring.
b) Give types of statistical variables.
c) Give NAAQS of NOx and SOx.
d) Give day time permissible limits for noise in silent and commercial zones.
e) Describe exposure dose with respect to radiations.
f) Draw diagram of G.M Counter.
g) Give the formula for estimation of density and basal area

Q.2 **Attempt any five questions:** **[3 x 5 =15]**

a) Sound system produced a sound of 0.004W, calculate the sound power level. (Given reference power is 10^{-12} watt/m^2).
b) Air sample collected have an initial flow rate 1.8m3/min and final flow rate 1.3 m3/min and sampling time of 8 hours, estimate the volume of air sampled.
c) Explain the formulas for relative frequency, relative density and IVI.
d) Describe working and applications of laminar air flow.
e) Explain the concept of half-life period. Comment on Roentgen absorbed dose.
f) Write a note on tools used for soil sampling and important soil quality indicators.
g) Write a note on the working principle of aneroid barometers.

Q.3 **Attempt any five questions:** **[5 x 5 =25]**

a) Forest has 8, 6, 3 and 2 individuals of *Mangifera indica, Azadirachta indica, Ficus benghalensis and Tamarindus indica* respectively, compute Simpson's Diversity Index
b) Explain site selection criteria for air monitoring.
c) Explain average sound pressure level and calculate it for 62dB and 66dB.
d) Give an account of general effluent standards.
e) Describe methods for estimation of NPK from soil sample
f) Find Out PF, RF, D, RD and abundance for given vegetation
g) Explain mechanism of working of AAS

Q3. f) Vegetation data:

Species	Q1	Q2	Q3	Q4	Q5
Amrud	25	12	21	0	9
Imali	16	13	26	18	21
Jackfruit	9	0	17	13	0

30/11/2022
O/C
2:30pm

Deccan Education Society's
Fergusson College (Autonomous), Pune-4
T.Y.B.Sc. (Semester V)
Subject: Environmental Science
(EVS3503) Remote Sensing and GIS (2019 pattern)

Time: 2.5 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 **Attempt any five questions:** **[2 x 5 =10]**

a) Define GIS database

b) What is Electromagnetic Radiation?

c) Explain the concept of Active Remote Sensing.

d) What is Emission?

e) Describe Image registration

f) What is vector data?

g) What is land cover?

Q.2 **Write note on any five questions:** **[3 x 5 =15]**

a) Spectral Signature

b) Atmospheric Windows

c) False Colour Composite

d) Along Track Scanning System

e) Advantages of GIS

f) Types of Remote Sensing platforms

g) Rayleigh Scattering

Q.3 **Attempt any five questions:** **[5 x 5 =25]**

a) Explain the Remote Sensing process.

b) Discuss Visual Image Interpretation.

c) Write a note on Spatial data types.

d) Discuss in brief any five Spatial Analysis Techniques

e) Explain the process of Image enhancement

f) Discuss Supervised method of classification

g) Give application of RS and GIS in Coastal management.

O/C Special Exam.
22/12/22.
Morning

Deccan Education Society's
Fergusson College (Autonomous), Pune-4
T.Y.B.Sc. (Semester V)
Subject: Environmental Science
(EVS3503) Remote Sensing and GIS (2019 pattern)

Time: 2.5 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 **Attempt any five questions:** **[2 x 5 =10]**

a) What is the use of Infrared radiation?

b) What is Electromagnetic Radiation?

c) Explain the concept of optical remote sensing.

d) What is Reflection?

e) What is satellite image?

f) Describe the raster data?

g) What is LULC?

Q.2 **Write note on any five questions:** **[3 x 5 =15]**

a) Reflectance Curve for Soil and Water

b) Atmospheric Windows

c) False Color Composite

d) Across Track Scanning System

e) Functions of GIS

f) Types of Remote Sensing

g) Non-selective Scattering

Q.3 **Attempt any five questions:** **[5 x 5 =25]**

a) Explain the process of Remote Sensing.

b) Discuss Visual Image Interpretation.

c) Write a note on vector data types.

d) Discuss in brief any five Spatial Analysis Techniques

e) Explain the process of Preprocessing

f) Discuss Unsupervised methods of classification

g) Give application of RS and GIS in forest management.

a/c special Exam
23/12/22
morning

Deccan Education Society's

Fergusson College (Autonomous), Pune-4

T.Y. B.Sc. (Semester V)

Subject: Environmental Science

(EVS3505) Introduction to Environmental Statistics (2019 pattern)

Time: 2.5 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 **Attempt any five questions:** **[2 x 5 =10]**

a) Define class interval.
b) Define Frequency density.
c) Calculate Geometric mean of 6, 4, 5, 9, 8, and 7.
d) What is Mode?
e) Write about Kurtosis.
f) Define null hypothesis.
g) Enlist types of non-random sampling.

Q.2 **Attempt any five questions:** **[3 x 5 =15]**

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

Number of grains per spike	20-22	23-25	26-28	29-31	32-34	35-37	38-40
Number of Plants	5	9	17	20	18	12	5

b) Draw **Histogram** for following data set.

Class	0-5	5-10	10-15	15-20	20-25	25-30	30-35
Frequency	5	16	42	51	35	12	6

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

X	0	1	3	4	6	7	8	10
f	30	17	23	10	16	4	7	2

P.T.O.

d) Explain cluster random sampling.

e) Calculate **Median** for following frequency distribution.

Class	0-3	3-6	6-9	9-12	12-15
Frequency	4	8	22	10	4

f) Write a note on types of variables.

g) Explain various ways of frequency distribution.

Q.3 **Attempt any five questions:** **[5 x 5 =25]**

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

Plant fresh weight (gm)	100-110	110-120	120-130	130-140	140-150
No. of plants	90	114	150	127	113

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

X	2	4	6	8	5	3	1
f	8	10	12	15	11	9	4

c) Calculate standard deviation for following frequency distribution.

X	1	2	3	4	5	6	7	8	9	10
f	5	10	20	25	40	42	45	48	70	80

d) Explain concept of experiment designing.

e) Draw **more than cumulative frequency curve** for following data set.

Class	10-20	20-30	30-40	40-50	50-60	60-70	70-80	80-90
Frequency	7	10	20	13	17	10	14	9

f) Discuss applications of Environmental statistics for Noise monitoring.

g) Explain role of statistics in water pollution studies.

Special Exam – 24/12/2022.
Morning Session

Deccan Education Society's
Fergusson College (Autonomous), Pune-4
T.Y.B.Sc. (Semester V)
Subject: Environmental Science
(EVS3511) Hydroponics: A Green Way of Urban Farming (2019 pattern)

Time: 2.5 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 Attempt any five questions: [2 x 5 =10]

a) Explain concept beneficial elements with suitable examples?
b) Recall the concept of Nutrient film technique.
c) Recall the benefits of vertical garden.
d) Enlist substrates used for hydroponics.
e) Give names of plant species grown using hydroponics.
f) What are aquaponics?
g) What type of nutrients are needed for hydroponics?

Q.2 Attempt any five questions: [3 x 5 =15]

a) Describe the importance of CO2 in the hydroponic system.
b) Explain the concept of growing media used in hydroponics? Give examples.
c) Distinguish between soil culture and hydroponics.
d) Describe role of pH in hydroponics.
e) Comment on inorganic hydroponic solutions.
f) Discuss different disadvantages of traditional agricultural systems.
g) What is the scope for market for hydroponics produce?

Q.3 Attempt any five questions: [5 x 5 =25]

a) What is meant by soilless farming? Write its need and importance
b) Comment on the skill and other requirement for start-up of hydroponic business.
c) Discuss the different types of soilless farming?
d) Give account of common additives and their function in hydroponics.
e) Explain in detail an aeroponics technique to grow plants.
f) Write a note on hydroponics as a commercial activity.
g) Justify the statement: hydroponics is going to benefit our soil.

06 DEC 2022

O/C

Deccan Education Society's
Fergusson College (Autonomous), Pune-4
T.Y.B.Sc. (Semester V)
Subject: Environmental Science
(EVS3512) Software's in Environmental Studies (2019 pattern)

Time: 2.5 Hrs **Max. Marks: 50**

Instructions to candidate:

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 **Attempt any five questions:** **[2 x 5 =10]**

a) What are applications of LCA studies?
b) What is meant by 'Carbon Footprint'?
c) Explain the concept of 'Sustainability Measurement'
d) What are Open source softwares?
e) Describe Topo maps.
f) Enlist any two softwares used for diagrammatic presentation.
g) Define Frequency density.

Q.2 **Attempt any five questions:** **[3 x 5 =15]**

a) Explain the concept of 'Sustainability Measurement'
b) What are applications of ecological footprint studies?
c) Explain use of ArcGIS software
d) Write a note on QGIS software.
e) Explain the concept of cumulative frequency curve.
f) Mention types of bar diagrams.
g) Write a note on frequency distribution rules.

Q.3 **Attempt any five questions:** **[5 x 5 =25]**

a) Discuss benefits of Bhuvan portal.
b) Discuss use of Global mapper software in environmental studies.
c) What are applications of CropWat and Open LCA Software?
d) Discuss the need and applications of sustainability measurement software's?
e) Discuss features of PAST software.
f) Discuss features of Excel software for measurement of central tendency.
g) Review the importance of softwares in Environmental data analysis.

08/12/2022
2:30pm

Deccan Education Society's
Fergusson College (Autonomous), Pune-4
T.Y.B.Sc. (Semester V)
Subject: Environmental Science
(EVS3506) Climate Change and Sustainability (2019 pattern)

Time: 2.5 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 **Attempt any five questions:** **[2 x 5 =10]**

a) Give explanation for 'Global Climate Change'
b) Which instruments are used for measurement of climate change?
c) How is water scarcity associated with global changes in climatic variations?
d) What is the purpose of National Adaptation Fund on Climate Change?
e) Mention important working areas of IPCC
f) Which are the major projects handled by UNFCCC?
g) What is Framework for Sustainability?

Q.2 **Attempt any five questions:** **[3 x 5 =15]**

a) Write an account on 2030 Agenda for sustainable development
b) Discuss on various carbon emission reduction technologies
c) Which are technical skills required to be an expert for environmental conservation?
d) Explain the importance of public participation in decision making
e) Discuss the various criticisms associated with sustainable development
f) Elaborate on need and objectives of National Carbonaceous Aerosols Programme
g) What are various sustainability measurement and reporting tools?

Q.3 **Attempt any five questions:** **[5 x 5 =25]**

a) Explain in detail about National Action Plan on Climate Change
b) Discuss on outcomes of Paris Agreement
c) What are various ways for carbon sequestration?
d) What are appropriate technologies used to achieve sustainability practices in industries?
e) Discuss in detail about ecological and carbon footprints for sustainability assessment
f) Explain the concept and various stages followed for Life Cycle Assessment
g) Write an account on programmes run by NASA and ISRO for climate change measurement

05/12/2022
2:30pm
O/C

Deccan Education Society's

Fergusson College (Autonomous), Pune-4

T.Y.B.Sc. (Semester V)

Subject: Environmental Science

(EVS3511) Hydroponics: A Green Way of Urban Farming (2019 pattern)

Time: 2.5 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 **Attempt any <u>five</u> questions:** **[2 x 5 =10]**

a) Write the full form of NFT and explain the concept.
b) Recall the concept of vertical garden
c) Illustrate aeroponics
d) Describe characteristics of rock wool and rice husk as substrates for hydroponics.
e) What types of nutrients are needed for Hydroponics?
f) Enlist the types of the vegetables and fruits that can be grown using hydroponic technique.
g) What is photoperiod?

Q.2 **Attempt any <u>five</u> questions:** **[3 x 5 =15]**

a) Describe the importance of pH in hydroponic system.
b) What is LECA? Why is it useful for plants?
c) Describe organic hydroponic solutions
d) Discuss important equipment and their role in hydroponics.
e) What is the scope for market for hydroponics produce?
f) Make a list of micro and macro nutrients needed for plants?
g) What are the disadvantages for hydroponics technique?

Q.3 **Attempt any <u>five</u> questions:** **[5 x 5 =25]**

a) Discuss factors influencing the production process in hydroponic system
b) Comment on the light and CO2 requirements in the hydroponic system
c) Discuss important factors of the market for the success of hydroponics.
d) Write a note on the scope of hydroponics in India.
e) Write a note on Hydroponics as a commercial activity
f) Justify the statement: Hydroponics is going to benefits our soil
g) Write a note on plant nutrition needed for hydroponics

Special Exam. O/C

19/12/22 Evening

Deccan Education Society's

Fergusson College (Autonomous), Pune-4

S.Y.B.Sc. (Semester IV)

Subject: Environmental Science

(EVS2401) Urban Ecosystems (2019 pattern)

Time: 2 ½ 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 **Attempt any five questions:** [2 x 5 =10]

a) Enlist issues of urban dwellings.
b) Define Ecological footprint.
c) What is green belt?
d) What is an urban forest?
e) Enlist two species of urban plants and animals each.
f) What is City Prosperity Index
g) What is Urbanization

Q.2 **Attempt any five questions:** [3 x 5 =15]

a) Write a note on Eco-housing.
b) Elaborate concept of urban sustainability.
c) Mention waste disposal issues with reference to urban dwelling.
d) Explain the concept of Controlled nature.
e) What is Urban woodland? Explain its significance.
f) Give examples of Sustainable cities of the World
g) Discuss the impact of urbanization

Q.3 **Attempt any five questions:** [5 x 5 =25]

a) Explain Environmental costs of urban infrastructure.
b) Examine housing scenarios at large-scale cities.
c) Discuss Scope, importance and threats to nature in the city
d) Prepare a draft for green cities
e) Classify the intended and unintended results of Urbanization
f) Outline the advantages of Green cities
g) Outline the various impacts with the urban areas

O/C special Exam - 22/12/22.
Evening session

Deccan Education Society's

Fergusson College (Autonomous), Pune-4

T.Y.B.Sc. (Semester V)

Subject: Environmental Science

(EVS3504) Environmental Biotechnology (2019 pattern)

Time: 2.5 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 **Attempt any <u>five</u> questions:** **[2 x 5 =10]**

a) Describe the concept of Azolla?
b) Write examples of earthworm suitable for vermicomposting
c) What is meant by bioleaching?
d) Enlist microbes involved in nitrogen fixation
e) Write full form of PSM and its use
f) Define: GMOs
g) Define : Bioindicators

Q.2 **Attempt any <u>five</u> questions:** **[3 x 5 =15]**

a) Write applications of environmental biotechnology?
b) Explain lifecycle of earthworm
c) Explain concept and role of azofertilizers in soil fertility
d) Write applications of biosensors
e) Write advantages and disadvantages of bioleaching
f) Explains concept of plant based biopesticides with example
g) Discuss methods used for stabilization of microbial biopesticides

Q.3 **Attempt any <u>five</u> questions:** **[5 x 5 =25]**

a) Write a note on production of bacterial biopesticides
b) Write a note on Insitu bioremediation processes.
c) Write a note on microbial oil recovery process
d) Write a note on composting process
e) Discuss various types of bioindicators with suitable examples
f) What is meant by neem gold? Explain its production process.
g) Write a note on social, ethical and environmental problems of GMO's

O/C Special Exam - 21/12/22 Evening

Deccan Education Society's

Fergusson College (Autonomous), Pune-4

T.Y.B.Sc. (Semester V)

Subject: Environmental Science

(EVS3502) Environmental Monitoring (2019 pattern)

Time: 2.5 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 Attempt any five questions: **[2 x 5 =10]**

a) Define L_{10} and L_{90}.

b) Describe a method to measure atmospheric pressure.

c) Enlist reagents for SO_2 estimation by improved West and Gaeke method.

d) Illustrate: mean and mode.

e) Describe biologically equivalent dose.

f) Enlist core parameters of National Water Quality Monitoring Programme.

g) Describe role of HEPA filter.

Q.2 Attempt any five questions: **[3 x 5 =15]**

a) Discuss methods to measure wind velocity and direction.

b) Explain flow chart of procedure for estimation of NOx.

c) Describe sound power level. Evaluate it for sound system producing sound of 0.002W (Given reference power is 10^{-12} watt/m^2)

d) Explain process of soil sample preparation. Comment on important soil quality indicators.

e) Explain types and tools of sampling for water and soil.

f) Give details of relative frequency and relative abundance.

g) Discuss working and applications of UV spectrophotometer.

Q.3 Attempt any five questions: **[5 x 5 =25]**

a) Write note on types and working principle of various thermometers.

b) Air sample collected has an initial flow rate 1.5m3/min, initial weight of filter 2.8573 g, final flow rate 1.2 m3/min, final weight as 3.2465 g and sampling time of 8 hours, estimate the SPM concentration.

c) Explain average sound pressure level and calculate it for 68dB and 77dB.

d) Illustrate with diagram mechanism of working of Geiger–Muller counter.

e) Give an account of methods of statistical sampling.

f) Forest has 5, 9, 4 and 2 individuals of *Mangifera indica, Azadirachta indica, Ficus benghalensis* and *Tamarindus indica* respectively, compute Shannon's Diversity Index.

g) Write note on working principle of GC-MS.

special Exam.
23/12/22
Evening

Deccan Education Society's
Fergusson College (Autonomous), Pune-4
T.Y.B.Sc. (Semester V)
Subject: Environmental Science
(EVS3506) Climate Change and Sustainability (2019 pattern)

Time: 2.5 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 **Attempt any five questions:** **[2 x 5 =10]**

a) Mention important working areas of UNFCCC?
b) Which are the major programmes run by MoEFCC for environmental conservation?
c) Mention any two strategies for Sustainability
d) What are the objectives for implementation of National Adaptation Fund for Climate Change?
e) Which are the current action plans set by IPCC to adapt with climate change?
f) Explain any two criticisms associated with sustainable development?
g) What is the need for environment, social and governance to achieve the objectives of Sustainability?

Q.2 **Attempt any five questions:** **[3 x 5 =15]**

a) Discuss any five Sustainable Development Goals set for 2030
b) Explain any two advanced technologies used to reduce carbon emissions
c) Which technical skills are required to be an expert for environmental conservation and sustainable practices?
d) Discuss the criticisms associated with sustainable development?
e) What is the UN Sustainable Development Knowledge Platform?
f) Explain the importance of public engagement for sustainable development
g) How are economic and social policies linked with environmental conservation?

Q.3 **Attempt any five questions:** **[5 x 5 =25]**

a) Explain in detail about National Action Plan on Climate Change
b) Why was the Paris Agreement considered a landmark agreement to mitigate and adapt with climate change?
c) Explain the importance of environmental education and research for solution of environmental issues
d) Write an account on programmes run by India to mitigate and adapt with climate change
e) Which are the tools used to calculate ecological and carbon footprints in industries and other organizations?
f) Explain the concept of Life Cycle Assessment? What are the various stages followed to calculate it?
g) Discuss various methodologies and tools used to measure sustainability in organizations

OIC Special Exam
24/12/21
Evening Session.

Deccan Education Society's
Fergusson College (Autonomous), Pune-4
T.Y.B.Sc. (Semester V)
Subject: Environmental Science
(EVS3512) Software's in Environmental Studies (2019 pattern)

Time: 2.5 Hrs **Max. Marks: 50**

Instructions to candidate:
- 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 **Attempt any five questions:** **[2 x 5 =10]**
- a) Explain the concept of 'Sustainability Measurement'
- b) Discuss the need for environmental software.
- c) Discuss use of shapefiles.
- d) What is a Topo Map?
- e) Enlist ways of frequency distribution.
- f) Mention formula of standard deviation.
- g) Define more than cumulative frequency.

Q.2 **Attempt any five questions:** **[3 x 5 =15]**
- a) Write an account on sustainability measurement tools and techniques
- b) What are the techniques to measure emitted carbon?
- c) Write a note on Global mapper software.
- d) Discuss the use of GPS.
- e) Write a note on types of hypothesis.
- f) Mention applications of softwares in Experiment design.
- g) Explain construction of Histogram.

Q.3 **Attempt any five questions:** **[5 x 5 =25]**
- a) Discuss various open source softwares used for GIS.
- b) Explain applications of Bhuvan earth.
- c) Explain the steps followed for use of CropWat Software
- d) Discuss the procedure to assess LCA studies with OpenLCA
- e) Discuss features of Excel software for data presentation.
- f) Write a note on application of PAST software.
- g) Mention applications of softwares in Environmental data analysis.

11/12/22
O/e

Deccan Education Society's

Fergusson College (Autonomous), Pune-4

T.Y.B.Sc. (Semester V)

Subject: Environmental Science

(EVS3504) Environmental Biotechnology (2019 pattern)

Time: 2.5 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 **Attempt any <u>five</u> questions:** **[2 x 5 =10]**

a) What is meant by environmental biotechnology?
b) Recall the concept of biopesticide? Write one example
c) Write a fullform of GMOs. Give one example
d) Enlist plants suitable for phytoremediation.
e) Enlist two microbes useful for the bioleaching process.
f) What is meant by symbiotic nitrogen fixation? Write one example of a microbe?
g) Define: Biosensors

Q.2 **Attempt any <u>five</u> questions:** **[3 x 5 =15]**

a) Explain the life cycle of earthworms with diagram.
b) Explain methods used for stabilization of microbes
c) Explain role of PSM as fertilizers
d) Write environmental significance of bioindicators
e) Explain any three factors affecting composting process
f) Describe importance of plants in phytoremediation process
g) Explain the concept of bioplastics with suitable examples.

Q.3 **Attempt any <u>five</u> questions:** **[5 x 5 =25]**

a) Write a note on production of fungal biopesticides
b) Write a note on Ex-situ bioremediation processes.
c) Write a note on the Bioleaching process.
d) Write a note on nitro fertilizers
e) Discuss various applications of environmental biotechnology.
f) Write a neem biopesticide production process
g) Write a note on GMOs

02/12/2023
2:30pm

Deccan Education Society's
Fergusson College (Autonomous), Pune-4
T.Y. B.Sc. (Semester V)
Subject: Environmental Science
(EVS3505) Introduction to Environmental Statistics (2019 pattern)

Time: 2.5 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 **Attempt any <u>five</u> questions:** **[2 x 5 =10]**

a) Define Sample.
b) Define median.
c) Calculate Harmonic mean of 2.3, 2.8, 3.0, 3.5 and 4.1.
d) Draw suitable curve of Kurtosis.
e) Calculate Geometric mean of 4, 6, 8, 10, and 12.
f) Enlist types of hypothesis.
g) Define stratified random sampling.

Q.2 **Attempt any five questions:** **[3 x 5 =15]**

a) Draw **Histogram** for following data.

Number of grains per spike	0-10	10-20	20-30	30-40	40-50	50-60	60-70
Number of Plants	2	7	13	30	24	17	8

b) Draw **Frequency curve** for following data set.

Class	0-5	5-10	10-15	15-20	20-25	25-30	30-35
Frequency	5	16	42	51	35	12	6

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

Class	10-25	25-40	40-55	55-70	70-85	85-100
Frequency	7	20	40	26	5	2

P.T.O.

d) Explain simple random sampling.

e) Calculate **Median** for following frequency distribution.

Class	Less than 3	3-6	6-9	9-12	12-15
Frequency	40	89	148	64	39

f) Write a note on Experiment design.

g) Explain the terms: Class interval, Frequency density.

Q.3 **Attempt any five questions:** **[5 x 5 =25]**

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

Plant fresh weight (gm)	0-10	10-20	20-30	30-40	40-50
No. of plants	8	14	18	12	5

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

X	2	4	6	8	10	12	14
f	2	2	4	5	3	2	1

c) Calculate **standard deviation** for following frequency distribution.

Class	51-55	56-60	61-65	66-70	71-75	76-80	81-85
Frequency	4	6	8	10	7	5	2

d) Calculate Arithmetic mean, Harmonic mean and Geometric mean for following data and interpret your results.
14, 15, 11, 9, 10, 17, 12, 20, 18, 19

e) Draw **less than cumulative frequency curve** for following data set.

Class	20-22	22-24	24-26	26-28	28-30	30-32	32-34	34-36
Frequency	7	10	20	13	17	10	14	9

f) Discuss applications of Environmental statistics in ecology.

g) Explain role of statistics for air quality monitoring.