+3-Sem-1(NEP)

BOT-C-1(P-1) R&B Major

DECEMBER, 2025

Microbiology and Phycology

Full Marks-100 **Time-3.00 hours**

Answer the questions as per instructions.

***Figures in the right hand side of margin indicates* marks**

Part- A

Q.1 Multiple Choice Questions (compulsory) **(10x1 =10)**

I) An infectious part of a virus is
a) Nucleic acid b) Tail
c) Protein coat d) Capsomeres

II) Prions are known to cause
a) Intestinal diseases b) Neurological diseases
c) Liver diseases d) Skin diseases

III) AIDS is caused by a
a) Fungus b) Virus
c) Mycoplasma d) Bacterium

IV) Steptomycin is obtained from
a) *Streptomyces aureofaciens* b) *Streptomyces erythreus*
c) *Streptomyces griseus* d) None of the above

V) Mycoplasma cells possess
a) DNA b) RNA
c) DNA and RNA d) None of the above

VI) Which of the following is the symbiotic N_2 fixing prokaryote ?
a) *Anabaena* b) *Volvox*
c) *Batrachospermum* d) *Cladophora*

VII) Floridean starch occurs in
a)Cyanophyceae b) Phaeophyceae
c) Rhodophyceae d) Bacillariophyceae

VIII) Red rust of Tea is caused by
a) a red algae b) a green algae
c) a fungus d) a bacterium

IX) The synzoospore of *Vaucheria* is
a) tetraflagellate b) biflagellaate
c) multiflagellate d) aflagellate

X) Plurilocular sporangia are characteristics of
a) *Dictyota* b) *Ectocarpus*
c) *Sargassum* d) *Cladophora*

Part B

Q.2 Short Questions type maximum 50 words (compulsory) **(9x2)**

I) What are some of the important virus diseases of plants.
II) What is a viroid ? Why it is unique.
III) Write notes on Gram stain technique
IV) List some of the plant diseases caused by bacteria.
V) Write the prokaryotic features of a cyanophycean cell.

VI) Name the types of spores found in algae.
VII) Differentiate between Isogamy and Oogamy.
VIII) What are 'globule' and 'nucule' and in which alga they are found?
IX) Where do the branches of limited growth occur in *Chara* ?

Part C

Q.3 Answer any eight question maximum 250 words **(8×5)**

I) Write briefly about structure viruses.
II) What are the chief differences between fermentation and respiration ?
III) Write short note on chief characteristics of major group of Archea.
IV) Describe the nature of the bacterial nucleus.
V) Write short note on algal habitats.
VI) Write short note on 'pigments in algae'.
VII) Write short note on 'main food reserve in algae'.
VIII) Write short notes on conceptacle.
IX) Why is *Chara* known as stonewort ?
X) Write notes on female sex organ of *Polysiphonia*.

Part D

Q. 4 Answer any four question maximum 800 words **(4×8)**

I) With suitable figures, write an account of life cycle of a bacteriophage.
II) Describe the fine structure of a typical prokaryotic cell.
III) Write an account of occurrence and structure of thallus of *Oedogonium*.
IV) Give an account of structure of thallus of *Chlamydomonas* with reference to the electron microscopic studies.
V) Describe the structure and mode of reproduction of in *Polysiphonia*.

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+3-Sem-1(NEP)

BOT-C-1(P-2) R&B Major

DECEMBER, 2025

Analytical Techniques in Plant Sciences

Full Marks-100 **Time-3.00 hours**

Answer the questions as per instructions.

***Figures in the right hand side of margin indicates* marks**

Part- A

Q.1 Multiple Choice Questions (compulsory) **(10x1 =10)**

I) Which part of microscope focus the light into object ?
a) Fine focus b) Condenser
c) Objective lens d) Tungsten bulb

II) Electron microscope gives magnification upto
a) 100 X b) 2000 X
c) 50,000 X d) 2,00,000 X

III) Analytical centrifuges are used to measure
a) Chemical properties of biological sample
b) Physical properties of biological sample
c) Biological properties of biological sample
d) All of the above

IV) In autoradiography, the emulsion or film contains _____ crystals?
a) Aluminium halide b) Magnesium halide
c) Silver halide d) None of these

V) What type of radiation is emitted by a radioisotope during decay?
a) Alpha particles b) Beta particles
c) Gamma rays d) All of these

VI) The basic for UV spectroscopy is
a) Tyndall effect b) Snell's law
c) Beer-Lambert law d) Nernst law

VII) In fluorescence spectroscopy, which term describes the ratio of emitted photons to absorbed photons?
a) Fluorescence lifetime b) Quantum yield
c) Stokes shift d) None of these

VIII) In HPLC, the mobile phase is
a) A liquid b) A gas
c) A solid d) both (b) and (c)

IX) What is the main reason for using a stacking gel in SDS-PAGE ?
a) To stain proteins
b) To prevent polymerization
c) To concentrate the proteins into tight bands
d) To resolve large proteins

X) In electrophoresis, DNA will migrate towards
a) cathode or positive electrode b) anode or negative electrode
c) cathode or negative electrode d) anode or positive electrode

Part B

Q.2 Short Questions type maximum 50 words (compulsory) (9x2)

I. What are the applications of transmission electron microscope?
II. What is the main principle behind flow cytometry ?
III. Write the role of rotor speed in centrifugation?
IV. What is meant by a half-life of a radioisotopes ?
V. Define autoradiography?
VI. What are the main parts of a flame photometer?
VII. Name the components of spectrophotometer.
VIII. What are the moving and stationary phases in Paper chromatography?
IX. What is the primary use of column chromatography ?

Part C

Q.3 Answer any eight question maximum 250 words (8×5)

I. Explain the role of Numerical Aperture in determining resolution.
II. Describe the role of fluorophores in labeling biological specimens.
III. Differentiate between differential centrifugation and density gradient centrifugation.
IV. Discuss about different types of rotors.
V. Explain the role of radioactive or fluorescent tags in Pulse-chase set ups.
VI. How does fluorescence indicate plant stress?
VII. How does increasing incident light intensity affect fluorescence?
VIII. What is the basic principle of Atomic Absorption Spectroscopy (AAS)?
IX. Describe the factors that affect the migration of molecules during electrophoresis ?
X. Explain why SDS denatures proteins and enables size-based separation.

Part D

Answer any four question maximum 800 words (4×8)

Q.4) Name some key types of light microscopes. Explain any one type in detail, covering its principle, applications, advantages and drawbacks.

Q.5) Describe the principle of Centrifugation and explain the uses of centrifugation in biological research.

Q.6) Give an account of the structural components of a UV-Visible spectrophotometer and explain its principles on which it works.

Q.7) Describe the fundamental principle behind flame photometry and how atomic excitation leads to light emission.

Q.8) What is ion exchange chromatography? Explain its principle and application.

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+3-Sem-1(NEP)

BOT-C-2(P-1)R&B Minor

DECEMBER, 2025

Microbiology and Phycology

Full Marks-100 Time-3.00 hours

Answer the questions as per instructions.

Figures in the right hand side of margin indicates marks

Part- A

Q.1 Multiple Choice Questions (compulsory) (10x1 =10)

I) An example of plant virus is

a) TMV b) Adeno vius

c) HIV d) Influenza

II) Viruses are

a) Prokaryotes b) Eukaryotes

c) living things d) neither prokaryotes nor eukaryotes

III) Outer layer of virus is composed of

a) Proteins b) Fats

c) Carbohydrates d) Nucleic acid

IV) A free living bacterium capable of fixing nitrogen is

a) Azotobacter b) Rhizobium

c) Pseudomonas d) Streptococcus

V) Surface appendages used by bacteria to attack one another and to host organism are called

a) Spirilla b) Thylakoids

c) Pili d) Mesosomes

VI) Heterocysts are found in the members of

a) Chlorophyceae b) Phaeophyceae

b) c) Cyanophyceae d) Rhodophyceae

VII) Which one of the following is an important Indian Phycologist ?

a) J. C. Bose b) F. E. Fritsch

c) M.S. Swaminathan d) M.O.P. Iyengar

VIII) Agar agar is obtained from

a) Chlorella b) Chara

c) Gracilaria d) Sargassum

IX) Which one of the following algae is popularly known as stonewort ?

a) *Volvox* b) *Vaucheria*

c) *Nostoc* d) *Chara*

X) *Polysiphonia* exhibits a special kind of alternation of generations which is called

a) haplontic b) diplontic

c) triphasic d) isomorphic

Part B

Q.2 Short Questions type maximum 50 words (compulsory) (9x2)

I) What genetic material is found in all plant viruses ?

II) Define the terms ‘temperate’ and ‘virulent’.

III) What are prions ?

IV) What is the main component of cell walls of bacteria ?

V) Differenciate between spore and gametes
VI) What are whiplash or acronematic flagella ?
VII) What type of sexual reproduction is found in *Oedogonium* ?
VIII) What are the main food reserves in Phaeophyta ?
IX) What are the different spores produced in the life cycle of *Polysiphonia* ?

Part C

Q.3 Answer any eight question maximum 250 words (8×5)

I) Write briefly about general properties of viruses.
II) Discuss different stages of metabolism in micro-organisms.
III) What is Gram stain technique ? Explain.
IV) How does the bacterial cell differ from the cells of a higher organism ?
V) What are various types of spores found in algae ?
VI) Write a short note on thallus structure of *Volvox.*
VII) Describe the structure of oogonium in *Oedogonium*.
VIII) Write a short note on thallus structure of *Fucus*
IX) Describe briefly on cell structure in *Chara*.
X) Write a short note on sex organs in *Polysiphonia*.

Part D

Q. 4 Answer any four question maximum 800 words (4×8)

I) Describe the morphology and structure of Tabaco Mosaic Virus (TMV).
II) What are bacteriophages? Discuss their morphology and replication.
III) Describe in detail the mode of sexual reproduction in bacteria.
IV) Write an essay on the economic importance of algae.
V) Give an illustrated account of life cycle of *Ectocarpus*.

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DECEMBER,2025

ENVIRONMENTAL STUDIES AND DISASTER MANAGEMENT

Time- 3 hrs **Full marks-100**

Answer as per instructions.
Figures in the righthand margin indicates marks

Part-I

Q.1 Answer all questions ସମସ୍ତ ପ୍ରଶ୍ନର ଉତ୍ତର ଦିଅନ୍ତୁ **[10x1=10]**

i) Which food component is the primary source of energy for the body?
ଶରୀର ପାଇଁ ଶକ୍ତିର ପ୍ରାଥମିକ ଉତ୍ସ କେଉଁ ଖାଦ୍ୟ ଉପାଦାନ?

A) Proteins ପ୍ରୋଟିନ୍ B) Vitamins ଭିଟାମିନ୍ C) Carbohydrates ଶର୍କରା D) Minerals ଖଣିଜ ଲବଣ

ii) Approximately what percentage of global anthropogenic methane emissions is estimated to come from rice cultivation? ଆନୁମାନିକ କେତେ ପ୍ରତିଶତ ବିଶ୍ୱସ୍ତରୀୟ ମାନବଜନିତ ମିଥେନ୍ ନିର୍ଗମନ ଧାନ ଚାଷରୁ ଆସିଥାଏ?

A) 1–2% B) 5% C) 10–12% D) 20%

iii) Which is the largest biogeographic zone of India by area? କ୍ଷେତ୍ରଫଳ ଦୃଷ୍ଟିରୁ ଭାରତର ସର୍ବବୃହତ ଜୈବ-ଭୌଗୋଳିକ ଅଞ୍ଚଳ କେଉଁଟି? A) Gangetic Plain ଗାଙ୍ଗେୟ ସମତଳ ଭୂମି B) Himalayas ହିମାଳୟ

C) Deccan Plateau ଦାକ୍ଷିଣାତ୍ୟ ମାଳଭୂମି D) Semi-Arid Zone ଅର୍ଦ୍ଧ-ଶୁଷ୍କ ଅଞ୍ଚଳ

iv) Which of the following is a non-ferrous mineral? ନିମ୍ନଲିଖିତ ମଧ୍ୟରୁ କେଉଁଟି ଏକ ଅଣ-ଲୌହ ଖଣିଜ?

A) Iron ore ଲୌହ ଆକରିକ B) Manganese ମାଙ୍ଗାନିଜ C) Copper ତମ୍ବା D) Cobalt କୋବାଲ୍ଟ

v) Under which Union Ministry does NIDM function? NIDM କେଉଁ କେନ୍ଦ୍ର ମନ୍ତ୍ରାଳୟ ଅଧୀନରେ କାର୍ଯ୍ୟ କରେ?

A) Ministry of Earth Sciences ଭୂବିଜ୍ଞାନ ମନ୍ତ୍ରାଳୟ B) Ministry of Home Affairs ଗୃହ ମନ୍ତ୍ରାଳୟ

C) MoEFCC D) Ministry of Science and Technology ବିଜ୍ଞାନ ଓ ପ୍ରଯୁକ୍ତି ମନ୍ତ୍ରାଳୟ

vi) Flash Floods are primarily caused by which of the following?
ଆକସ୍ମିକ ବନ୍ୟା ମୁଖ୍ୟତଃ ନିମ୍ନଲିଖିତ ମଧ୍ୟରୁ କାହା ଦ୍ୱାରା ହୋଇଥାଏ?

A) Gradual snowmelt ଧୀରେ ଧୀରେ ତୁଷାର ତରଳିବା B) High-pressure systems ଉଚ୍ଚ ଚାପ ପ୍ରଣାଳୀ

C) Tides ଜୁଆର। D) Sudden heavy rainfall or cloudbursts ହଠାତ୍ ପ୍ରବଳ ବର୍ଷା ବା ମେଘ ବିସ୍ଫୋରଣ

vii) Who is the ex-officio Chairperson of the National Board for Wild Life?
ଜାତୀୟ ବନ୍ୟପ୍ରାଣୀ ବୋର୍ଡର ପଦବୀ ନିର୍ବିଶେଷରେ ଅଧ୍ୟକ୍ଷ କିଏ?

A) Minister of Environment ପରିବେଶ ମନ୍ତ୍ରୀ B) Director of Wildlife Preservation ବନ୍ୟପ୍ରାଣୀ ସଂରକ୍ଷଣ ନିର୍ଦ୍ଦେଶକ

C) Prime Minister of India ଭାରତର ପ୍ରଧାନମନ୍ତ୍ରୀ D) Secretary to the Govt. of India ଭାରତ ସରକାରଙ୍କ ସଚିବ

viii) The statistical study of human populations is called: ମାନବ ଜନସଂଖ୍ୟାର ପରିସଂଖ୍ୟାନ ଅଧ୍ୟୟନକୁ କ'ଣ କୁହାଯାଏ?

A) Geography ଭୂଗୋଳ B) Demography ଜନସଂଖ୍ୟା ବିଜ୍ଞାନ

C) Ecology ପରିବେଶ ବିଜ୍ଞାନ D) Sociology ସମାଜଶାସ୍ତ୍ର

ix) Which type of soil, generated by the weathering of basic rock, is prevalent in the low-lying regions of Sambalpur? ମୌଳିକ ଶିଳାର କ୍ଷୟ ହେତୁ ସୃଷ୍ଟି ହୋଇଥିବା କେଉଁ ପ୍ରକାରର ମୃତ୍ତିକା ସମ୍ବଲପୁରର ତଳିଆ ଅଞ୍ଚଳରେ ଦେଖାଯାଏ?

A) Red Soil ଲାଲ ମାଟି B) Laterite Soil ଲାଟେରାଇଟ୍ ମାଟି

C) Black Soil କଳା ମାଟି D) Alluvial Soil ଜଳଜଳ ମାଟି

x) Which industrial group was specifically studied for its impact on fluoride levels in native crops within the Jharsuguda-Sambalpur belt? ଝାରସୁଗୁଡ଼ା-ସମ୍ବଲପୁର ଅଞ୍ଚଳରେ ଦେଶୀ ଫସଲରେ ଫ୍ଲୋରାଇଡ୍ ସ୍ତର ଉପରେ ଏହାର ପ୍ରଭାବ ପାଇଁ କେଉଁ ଶିଳ୍ପ ଗୋଷ୍ଠୀକୁ ଅଧ୍ୟୟନ କରାଯାଇଥିଲା?

A) TATA Steel B) Vedanta Alumina C) Jindal Power D) MCL

Part-II

Q.2 Answer all questions ସମସ୍ତ ପ୍ରଶ୍ନର ଉତ୍ତର ଦିଅନ୍ତୁ **[9x2=18]**

1. Suggest two measures an individual can take to reduce air pollution.
ବାୟୁ ପ୍ରଦୂଷଣ ହ୍ରାସ କରିବା ପାଇଁ ଜଣେ ବ୍ୟକ୍ତି ଗ୍ରହଣ କରିପାରୁଥିବା ଦୁଇଟି ପଦକ୍ଷେପ ପରାମର୍ଶ ଦିଅନ୍ତୁ।

2. How does radiation affect cells? ବିକିରଣ କୋଷଗୁଡ଼ିକୁ କିପରି ପ୍ରଭାବିତ କରେ?

3. What is biodiversity and why is it important? ଜୈବ ବିବିଧତା କ'ଣ ଏବଂ ଏହା କାହିଁକି ଗୁରୁତ୍ୱପୂର୍ଣ୍ଣ?

4. What is apiculture? What is its importance? ମହୁମାଛି ପାଳନ କ'ଣ? ଏହାର ଗୁରୁତ୍ୱ କ'ଣ?

5. What is the NDMA and under which act was it established?
NDMA କ'ଣ ଏବଂ ଏହା କେଉଁ ଅଧିନିୟମ ଅଧୀନରେ ପ୍ରତିଷ୍ଠିତ ହୋଇଥିଲା?

6. What is lightning? ବିଜୁଳି କ'ଣ?

7. What is Environmental Ethics? ପରିବେଶ ନୈତିକତା କ'ଣ?

8. What are the negative effects of urbanisation? ସହରୀକରଣର ନକାରାତ୍ମକ ପ୍ରଭାବଗୁଡ଼ିକ କ'ଣ?

9. What are the main causes of water pollution? ଜଳ ପ୍ରଦୂଷଣର ମୁଖ୍ୟ କାରଣଗୁଡ଼ିକ କ'ଣ?

Part-III

Q.3 Answer **eigh**t out of ten questions ଦଶଟି ମଧ୍ୟରୁ ଆଠଟି ପ୍ରଶ୍ନର ଉତ୍ତର ଦିଅନ୍ତୁ **[8x5=40]**

i) Define air pollution. Discuss its major causes and harmful effects.
ବାୟୁ ପ୍ରଦୂଷଣର ସଂଜ୍ଞା ଦିଅନ୍ତୁ। ଏହାର ମୁଖ୍ୟ କାରଣ ଏବଂ କ୍ଷତିକାରକ ପ୍ରଭାବ ବିଷୟରେ ଆଲୋଚନା କରନ୍ତୁ।

ii) "Environmental studies is a multidisciplinary field", justify this statement.
"ପରିବେଶ ଅଧ୍ୟୟନ ଏକ ବହୁମୁଖୀ କ୍ଷେତ୍ର", ଏହି ବିବୃତିର ଯଥାର୍ଥତା ପ୍ରତିପାଦନ କରନ୍ତୁ।

iii) What are the key objectives of the Air Act, 1981? ବାୟୁ ଅଧିନିୟମ, ୧୯୮୧ ର ମୁଖ୍ୟ ଉଦ୍ଦେଶ୍ୟଗୁଡ଼ିକ କ'ଣ?

iv) Urbanization is a boon as well as a bane for social development. Justify.
ସହରୀକରଣ ସାମାଜିକ ବିକାଶ ପାଇଁ ଏକ ଆଶୀର୍ବାଦ ଏବଂ ଅଭିଶାପ। ଯଥାର୍ଥତା ଦର୍ଶାନ୍ତୁ।

v) Explain the various methods of population control in India.
ଭାରତରେ ଜନସଂଖ୍ୟା ନିୟନ୍ତ୍ରଣର ବିଭିନ୍ନ ପଦ୍ଧତି ବ୍ୟାଖ୍ୟା କରନ୍ତୁ।

vi) Discuss community preparedness for floods. ବନ୍ୟା ପାଇଁ ଗୋଷ୍ଠୀଗତ ପ୍ରସ୍ତୁତି ବିଷୟରେ ଆଲୋଚନା କରନ୍ତୁ।

vii) Discuss the institutional framework of Disaster Management in India.
ଭାରତରେ ବିପର୍ଯ୍ୟୟ ପରିଚାଳନାର ଅନୁଷ୍ଠାନିକ ଭିତ୍ତିଭୂମି ବିଷୟରେ ଆଲୋଚନା କରନ୍ତୁ।

viii) Define 'Climate Change' and explain its causes and effects.
ଜଳବାୟୁ ପରିବର୍ତ୍ତନର ସଂଜ୍ଞା ଦିଅନ୍ତୁ ଏବଂ ଏହାର କାରଣ ଓ ପ୍ରଭାବ ବ୍ୟାଖ୍ୟା କରନ୍ତୁ।

ix) Explain population density and growth models. J-shaped vs. S-shaped.
ଜନସଂଖ୍ୟା ସାନ୍ଦ୍ରତା ଏବଂ ଅଭିବୃଦ୍ଧି ମଡେଲଗୁଡ଼ିକ ବ୍ୟାଖ୍ୟା କରନ୍ତୁ। J-ଆକୃତି ବନାମ S-ଆକୃତି।

x) Give a detailed discussion on survival skills in case of flood.
ବନ୍ୟା ସମୟରେ ବଞ୍ଚିବା ପାଇଁ ଆବଶ୍ୟକ କୌଶଳ ବିଷୟରେ ବିସ୍ତୃତ ଆଲୋଚନା କରନ୍ତୁ।

Part-IV

Q.4 Answer **four** out of five questions ପାଞ୍ଚଟି ମଧ୍ୟରୁ ଚାରିଟି ପ୍ରଶ୍ନର ଉତ୍ତର ଦିଅନ୍ତୁ **[4x8=32]**

i) Discuss in-situ and ex-situ methods of biodiversity conservation.
ଜୈବ ବିବିଧତା ସଂରକ୍ଷଣର in-situ ଏବଂ ex-situ ପଦ୍ଧତି ବିଷୟରେ ଆଲୋଚନା କରନ୍ତୁ।

ii) What are the objectives of the Environment Protection Act, 1986?
ପରିବେଶ ସୁରକ୍ଷା ଅଧିନିୟମ, ୧୯୮୬ ର ଉଦ୍ଦେଶ୍ୟଗୁଡ଼ିକ କ'ଣ?

iii) Explain the importance of wildlife conservation in ecological balance.
ପାରିସ୍ଥିତିକ ସନ୍ତୁଳନ ରକ୍ଷା କରିବାରେ ବନ୍ୟପ୍ରାଣୀ ସଂରକ୍ଷଣର ଗୁରୁତ୍ୱ ବ୍ୟାଖ୍ୟା କରନ୍ତୁ।

iv) Differentiate between hazard and disaster. Discuss the Disaster Management Cycle.
ବିପଦ ଏବଂ ବିପର୍ଯ୍ୟୟ ମଧ୍ୟରେ ପାର୍ଥକ୍ୟ ଦର୍ଶାନ୍ତୁ। ବିପର୍ଯ୍ୟୟ ପରିଚାଳନା ଚକ୍ର ବିଷୟରେ ଆଲୋଚନା କରନ୍ତୁ।

v) Explain the basic principles of identification of birds. ପକ୍ଷୀ ଚିହ୍ନଟ କରିବାର ମୂଳ ନୀତିଗୁଡ଼ିକ ବ୍ୟାଖ୍ୟା କରନ୍ତୁ।

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+3 SEM-1 (NEP)
ES-VAC-I R&B-SCI&COMM.

December,2025
ENVIRONMENTAL STUDIES AND DISASTER MANAGEMENT

Time; 3 hrs **Full Mark -100**

Answer as per instructions
Figure in the right-hand margin indicates marks

Part-I

Q.1 Answer ***all*** questions **[10x1=10]**

i) The "Tainting" of seafood refers to
A) The death of fish due to toxins B) The unpleasant flavour of seafood caused by pollutants
C) The discoloration of marine plants D) The accumulation of microplastics in tissue

ii)What is the unit used to measure the biological effect of radiation on living tissue?
A) Gray (Gy) B) Curie (Ci) C) Roentgen (R) D) Sievert (Sv)

iii) Which biogeographic zone is known as the "Biogeographical Gateway" for India's flora and fauna?
A) Western Ghats B) Islands C) North-East India D) Trans-Himalaya

iv)Which revolution deals with increasing fish production?
A) White Revolution B) Blue Revolution C) Green Revolution D) Pink Revolution

v) The National Disaster Management Authority (NDMA) in India is headed by
A) President of India B) Home Minister of India
C) Prime Minister of India D) Vice President of India

vi)What is the approximate temperature of a lightning bolt?
A) 3,000°C B) 10,000°C C) 30,000°C D) 5,000°C

vii) Under the 2023 amendment, what is the new official name of the Forest (Conservation) Act?
A) Indian Forest Management Act B) Van (Sanrakshan Evam Samvardhan) Adhiniyam
C) National Forest Protection Act D) Biodiversity and Forest Act

viii)What does the human population growth curve typically resemble?
A) J-shaped B) U-shaped C) S-shaped D) Linear

ix) In Delhi Ridge which species that release toxins to prevent native plant growth was introduced by the British?

x) Bargarh is known as the "Rice Bowl of Odisha." Which practice is a primary contributor to soil salinity in its canal-irrigated regions?

Part-II

Q.2 Answer ***all*** questions **[9x2=18]**

i) State any four harmful effects of noise pollution
ii) What are two main causes of soil pollution?
iii) What are the different types of forests managed by the government?
iv) What are the two strict requirements a region must meet to be classified as a hotspot?
v) What is the DDMA and under which act was it established?
vi) What is the "eye" of a cyclone?
vii) What causes ozone hole in the stratosphere?

viii) What are the positive effects of urbanisation?

ix) Mention two causes of industrial pollution

Part-III

Q.3 Answer ***eight*** out of ten questions **[8x5=40]**

i) Define water pollution. Discuss its major causes and the harmful effects it has on living organisms

ii) "Environmental studies is a multidisciplinary field", justify this statement

iii) Why is the conservation of minerals essential? Suggest ways to conserve them

iv) What are the changes caused by agriculture and overgrazing?

v) What are the Key Endangered and Endemic Species of India? What are their key causes of decline? What is their conservation status?

vi) Odisha is highly vulnerable to heatwaves, particularly during March to June, with increasing intensity due to climate change. What are the key factors contributing to this vulnerability?

vii) Give a comprehensive discussion on the National Disaster Management Authority

viii) What is acid rain? Discuss on chemical formation and their harmful effects during acid rain.

ix) Define population and population density. List four key population attributes. Briefly explain the two growth models (J-shaped vs. S-shaped). Mention two factors affecting population density

x) Give a detailed discussion on survival skills in case of earthquake.

Part-IV

Q.4 Answer ***four*** out of five questions **[4x8=32]**

i) Define noise ? What are the causes of noise pollution? How noise pollution is measured? What are its effects on human and environment? How the noise pollution can be controlled?

ii) Define energy resources and classify them into conventional and non-conventional sources. Explain any three advantages of non-conventional energy resources and discuss their importance in the context of sustainable development

iii) What is biodiversity? Give a detailed discussion on in-situ and ex-situ methods of conservation of biodiversity?

iv) What is disaster? With a labelled diagram, give detailed explanations of each phase of the Disaster Management Cycle.

v) Explain the functional elements of solid waste management and discuss the methods of its disposal.

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DECEMBER, 2025

Gardening and Vermicomposting

Full Marks-100 **Time-3.00 hours**

Answer the questions as per instructions.

Figures in the right hand side of margin indicates **marks**

Part- A

Q.1 Multiple Choice Questions (Answer All) **(10x1=10)**

I) Pomology is the study of production and marketing of
a) Vegetable b) Wine
c) Grapes d) Fruits

II) Nitrogen, Phosphorus and Potassium are three main
a) Micronutrient b) Macronutrient
c) Both (a) and (b) d) None of these

III) Grafting can be done only in
a) Dicotyledonous plants b) Monocotyledonous plants
c) Both (a) and (b) d) None of these

IV) Rooting in stem cuttings are stimulated by using
a) ABA b) Ethylene
c) Indole acetic acid d) Jasmonic acid

V) In ginger, vegetative propagation occurs through
a) Runners b) Rhizome
c) Bulbs d) Stem tuber

VI) Application of controlled amount of water to plants either in garden or in crop fields at needed intervals is known as
a) Irrigation b) Drainage
c) Both (a) and (b) d) None of these

VII) The vermicompost is _____ in colour.
a) Blue b) White
c) Orange d) Brownish

VIII) Which of the following material can be used for vermicompost?
a) Vegetable waste b) Organic waste
c) Agriculture waste d) All of the above

IX) Which among the following characteristics are to be maintained in vermicompost bedding?
a) Moisture level b) Aeration
c) Food source d) All of the above

X) Nutrients present in vermicompost are
a) Nitrogen b) Phosphorus
c) Potassium d) All of the above

Part B

Q.2 Answer the following questions in maximum 50 words **(9x2)**

I) Give two economic benefits from gardening.
II) Mention effect of Phosphorus deficiency.
III) Write on cutting method of asexual reproduction.
IV) What is the function of rooting hormones? Give examples.
V) What do you understand by rooting medium? Name some common types of rooting media.
VI) What is vermiculture?
VII) What type of worm is used in vermicomposting?

VIII) What environmental factors are crucial to maintain for a successful vermicomposting bin?

IX) What are two major benefits of using vermicompost in gardening?

Part C

Q.3 Answer any eight question maximum 250 words (8×5)

I) Discuss the time of manure and fertilizer application.

II) Discuss the role of boron as plant nutrient.

III) What are indications for mineral deficiency in plants?

IV) Write short note on advantages of 'vegetative propagation'.

V) Describe drip irrigation and its advantages.

VI) What are the properties of vermicompost?

VII) What are the types of waste that can be used in vermicomposting?

VIII) Why vermiculture is important?

IX) What are the challenges faced at the time of making of vermicopost?

X) Why it is called vermiculture?

Part D

Q. 4 Answer any four question maximum 800 words (4×8)

I) Explain the scope and importance of horticulture.

II) Give an account of application of nutrients.

III) Define plant propagation. Discuss different types of plant propagation.

IV) What is grafting? Discuss its importance in horticulture.

V) Explain the process of vermicomposting using garden waste. Discuss the advantages and disadvantages of vermicomposting and its benefits in agriculture.

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