

DECEMBER, 2024

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) (1×10 =10)

- I) What is the name for the protein shell of a virus that enclosed the genetic material?
a) Virion b) Capsid c) Peplomers d) Capsomeres
- II) Which of the following is a helical virus?
a) Tobacco mosaic virus (TMV) b) T4 bacteriophage c) Pox virus d) Herpes virus
- III) What is virus that infect bacteria called?
a) Virophage b) Lysophage c) Bacteriophage d) None
- IV) Transduction involve _____.
a) Bacteria obtaining DNA from the external environment
b) Bacteria obtaining DNA from the mother cell
c) Transfer of genome by conjugation
d) Transfer of genetic material through virus
- V) Teichoic acids are basically found in _____.
a) Cell wall of Gram-positive bacteria b) Outer membrane of Gram-positive bacteria
c) Outer membrane of Gram-negative bacteria d) Cell wall of Gram-negative bacteria
- VI) Cyanobacteria are known for their ability to fix atmospheric _____.
a) Carbon dioxide b) Oxygen c) Nitrogen d) Hydrogen
- VII) Laminaria is an example for _____.
a) Phaeophyta b) Pyrophyta c) Chlorophyta d) Chrysophyta
- VIII) The cell wall of Chlorophyta contains _____.
a) Cellulose b) Algin c) Chitin d) Peptidoglycan
- IX) When a tuft of flagella is present at one end of the bacterial cell, it is called _____.
a) Peritrichous b) Monotrichous c) Amphitrichous d) Lophotrichous
- X) Which of the following pigments is not found in Prochloron?
a) Chlorophyll a b) Zeaxanthin c) Chlorophyll b d) Phycobillin

Part B

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

- I) Tobacco Mosaic Virus (TMV)
II) General structure of Prions
III) Economic importance of Virus
IV) Mycoplasma
V) Morphology of Nostoc
VI) General characteristics of Algae
VII) Role of algae in biotechnology
VIII) Evolutionary significance of Chara
IX) Difference between phaeophyte and rhodophyte

Part C

Q.3 Answer any eight question maximum 250 words

(8×5)

- I) Baltimore classification
- II) Symptoms, effect and control of Viral plant diseases
- III) Write short note on Conjugation
- IV) Evolutionary significance of Prochloron
- V) Cell structure of Cyanobacteria
- VI) Fritsch system of classification
- VII) Reproduction in Coleochaete
- VIII) Morphology and cell structure of Charophyta
- IX) Reproduction in Fucus
- X) Nutrition in bacteria

Part D

Q. 4 Answer any four question maximum 800 words

(4×8)

- I) Describe discovery, nature and physiochemical characteristics of viruses?
Explain lytic and lysogenic cycle?
- II) Write down the general characteristics of bacteria and explain the bacterial recombination?
- III) Explain the morphology and life cycle of Oedogonium?
- IV) Describe the general characteristics of Rhodophyta and explain the life cycle of Polysiphonia in details?
- V) Describe the occurrence of Xanthophyta and explain the life cycle of Vaucheria?

DECEMBER,2025
Analytical Techniques in Plant Sciences

Full Marks-100

Time-3.00 hours

Part A

Q.1 Multiple Choice Questions (compulsory)

(1×10 =10)

- I) Negative staining is used for examining _____?
a) Virus particles b) Protein molecules c) Bacterial flagella d) all of these
- II) Flow cytometry uses _____?
a) Heavy isotope b) Radioactive elements c) Immunological techniques d) Energy content
- III) What is the principle of Centrifugation?
a) Sedimentation principle b) Filtration principle c) Evaporation principle d) None
- IV) _____ is a specialized form of centrifuge, which rotates at high speed?
a) Disk centrifuge b) Ultra centrifuge c) Stack centrifuge d) None
- V) Select the wavelength range corresponding to UV-Visible region?
a) 400-800nm b) 200-800nm c) 800-1000nm d) 900-1000nm
- VI) In Atomic absorption spectroscopy which of the following is the generally used radiation source?
a) Tungsten lamp b) Xenon mercury arc lamp c) Deuterium discharge lamp d) Hollow cathode lamp
- VII) What is the application of flame photometry?
a) Determine functional group b) study of chemical structure
c) To assay of drug d) To estimate metallic ions
- VIII) Ion exchange chromatography does not depend on which of the following property?
a) P^H b) Salt concentration c) Buffer d) Molecular weight of protein
- IX) Which technique separates charged particles using electric field?
a) Hydrolysis b) Electrophoresis c) Protein synthesis d) Protein denaturings
- X) Who discovered X rays ?
a) Paul villard b) J.J Thomson c) Wilhelm Rontgen d) None

Part B

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

(2 ×9)

- Explain the principle of microscopy?
- What do you mean by negative staining?
- Write short note on freeze etching?
- What is autoradiography?
- What do you mean by ultracentrifugation?
- Explain the Beer-Lambert's Law?
- Write down the principle of fluorescence spectroscopy?
- Explain the ascending and descending method of paper chromatography?
- Write down the differences between AGE and PAGE?

Part C

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

- a) Explain the flow cytometry with suitable diagram?
- b) What do you mean by shadow casting? Explain in detail?
- c) What is Radioisotopes? Write the uses of radioisotopes in biological research?
- d) Write short note on pulse chase experiment?
- e) Write down the principle and components of flame photometer?
- f) Write down the working mechanism of chlorophyll a fluorescence?
- g) Write short note on bomb calorimeter with suitable diagram?
- h) What you mean by molecular sieve chromatography? Explain its principle?
- i) What is TLC? Write down the principle of TLC?
- j) What do you mean by mass spectrometry? Explain in detail?

Part D

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

- 4) Explain the fundamental principles behind SEM and TEM with suitable diagrams, detailing their key differences?
- 5) What do you mean by centrifugation? Explain in details the types of centrifugation?
- 6) Write down the principle, components and working mechanism of IR spectroscopy?
- 7) What is the principle of chromatography? Explain in detail the paper chromatography?
- 8) Discuss the various types of electrophoresis techniques and their specific applications in separating and analyzing biological samples?

DECEMBER, 2024
Microbiology and phycology

Full Marks-100

Time-3 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)

(1×10)

- I) The rod of TMV contains _____ subunit of capsomeres?
a) 2130 b) 4130 c) 3330 d) 2230
- II) Which of the following is not true for a virus?
a) It possesses one nucleic acid RNA or DNA b) Genetic material may be enclosed in a protein sheath
c) It can reproduce extracellularly d) both a and b
- III) Intracellular membrane structures continuous with cell membrane in bacteria are called ____?
a) Ribosome b) Mesosome c) Mesogenate d) Capsid
- IV) Conjugation process was discovered by _____?
a) Hatch and slack b) Lederberg and Tatum c) Woese and fox d) Zinder
- V) The main food storage in cyanobacteria is _____?
a) Cyanophycin b) Oil c) Floridian starch d) Laminarin
- VI) Anisogamous reproduction is seen in _____?
a) Chara species b) Nitella species c) Chlamydomonas braunii d) Vaucheria
- VII) Laminaria is mainly the storage food material in class _____?
a) Rhodophyta b) Chlorophyta c) Xanthophyta d) Phaeophyta
- VIII) The female sex organ in Char is known as _____?
a) Globule b) Corona c) Nucule d) Carpogonium
- IX) Pyrenoids consists of _____?
a) Only starch b) Only protein c) Starch surrounded by protein d) Protein surrounded by starch
- X) Fertilization in Fucus is _____?
a) Internal b) External c) Both d) None of these

Part B

Q.2 Answer the following Questions in 50 words

(2 ×9)

- I) What do you mean by eclipse period?
II) Give two differences between virus and viroid?
III) Name the three bacteria which are involved in symbiotic nitrogen fixation?
IV) Write two roles of bacteria in environment?
V) What is an episome and a plasmid?
VI) What are the types of flagellar distribution in bacteria?
VII) What is cyanotoxin?
VIII) What is Synzoospore?
IX) Write the systematic position of Polysiphonia?

Part C

Q.3 Answer any eight question maximum 250 words

(5×8)

- I) Viroids
II) Nature and chemistry of Virus
III) Spheroplast

- IV) Bacterial cell structure
- V) Distinguish between gram-positive and gram-negative bacteria
- VI) Heterocyst
- VII) Vegetative reproduction in algae
- VIII) Asexual reproduction in volvox
- IX) Cell structure of Chara
- X) Sex organs in Polysiphonia

Part D

Answer any four question maximum 800 words

(8×4)

- Q.4) How viruses are classified? Discuss the Baltimore's system of classification of virus?
- Q.5) Discuss the microbial nutrition, growth and metabolism in details?
- Q.6) Give an account of the cell structure, reproduction and economic impotence of cyanobacteria with suitable example?
- Q.7) Give a general account of range of thallus structure in algae along with various economic uses of algae?
- Q.8) Describe the general characteristics of Phaeophyta and explain the life cycle of fucus in detail?

DECEMBER, 2024

Bio-fertilizers and Bio-pesticides

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

(1×10 =10)

I) An aquatic fern that performs nitrogen fixation is _____?

- a) Nostoc b) Azolla c) Salvinia d) Salvia

II) Which of the following is a symbiotic nitrogen fixing bacteria?

- a) Rhizobium b) Azotobacter c) Xanthomonas d) Azospirillum

III) Which of the following is incorrectly matched?

- a) Alnus-Frankia b) Alfalfa-Rhizobium
c) Nitrogen Fixer-Anabaena d) Mycorrhiza-Rhodospirillum

IV) Which of the following is not a biofertilizer?

- a) Mycorrhiza b) Rhizobium c) Agrobacteria d) Nostoc

V) Which of the following is a pair of biofertilizer?

- a) salmonella and E. coli b) Rhizobium and grass
c) Nostoc and legume d) Azolla and BGA

VI) Azotobacter is a/ an _____?

- a) Nitrogen fixing bacteria b) Antibiotic c) Sulphur fixing bacteria d) Virus

VII) Which of the following is not a free-living nitrogen fixing bacteria?

- a) Azotobacter b) Clostridium c) Klebsiella d) Xanthomonas

VIII) What is the full form of VAM?

- a) Vesicular-arbuscular mycorrhiza b) Venom-Azolla mycorrhiza
c) Venom-arbuscular mycorrhiza d) Vesicular-azollae mycorrhiza

IX) DDT is _____?

- a) Biodegradable b) non-biodegradable c) Growth enhancer d) Tranquilizer

X) _____ is a non-symbiotic nitrogen fixing bacteria?

- a) Rhizobium b) Frankia c) Azolla d) Azotobacter

Part B

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

- I) What do you mean by Biofertilizers?
- II) Write down the field application of rhizobium?
- III) Write down the general characteristics of Frankia?
- IV) What are the roles of Azolla in rice cultivation?
- V) What do you mean by non-symbiotic nitrogen fixers? Give a suitable example?
- VI) Write down the field application of phosphate solubilizing microbes?
- VII) Give an account of importance of mycorrhizal inoculum?
- VIII) Write down the field application of Viruses?
- IX) What do you mean by ectomycorrhiza?

Part C

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

- I) Symbiosis
- II) Legume/ Pulse plants
- III) Isolation, characterization, mass multiplication of Azolla
- IV) Cyanobacteria
- V) Importance of mycorrhizal inoculum
- VI) Mass inoculum production of VAM
- VII) Free living Azospirillum
- VIII) Bacillus thuringiensis
- IX) Virus cultivation
- X) Casuarina plants in nitrogen fixation

Part D

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

- Q.4)** Give a general account of the microbes used as biofertilizers for various crop plants and their advantages over chemical fertilizer?
- Q.5)** Write down the isolation, characteristics, mass inoculum, production and field application of Azotobacter?
- Q.6)** Give a general account of microbes used as bioinsecticides and their advantages over synthetic pesticides?
- Q.7)** Write down the isolation, characterization, mass multiplication, crop response of Azolla?
- Q.8)** Give an account of types of mycorrhiza and associated plants? Write down the mass inoculum production and field application of VAM?

December, 2024
Environmental Studies & Disaster Management

F.M.-100

Time- 3Hours

(Answer the questions as per instructions written in each part)

Part-I

Q.1. Answer all the questions either in one ward or by fill up the blanks or by choosing the True or False or as per the case may be **1x10=10**

- Ozone is a primary air pollutant (True/False).
ଓଜୋନ୍ ଏକ ପ୍ରାଥମିକ ବାୟୁ ପ୍ରଦୂଷକ (ସତ୍ୟ/ମିଥ୍ୟା)।
- Give an example of point source of water pollution.
ଜଳ ପ୍ରଦୂଷଣର ବିନ୍ଦୁ ଉତ୍ସର ଏକ ଉଦାହରଣ ଗିଭା ।
- What is Noise? ଶବ୍ଦ କ'ଣ?
- Out of alpha, beta and gamma radiation, which is most harmful to mankind?
ଆଲଫା, ବିଟା ଏବଂ ଗାମା ବିକିରଣରୁ ବାହାର, ଯାହା ମାନବଜାତି ପାଇଁ ସବୁଠାରୁ କ୍ଷତିକାରକ?
- Coal is a non-renewable resource (True/ False)
କୋଇଲା ଏକ ଅଣ-ନବୀକରଣଯୋଗ୍ୟ ସମ୍ପଦ (ସତ୍ୟ/ମିଥ୍ୟା)
- How many megadiverse countries are there in the world?
ବିଶ୍ୱରେ କେତେ ମହାବିବିଧ ଦେଶ ଅଛି?
- Give one example each of inorganic fertilizer and pesticide.
ଅଜୈବ ସାର ଏବଂ କୀଟନାଶକର ପ୍ରତ୍ୟେକର ଗୋଟିଏ ଉଦାହରଣ ଦିଅ ।
- Expand the abbreviation NDRF. ସଂକ୍ଷିପ୍ତ ନାମ NDRF ବିସ୍ତାର କର ।
- Environmental Protection Act was enacted in the year _____.
ପରିବେଶ ସୁରକ୍ଷା ଆଇନ _____ ବର୍ଷରେ ପ୍ରଣୀତ ହୋଇଥିଲା ।
- Define population. ଜନସଂଖ୍ୟାକୁ ପରିଭାଷିତ କର ।

Part-II

Q.2. Answer all the questions within maximum of 50 words **2x9=18**

- Write the sources of noise pollution. ଶବ୍ଦ ପ୍ରଦୂଷଣର ଉତ୍ସ ଲେଖ ।
- Write the effects of soil erosion. ମୃତ୍ତିକା କ୍ଷୟର ପ୍ରଭାବ ଲେଖ ।
- Write the problems associated with overexploitation of surface water.
ଭୂପୃଷ୍ଠ ଜଳର ଅତ୍ୟଧିକ ଶୋଷଣ ସହିତ ଜଡ଼ିତ ସମସ୍ୟା ଲେଖ ।
- Highlight the factors responsible for population growth.
ଜନସଂଖ୍ୟା ବୃଦ୍ଧି ପାଇଁ ଦାୟୀ କାରଣଗୁଡ଼ିକୁ ହାଇଲାଇଟ୍ କର ।
- List the causes of global warming. ବିଶ୍ୱ ଉଷ୍ମତାର କାରଣଗୁଡ଼ିକର ତାଲିକା କର ।
- Write the benefits of construction of Dams. ବନ୍ଧ ନିର୍ମାଣର ଲାଭ ଲେଖନ୍ତୁ ।
- Enlist the risk associated with flood. ବନ୍ୟା ସହିତ ଜଡ଼ିତ ବିପଦକୁ ତାଲିକାଭୁକ୍ତ କରନ୍ତୁ ।
- Write the different layers of atmosphere from bottom upwards.
ତଳୁ ଉପର ବାୟୁମଣ୍ଡଳର ବିଭିନ୍ନ ସ୍ତର ଲେଖନ୍ତୁ ।
- How women are associated in forest conservation?
ମହିଳାମାନେ ଜଙ୍ଗଲ ସଂରକ୍ଷଣରେ କିପରି ଜଡ଼ିତ?

Part-III

Q.3. Answer 8 out of 10 questions within maximum of 250 words

5x8=40

- a) What is acid rain? Elaborate the effects of acid rain.
ଏସିଡ଼ ବର୍ଷା କ'ଣ? ଏସିଡ଼ ବର୍ଷାର ପ୍ରଭାବକୁ ବିସ୍ତାରିତ କରନ୍ତୁ।
- b) Describe the primary treatment of waste water. ଅପଚୟ ଜଳର ପ୍ରାଥମିକ ଚିକିତ୍ସା ବର୍ଣ୍ଣନା କରନ୍ତୁ।
- c) Write the structure of any aquatic ecosystem with example of each component.
ପ୍ରତ୍ୟେକ ଉପାଦାନର ଉଦାହରଣ ସହିତ ଯେକୌଣସି ଜଳୀୟ ପରିସଂସ୍କାର ଗଠନ ଲେଖନ୍ତୁ।
- d) Write the demerits of using non-renewable resources.
ନବୀକରଣୀୟ ସମ୍ବଳ ବ୍ୟବହାରର ଅସୁବିଧା ଲେଖନ୍ତୁ।
- e) Write the effects of urbanization. ସହରୀକରଣର ପ୍ରଭାବ ଲେଖନ୍ତୁ।
- f) Write the environmental and health hazards of solid waste.
କଠିନ ଆବର୍ଜନାର ପରିବେଶଗତ ଏବଂ ସ୍ୱାସ୍ଥ୍ୟ ବିପଦ ଲେଖନ୍ତୁ।
- g) Describe the role of State Disaster Management Authority (SDMA).
ରାଜ୍ୟ ବିପର୍ଯ୍ୟୟ ପରିଚାଳନା କର୍ତ୍ତୃପକ୍ଷ (SDMA)ର ଭୂମିକା ବର୍ଣ୍ଣନା କରନ୍ତୁ।
- h) Describe the Disaster Management cycle. ବିପର୍ଯ୍ୟୟ ପରିଚାଳନା ଚକ୍ର ବର୍ଣ୍ଣନା କରନ୍ତୁ।
- i) Write the problems encountered by society due to heat waves.
ଗରମ ତରଙ୍ଗ ଯୋଗୁଁ ସମାଜ ସମ୍ମୁଖୀନ ହେଉଥିବା ସମସ୍ୟା ଲେଖନ୍ତୁ।
- j) Describe the in-situ methods of biodiversity conservation.
ଜୈବ ବିବିଧତା ସଂରକ୍ଷଣର ଅନ୍ତର୍ନିହିତ ପଦ୍ଧତି ବର୍ଣ୍ଣନା କରନ୍ତୁ।

Part-IV

Q.4. Answer 4 out of 5 questions within maximum of 800 words

8x4=32

- a) Describe the sources and effects of air pollution on environment and human health.
ପରିବେଶ ଏବଂ ମାନବ ସ୍ୱାସ୍ଥ୍ୟ ଉପରେ ବାୟୁ ପ୍ରଦୂଷଣର ଉତ୍ସ ଏବଂ ପ୍ରଭାବ ବର୍ଣ୍ଣନା କରନ୍ତୁ।
- b) Describe the causes and effects of modern agriculture on soil and human health.
ମାଟି ଏବଂ ମାନବ ସ୍ୱାସ୍ଥ୍ୟ ଉପରେ ଆଧୁନିକ କୃଷିର କାରଣ ଏବଂ ପ୍ରଭାବ ବର୍ଣ୍ଣନା କରନ୍ତୁ।
- c) Describes the causes and effects of deforestation.
ଜଙ୍ଗଲ କ୍ଷୟର କାରଣ ଏବଂ ପ୍ରଭାବ ବର୍ଣ୍ଣନା କରନ୍ତୁ।
- d) Describe the survival skill adopted during and after earthquake.
ଭୂମିକମ୍ପ ସମୟରେ ଏବଂ ପରେ ଗ୍ରହଣ କରାଯାଇଥିବା ବଞ୍ଚିବାର କୌଶଳ ବର୍ଣ୍ଣନା କରନ୍ତୁ।
- e) Describe the salient features of water (Prevention and Control of Pollution) Act.
ଜଳ (ପ୍ରଦୂଷଣ ନିବାରଣ ଏବଂ ନିୟନ୍ତ୍ରଣ) ଆଇନର ପ୍ରମୁଖ ବୈଶିଷ୍ଟ୍ୟଗୁଡ଼ିକ ବର୍ଣ୍ଣନା କରନ୍ତୁ।

December, 2025

Environmental Studies & Disaster Management

F.M.-100

Time- 3Hours

(Answer the questions as per instructions written in each part)

Part-I

Q.1. Answer all the questions either in one ward or by fill up the blanks or by choosing the True or False or as per the case may be **1 x 10=10**

- a) Peroxyl Acetyl Nitrate is a primary air pollutant (True/False).
- b) Agricultural run- off is a non-point source of water pollution (True/ False)
- c) What is the unit of measurement of Noise?
- d) Out of alpha, beta and gamma radiation, which is least harmful to mankind?
- e) Forest is a renewable resource (True/ False)
- f) How many megadiverse countries are there in the world?
- g) Give one example each of inorganic fertilizer and pesticide.
- h) Expand the abbreviation ODRAF.
- i) Disaster Management Act was enacted in the year _____.
- j) Define community.

Part-II

Q.2. Answer all the questions within maximum of 50 words **2 x 9=18**

- a) Write the sources of marine pollution.
- b) Write the effects of radiation pollution.
- c) Write the problems associated with overgrazing.
- d) Highlight the factors responsible for population growth.
- e) List the causes of climate change.
- f) Write the problems associated with construction of Dams.
- g) Enlist the risk associated with Lightening.
- h) Write the different layers of atmosphere from bottom upwards.
- i) How tribal people are associated in forest conservation?

Part-III

Q.3. Answer 8 out of 10 questions within maximum of 250 words **5 x 8=40**

- a) What is Green House Effect (GHE)? Elaborate the effects of GHE.
- b) Describe the secondary treatment of waste water.
- c) Write the structure of forest ecosystem with example of each component.
- d) Write the advantages of using renewable resources.
- e) Suggest some methods to control human population growth.
- f) Highlight the various options available for solid waste management.
- g) Describe the role of National Disaster Management Authority (NDMA).
- h) Describe the Disaster Management cycle.
- i) Write the problems encountered by society due to cyclone.
- j) Describe the ex-situ methods of biodiversity conservation.

Part-IV

Q.4. Answer 4 out of 5 questions within maximum of 800 words **8 x 4=32**

- a) Describe the sources and effects of water pollution on environment and human health.
- b) Describe the environmental effects of extracting and using mineral resources.
- c) Describes the benefits and threats of biodiversity.
- d) Describe the survival skill adopted during and after earthquake.
- e) Describe the salient features of Forest Act.
