



Attempt this Paper on this Question Sheet only.

PART I – OBJECTIVE (10 MARKS)

Q. No. 1: Multiple Choice Questions: Tick the Correct answer.

1. ----- species are commonly known as blue or green molds.
(a). *Penicillium* (b). *Mucor*
(c). *Rhizopus* (d). *Puccinia*
2. ----- is used by prokaryotic cells for locomotion.
(a). Pilli (b). Mitochondria
(c). Flagella (d). Endospore
3. *Marsilea* is heterosporous and sori are produced in fruiting bodies called -----.
(a). synangia (b). sporocarp
(c). stobili (d). None of these
4. In smut fungi, the site of karyogamy and meiosis is -----.
(a). basidiospore (b). teliospore
(c). parasitic mycelium (d). none of these
5. *Pinnularia* part is shaped like an elongate box ensheathed in a siliceous wall often called a -----.
(a). valve (b). frustule
(c). silica (d). none of these
6. Synangium is the characteristic feature of -----.
(a). *Selaginella* (b). *Psilotum*
(c). *Equisetum* (d). *Marsilea*
7. The *Ectocarpus* species are golden brown in color due to presence of dominant -----.
(a). fucoerythrin (b). fucoxanthin
(c). beta-carotene (d). both b & c
8. In -----, the life cycle is triphasic.
(a). *Ectocarpus* (b). *Polysiphonia*
(c). *Chara* (d). none of these
9. ----- are commonly called amphibious plants.
(a). Bryophytes (b). Pteridophytes
(c). Gymnosperms (d). none of these
10. A fully formed infectious viral particle is termed as -----.
(a). viroid (b). virusoid
(c). viron (d). capsid



UNIVERSITY OF THE PUNJAB

First Semester 2017

Examination: B.S. 4 Years Programme

(Special Examination)

Roll No.

PAPER: Botany-I (Plant Diversity)

TIME ALLOWED: 30 mins.

Course Code: BOT-101/11300

MAX. MARKS: 10

Attempt this Paper on this Question Sheet only.

PART I – OBJECTIVE (10 MARKS)

Q.1 Multiple choice questions: Tick the correct answers. (10 Marks)

- i. **Viral genome attached to the bacterial genome is termed as:**
 - a) Bacteriophage
 - b) Prophage
 - c) Lysogeny
 - d) Lysis
- ii. **The transmission of a double stranded piece of DNA from a donor bacterium to recipient through a tube is known as:**
 - a) Transformation
 - b) Sex pilli
 - c) Binary Fission
 - d) Conjugation
- iii. **Which structure is used by Prokaryotic cells for locomotion?**
 - a) Pilli
 - b) Mitochondria
 - c) Flagella
 - d) Endospore
- iv. **Reproductive organs are produced in the form of cones in:**
 - a) Angiosperms
 - b) Gymnosperms
 - c) Conifers
 - d) Cryptogams
- v. **Sori are produced in hard bodies in *Marsilea* known as:**
 - a) Basidiocarps
 - b) Seeds
 - c) Synangia
 - d) Sporocarps
- vi. **The type of fruiting body formed in *Phyllactinia* is:**
 - a) Perithecium
 - b) Apothecium
 - c) Basidiocarp
 - d) Cleistothecium
- vii. **Aeciospores are carried to wheat leaves where they germinate to form:**
 - a) Telia
 - b) Basidia
 - c) Uredinia
 - d) Pycnia
- viii. **The protostele in which xylem core is Smooth and rounded is:**
 - a) Plectostele
 - b) Haplostele
 - c) Actinostele
 - d) Polycyclic
- ix. **Pteridophytes are also called:**
 - a) Phanerogams
 - b) Vascular Cryptogams
 - c) Spermatophytes
 - d) Gymnosperms
- x. **The dwarf shoots of pine tree with its foliage leaves is called:**
 - a) Spur
 - b) Needle
 - c) Strobilus
 - d) Indusium



UNIVERSITY OF THE PUNJAB

First Semester 2017

Examination: B.S. 4 Years Programme

(Special Examination)

Roll No.

PAPER: Botany-I (Plant Diversity)

TIME ALLOWED: 2 hrs. & 30 mins.

Course Code: BOT-101/11300

MAX. MARKS: 50

Attempt this Paper on Separate Answer Sheet provided.

PART II, SUBJECTIVE

Q. 2. Answer the following questions briefly.

(20 MARKS)

- a. Give symptoms of TOBACCO MOSAIC DISEASE.
- b. Explain the role of PILLI in bacteria.
- c. Differentiate between UNILOCULAR and PLURILOCULAR SPORANGIA.
- d. Describe briefly the structure of GLOBULE of *Chara*.
- e. Differentiate between PROTOSTELE and SIPHONOSTELE.
- f. Explain the internal structure of *Physcia*.
- g. Differentiate between ASCOMYCETES and BASIDIOMYCETES.
- h. How cell wall of bacteria differ from plant cell wall?
- i. Write differences between Pteridophytes and Gymnosperms.
- j. Describe the structure of archegonium in *Funaria*.

Q. 3. Answer the following questions comprehensively. All questions carry equal marks.

(30 MARKS)

- i. (a) Give an account on general characteristics of BRYOPHYTES. (5 Marks)
(b) Describe the SEXUAL REPRODUCTION in bacteria. (5 Marks)
- ii. (a) Compare the characteristics of CHLOROPHYTA and RHODOPHYTA (5 Marks)
(b) Explain the life cycle of RUST FUNGI with illustration. (5 Marks)
- iii. (a) Describe the ultrastructure of a typical virus. Illustrate with an example. (5 Marks)
(b) Explain internal structure of the stem of *Ephedra*. Also draw its Neat and labeled diagram. (5 Marks)



UNIVERSITY OF THE PUNJAB

Second Semester - 2018

Examination: B.S. 4 Years Programme

Roll No.

PAPER: Botany-II

(Plant Systematic Anatomy & Development Theory)

Course Code: BOT-103 / BOT-12300 Part – I (Compulsory)

TIME ALLOWED: 15 Mints.

MAX. MARKS: 10

Attempt this Paper on this Question Sheet only.

Please encircle the correct option. Each MCQ carries 1 Mark. This Paper will be collected back after expiry of time limit mentioned above.

Q 1. Multiple Choice Questions

(1x10=10)

1. Arrangement of leaf on stem is called
a) Cryptogamy b) Phyllode c) Phyllotaxy d) none of them
2. Oldest available literature in botany is
a) Species plantarum b) Historia plantarum c) Philosophia botanica d) none of them
3. *Capsicum frutescens* is the scientific name of
a) Black pepper b) Love apple c) Red pepper d) Shimla mirch
4. Euphorbiaceae family have special type of inflorescence called
a) Raceme b) Cyathium c) Capitulum d) Cymose
5. *Saccharum officinarum* is the most important source of in the world
a) Carbohydrates b) Proteins c) Sugar d) Lipids
6. Pericycle is the characteristic feature of
a) Stem b) Root c) Leaves d) Flower
7. Parenchyma cells having chloroplasts constitute
a) Chlorophyllous parenchyma b) Collenchyma c) Chlorenchyma d) Aerenchyma
8. Cork cambium is an example of
a) Apical meristem b) Intercalary meristem c) Primary meristem d) Lateral meristem
9. Stigma is the modification of the tissue of at the apex of the
a) Ovary b) Style c) Carpel d) Anther
10. Which of the following living cells give the mechanical support and strength to plant?
a) Sclerenchyma b) Phloem c) Stone cells d) Collenchyma



UNIVERSITY OF THE PUNJAB

Second Semester - 2018

Examination: B.S. 4 Years Programme

Roll No.

PAPER: Botany-II

(Plant Systematic Anatomy & Development Theory)

Course Code: BOT-103 / BOT-12300 Part – II

TIME ALLOWED: 2 Hrs. & 45 Mints.

MAX. MARKS: 50

Attempt this Paper on Separate Answer Sheet provided.

Short Questions (each question carry two marks)

(10x2=20)

1. Compare natural and phylogenetic systems of classification
2. Define cryptogamy and phanerogamy
3. Enlist rules of nomenclature
4. Differentiate between paratype and topotype
5. Write four distinguishing feature of family Asteraceae
6. Write four botanical names of plants belonging to the family Solanaceae
7. Differentiate between parenchyma and chlorenchyma
8. Differentiate between exarch and endarch xylem maturation pattern
9. Compare Hypogyny and Epigyny with diadrams
10. Compare monocot and dicot stem

Detailed Questions (30)

1. (a). Explain the modern system of classification. (5)
(b). Unfold merits and demerits of this classification system (5)
2. (a). Write a brief note on the anatomical features of cell wall. (5)
(b). Discuss the development of transition zone area in any woody plant (5)
3. (a). Define the terms micropyle, aestivation and syncarpous (3)
(b). Also describe different types of Placentation (7)



UNIVERSITY OF THE PUNJAB

Third Semester 2018
Examination: B.S. 4 Years Programme

Roll No.

PAPER: Botany-III (Cell Biology, Genetics and Evolution) TIME ALLOWED: 2 hrs. & 30 mins.
Course Code: BOT-201/21300 MAX. MARKS: 50

Attempt this Paper on Separate Answer Sheet provided.

SUBJECTIVE PART

Question 2: Attempt any 10 of the following questions. Each question carries two marks.

1. How carbohydrates and sugars are used by the body?
2. How ribosomes are involved in protein synthesis?
3. What are nucleic acids?
4. Define evolution?
5. What are the types of plastids?
6. Differentiate between nucleus and nucleolus.
7. Describe the role of pachytene in meiosis.
8. What is the chemical composition of cell membrane?
9. What is Inversion mutation?
10. Differentiate between alleles and gene.
11. What is the Mendel law of independent assortment?
12. What is a genetic code?
13. What is back cross?
14. Define segregation
15. What is a stop codon?

Question 2: Attempt any two of the following three questions.

- 1: a) How vacuoles play an important role in a plants cell (07)
b) What is sex linked inheritance? Explain with examples? (08)
- 2: a) What are the glyoxysomes and peroxysomes and discuss their functions (08)
b) Discuss gene expression regulation (The *Lac operon*). (07)
- 3: Discuss the basic genetic Engineering techniques and its role in revolutionizing modern life. (15)



UNIVERSITY OF THE PUNJAB

Roll No.

Third Semester 2018
Examination: B.S. 4 Years Programme

PAPER: Botany-III (Cell Biology, Genetics and Evolution) TIME ALLOWED: 30 mins.
Course Code: BOT-201/21300 MAX. MARKS: 10

Attempt this Paper on this Question Sheet only.

OBJECTIVE PART

Question 1: Attempt all the questions. Circle the correct option. Each question carries one mark

1. The degradative Processes are categorized under the heading of
(A) Anabolism (B) Catabolism (C) Metabolism (D) None of the above
2. The most active site of protein synthesis is the
(A) Nucleus (B) Ribosome (C) Mitochondrion (D) Cell sap
3. The ability of the cell membrane to act as a selective barrier depends upon
(A) The lipid composition of the membrane (B) The pores which allows small molecules
(C) The special mediated transport systems (D) All of these
4. The Golgi complex
(A) Synthesizes proteins (B) Produces ATP (C) Provides a pathway for transporting
chemicals (D) Forms glycoproteins
5. The sugar found in RNA is
(A) Ribose (B) Deoxyribose (C) Ribulose (D) Erythrose
6. The functions of plasma albumin are
(A) Osmosis (B) Transport (C) Immunity (D) both (A) and (B)
7. In quaternary structure, subunits are linked by
(A) Peptide bonds (B) Disulphide bonds (C) Covalent bonds (D) Non-covalent bonds
8. A nucleoside consists of
(A) Nitrogenous base (B) Purine or pyrimidine base + sugar (C) Purine or pyrimidine base +
phosphorous (D) Purine + pyrimidine base + sugar + phosphorous
9. In contrast to eukaryotic mRNA, prokaryotic mRNA
(A) Can be polycistronic (B) Is synthesized with introns (C) Can only be monocistronic
(D) Has a poly A tail
10. The structure of tRNA appears like a
(A) Helix (B) Hair pin (C) Clover leaf (D) Coil



PAPER: Botany-IV (Plant Physiology and Ecology)

TIME ALLOWED: 15 Mints.

Course Code: BOT-203 / BOT-22300 Part - I (Compulsory)

MAX. MARKS: 10

Attempt this Paper on this Question Sheet only.

Please encircle the correct option. Each MCQ carries 1 Mark. This Paper will be collected back after expiry of time limit mentioned above.

Q. 1 1. Stomatal opening is stimulated by (1x10=10)

- a. Blue light
 - b. Red light
 - c. Green light
 - d. UV light
2. The unit of chemical potential is
- a. $J\ mol^{-1}$
 - b. $J\ mol^{-2}$
 - c. $J\ mol^{-3}$
 - d. None
3. Water depth in the sedge meadow stage of hydrosere is
- a. 6-8 feet
 - b. 4-6 feet
 - c. 1 foot
 - d. 1-2 inches
4. The water in the depth and permanently saturated zone is called
- a. Hygroscopic water
 - b. Chemically combined water
 - c. Ground water
 - d. Gravitational water
5. Which food chain does not start from plants?
- a. Grazing
 - b. Detritus food chain
 - c. Pond food chain
 - d. Terrestrial food chain
6. Electrochemical gradient across plasma membranes of plants is generated by
- a. H^+ -ATPase
 - b. H^+ -pyrophosphatase
 - c. Both a&b
 - d. None
7. Which of the following plant hormones is involved in fruit ripening?
- a. Abscisic Acid (ABA)
 - b. Cytokinins
 - c. Ethylene
 - d. Auxins
8. The state of water that moves in all directions is called
- a. Capillary water
 - b. Hygroscopic water
 - c. Gravitational water
 - d. Combined water
9. Which of the following is considered a macronutrient for most plants?
- a. Iron
 - b. Copper
 - c. Magnesium
 - d. Manganese
10. Several Calvin cycle enzymes are more active at pH
- a. pH =4
 - b. pH= 7
 - c. pH=8
 - d. Other than these



UNIVERSITY OF THE PUNJAB

Fourth Semester - 2018

Examination: B.S. 4 Years Programme

Roll No.

PAPER: Botany-IV (Plant Physiology and Ecology)
Course Code: BOT-203 / BOT-22300 Part – II

TIME ALLOWED: 2 Hrs. & 45 Mints.
MAX. MARKS: 50

Attempt this Paper on Separate Answer Sheet provided.

Q2. Answer the following question with short answer. (10x2=20)

- I. Differentiate between soil texture and soil structure.
- II. Give two main types of population growth.
- III. Differentiate between food web and food chain.
- IV. What is the role of ABA in seed dormancy?
- V. Differentiate between absorption and action spectrum.
- VI. What is the difference between an essential and beneficial nutrient element?
- VII. Define photorespiration.
- VIII. How is wind an important environmental factor for plants?
- IX. How does the Casparian strip affect water movement into the plant?
- X. What is the autogenic change incurred during succession.

Q 3. Answer the following questions briefly. (6x5=30)

- I. Draw a graphic representation of the N cycle in nature. Write the salient features of this cycle.
- II. Give in detail the characteristics of plant communities.
- III. Diagram the flow of electrons that occur in linear electron transport in photosynthesis
- IV. Differentiate between carrier, channel and pumps.
- V. Give an account of hydrophytes that enable them to survive under water- saturated conditions.
- VI. Describe the role of auxin in gravitropism in plants.



PAPER: Higher Fungi
Course Code: BOT-301

TIME ALLOWED: 30 mins.
MAX. MARKS: 10

Attempt this Paper on this Question Sheet only.

OBJECTIVE TYPE

PART-I

Q1. Each question has four possible answers. Choose the correct answer and encircle it.

1. Fungi which reproduce only by asexual means, and produce conidia
 - a. Are unable to undergo mitosis
 - b. Are members of the Deuteromycota
 - c. Lack an anamorphic phase
 - d. Lack a telomorphic phase
2. Stink horn is the common name of
 - a. *Phallus*
 - b. *Agaricus*
 - c. *Lycoperdon*
 - d. None of the above
3. The fruiting body of *Penicillium* is called
 - a. Cleistothecium
 - b. Perithecium
 - c. Apothecium
 - d. Stroma
4. _____ Is an example of Rust fungus.
 - a. *Puccinia*
 - b. *Amanita*
 - c. *Erysiphe*
 - d. *Uncinula*
5. Gills are produced in
 - a. *Ganoderma*
 - b. *Russula*
 - c. *Alternaria*
 - d. *Hydnum*
6. Smut is caused by
 - a. *Ustilago*
 - b. *Puccinia*
 - c. *Alternaria*
 - d. *Cercospora*
7. Dolipore septa are the characteristic feature of _____ mycelium
 - a. Ascomycetes
 - b. Lichens
 - c. Basidiomycetes
 - d. Deuteromycotina
8. The thallus of lichen contains
 - a. Algal cells
 - b. Fungal hyphae
 - c. a&b
 - d) None of these
9. Plants get benefit from the fungus forming symbiotic association in the form of
 - a. Water
 - b. Minerals
 - b. Carbohydrates
 - d. a & b
10. Region where basidiospores are attached to the basidium is termed as
 - a. Sterigmata
 - b. Pileus
 - c. Raphe
 - d. None of the above



UNIVERSITY OF THE PUNJAB

Fifth Semester 2018
Examination: B.S. 4 Years Programme

Roll No.

PAPER: Higher Fungi
Course Code: BOT-301

TIME ALLOWED: 2 hrs. & 30 mins.
MAX. MARKS: 50

Attempt this Paper on Separate Answer Sheet provided.

SUBJECTIVE TYPE

PART-II

2. Briefly answer the following questions. Each question carries two marks. 20 Marks

1. Differentiate between PEZIZALES and APHYLLOPHORALES ?
2. What is the difference between PARTIAL and UNIVERSAL VEIL?
3. What are UREDINIOSPORES and AECIOSPORES?
4. What are different types of CONIDIAL development in ascomycetes?
5. Give a diagrammatic representation of ASCUS development?
6. Differentiate between a PYCNIUM and AECIUM?
7. What is the economic importance of *SACCHAROMYCES*?
8. What are OPERCULATE and IOPERCULATE DISCOMYCETES? Give some examples.
9. What are HYPOGEOUS and EPIGEOUS fruiting bodies?
10. Differentiate between *AGARICUS* and *AMANITA* with labeled diagrams.

SUBJECTIVE QUESTIONS

30 Marks

Q3. Answers the following questions.

1. Write a note on ERGOT OF RYE disease caused by *CLAVICEPS PURPUREA*. Draw labeled life cycle. (05 marks)
2. Give general characters of LICHENS. Also explain their anatomy with suitable labeled diagram. (05 marks)
3. Write beneficial role of fungi in ecosystem. (05 marks)
4. What is black stem rust of wheat? Give methods to control this disease. (05 marks)
5. What is CENTRUM? Write a note on different types of Centrum found in ASCOMYCOTINA. (10 marks)



Attempt this Paper on this Question Sheet only.

OBJECTIVE

A. Choose the correct answer:

10

1. Plasmids are transferred between bacteria by way of a

- i. transposon
- ii. conjugator
- iii. pilus
- iv. snorkel
- v. trichogyne

2. Which of these describes a Holliday junction?

- i. A section of DNA where base pairing is not exact.
- ii. A strand of DNA containing genetic material from two different chromosomes
- iii. An interaction of two strands of DNA from homologous chromosomes
- iv. A three stranded DNA structure where single stranded DNA has invaded a double helix.

3. Transcription is initiated when RNA polymerase binds to

- i. a promotor
- ii. an initiator
- iii. a transcriptor
- iv. a codon

4. Which of the following genes is not a structural gene of the lac operon?

- i. lac A
- ii. lac I
- iii. lac Y
- iv. lac Z

5. This type of recombination does not require homologous sequences and is important for the integration of viral genomes into bacterial chromosomes

- i. replicative recombination
- ii. general recombination
- iii. site-specific recombination
- iv. None of the above

P.T.O.

6. Which of the following involves defective DNA repair mechanism?

- i. Haemophilia
- ii. Down Syndrome
- iii. Xeroderma pigmentosum
- iv. Hypertension

7. This type of plasmid can exist with or without being integrated into the host's chromosome

- i. medosome
- ii. lysosomes
- iii. episome
- iv. chromosome

8. Which of the following can be used as a tool by microbial geneticist?

- i. plasmids
- ii. transposable elements
- iii. bacteriophages
- iv. All of the above

9. Slipped mispairing may cause deletions resulting in

- i. Insertional inactivation
- ii. Translocations
- iii. Single nucleotide substitutor
- iv. Frame shift mutations
- v. Error in nucleotide choice

10. Euchromatin is

- i. Highly condensed
- ii. Highly expressed
- iii. Loosely packed
- iv. None of the above



UNIVERSITY OF THE PUNJAB

Fifth Semester 2018
Examination: B.S. 4 Years Programme

Roll No.

PAPER: Microbial and Molecular Genetics
Course Code: BOT-303

TIME ALLOWED: 2 hrs. & 30 mins.
MAX. MARKS: 50

Attempt this Paper on Separate Answer Sheet provided.

SUBJECTIVE

B. Explain the following:

20

- Q. Differentiate between
- REPLICATIVE and CONSERVATIVE TRANSPOSITION
 - SPONTANEOUS and INDUCED mutations
 - POLYMERASE and LIGASE
 - NUCLEOSOME and NUCLEOID Region
 - VIRULENT and TEMPERATE PHAGES
 - CISTRON and OPERON
 - LIGHT and DARK repair
 - INDUCTION and REPRESSION
 - COMPLEMENTATION and RECOMBINATION
 - BIOCHEMICAL MUTANTS and VISIBLE MUTANTS

C. Write brief answers:

30

- What do you understand by the term P-CYTOTYPE and M-CYTOTYPE? Write about the mechanisms involved in the transposition.
- Explain the mechanisms involved in mutations caused by BASE ANALOGUES with reference to 5-Bromouracil and Aminopurine. Draw diagram where necessary.
- What do you understand by the term "CATABOLITE REPRESSION"?
- What do you mean by "TRANSLOCATION"?
- How can you map the genes using the process of CONJUGATION in prokaryotes?
- Illustrate the structure of a BACTERIOPHAGE in detail. Draw labelled diagram also.



UNIVERSITY OF THE PUNJAB

Roll No.

Fifth Semester 2018
Examination: B.S. 4 Years Programme

PAPER: Evolutionary Trends in Trachaeophytes
Course Code: BOT-305

TIME ALLOWED: 30 mins.
MAX. MARKS: 10

Attempt this Paper on this Question Sheet only.

OBJECTIVE TYPE

1. Multiple Choice Questions (10)

Encircle the correct options.

- 1) The **Leaves** which bear **sporangia** are called;
a. Sporophyll b. Bract c. Cone d. Strobilus
- 2) The process of **double fertilization** is unique in;
a. Gymnosperms b. Cycads c. Angiosperms d. Ferns
- 3) The best types of **fossils** are found as;
a. Compressions b. Impressions c. Imprints d. Petrifications
- 4) **Evolution** can be defined as;
a. Negative process b. Gradual change in characters c. Descend with change
d. Destructive change
- 5) **Trachaeophytes** are the plants with;
a. Large stems b. Epidermis c. Xylem and Phloem d. Seeds
- 6) Which of the following is not a **Leptosporangiate Fern**?
a. *Dryopteris* b. *Adiantum* c. *Marattia* d. *Pteris*
- 7) Earliest known **Lycopsids** are included in;
a. Drepanophycales b. Ophioglossales c. Gnetales
d. *Ranales*
- 8) Stems mostly equipped with ridges and furrows are characteristic for;
a. Ferns b. *Dioon* c. Sphenopsids d. *Abies*
- 9) **Aglaophyton major** is a;
a. Trachaeophyte b. Gymnosperm c. Fern
d. Early Devonian Non-Vascular plant with hydroids and leptoids
- 10) **Hymenophyllum** is a;
a. Filmy Fern b. Primitive Algae c. Bryophyte d. Gymnosperm



UNIVERSITY OF THE PUNJAB

Fifth Semester 2018

Examination: B.S. 4 Years Programme

Roll No.

PAPER: Evolutionary Trends in Tracheophytes
Course Code: BOT-305

TIME ALLOWED: 2 hrs. & 30 mins.
MAX. MARKS: 50

Attempt this Paper on a Separate Answer Sheet provided to you. Marks shall be deducted for wrong spellings. Draw neat and labeled diagrams where necessary.

SUBJECTIVE TYPE

2. Give short and to the point answers. (2X10 = 20)

- i. Differentiate between **Bryophytes** and **Tracheophytes**.
- ii. Write down steps involved in the **Evolution of Seeds**.
- iii. Differentiate between **Leptosporangiate** and **Eusporangiate** Ferns.
- iv. Define the term "**STELE**" with examples.
- v. What is **MESXARCH XYLEM**? Support your answer with neat and labeled diagram(s).
- vi. Name any two **AQUATIC FERNS**.
- vii. Enlist any four synthetic characters of **ARTHROPHYTA**.
- viii. How **FALSE INDUSIUM** differs from **TRUE INDUSIUM**?
- ix. What makes **GNETALES** most important among **GYNMOSPERMS**?
- x. Highlight the status of **FEMALE GAMETOPHYTE** in **ANGIOSPERMS**.

3. Answer the following questions **BRIEFLY**. Maximum Marks = 30

- Q1.** Give a detailed account of the "**GEOLOGICAL TIME SCALE**" with reference to the evolution of Vascular Plants. (10 marks).
- Q2.** Write comprehensive note on the **EVOLUTIONARY IMPORTANCE** of **ANGIOSPERMS** along with **THEORIES** pertaining to their **ORIGIN**. (10 marks)
- Q3.** Compare and Contrast **SPHENOPHYLLALES** with **EQUSETALES**. Give examples along with neat and labeled diagrams to support your answer. (10 marks)



UNIVERSITY OF THE PUNJAB

Roll No.

Fifth Semester 2018
Examination: B.S. 4 Years Programme

PAPER: Environmental Biology
Course Code: BOT-307

TIME ALLOWED: 30 mins.
MAX. MARKS: 10

Attempt this Paper on this Question Sheet only.

OBJECTIVE TYPE

Q 1. Encircle correct option of the statements given below.

10

- (i) pH value of acid rain is less than
(a) 6.0 (b) 5.7 (c) 5.5 (d) 5.3
- (ii) Organic wastes in water can
(a) Deplete dissolved oxygen of water (b) Cause cancer
(c) Cause excessive growth of algae (d) reduce photosynthesis
- (iii) Pollutant gas in atmosphere involved in the production of ozone in the air is
(a) SO₂ (b) NH₃ (c) NO₂ (d) Cl
- (iv) Ozone layer in atmosphere is located in
(a) Stratosphere (b) Troposphere (c) Exosphere (d) Mesosphere
- (v) Higher the ICV (Inter-phase Chromosome Volume), higher is the radio-sensitivity in
(a) Higher plants (b) Lower plants (c) Invertebrates (d) Higher animals
- (vi) Major Contribution in global warming is that of
(a) CFC (b) Methane (c) CO₂ (d) N₂O
- (vii) Unit used to measure Noise intensity is
(a) Joule (b) Decibel (c) Hertz (d) Kilometer
- (viii) Radiations that can travel only up to a few centimeters in the air are known as
(a) X-Rays (b) Beta Particles (c) Gamma Rays (d) Alpha Particles
- (ix) BOD is
(a) a measure of organic matter present in water (b) Biochemical Oxygen Demand
(c) usually less than COD (d) all a, b and c
- (x) A species abundant in its natural range but with declining population is said to be
(a) Extinct species (b) Threatened species (c) Endangered species (d) Indicator species



UNIVERSITY OF THE PUNJAB

Fifth Semester 2018
Examination: B.S. 4 Years Programme

Roll No.

PAPER: Environmental Biology
Course Code: BOT-307

TIME ALLOWED: 2 hrs. & 30 mins.
MAX. MARKS: 50

Attempt this Paper on Separate Answer Sheet provided.

SUBJECTIVE TYPE

Q 2. Answer the following short questions

(2.5 x 8)

- (i) Differentiate between Troposphere and Stratosphere
- (ii) What is Biological magnification?
- (iii) The Fall out problem
- (iv) Explain Ex situe conservation and its impacts
- (v) Effects of Ozone on plant growth
- (vi) Classify solid waste pollution
- (vii) Greenhouse gases, their sources and impacts
- (viii) Thermal pollution and its impacts

Give detailed answers of the following

Q 3. Enlist and discuss in detail general and specific adverse effects of water pollution

10

Q 4. Define photochemical smog. Write down the mechanism of its formation, diurnal variation of its major pollutants and its impacts.

10

Q 5. What do you understand by greenhouse effect and global warming? Critically discuss nature and role of greenhouse gases. What are impacts of global warming?

10



UNIVERSITY OF THE PUNJAB

Sixth Semester - 2018

Examination: B.S. 4 Years Programme

Roll No.

PAPER: Plant Anatomy (Advance Course)
Course Code: BOT-311 Part – II

TIME ALLOWED: 2 Hrs. & 45 Mints.
MAX. MARKS: 50

Attempt this Paper on Separate Answer Sheet provided.

Q. No. 2: Give brief answers of following questions. (10x2=20)

1. What is siphonostele? What are its different types?
2. Define Reaction wood. What are its different types?
3. Differentiate Hard wood and Soft wood in plants.
4. What are parenchyma tissues? Give their function.
5. Differentiate between vessel members and tracheids.
6. Why is the heart wood darker in color than sap wood?
7. How is fascicular cambium different from inter-fascicular cambium?
8. What is meant by 'Guttation'? How it is linked with 'Hydathodes'?

Q. No. 3: Give a detailed account on root-shoot transition. (10)

Q. No. 4: Explain the histology of angiosperm leaf. (10)

Q. No. 5: What is meant by Axial and Ray systems in Secondary xylem? Explain in detail.
(10)



UNIVERSITY OF THE PUNJAB

Sixth Semester - 2018

Examination: B.S. 4 Years Programme

Roll No.

PAPER: Plant Anatomy (Advance Course)
Course Code: BOT-311 Part – I (Compulsory)

TIME ALLOWED: 15 Mints.
MAX. MARKS: 10

Attempt this Paper on this Question Sheet only.

Please encircle the correct option. Each MCQ carries 1 Mark. This Paper will be collected back after expiry of time limit mentioned above.

Q. No. 1: Fill in the blanks with suitable terms. (1x10=10)

- Presence of casparian strips is a characteristics feature of -----.
(a). Endodermis (b). Exodermis
(c). Epidermis (d). Pericycle
- Vascular bundles in a dicot stem are -----.
(a). open, collateral, exarch (b). Closed, collateral, endarch
(c). Closed, collateral, exarch (d). open, collateral, endarch
- is formed on the lower sides of leaning or crooked stems of conifer trees.
(a). Compression wood (b). Tension wood
(c). Heart wood (d). Early wood
- Trichomes secreting the sticky substances are -----.
(a). Glands (b). Colleters
(c). Stinging hairs (d). Papillae
- A leaf in which palisade parenchyma is present on both abaxial and adaxial leaf surfaces is termed as -----.
(a). Bifacial leaf (b). Isobilateral leaf
(c). Dorsiventral (d). Foliage
- Which of the following give rise to cork tissue?
(a). Phellogen (b). Periblem
(c). Periderm (d). Phellogen
- Guttation is a process characteristic to -----.
(a). Nectaries (b). Laticifers
(c). Hydathodes (d). Resin ducts
- The ability of wood to withstand rotting is called -----.
(a). pliability (b). Texture
(c). strength (d). Durability
- In ----- type of xylem, the development of the xylem takes place toward the centre of the axis.
(a). endarch (b). exarch
(c). mesarch (d). Both a & b
- In ----- type of siphonostele, xylem is surrounded on both sides by rings of phloem.
(a). Amphiphloic solenostele (b). Ectophloic solenostele
(c). both a & b (d). none of these



UNIVERSITY OF THE PUNJAB

Sixth Semester - 2018

Examination: B.S. 4 Years Programme

Roll No.

PAPER: Gene Cloning (Advance Course)
Course Code: BOT-313 Part – II

TIME ALLOWED: 2 Hrs. & 45 Mints.
MAX. MARKS: 50

Attempt this Paper on Separate Answer Sheet provided.

Q2: Answer the following:

(2x10=20)

- i. What are ADAPTORS?
- ii. What do you mean by KLENOW fragment?
- iii. What is the basic principle of GEL ELECTROPHORESIS?
- iv. Explain plasmid compatibility.
- v. Give significance of cloning δ -endotoxin in crop plants.
- vi. Define TRANSFECTION.
- vii. What do you mean by the term INTRONS?
- viii. What is GENE THERAPY and for what purpose it is used?
- ix. Explain briefly the process of SOUTHERN BLOTTING.
- x. What do you understand by the term Microinjection?

Q3: Explain the following:

(6x5=30)

1. What do you know about COSMIDS?
2. Explain INSERTIONAL INACTIVATION of *lac Z* gene.
3. Write down the procedure for the preparation of TOTAL CELL DNA.
4. What are the different classes of DNA manipulative ENZYMES?
5. Explain briefly about phage M13 as CLONING vector.
6. Write about the method for the preparation of COMPETENT *E. coli* cells.



UNIVERSITY OF THE PUNJAB

Sixth Semester - 2018

Examination: B.S. 4 Years Programme

Roll No.

PAPER: Gene Cloning (Advance Course)
Course Code: BOT-313 Part – I (Compulsory)

TIME ALLOWED: 15 Mints.
MAX. MARKS: 10

Attempt this Paper on this Question Sheet only.

Please encircle the correct option. Each MCQ carries 1 Mark. This Paper will be collected back after expiry of time limit mentioned above.

Q1: Choose the correct answer:

(1x10=10)

1. The second step in most genetic engineering experiments is
 - a. Screening
 - b. Production of recombinant DNA
 - c. Cleavage of DNA
 - d. Cloning
 - e. Testing
2. Which of the following statement is true?
 - a. A vector should have an origin of replication
 - b. A vector should have selectable markers
 - c. A vector should have unique restriction site
 - d. All of these
3. In the screening process, clones that metabolize X-gal turn
 - a. Yellow
 - b. Orange
 - c. Red
 - d. Blue
 - e. White
4. Bacteria protect themselves from viruses by fragmenting viral DNA upon entry with
 - a. Ligases
 - b. Methylases
 - c. Endonucleases
 - d. Vectors
 - e. Probes
5. For what purpose is DNA electrophoresis used?
 - a. To amplify a DNA for cloning
 - b. To separate noncharged molecules of DNA based on size
 - c. To separate charged molecules of DNA based on size
 - d. To separate charged molecules of DNA based on amount of positive charge
 - e. To produce static electricity by friction

(P.T.O.)

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6. **Gene therapy targets**
 - a. Genotypes
 - b. Phenotypes
 - c. Either a or b depending on the application
 - d. Both genotypes and phenotypes

 7. **In preliminary screening of clones, it is common to use**
 - a. Restriction enzymes
 - b. Probes
 - c. Antibiotics
 - d. Dyes
 - e. Milipore filters

 8. **Ti plasmid which is used as plant vector is obtained from**
 - a. *Agrobacterium tumefaciens*
 - b. *Agrobacterium radiobacter*
 - c. *Thermus aquaticus*
 - d. None of the above

 9. **Certain endonucleases cut DNA and leave DNA termini without overhangs which are called**
 - a. cohesive termini
 - b. sticky ends
 - c. blunt ends
 - d. oligonucleotides
 - e. none of the above

 10. **_____ is a filamentous phage**
 - a. T2
 - b. λ
 - c. M13
 - d. T4



UNIVERSITY OF THE PUNJAB

Sixth Semester - 2018

Examination: B.S. 4 Years Programme

Roll No.

PAPER: Plant Tissue Culture (Advance Course)

TIME ALLOWED: 2 Hrs. & 45 Mints.

Course Code: BOT-315 Part – II

MAX. MARKS: 50

Attempt this Paper on Separate Answer Sheet provided.

PART-II

Q2. QUESTIONS WITH SHORT ANSWERS

(10×2=20 Marks)

1. Enlist the basic apparatus required in Plant Tissue Culture Laboratory.
2. What is Sterilization? Why is it so important in a Plant Tissue Culture lab?
3. What are Callus Cultures?
4. What is meant by 'Medium undefined'?
5. Enlist the major components used in Plant Tissue Culture media.
6. What are some of the practical applications of Plant Tissue Culture?
7. What are the two most significant applications of plant Protoplast cultures.
8. How would you prepare Virus-free plants using tissue culture means?
9. How can we prepare hybrids using Plant Tissue Culture techniques?
10. What is meant by the term 'Cellular Totipotency'?

Q3. QUESTIONS WITH BRIEF ANSWERS

(10×3=30 Marks)

1. What is meant by Aseptic Techniques? Give methods of Aseptic Technique in plant tissue culture.
2. Write a brief account of Organogenesis in plant tissue culture.
3. Write note on
 - A) Cell suspension cultures.
 - B) Anther and pollen culture.



UNIVERSITY OF THE PUNJAB

Sixth Semester - 2018

Examination: B.S. 4 Years Programme

Roll No.

PAPER: Plant Tissue Culture (Advance Course)
Course Code: BOT-315 Part – I (Compulsory)

TIME ALLOWED: 15 Mints.
MAX. MARKS: 10

Attempt this Paper on this Question Sheet only.

Please encircle the correct option. Each MCQ carries 1 Mark. This Paper will be collected back after expiry of time limit mentioned above.

PART-I

Each question has four possible answers. Choose the correct (or the most appropriate) answer by encircling it. Each question carries equal marks.

Multiple choice questions

Q1. Encircle the correct option

(10)

1. Callus is usually sub-cultured after
a) 1-2 weeks b) 2-3 weeks c) 4-6 weeks d) varies as per experimental requirement
2. Dry heat is used for sterilization of
a) Glassware b) Liquid media c) Hormonal solutions d) vitamin stocks
3. Explants can be surface sterilized by
a) Dry heat b) Wet heat c) chemical methods d) Incineration
4. Pollen culture technique is used to produce
a) Hybrid plants b) Haploid plants c) Diploid plants d) a, b, c are correct
5. Cytoplasmic hybrids containing nucleus from one parent and cytoplasm from both parents are called
a) Asymmetric hybrids b) Cybrids c) Somatic hybrids d) Symmetric cybrids
6. The tissue culturing can be used to produce
a) Callus cultures b) Hybrid plants c) Pathogen-free plants d) a, b, c are correct
7. The hormones used in plant tissue culture include
a) IAA b) Gibberellins c) ABA and IBA d) a, b, c are true
8. In autoclave, the media is generally sterilized at 121°C having pressure at
a) 10 psi b) 15 psi c) 20psi d) 25psi
9. Chemical fusion of protoplast do not require
a) PEG treatment b) NaNO_3 treatment c) AC/DC treatment d) Calcium treatment
10. Microfiltration involves
a) microporous medium b) membrane filters c) microfilters d) a, b, c are true



UNIVERSITY OF THE PUNJAB

Sixth Semester - 2018

Examination: B.S. 4 Years Programme

Roll No.

PAPER: Palynology (Advance Course)
Course Code: BOT-317 Part – II

TIME ALLOWED: 2 Hrs. & 45 Mints.
MAX. MARKS: 50

Attempt this Paper on Separate Answer Sheet provided.

Q.2 Answer the following short questions. (10x2=20)

- I. Differentiate between a **Spore** and a **Pollen Grain**.
- II. Write a note on **Environmental Palynology**.
- III. Differentiate between **Palynodebris** and **Varia**.
- IV. How will you identify **Recycling**?
- V. Describe **Pollen wall stratification** with the help of neat and labeled diagramme.
- VI. Describe applications of **Palaeopalynology**.
- VII. How would you differentiate between **long Ranging** and **Index playnomorphs**?
- VIII. What does the colour of **fossil palynomorphs** indicate and why does it vary?
- IX. What do these codes indicate about spores and pollen: **Sa0, Scz, Pc3, Pv2**.
- X. Differentiate between **Baculate** and **Echinate** Exine.

Answer the following Long Questions. (10x3=30)

Q.3: Define **Maceration**. Describe in detail complete procedure of Collection and Maceration of flowers from different plants for the isolation of Pollen / Spores.
(10 Marks)

Q.4: a) Draw a diagram representing the **alteration of sporopollenin and other organic substances** with **coalification** by **geothermal alterations** (adopted from Potonie and Kremp, 1953).
(05 Marks)

b) Describe the **Turmal System** of classification for Pollen and Spores.
(05 Marks)

Q.5: a) Discuss preservation of Spores and Pollen in **sediments**. (05 Marks)

b) How many different types of **Mounting Media** are used in Palynology?

Write down the procedure to prepare **Glycerin Jelly**. (05 Marks)



UNIVERSITY OF THE PUNJAB

Sixth Semester - 2018

Examination: B.S. 4 Years Programme

Roll No.

PAPER: Palynology (Advance Course)
Course Code: BOT-317 Part – I (Compulsory)

TIME ALLOWED: 15 Mints.
MAX. MARKS: 10

Attempt this Paper on this Question Sheet only.

Please encircle the correct option. Each MCQ carries 1 Mark. This Paper will be collected back after expiry of time limit mentioned above.

- Q.1 Select the correct option and encircle it. (1x10=10)
- I. Which is not included in **palynomorphs**
a. Nanofossils b. Dinoflagellates c. Scolecodonts d. Chitinozoan
 - II. **Palynomorphs** are organic walled whole organisms or parts of organisms range in size from
a. 5um-200um b. 5um-300um c. 5um-500um d. 5um-50um
 - III. **Fossilized algae** include
a. Spirogyra b. *Padiastum* c. *Sargassum* d. Chara
 - IV. **Archeological palynology** is the study of pollen from
a. Ancient sediments b. Old civilizations c. Honey d. Crime Scenes
 - V. Carbonized **sporopollenin** is more resistant to
a. Break down b. Oxidation c. Reduction d. Polymerization
 - VI. The chances of finding fossil Pollen and Spores is more likely in
a. Coarse grained sandstone b. Fine grained sandstone c. Silt stone d. clay stone
 - VII. **Angiospermic pollen** are abundant in
a. Permian sediments b. Tertiary sediments c. Jurassic sediments
 - VIII. According to Faegri **Foot Layer** is included in
a. Ektexine b. Endexine c. Tectum d. None
 - IX. **Elements** irregularly distributed and undulating are called
a. Rugulate b. Striate c. Reticulate d. Scabrate
 - X. The **discordant** forms that are younger than the associated rock are characterized by
a. Stratigraphic Leak b. Recycling c. Reworking d. None



UNIVERSITY OF THE PUNJAB

Seventh Semester 2018
Examination: B.S. 4 Years Programme

Roll No.

PAPER: Air Pollution its Impacts and Control
Course Code: BOT-401

TIME ALLOWED: 2 hrs. & 30 mins.
MAX. MARKS: 50

Attempt this Paper on Separate Answer Sheet provided.

Q 2. Write short notes of 8 to 10 lines on the following:

20

- (i) Sources and impacts of mercury pollution
- (ii) Urban Pollution Rankings in Pakistan and other Countries
- (iii) Effects of Chernobyl Event
- (iv) Fallout Problem
- (v) Effects of Air Pollutants on Inert materials
- (vi) Differentiate between primary and secondary pollutants
- (vii) Comparative radio-sensitivity of different organisms
- (viii) Fate of Radionuclides in the environment

Q 3. Give a detailed account of Acid Rain, its formation, types and different sources.

Discuss its effects on forests, aquatic ecosystems and artifacts.

10

Q 4. What is Greenhouse Effect, Global Warming and Climate Change? Give an account of
Culprit gases and their warming potential. What are impacts of Climate Change?

10

Q 5. Give an account of

- a) Exhaust Emissions from Motor Vehicles
- b) Stratospheric Ozone, Its importance, Production and Depletion

5

5



UNIVERSITY OF THE PUNJAB

Roll No.

Seventh Semester 2018
Examination: B.S. 4 Years Programme

PAPER: Air Pollution its Impacts and Control
Course Code: BOT-401

TIME ALLOWED: 30 mins.
MAX. MARKS: 10

Attempt this Paper on this Question Sheet only.

Q 1. Encircle correct option of the statements given below.

10

- (i) Which one is an example of natural air pollution?
(a) Industrial emissions (b) Volcanic Ash (c) Vehicle Exhaust (d) Cigarette smoke
- (ii) Particulate air pollution from automobile exhaust is due to
(a) Zinc (b) Cadmium (c) Lead (d) Mercury
- (iii) Acid precipitation causes
(a) Human Skin Burn (b) Weathering of Rocks
(c) Changes in soil for plants growth (d) Changes in lakes for aquatic life
- (iv) The major source of carbon monoxide emissions is
(a) Automobiles (b) Tobacco Smoking (c) Industry (d) Domestic Fuel Burning
- (v) The law that regulates air pollution is
(a) Air quality Control (b) Atmospheric Pollution (c) Oh No! Ozone Hole (d) Clean Air Act
- (vi) Which of the following group of organisms is more sensitive to radiations
(a) Plants (b) Mammals (c) Insects (d) Amphibians
- (vii) People who are least likely to be bothered by air pollution are
(a) Elderly people (b) Healthy People (c) Infants (d) People with Asthma
- (viii) Visible ozone injury symptoms on leaves of sensitive plants is
(a) Flecking (b) Stippling (c) Leaf Deformation (d) All a, b and c
- (ix) Radiation that can travel only a few centimeters in the air is
(a) Beta Particles (b) Alpha Particles (c) Gamma Rays (d) X-rays
- (x) The phenomenon of Acid Rain is
(a) Global (b) Local (c) Regional (d) National



UNIVERSITY OF THE PUNJAB

Seventh Semester 2018
Examination: B.S. 4 Years Programme

Roll No.

PAPER: Biohazards, Biosafety, Bioethics
Course Code: BOT-403

TIME ALLOWED: 2 hrs. & 30 mins.
MAX. MARKS: 50

Attempt this Paper on Separate Answer Sheet provided.

PART II –SUBJECTIVE (50 MARKS) Time allowed: Two Hours and 15minutes

SHORT QUESTIONS (20- Marks)

Q. 2. Answer the following questions briefly.

1. What is difference between animal and plant cell culture?
2. What is the moral and ethical value of human being cloning?
3. Write down the classification of laboratories on the basis of biosafety level.
4. What is the role of biological weapons?
5. What are manmade compounds?
6. Describe briefly the causes and effects of greenhouse effect.
7. How can we get a Patent?
8. What are the measures which are essentially needed for the protection of factory workers?
9. Describe the most dangerous Solid Waste?
10. How can we prepare a standard laboratory?

Q. 3. Answer the following questions. (30)

- iii. (a) What is Genetic engineering? (05 Marks)
(b) Write down a short note on Heavy metals? (05 Marks)
- iv. (a) What are different types of microbes which cause hazardous effect on environment? (05 Marks)
(b) Write a short note on 'Water Pollution' (Marks: 5)
- iii. (a) What are solid waste? Give measures to discard it. (05 Marks)
(b) What is the role of Environmental Protection Agency? (05 Marks)



UNIVERSITY OF THE PUNJAB

Roll No.

Seventh Semester 2018
Examination: B.S. 4 Years Programme

PAPER: Biohazards, Biosafety, Bioethics
Course Code: BOT-403

TIME ALLOWED: 30 mins.
MAX. MARKS: 10

Attempt this Paper on this Question Sheet only.

Attempt all questions. Marks shall be deducted for wrong spellings, erasing or overwriting. Write your names and roll no. on all sheets.

PART I – OBJECTIVE (10 MARKS) Time allowed: 15 Minutes

Q. 1. Multiple choice questions: Tick (✓) the correct answer. (10 Marks)

1. Some of the differences between a fume hood and a biological safety cabinet (BSC) are that a BSC protects both the user and the material inside the cabinet and that the exhaust is HEPA filtered.
True or False
2. Which of the following practices should be utilized when working in a biological safety cabinet?
A. Disinfect the work surface of the BSC before and after work
B. Disinfect all items which go into and come out of the BSC
C. Do not store any items in the BSC
D. All of the above.
3. Which of the following type(s) of Personal Protective Equipment (PPE) is frequently used?
a. Safety glasses b. Gloves c. Lab Coats d. All of the above
4. How should biological materials that need to be transported from the lab to another location be handled?
A. Wear a lab coat and transport materials in your pocket
B. Wear gloves and carries the material in your hands
C. Seal materials in a leak-proof, shatter-resistant secondary container
D. Cells in cell culture flasks and dishes are fine for transport
5. The water bodies in district Kasur are contaminated by
(a) Glass (b) Paper (c) Tanneries (d) Hospital waste
6. Ozone is depleted due to
(a) Heat (b) Radiation (c) CFC (d) Pb
7. Female mosquito take blood because it need ----- for egg production
(a) Protein (b) fats (c) Carbohydrates (d) Vitamins
8. The process by which all living cells, spores, and acellular entities are either destroyed or removed from an object or habitat is called
(a) Antisepsis (b) Disinfection (c) Sanitation (d) Sterilization
9. Ultraviolet (UV) radiation is an effective microbial control agent because
(a) It oxidizes cellular constituents (b) It damages DNA
(c) It damages the cell membrane (d) All of the above
10. Which agency is responsible for regulating disinfectants?
(a) Environmental Protection Agency (b) National Institutes of Health
(c) Food and Drug Administration (d) World Health Organization



Attempt this Paper on this Question Sheet only.

Q 1. Encircle correct option of the statements given below.

10

- (i) Which of the following is a micronutrient
(a) Co (b) Cd (c) P (d) Zn
- (ii) Dark Green or Blue Green foliage is typical deficiency symptom of
(a) Phosphorus (b) Manganese (c) Potassium (d) a and c
- (iii) Modified Hoagland Solution contains
(b) Only Nitrate (b) Nitrate and Ammonium (c) Nitrite (d) Both b and c
- (iv) Which one of the following is a preferred Nitrogen Source to support cell division in meristematic tissues
(a) Nitrite (b) Nitrate (c) Ammonia (d) Ammonium
- (v) Gravel has particle size
(a) 0.2 mm – 2 mm (b) 0.02 mm – 0.2 mm (c) > 2 mm (d) 0.002 mm – 0.02 mm
- (vi) Mycorrhizae is a Greek word for
(a) Bacteria and Fungi (b) Fungus and Root (c) Nodule formation (d) Hearting Net
- (vii) What is percentage proportion of Nitrogen fixed by Microorganisms
(a) 50% (b) 20% (c) 40% (d) 90%
- (viii) Physical loss of gaseous Ammonia to the atmosphere is called
(a) Mineralization (b) Nitrification (c) Volatilization (d) Ammonification
- (ix) Which nutrient is considered as constituent of Nucleic Acid, Nucleotides and Co-enzymes
(a) P (b) Si (c) N (d) S
- (x) Hard, dry and brittle plant tissues with distorted leaves are deficiency symptoms of
(a) Molybdenum (b) Boron (c) Copper (d) Iron



UNIVERSITY OF THE PUNJAB

Seventh Semester 2018
Examination: B.S. 4 Years Programme

Roll No.

PAPER: Plant Nutrition and Soil Fertility
Course Code: BOT-405

TIME ALLOWED: 2 hrs. & 30 mins.
MAX. MARKS: 50

Attempt this Paper on Separate Answer Sheet provided.

- Q 2. Write short notes of 8 to 10 lines on the following: 20
- (i) Write down the chemical composition of Hoagland culture solution
 - (ii) Functions of Nitrogen and Magnesium in plants
 - (iii) The concept of the Ecotype
 - (iv) Benefits of use of Lime in agriculture
 - (v) Effects of plant nutrients on their water requirements
- Q 3. What are experimental and biological considerations regarding absorption of Nitrate and Ammonium ions? Give a detailed account of mechanism of absorption. 10
- Q 4. What is Nitrogen fixation? Give a detailed account of the physiology of the formation of root nodules. 10
- Q 5. Give a critical account of role of mineral elements in plant ecological studies. 10



UNIVERSITY OF THE PUNJAB

Seventh Semester 2018

Examination: B.S. 4 Years Programme

Roll No.

PAPER: Biodegradation and Bioremediation
Course Code: BOT-407

TIME ALLOWED: 2 hrs. & 30 mins.
MAX. MARKS: 50

Attempt this Paper on Separate Answer Sheet provided.

SHORT QUESTIONS (20 MARKS)

Q. 2 Answer the following questions briefly:

1. What do you mean by lithotrophic bacteria?
2. Write down the basic procedure for bioremediation?
3. What are Xenobiotic?
4. What is ACTIVATION? Enlist mechanisms involve in ACTIVATION.
5. What is meant by Biodegradation?
6. Describe the process of sorption and its effect on biodegradation.
7. What are heavy metal compounds? How can they enter in our environment?
8. What is meant by bioreactor-based method of bioremediation?
9. What are important life cycle for a good environment?
10. Explain the environmental effects on bacterial growth.

Q. 3 Answer the following questions (30 Marks)

- i. (a). What is meant by enrichment culture? What type of enrichment strategies may be used for pollution control? (05 Marks)
(b). Write down the major source of environmental pollution. (05 Marks)
- ii. (a). Describe different strategies used for bioremediation with special emphasize on genetic approach. (05 Marks)
(b). Write a note on biocatalyst selection for bioremediation. (05 marks)
- iii. (a). Describe the effect of different environmental factor on Biodegradation and bioremediation? (05 Marks)
(b). Describe Microbial Technology for removal of heavy metals from environment. (05 Marks)



UNIVERSITY OF THE PUNJAB

Roll No.

Seventh Semester 2018
Examination: B.S. 4 Years Programme

PAPER: Biodegradation and Bioremediation
Course Code: BOT-407

TIME ALLOWED: 30 mins.
MAX. MARKS: 10

Attempt this Paper on this Question Sheet only.

Q. 1 Multiple choice questions: Tick (✓) the correct answer: (10 Marks)

1. The use of bacteria to degrade environmental pollutants is known as:
a). Microremediation b). Nanoremediation
c). Bioremediation d). All of these
2. Microorganisms remove organic compounds by:
a). Adsorption b). Degradation
c). Complexion d). All of these
3. A non-directed physio-chemical interaction between heavy metals and surface of microorganisms is called:
a). Biotransformation b). Biomagnifications
c). Bioaccumulation d). Biosorption
4. Which of the following have been used for bioremediation?
a). Aerobic Bacteria b). Plants
c). Horses d). Viruses
5. Generally, enzymes which can transform organic pollutants are:
a). Specific b). Non-specific
c). Have high molecular weight d). Resistant to high temperature
6. The genes are used of two different sources for a typical pathway, the procedure is known as:
a). Rational approach b). Bioaugmentation
c). Directed evolution d). Biostimulation
7. The decomposer would most likely occur at which stage of waste water treatment?
a). primary b). Secondary
c). Tertiary d). Advanced
8. The catabolic genes are usually present on:
a). Plasmids b). Chromosome
c). Ribosome d). None of these
9. Plant-microbe interaction is used for:
a). Improvement of plant yield b). To make association for environment
c). To take shelter d). None of these
10. Microorganisms remove metals by:
a). Adsorption b). Degradation
c). Complexion d). All of these