

[This question paper contains 4 printed pages.]

Your Roll No.....

Sr. No. of Question Paper : 1564

I

Unique Paper Code : 2162521101

Name of the Paper : Plant Diversity and Systematics

Name of the Course : B.Sc. Life Science

Semester : I

Duration : 2 Hours

Maximum Marks : 60

Instructions for Candidates

1. Write your Roll No. on the top immediately on receipt of this question paper.
2. Attempt any **Four** questions in all, **first** question is compulsory.
3. **All** questions carry equal marks.
4. Attempt **all** parts of the questions together.
5. Draw well-labelled diagrams wherever necessary.

1. (a) Expand the following (any **three**) : (3×1=3)

- (i) Hook.f.
- (ii) A.DC.
- (iii) ICN
- (iv) *nom. nud.*
- (v) *nom. nov.*

(b) Define any **five** of the following terms : (5×1=5)

- (i) Transfusion tissue
- (ii) Mycorrhiza
- (iii) Coenobium
- (iv) Cleistothecium
- (v) Plasmid
- (vi) Heterocysts

(c) Fill in the blanks : (5×1=5)

- (i) Fungal cell wall is predominantly made up of a polysaccharide known as _____.
- (ii) The name of order ends with suffix _____.
- (iii) Trabeculae are present in the sporophyte of _____.

(iv) The alternate name of the family Cruciferae is _____.

(v) Evolutionary history of an organism is known as _____.

(d) What will be the name of the genus commemorating the following persons? (2×1=2)

(i) Linnaeus

(ii) Clarke

2. Differentiate between the following (any **three**):
(3×5=15)

(i) Lytic and lysogenic cycle

(ii) Raceme and Catkin inflorescence

(iii) Archaeobacteria and Eubacteria

(iv) Bryophytes and Pteridophytes

(v) Natural and artificial system of classification

3. Write short notes on the following (any **three**):
(3×5=15)

(i) Sexual reproduction in *Rhizopus*

(ii) Binomial nomenclature

(iii) Asexual reproduction in *Penicillium*

- (iv) Type method
- (v) Common features of gymnosperms
4. (a) Draw well-labelled diagrams of the following (any two) : (2×5=10)
- (i) V. S. gill of *Agaricus*
 - (ii) V.S. of *Marchantia* thallus through gemma cup
 - (iii) EM of bacterial cell
- (b) Interpret the following citations (any two) : (2×2.5=5)
- (i) *Lupinus* [Tourn.] L.
 - (ii) *Cerasus cornuta* Wall. ex Royle
 - (iii) *Vallisneria natans* (Lour.) Hara
5. (a) Enlist the different methods of genetic recombination in bacteria. Explain any one of them. (5)
- (b) Give an account of adaptation of land habit in bryophytes. (5)
- (c) Give an outline of Bentham & Hooker's System of classification up to series level. (5)

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Your Roll No.....

Sr. No. of Question Paper : 1568

I

Unique Paper Code : 2232521101

Name of the Paper : Diversity of Animals (DSC-3)

Name of the Course : B.Sc. (P) Life Science NEP-UGCF

Semester : I

Duration : 2 Hours

Maximum Marks : 60

Instructions for Candidates

1. Write your Roll No. on the top immediately on receipt of this question paper.
2. Attempt **FOUR** questions in all.
3. Question No. 1 which is compulsory.
4. Illustrate your answers with diagram wherever necessary.

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1. (a) Define the following terms (Any Five) : (5)

- (i) Cephalization
- (ii) Endothermy
- (iii) Catadromous migration
- (iv) Strobilation
- (v) Binomial nomenclature
- (vi) Stone canal

(b) Give the scientific name of the following terms
(Any Four) : (2)

- (i) Acorn worm
- (ii) Saw fish
- (iii) Portuguese man-of-war
- (iv) Feather star
- (v) Tree frog

(c) Distinguish between the following terms (Any Four) : (2×4=8)

(i) Protostomes and deuterostomes

(ii) Pseudocoelomate and coelomate animals

(iii) Apposition and superposition vision

(iv) Torsion and detorsion

(v) Flagella and cilia

2. (a) Outline the life cycle of *Ascaris lumbricoides* and include a brief note on its adaptations for parasitism. (6+3=9)

(b) Describe the phenomenon of polymorphism in Hydrozoa highlighting its types and functions within the colony. (6)

3. (a) Explain the types of canal systems found in Porifera describing their structure and functions. (8)

(b) Describe the process of pearl formation in molluscs. (7)

4. (a) Explain the process of osmoregulation in fishes detailing the mechanisms used by freshwater and marine species to maintain water and salt balance. (10)
- (b) Describe the biting mechanism in snakes highlighting the structure and function involved. (5)
5. (a) Discuss the adaptations for flight in birds explaining the structural and physiological modifications that enhance flight efficiency. (9)
- (b) Describe parental care in amphibians its various forms with examples. (6)
6. Write short notes on Any **Three** of the following topics : (3×5=15)
- (i) Metamerism in Annelida
 - (ii) Retrogressive metamorphosis in Protochordates
 - (iii) Locomotion in Amoeboids
 - (iv) Origin of Mammals
 - (v) Metamorphosis in Insects

[This question paper contains 4 printed pages.]

Your Roll No.....

Sr. No. of Question Paper : 1475

Unique Paper Code : 2162522301

Name of the Paper : Plant Cell and Developmental Biology

Name of the Course : B.Sc (P) Life Science

Semester : III

Duration : 2 Hours

Maximum Marks : 60

Instructions for Candidates

1. Write your Roll No. on the top immediately on receipt of this question paper.
2. Question No. 1 is compulsory.
3. Attempt **four** questions in all.
4. Answer **all parts** of each question together
5. Draw diagrams wherever required.

1. (a) Fill in the blanks: (any five)

(1x5= 5)

(i) _____ are the densely packed structures within the nucleus where ribosomal RNA is transcribed.

(ii) In woody plants, the _____ is a type of secondary meristem that generates the outer bark, while the _____ produces secondary vascular tissues.

(iii) Exine, which is the outermost layer of the pollen wall, is composed primarily of _____, a complex biopolymer.

(iv) The entry of pollen tube through the micropyle to reach the embryo sac in an ovule is termed as _____.

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- (v) Repeated free nuclear divisions without cell wall formation leads to _____ type of endosperm formation.
- (vi) _____ tissue provides flexible structural support in growing plant parts, consisting of elongated cells with unevenly thickened walls.
- (vii) Self-sterility is a contrivance for _____.

(1x5=5)

(b) Define the following (any five):

- (i) Primary meristem
- (ii) Apical meristem
- (iii) Microsporogenesis
- (iv) Chalazogamy
- (v) Brachyscreids
- (vi) Anatropous ovule

(c) State whether the following statements are True or False (any five).

(1x5=5)

- (i) Chloroplasts are responsible for energy production through cellular respiration in plant cells.
- (ii) In roots, the apical meristem is immediately followed by zone of maturation.
- (iii) In the stem, the vascular bundles are radial and closed.
- (iv) The middle layer of the anther wall is primarily responsible for pollen development.

(v) The ABCDE model explains the genetic regulation of flower organ identity in plants.

(vi) In monocot seeds, the endosperm is typically absorbed during embryonic development, unlike dicots.

2. Differentiate between the following (any three):

(5x3=15)

- (i) Dicot and Monocot root.
- (ii) Prokaryotes and Eukaryotes
- (iii) Amoeboid and secretory tapetum
- (iv) Nuclear and Cellular endosperm
- (v) Orthotropous and Hemitropous ovule

3. Write short notes on any three of the following:

(5x3=15)

- (i) Primary and secondary cell wall
- (ii) Endosymbiotic theory
- (iii) Pollen wall
- (iv) Female germ unit
- (v) Polygonum type of embryo sac.

4. Draw well-labelled diagram of any three of the following

(5x3=15)

- (i) Ultrastructure of mitochondrion
- (ii) T.S. of Dicot stem
- (iii) T. S. Mature Anther

(iv) Nuclear pore complex

(v) Helobial endosperm

5. Attempt any two from the following:

(7.5 x 2=15)

(a) Explain the anomalous secondary growth in the stem of *Salvadora* with the help of a well-labelled diagram.

(b) Explain the processes of megasporogenesis and megagametogenesis with the help of suitable diagrams.

(c) With the help of diagrams, explain the salient features of the classification of stomata proposed by Metcalfe and Chalk.

6. (a) Discuss the mechanisms of pollen-pistil interactions and describe the pathway of pollen tube growth during fertilization. (5)

(b) Describe the structure and function of endoplasmic reticulum. (5)

(c) Explain the *tunica-corpus* theory of organization of shoot apex. (5)

(2000)

[This question paper contains 4 printed pages.]

Your Roll No.....

Sr. No. of Question Paper : 1479

I

Unique Paper Code : 2232522301

**Name of the Paper : Biochemistry : Basic concepts
of Metabolism**

**Name of the Course : B.Sc. (Prog.) Life Science,
Zoology Examination**

Semester : III (ZOO-LS-DSC-09)

Duration : 2 Hours

Maximum Marks : 60

Instructions for Candidates

1. Write your Roll No. on the top immediately on receipt of this question paper.
2. Draw neat, well labeled diagrams, wherever required.
3. Attempt **Four** questions in all.
4. Question No. 1 is compulsory.

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1. (i) Define the following terms (**any four**) : (4)

- (a) Epimerase
- (b) Glucogenic amino acids
- (c) Amphibolic Pathway
- (d) Zwitterion
- (e) Triglycerides
- (f) Glycogenesis

(ii) Differentiate between (**any three**) : (6)

- (a) Hexokinase and Glucokinase
- (b) Transamination and Deamination
- (c) Synthase and Synthetase
- (d) Saturated Fatty acid and Unsaturated Fatty acid
- (e) Alpha helix and Beta pleated structure of Proteins

- (iii) Give the structure of the following : (5)
- (a) Citrulline
 - (b) Triacylglycerol
 - (c) Alanine
 - (d) Uridine diphosphate glucose
 - (e) Glyceraldehyde 3 phosphate
2. (a) Briefly describe the six major classes of enzymes. (6)
- (b) Give a detailed account of beta-oxidation of Palmitic acid. (9)
3. Describe the pentose phosphate pathway. (15)
4. (a) Describe the electron flow through various complexes of electron transport chain. (8)
- (b) Describe urea cycle with the help of chemical structures. (7)

5. (a) Elaborate the citric acid cycle and its regulation. (12)

(b) Describe the induced fit model of enzyme action. (3)

6. Write short notes on any three of the following :
(5×3=15)

(a) Disaccharides

(b) Steroids

(c) Glucose -Alanine cycle

(d) Glycogenolysis

[This question paper contains 8 printed pages.]

Your Roll No.....

Sr. No. of Question Paper : 1455

I

Unique Paper Code : 2172523501

**Name of the Paper : Coordination Chemistry and its
Application in Biological
Systems**

Name of the Course : B.Sc. (Prog.) Life Science

Semester : V

Duration : 2 Hours

Maximum Marks : 60

Instructions for Candidates

1. Write your Roll. No. on the top immediately on receipt of this question paper.
 2. Attempt any four questions.
 3. All questions carry equal marks
- 1 (a) Give reasons for the following:

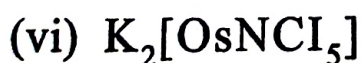
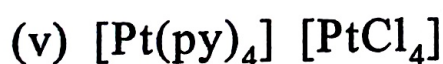
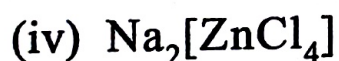
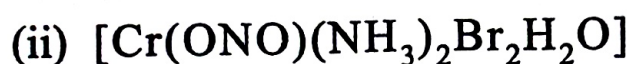
(i) The crystal field splitting in tetrahedral complexes is smaller than that in octahedral complexes.

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(ii) 4d and 5d transition metals form low spin complexes.

(b) Give the IUPAC names of the following complexes (any five) :



(c) Discuss the mechanism of substitution reactions in square planar complexes. (5,5,5)

2 (a) On the basis of valence bond theory, answer the following questions for the six-coordinated complex ion : $[\text{Fe}(\text{CN})_6]^{3-}$

(i) What is the oxidation state of Fe?

(ii) What type of hybridization is involved?

(iii) Whether the given complex is inner orbital or outer orbital complex?

(iv) What is the magnetic behaviour of the complex ion?

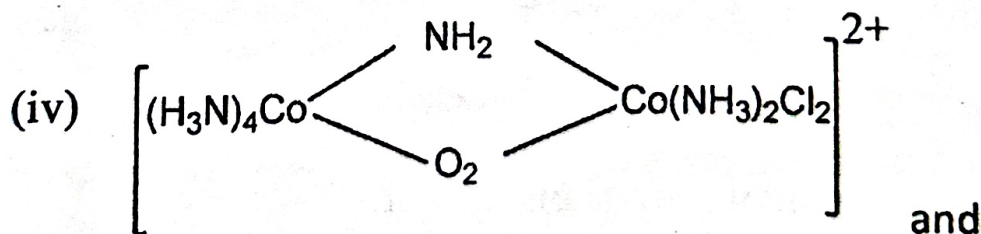
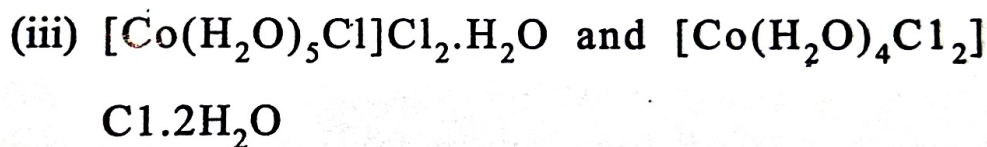
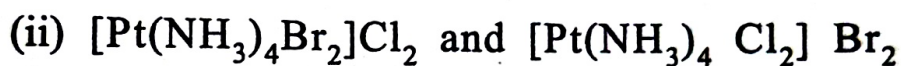
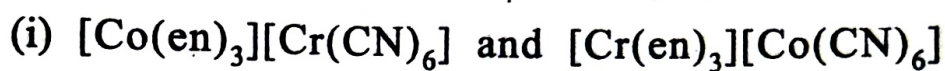
(v) Calculate the value of magnetic moment (spin only).

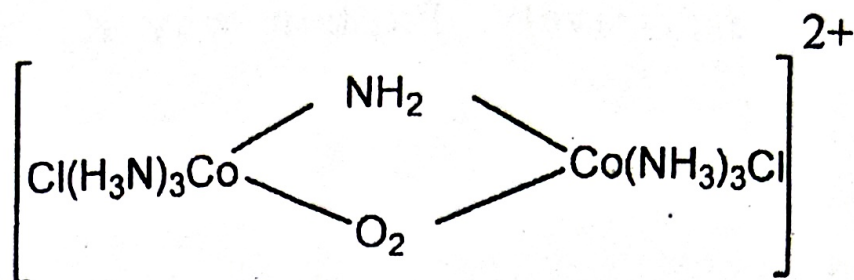
(b) Write chemical formulae for the following compounds :

- (i) Potassium tetrafluoroargentate(I)
 - (ii) Octacarbonyl- μ -dicarbonyl diiron(0)
 - (iii) Sodium dithiosulphatoargentate(I)
 - (iv) Pentammineazidocobalt(III)sulphate
 - (v) Dichlorotetraaquachromium(III)nitrate
- (c) What are the similarities and differences between hemoglobin and myoglobin? (5,5,5)
- 3 (a) $[\text{Co}(\text{CN})_6]^{4-}$ ion is paramagnetic, while $[\text{Co}(\text{CN})_6]^{3-}$ ion is diamagnetic, although both the ions have strong ligands. Explain on the basis of crystal field theory.
- (b) The formation of $[\text{Cd}(\text{Br})_4]^{2-}$ from $[\text{Cd}(\text{H}_2\text{O})_6]^{2+}$ exhibit the successive equilibrium constants K_1 ,

K_2 , K_3 and K_4 as 1.56, 0.54, 0.06 and 0.37, respectively. Explain why K_4 is larger than K_3 .

(c) Name the type of isomerism exhibited by the following complexes:





(v) $[\text{Pd}(\text{PPh}_3)_2(\text{SCN})_2]$ and $[\text{Pd}(\text{PPh}_3)_2(\text{NCS})_2]$
(5,5,5)

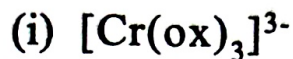
4 (a) Calculate crystal field stabilization energy (CFSE) values for :

(i) d^5 high spin octahedral system and

(ii) d^7 tetrahedral ion in strong field

(b) What is trans effect? Explain the polarization theory of trans effect.

(c) Draw the possible isomers for the following complexes :



5. Write short notes on (any three):

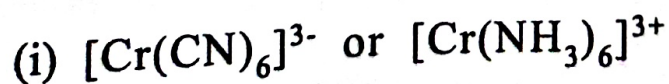
(a) Jahn Teller distortion

(b) Outer orbital complexes

(c) Bohr's effect in hemoglobin

(d) Limitations of valence bond theory (5,5,5)

6 (a) Which complex in each of the following pairs will have greater crystal field splitting and why?



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(ii) $[\text{Fe}(\text{CN})_6]^{3-}$ or $[\text{Ru}(\text{CN})_6]^{3-}$

(b) Give reasons for the following:

(i) Square planar complexes with coordination number 4 exhibit geometrical isomerism, whereas tetrahedral complexes do not.

(ii) $[\text{Co}(\text{NH}_3)_5\text{Br}]^{2+}$ is optically inactive.

— (c) How do charge and size of metal ion affect thermodynamic stability of complexes? (5,5,5)

[This question paper contains 4 printed pages.]

Your Roll No.....

Sr. No. of Question Paper : 1466

I

Unique Paper Code : 2162523502

Name of the Paper : Plant Physiology and Metabolism

Name of the Course : B.Sc (Prog) Life Sciences

Semester : V

Duration : 2 Hours

Maximum Marks : 60

Instructions for Candidates

1. Write your Roll No. on the top immediately on receipt of this question paper.
2. Attempt four questions in all.
3. Question No. 1 is compulsory.
4. All questions carry equal marks

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1. (a) Name the following (Any Five) (5)
- (i) Oxygen scavenging protein involved in nitrogen fixation in root nodules.
 - (ii) An ethylene releasing compound
 - (iii) A mineral responsible for osmoregulation and stomatal movement.
 - (iv) End product of glycolysis
 - (v) Molecule that exhibits photo reversibility
 - (vi) A hormone that was named after a fungus.
- (b) Give one contribution of the following: (5)
- (i) Hendrich and Borthwick
 - (ii) P. Mitchell
 - (iii) Hans A. Krebs
 - (iv) M. Chailakhyan
 - (v) F. Went
- (c) Define the following: (5)
- (i) Anaerobic Respiration
 - (ii) Cavitation
 - (iii) Coenzyme
 - (iv) Photoperiodism

(v) ROS

2. Distinguish Between **any three**:

(5×3=15)

(i) Active absorption and Passive absorption

(ii) Cyclic and Non-Cyclic electron transport chain

(iii) Hydroponics and Soil Culture

(iv) Carrier Proteins and Channel Proteins

(v) Short Day Plants and Long Day Plants

3. Write short notes on (**any three**):

(3×5=15)

(i) Photophosphorylation

(ii) Photorespiratory glycolate pathway

(iii) Pressure flow model for translocation in phloem

(iv) Antioxidative enzymes

4. (a) Discuss the critical role of dark period in flowering.

(3×5=15)

(b) Physiological role of Auxin

- (c) Write the salient features of cohesion-tension theory of Ascent of Sap.
5. (a) Discuss Calvin cycle in detail mentioning enzymes involved in each step. (8)
- (b) What are enzymes? Give an account of any three factors affecting enzyme activity. (7)
6. (a) Give an account of mechanism of stomatal opening and closing with reference to ion theory. (8)
- (b) Illustrate the role of Gibberellic acid in α -amylase synthesis in cereal aleurone layer. (7)

[This question paper contains 8 printed pages.]

Your Roll No.....

Sr. No. of Question Paper : 6334

I

Unique Paper Code : 42167902

Name of the Paper : Cell and Molecular Biology

Name of the Course : B.Sc. (Prog.) Life Science

Semester : V

Duration : 3 Hours

Maximum Marks : 75

Instructions for Candidates

1. Write your Roll. No. on the top immediately on receipt of this question paper.
2. Attempt any five questions in all.
3. Question NO.1 is compulsory.
4. All questions carry equal marks.
5. Answer all parts of a question together.

1. (a) Expand the following (ANY FIVE): (5×1=5)

(i) TEM

(ii) NPC

(iii) rRNA

(iv) ATP

(v) RER

(vi) PCR

(vii) GTF

(b) Fill in the blanks (ANY FIVE): (5×1=5)

(i) is suicidal bag of the cell.

(ii) The kind of ribosomes found in the chloroplast are

(iii) DNA is wrapped twice around the in a 30 nm chromatin fibre.

(iv) By the process of, introns are removed from a pre-mRNA.

(v) Chromosomes are found arranged on the equatorial plane of a cell duringof the mitosis.

(vi) is the only organelle that is without a cell membrane.

(vii) Incoming aminoacyl t-RNA binds to the site of the ribosome engaged in translation.

(c) Match the following: (5×1=5)

(i) Danielli and Davson (a) Plastid

(ii) Okazaki fragments (b) DNA genetic material

(iii) Mitochondria (c) Replication

(iv) Hershey-Chase (d) Lipid bilayer

(v) Chloroplast (e) Power house of the cell

2. (a) Define ANY THREE of the following:

(3×3= 9)

(i) Chromatin

(ii) Nucleoid

(iii) Marker enzymes

(iv) Aquaporin

(v) DNA Polymerase

(vi) Endosymbiotic theory

(vii) Operon

(b) Write the contribution of ANY THREE the following scientist: (3 x 2 = 6)

(i) Camillo Golgi

(ii) Carl Benda

(iii) Robert Brown

(iv) Robert Hook

(v) Schleiden and Schwann

(vi) de Duve

(vii) Singer and Nicolson

3. Write short notes on ANY THREE the following:

(3 × 5 = 15)

(i) Sample preparation for light microscopy.

(ii) Glyoxysome

(iii) Genetic code

(iv) Selective permeability of membrane

(v) Replication enzymes

4. Differentiate between ANY FIVE of the following:

(5 × 3 = 15)

(i) TEM and SEM

(ii) Smooth endoplasmic reticulum and Rough
endoplasmic reticulum

(iii) Mitosis and Meiosis

(iv) Prokaryote and Eukaryote

(v) mRNA and tRNA

(vi) Transcription and Translation

(vii) Phagocytosis and Pinocytosis

5. (a) Explain the process of transcription in prokaryotes.
(10)

(b) Draw and describe the Lampbrush Chromosome.
(5)

6. (a) Describe the fluid mosaic model and membrane proteins.
(8)

(b) Explain the features and importance of Watson and Crick's model of DNA.
(7)

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7. (a) Differentiate between light microscope and electron microscope. (8)

(b) With the help of diagrams, explain the structure and role of either Golgi bodies or Mitochondria. (7)

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Your Roll No.....

Sr. No. of Question Paper : 6341

I

Unique Paper Code : 42237903

Name of the Paper : DSE-Animal Biotechnology

**Name of the Course : B.Sc (Prog.) Life Science
LOCF**

**Semester : V, Theory Exam-Nov/Dec,
2024**

Duration : 3 Hours

Maximum Marks : 75

Instructions for Candidates

1. Write your Roll No., Name of the paper, Course, Semester, and Date of examination on the first page of answer sheet.
2. Attempt ANY FIVE questions. Question number 1 is compulsory. Substantiate your answer with diagrams wherever necessary.

1. (a). Define the following : (5)

(i) STR

(ii) Ligase

(iii) Shuttle Vectors

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(iv) Transformation

(v) Genomics

(b) Differentiate between :

(2×5=10)

(i) Lysogenic and Lytic cycle

(ii) Cosmid and Phagemid

(iii) Staggered and Blunt cuts

(iv) Northern and Western blotting

(v) Electroporation and Calcium chloride method of transformation

(c) Write true and false for the following :

(4)

(i) Blue and white screening is used to differentiate between recombinants and non-recombinants.

(ii) Cyanogen bromide is used to make the bacterial cells competent for transformation.

(iii) EDTA is used as blocking agent in blotting technique.

(iv) Modified binary shuttle Ti Plasmid can propagate in two different hosts.

(d) Expand the following : (4)

- (i) pBR322
- (ii) PAGE
- (iii) SCID
- (iv) SDS

(e) Write the contribution the scientist : (4)

- (i) Boliver & Rodriguez
- (ii) Ian Wilmut
- (iii) E. M. Southern
- (iv) Kary Mulis

2. (a) Describe in detail the process of production of recombinant insulin hormone. (6)

(b) What is transformation? Explain the process of transformation by electroporation. (6)

3. (a) What is gene therapy? Explain the various types of gene therapies. (6)

(b) Explain the method of production of insect resistant transgenic plants with the help of suitable diagrams. (6)

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4. Explain the construction of genomic libraries. Describe any two methods of screening the libraries. (12)
5. (a) Explain with the help of diagram the technique of PCR. (6)
- (b) What are restriction enzymes? Explain Type II restriction endonuclease. (6)
6. (a) What is Cystic fibrosis? Explain the molecular diagnostic methods of this genetic disease. (6)
- (b) Explain briefly Dideoxy method of DNA sequencing. (6)
7. Write short notes (Any Three): (3×4=12)
- (a) Dolly the Sheep
- (b) Edible Vaccine
- (c) CRISPR Cas-9
- (d) Metagenomics