28/11/2022
01
2:30 pm

Deccan Education Society's

FERGUSSON COLLEGE (Autonomous) Pune-4

Affiliated to SavitribaiPhule Pune University

B.Sc.–I (Semester : I)

Subject: Biotechnology

Paper Title: Concepts in Biotechnology

Paper Code:BTH1101

[Time: 2.5 Hours] **2019 Pattern (2 Credits)** **[Max. Marks : 50]**

Instructions to the candidates:

1) All questions are compulsory.
2) Neat diagrams must be drawn wherever necessary.
3) Figures to the right side indicate full marks.

Q1) **Answer the following questions (Any Five).** **10 M**

a) Name the first antibiotic discovered and who discovered it.
b) What is the important breakthrough in the treatment of diabetes and who discovered it?
c) Write briefly about the sheep Dolly.
d) What is gene therapy?
e) Briefly write about Ti plasmid.
f) What is a Kibo?

Q2) **Answer the following questions (Any Four).** **12 M**

a) What are liposomes and their use in the field of medicine?
b) Name the two types of gene therapy with suitable examples.
c) What is tissue engineering and state its applications?
d) State briefly about 'Golden rice'.
e) What is the difference between bioaccumulation and bioleaching?

Q3) **Answer the following questions**

a) Explain Agrobacterium mediated transformation in plants with suitable diagram? **9 M**
b) What are viral vectors? Give two examples. 5M

OR

a) Discuss the difference between genetically modified crops and conventional crops? 4M
b) What are restriction enzymes (RE) and gives few examples of RE? 5M

Q4) **Answer the following questions (Any Two).** 4M **6 M**

a) What is ICMR and DST? Give examples of organizations governed by them.
b) What are vaccines? Give examples of different types of vaccine.
c) Explain how biotechnology has revolutionized the treatment of cancer?

Q5) **Answer the following questions** **8 M**

a) Discuss about bioremediation and biomethanation. 4M

b) What is regenerative medicine? 4M

OR

a) Explain about the environmental effect of Genetically modified crops? 4M

b) How biotechnology has helped in the control of crop pests? 4M

Q6) **Answer the following questions (Any One)** **5M**

a) Discuss about the current applications of biotechnology to solve the environmental issues?

b) What are various application of recombinant DNA technology? Give 3 examples.

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Deccan Education Society's

FERGUSSON COLLEGE (Autonomous) Pune-4

Affiliated to SavitribaiPhule Pune University

B.Sc.–I (Semester: I)

Subject: Biotechnology

Paper Title: Biological Chemistry-I

Paper Code:BTH1102

2019 Pattern (2 Credits)

[Time: 2 Hours] **[Max. Marks : 50]**

Instructions to the candidates:

1) All questions are compulsory.
2) Neat diagrams must be drawn wherever necessary.
3) Figures to the right side indicate full marks.

Q1) **Answer the following questions (Any Five).** **10 M**

a) State first law of thermodynamics.
b) What is glycosidic bond?
c) Define EMF.
d) Write a note on alpha helices of protein.
e) Distinguish between ionic and covalent bonds.
f) Define lipids.

12 M

Q2) **Answer the following questions (Any Four).**

a) What are polysaccharides? State and explain its two types in detail.
b) Write a note on exothermic and endothermic reactions.
c) Explain the Lewis theory of chemical bonding in detail.
d) What is Standard electrode potential? .Explain it in detail.
e) Sate and explain the Le Chatelier's principle.

Q3) **Answer the following questions** **9 M**

a) Write a detail account on the hydrophobic interactions. 5M
b) What is hydrogen bonding? State and explain different types of hydrogen bonding. 4M

OR

a) Write a note on isoelectric point. 5M
b) What is osmosis? State the law of osmotic pressure. 4M

.Q4) **Answer the following questions (Any Two).** **6 M**

a) Describe the structure of DNA.
b) Write an account on the Vander Waals forces.
c) Write a note on Electrolysis? Explain it with one example.

Q5) **Answer the following questions** **8M**

a) What is thermodynamics? State the importance and limitations of thermodynamics. **4M**
b) State and explain the Faraday's second law of electrolysis. **4M**

OR

a) Write an account on the tertiary structure of protein. **4M**
b) What is solubility product and state its applications. **4M**

Q6) **Answer the following questions (Any One)** **5M**

a) Describe the structure of steroids. Add a note on the functions of cholesterol.
b) What is ATP and its role in bioenergetics?

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Deccan Education Society's

FERGUSSON COLLEGE (Autonomous) Pune-4

Affiliated to Savitribai Phule Pune University

B.Sc.–I (Semester : II)

Subject: Biotechnology

Paper Title: Biophysics

Paper Code: BTH 1103

2019 Pattern (2 Credits)

[Time: 2 Hours] **[Max. Marks : 50]**

Instructions to the candidates:

1) All questions are compulsory.
2) Neat diagrams must be drawn wherever necessary.
3) Figures to the right side indicate full marks.

Q1) **Answer the following questions (Any Five).** **10 M**

a) Define one Becquerel.
b) What is photosynthesis?
c) What is the difference between gamma -rays and beta –rays?
d) Briefly explain nuclear radiations.
e) State the Bohr's third postulate of atomic theory.
f) Define radiopharmaceuticals.

Q2) **Answer the following questions (Any Four).** **12 M**

a) Briefly explain quantization of energy level.
b) Explain photomorphogenesis .
c) Explain the principle of a GM counter.
d) Explain circadian rhythm.
e) Write briefly on Pentose phosphate pathway.

Q3) **Answer the following questions** **9 M**

a) Difference between glycolysis and gluconeogenesis. 5M
b) Explain about the uses and principle of a scintillation counter. 4M

OR

a) Discuss the role of phosphocreatine in energy generation. 5M
b) What are the effects of radiation on the cells? 4M

Q4) **Answer the following questions (Any Two).** **6 M**

a) What is the role of pyruvate in different metabolic pathways?
b) State the importance of glycolysis.
c) Explain Radioimmunoassy and its application.

Q5) **Answer the following questions** **8 M**

a) Explain the bioluminescense in plants/insects 4M

b) Explain the role of kidney in osmoregulation. 4M

OR

a) State the importance of oxidative phosphorylation with suitable diagram. 4M

b) What is the role of hormones in the process of thermoregulation in human body? 4M

Q6) **Answer the following questions (Any One)** **5M**

a) Explain the chloride-bicarbonate exchange mechanism in erythrocytes.

b) What is the importance of ATP, ADP and electrons in bioenergetics?

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Deccan Education Society's

FERGUSSON COLLEGE (Autonomous) Pune-4

Affiliated to Savitribai Phule Pune University

B.Sc.–I (Semester : II)

Subject: Biotechnology

Paper Title: Evolutionary Biology and Biodiversity

Paper Code:BTH1201

2019 Pattern (2 Credits)

[Time: 2 Hours] **[Max. Marks : 50]**

Instructions to the candidates:

1) All questions are compulsory.
2) Neat diagrams must be drawn wherever necessary.
3) Figures to the right side indicate full marks.

Q1) **Answer the following questions (Any Five).** **10 M**

a) What is a species?
b) Give an example of a pair of species showing convergent evolution.
c) Name any 2 scientists associated with evolutionary biology.
d) What is meant by island biogeography?
e) What is taxonomy?
f) Define global warming.

Q2) **Answer the following questions (Any Four).** **12 M**

a) Write a note on dispersal of organisms.
b) What is sexual selection, give examples?
c) Write a note on neo-darwinism
d) Describe Lamarck's theory of acquired characters.
e) What are the shortfalls of biodiversity conservation?

Q3) **Answer the following questions** **9 M**

a) Describe in detail the theory of natural selection. 5M
b) Give an account of the history of evolutionary biology. 4M

OR

a) Explain the effects of climate change on biodiversity. 5M
b) What are the international organizations, conventions and treaties for the protection of biodiversity? 4M

Q4) **Answer the following questions (Any Two).** **6 M**

a) Distinguish between convergent and divergent evolution.
b) What have been the different evidence of evolution of life found so far?
c) Distinguish between allopatric and sympatric speciation.

Q5) **Answer the following questions** **8 M**

a) Describe in detail what is adaptive radiation? 4M
b) What is meant by phylogenetics, give examples? 4M

OR

a) What is the need for biodiversity conservation? 4M
b) What are the anthropogenic effects on natural ecosystems? 4M

Q6) **Answer the following questions (Any One)** **5M**

a) Write a note on the origin of life on Earth

b) Explain in detail the features of the Wildlife Protection Act, 1972.

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Deccan Education Society's

FERGUSSON COLLEGE (Autonomous) Pune-4

Affiliated to Savitribai Phule Pune University

B.Sc.–I (Semester : II)

Subject: Biotechnology

Paper Title: Biological Chemistry II

Paper Code: BTH1202

2019 Pattern (4 Credits)

[Time: 2 Hours] **[Max. Marks : 50]**

Instructions to the candidates:

1) All questions are compulsory.
2) Neat diagrams must be drawn wherever necessary.
3) Figures to the right side indicate full marks.

Q1) **Answer the following questions (Any Five).** **10 M**

a) Define Chemical Kinetics.
b) Define Catalysis.
c) Define Steriochemistry.
d) What are enzyme?
e) Give the plot of the zero order reaction and explain it.
f) Distinguish between SN1 and SN2 mechanism.

Q2) **Answer the following questions (Any Four).** **12 M**

a) What are conformational isomers?
b) Derive an expression for the rate constant for the reaction A+B->C+D
c) Give the difference between order and molecularity of reaction.
d) Explain the different classes of enzymes.
e) What are geometrical isomers? Explain it in detail.

Q3) **Answer the following questions** **9 M**

a) What is plain polarized light? Explain its effect over optically active compounds with example. 5M

b) Explain the following organic reactions with examples. 4M
i)Addition
ii)Elimination.

OR

a) What is rate of a reaction? Derive rate law equation of the first order reaction. 5M

b) Write a note on R,S Nomenclature System. 4M

Q4) **Answer the following questions (Any Two).** **6 M**

a) What is heterogeneous catalysis? Explain it with the help of example.
b) Define order of reaction. Derive and explain the equation of zero order reaction.
c) The initial concentration of N_2O_5 in the following first order reaction $N_2O_5(g) \rightarrow 2NO_2(g)+1/2\ O2(g)$ was 1.24×10^{-2} mol L^{-1} at 318K.The concentration of N2O5 after 60 minutes was 0.20×10^{-2} mol L^{-1}.Calculate the rate constant of the reaction at 318 K.

Q5) **Answer the following questions** **8 M**

a) What is activation energy? Derive its equation with the help of activation energy curve. 4M

b) What are nucleophiles and electrophiles? Explain its role in the Biological Chemistry. 4M

OR

a) Write a note on Newman Projection formula. Explain it with one example of it 4M

b) What are the factors affecting the enzyme activities. 4M

Q6) **Answer the following questions (Any One) Five Marks Each** **CO 6.** **5M**

a) What is conformational isomers? Explain the confirmation of n-Butane along with energy profile diagram.

b) What is collision theory? Derive the Arrhenius equation with reference to it.

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Deccan Education Society's

FERGUSSON COLLEGE (Autonomous) Pune-4

Affiliated to Savitribai Phule Pune University

F.Y.B.Sc. (Semester: II)

Subject: Biotechnology

Paper Title: Bioinstrumentation

Paper Code: BTH 1203

2019 Pattern (2 Credits)

[Time: 2.5 Hours] **[Max. Marks : 50]**

Instructions to the candidates:

1) All questions are compulsory.
2) Neat diagrams must be drawn wherever necessary.
3) Figures to the right side indicate full marks.

Q1) **Answer the following questions (Any Five). Two Marks Each** **10 M**

a) Define crosslinking in Agarose gel electrophoresis.
b) What is the use of Ethidium Bromide?
c) Define: Rotors
d) What is a TLC chamber?
e) Define: gradient centrifugation
f) What do you mean by visible spectroscopy?

Q2) **Answer the following questions (Any Four). Three Marks Each** **12 M**

a) What is the importance of hydrogen ion concentration?
b) With a neat labelled diagram, explain the parts of a compound microscope.
c) Comment on dyes used in electrophoresis.
d) How can isolated proteins be purified?
e) Write a note on maintenance of a pH meter.

Q3) **Answer the following questions.** **9 M**

a) Describe the principle behind agarose gel electrophoresis. 5M
b) What are the factors affecting the migration of DNA? 4M

OR

a) Describe the principle behind Paper Chromatography. 5M
b) What are the factors affecting the rate of migration of compounds in chromatography? 4M

Q4) **Answer the following questions (Any Two). Three Marks Each** **6 M**

a) What is a Scanning Electron Microscope?
b) How is the purity of DNA checked after isolation?
c) Give the similarities and differences between a bright field and dark field microscope.

Q5) **Answer the following questions** **8 M**

a) Describe Poly Acrylamide Gel Electrophoresis technique. 4M
b) Give the types and applications of Poly Acrylamide Gel Electrophoresis 4M

OR

a) Give the construction and working of a spectrophotometer. 4M

b) How is a spectrophotometer useful for biotechnologists? 4M

Q6) **Answer the following questions (Any One) Five Marks Each** **5 M**

a) Explain the construction and working of a centrifuge.

b) Explain the principle behind a conductivity meter and give its significance,

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Deccan Education Society's

FERGUSSON COLLEGE (Autonomous) Pune-4

Affiliated to Savitribai Phule Pune University

F.Y. B.Sc. (Semester: II)

Subject: Biotechnology

Paper Title: Animal Science-II

Paper Code: BTH1204

2019 Pattern (2 Credits)

[Time: 2.5Hours] **[Max. Marks : 50]**

Instructions to the candidates:

1) All questions are compulsory.
2) Neat diagrams must be drawn wherever necessary.
3) Figures to the right side indicate full marks.

Q1)		**Answer the following questions (Any Five).**	**10 M**
	1)	Define Goblet cells.	2M
	2)	Differentiate between exocrine and endocrine glands.	2M
	3)	What are photoreceptor cells in animals?	2M
	4)	Mention two mechanisms in animals that help them for thermoregulation in cold.	2M
	5)	Write the function of cilia and mention where ciliated cells are found in animals.	2M
	6)	Differentiated between pulmonary and a systemic artery.	2M
Q2)		**Answer the following questions (Any Four).**	**12 M**
	1)	Explain homeostasis in animals.	3M
	2)	Draw and explain cuboidal epithelial cells.	3M
	3)	Write a note on some buffers present in the body.	3M
	4)	Draw and label the parts of a human brain.	3M
	5)	Explain the internal structure of testis using a suitable diagram.	3M
Q3)		**Answer the following questions.**	**9 M**
	1)	Write a note on endocrine glands in humans	5M
	2)	Elaborate on the hormonal regulation of menstruation in humans.	4M
		OR	
	1)	Draw the well-labelled structure of heart and mention the functions of each major structure.	5M
	2)	Describe the features of cardiac tissue.	4M
Q4)		**Answer the following questions (Any Two).**	**6 M**
	1)	Draw the structure of eye.	3M
	2)	Write a note on corticosteroids.	3M
	3)	Write a note on extracellular matrix.	3M

Q5)		**Answer the following questions**	**8 M**
	1)	Write a note on types of blood cells.	4M
	2)	Add a note on ABO blood typing.	4M
		OR	
	1)	Explain the steps of carbohydrate digestion in animals.	4M
	2)	Write a note on digestive glands.	4M
Q6)		**Answer the following questions (Any One)**	**5 M**
	1)	Write a note on staining of different animal tissues.	5 M
	2)	Explain the role of nephron in urine formation.	5 M

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Deccan Education Society's

FERGUSSON COLLEGE (Autonomous) Pune-4

Affiliated to Savitribai Phule Pune University

F.Y. B.Sc. (Semester: II)

Subject: Biotechnology

Paper Title: Plant Sciences II

Paper Code: BTH 1205

2019 Pattern (2 Credits)

[Time: 2 Hours] **[Max. Marks : 50]**

Instructions to the candidates:

1) All questions are compulsory.
2) Neat diagrams must be drawn wherever necessary.
3) Figures to the right side indicate full marks.

Q1) **Answer the following questions (Any Five).** **10 M**

a) What is bioprospecting? Give example.
b) What are alkaloids?
c) Explain horticulture with advantages and disadvantages.
d) What are Flavonoids? Give example.
e) What is F0F1 complex?
f) Explain the structure of sucrose.

Q2) **Answer the following questions (Any Four).** **12 M**

a) Explain C3 cycle.
b) What is floriculture? Add note on floriculture in India.
c) Explain turgidity, flaccidity, capillary action with diagram.
d) What are the diseases caused by deficiency of macro nutrients in plants.
f) What is glycolysis?

Q3) **Answer the following questions** **9 M**

a) What are the plant secondary metabolites? What are the commercially important PSM to pharmaceutical industry? 5M
b) What is kranz anatomy? Explain CAM pathway. 4M

OR

c) What are the fungal infections in plants? What are symptoms and treatment? 5M
d) Explain structure of water. What are the properties of water that enable it to be readily transported through the plant body? 4M

Q4) **Answer the following questions (Any Two).** **6 M**

a) What is green house technology? What are the different types of green house?
b) Explain starch biosynthesis.
c) What is transpiration and which parts of plant are involve in transpiration? What are the factors affecting transpiration?

Q5)		**Answer the following questions (Any Two)**	**8 M**
	a)	Write note on "Forest as a natural resource"	4M
	b)	Explain light dependent reactions in photosynthesis.	4M
		OR	
	c)	What is the photosynthetic pigment system? Explain their role in light dependent reactions.	4M
	d)	What is plant breeding? Write note on methods and need for plant breeding.	4M
Q6)		**Answer the following questions (Any One)**	**5 M**
	a)	How glycolysis is linked to Citric Acid cycle. How many ATPs are produced by oxidation of one molecule of sucrose?	
	b)	Explain water absorption by roots.	

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Deccan Education Society's

FERGUSSON COLLEGE (Autonomous) Pune-4

Affiliated to SavitribaiPhule Pune University

F.Y.BSc (Semester : II)

Subject: Biotechnology

Paper Title: Microbial Growth, Control and Applications

Paper Code: BTH 1206

2019 Pattern (2 Credits)

[Time:Hours] [Max. Marks : 50]

Instructions to the candidates:

1) All questions are compulsory.
2) Neat diagrams must be drawn wherever necessary.
3) Figures to the right side indicate full marks.

Q1) Answer the following questions (Any Five). **10 M**

a) Diagrammatically explain the process of binary fission in bacteria.
b) Explain the concept of mixed cultures.
c) What are culture Collection Centers?
d) Define generation time with suitable example.
e) What are chemolithotrophs?
f) How are microaerophiles different from Aerotolerant anaerobes?

Q2) Answer the following questions (Any Four). **12 M**

a) Write a short note on probiotics.
b) How will you prepare 100 ml of Nutrient agar?
c) Comment on indirect methods used in measuring bacterial growth.
d) Discuss any two methods used for maintenance and preservation of bacteria.
e) What is the effect of phenol and phenolic compounds on bacteria.

Q3) Answer the following questions **9 M**

a) Differentiate between facultative anaerobes and obligate aerobes. 5M
b) Write note on Normal flora 4M

OR

c) Explain the methods used to control biofilm formation. 5M
d) Diagrammatically explain lysogenic cycle in bacteriophages. 4M

Q4) Answer the following questions (Any Two). **6M**

a) Classify microbes on the basis of preferred temperature range.

b) Discuss the interaction between microbes and animals with suitable examples.
c) Comment on Bioremediation is essential process in environment.

Q5) Answer the following questions **8M**

a) Describe the effect of microbial control agents on cellular structures. 4M
b) What are macroscopic colony characteristics? Explain any two characteristics in detail. 4M

OR

c) Discuss the process of transformation in bacteria. 4M
d) How will you perform pour plate method? 4M

Q6) Answer the following questions **5M**

a) Why are nitrogen fixers and phosphate solubilizers important in the environment?
b) With the help of neat diagram explain Microbial growth curve.

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Deccan Education Society's

FERGUSSON COLLEGE (Autonomous) Pune-4

Affiliated to SavitribaiPhule Pune University

F.Y.B.Sc. (Semester: II)

Subject: Biotechnology

Paper Title: Quantitative Methods in Biology – II

Paper Code:BTH1207

2019 Pattern (2Credits)

[Time: 2.5Hours] **[Max. Marks : 50]**

Instructions to the candidates:

1) All questions are compulsory.
2) Neat diagrams must be drawn wherever necessary.
3) Figures to the right side indicate full marks.
4) Use of scientific, non-programmable calculators and statistical tables in permitted.

Q1) **Answer the following questions (Any Five).** **10 M**

a) Define entity.
b) Define instance.
c) Mention the applications of mathematics in biology.
d) Give four examples of variables that follow binomial distribution.
e) In order to calculate Poisson probabilities, what information about the data is required?
f) When is the Type I error committed?

Q2) **Answer the following questions (Any Four).** **12 M**

a) What are probability distributions?
b) Distinguish between LAN and WAN.
c) Write the formula to be used to calculate binomial probabilities. Give meanings of each of the denotations.
d) The average attendance of F.Y.B.Sc. students on a given day is 25. What is the probability that exactly 20 students will be present on 1 June 2022?
e) What are the types of the student's *t* test?

Q3) **Answer the following questions** **9 M**

a) The average height of students of the T.Y.B.Sc. students is 175 cm. What is the probability that a student will be taller than 180 cm? 5M

b) A coin is tossed 15 times. Calculate the probability of obtaining at the most 7 Heads. 4M

OR

a) A pharmaceutical company claims to have developed a drug which potentially reduces weight in obese men when used for a month. The investigators from the company test 10 Indian men to test this. They collected the weights data prior to the use of the drug, and after the use of the drug. The data are represented below. Test whether the company's claim is correct, using the student's *t* test. 5M

Weights	1	2	3	4	5	6	7	8	9	10
Before	86	92	79	95	102	99	92	89	93	100
After	80	95	75	90	95	85	93	86	90	94

b) What is hypothesis testing and why is it necessary? 4M

6 M

Q4) **Answer the following questions (Any Two).**

a) What are the applications of the chi square test?

b) Write a note on www and internet.

c) What is firewall? Explain its uses

Q5) **Answer the following questions.** **8 M**

a) Define data, information, entities and attributes. 4M

b) Write a note on multimedia database. 4M

OR

a) Discuss various symbols used in entity relationship diagram. 4M

b) Draw the entity relationship diagram of the student database. 4M

Q6) **Answer the following questions (Any One)** **5 M**

a) Write comparative account on relational data model and hierarchical data model.

b) Write a note on NCBI and UniProtKB.

Deccan Education Society's

FERGUSSON COLLEGE (Autonomous) Pune-4

Affiliated to Savitribai Phule Pune University

F.Y. B.Sc. (Semester: II)

Subject: Biotechnology

Paper Title: Cell Biology I Paper Code: BTH 1208

2019 Pattern (2 Credits)

22/11/2019

[Time: 2.5 Hours] **[Max. Marks : 50]**

Instructions to the candidates:

1) All questions are compulsory.
2) Neat diagrams must be drawn wherever necessary.
3) Figures to the right side indicate full marks.

Q1) **Answer the following questions (Any Five).** **10 M**

a) Define: Cisternae.
b) Define: crossover
c) What are Glycosaminoglycans?
d) What is Ubiquinone and Plastoquinone?
e) What are integrins?
f) Enlist the functions of cytoskeleton.

Q2) **Answer the following questions (Any Four).** **12 M**

a) Give a comparative account of archaebacteria, prokaryotic and eukaryotic cells.
b) What are lysosomes?
c) What are the factors affecting plasma membrane fluidity?
d) Give the functions of Smooth Endoplasmic Reticulum.
e) Explain the structure and role of plasmodesmata.

Q3) **Answer the following questions.** **9 M**

a) Draw a neat labelled diagram of stages of mitosis. 5M
b) Explain cyclin-cdk activation and deactivation mechanism. 4M

OR

a) Classify cellular junctions in detail. 5M
b) Explain any one cell-matrix junction with neat labelled diagram. 4M

Q4) **Answer the following questions (Any Two).** **6 M**

a) Explain the lipids and proteins that make up the plasma membrane.
b) Give the ultrastructure of nucleus with a neat labelled diagram.
c) What is glycocalyx? Give its significance.

Q5) **Answer the following questions** **8 M**

a) What are proteoglycans, collagen and multi adhesive matrix proteins? 4M
b) Give the Singer-Nicholson Model for Membrane Structure. 4M

OR

a) What are vacuoles? Explain with a neat labelled diagram. 4M
b) Give the structure and significance of plant cell wall. 4M

Q6) **Answer the following questions (Any One)** **5 M**

a) What are microfilaments? Write a note on the process of their assembly
b) Explain the process of cell division in germ cells and give its significance.

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O/C

Deccan Education Society's
Fergusson College (Autonomous) Pune-4
S.Y.B.Sc.(Semester III)
Biotechnology
Cell Biology I (BTH2301)
(2016 Pattern)

Time: 2 Hours **Max Marks: 50**

Instructions: a) All questions are compulsory.
b) Figures to right indicate full marks.
c) Draw neat labelled diagrams whenever necessary

Q.1 Answer Any Five of the following questions: **(2x5=10)**

a. What is a cell?
b. Enlist the components of Extra cellular Matrix of an animal cell.
c. Write the importance of ribosomes.
d. What are plasmodesmata?
e. Define: Anchoring junctions.
f. Enlist the types of cytoskeletal elements.
g. Give the functions of Endoplasmic Reticulum

Q.2 Answer Any Five of the following questions: **(3x5=15)**

a. Differentiate between cell wall and cell membrane.
b. Draw a neat labeled diagram of cell cycle.
c. Write a note on: Mitosis, with diagram.
d. Explain the assembly and disassembly of microtubules.
e. Why are vacuoles important?
f. What is the role of lysosomes?
g. Draw a neat labeled diagram of chloroplasts.

Q.3 Answer Any Five of the following questions: **(5x5=25)**

a. Elaborate on the regulation of cell cycle.
b. Write a note on meiosis drawing a neat labeled diagram.
c. What are tight junctions? Write their significance.
d. Describe the oxidative phosphorylation in mitochondrion.
e. Explain the models describing formation of Golgi complex.
f. Explain the Fluid Mosaic Model of the plasma membrane.
g. Describe the structure and role of nucleus.

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Deccan Education Society's
FERGUSSON COLLEGE (Autonomous) Pune-4
Affiliated to SavitribaiPhule Pune University

S.Y. B.Sc. (Semester:III)
Subject: Biotechnology
Paper Title: Cell Biology II
Paper Code: BTH 2301
2019 Pattern (2 Credits)

[Time: 2.5Hours] **[Max. Marks : 50]**

Instructions to the candidates:
1) All questions are compulsory.
2) Neat diagrams must be drawn wherever necessary.
3) Figures to the right side indicate full marks.

Q1) **Answer the following questions (Any Five). Two Marks Each** **10 M**

a) Define: Carriers
b) What is the significance of P 53 protein?
c) What are light driven pumps?
d) Differentiate between primary active transport and secondary active transport.
e) What are SNAREs?
f) Enlist the properties of tumor cells.

Q2) **Answer the following questions (Any Four). Three Marks Each** **12 M**

a) Give an example of signaling by GTP binding proteins.
b) What is the role of Cytochrome C in apoptosis?
c) Give the significance and the function of coat proteins.
d) How are proteins targeted and transported to the thylakoid lumen?
e) Explain the steps in the process of tumor metastasis.

Q3) **Answer the following questions.** **9 M**

a) Explain the types of cell surface receptors. 5M
b) Describe the activation of a G protein coupled receptor with the help of an example. 4M

OR

a) How do the ER signal sequence and SRP direct ribosomes to the ER membrane? Explain with the help of a neat labelled diagram. 5M
b) Elaborate the role of Ran in protein transport. 4M

Q4) **Answer the following questions (Any Two). Three Marks Each** **6 M**

a) Write a note on intracellular regulators of apoptosis.
b) Explain the calcium-calmodulin pathway.
c) How does the Hedgehog signal switch the target genes ON?

Q5) **Answer the following questions** **8 M**

a) Explain the gated transport of proteins in the nucleus with the help of a neat labelled diagram. 4M

b) How are newly synthesized lysosomal hydrolases made to reach the lysosomes? 4M

OR

a) How can a drug act to block the progression of cancer? Explain with the help of an example. 4M

b) What are survival factors? How are they important in inhibition of apoptosis? 4M

Q6) **Answer the following questions (Any One) Five Marks Each** **5 M**

a) Explain the working and significance of channels using a chemical synapse as an example.

b) Explain the assembly and disassembly of a Clathrin coat during vesicular transport.

11/12/22
10.30 am

01 DEC 2022

Deccan Education Society's
FERGUSSON COLLEGE (Autonomous) Pune-4
Affiliated to SavitribaiPhule Pune University

S.Y. B.Sc. (Semester: III)
Subject: Biotechnology
Paper Title: Molecular Biology-I
Paper Code: BTH2302
2019 Pattern (2 Credits)

[Time: 2.5Hours] **[Max. Marks : 50]**

Instructions to the candidates:
1) All questions are compulsory.
2) Neat diagrams must be drawn wherever necessary.
3) Figures to the right side indicate full marks.

Q1)	**Answer the following questions (Any Five).** **Two Marks Each**		**10 M**
1)	What was the aim of Griffith's experiment?		2M
2)	DNA fingerprinting analyses which feature of the genome?		2M
3)	Name the proteins which hydrolyse ATP in prokaryotic DNA replication		2M
4)	How does UV radiation act as a DNA damaging agent?		2M
5)	Draw GC base pairing.		2M
6)	Where does site specific recombination occur?		2M
Q2)	**Answer the following questions (Any Four).** **Three Marks Each**		**12 M**
1)	Describe the genome of any one virus.		3M
2)	Write a note on replication of linear chromosomal ends in eukaryotes.		3M
3)	Explain what is a nucleosome.		3M
4)	Draw and label the different parts of a chromosome.		3M
5)	Draw a labelled diagram of prokaryotic mRNA and mention its features.		3M
Q3)	**Answer the following questions.**		**9 M**
1)	Describe the chemistry of DNA replication in detail.		5M
2)	Write a note on DNA polymerases in prokaryotes.		4M
	OR		
1)	Describe the main steps of homologous recombination.		5M
2)	Describe the function of proteins involved in each of the steps described above.		4M
Q4)	**Answer the following questions (Any Two).** **Three Marks Each**		**6 M**
1)	Describe the structure of A-DNA.		3M
2)	Write a note on semi-conservative model of DNA replication.		3M
3)	Write a note on centromere.		3M

Q5)		**Answer the following questions**	**8 M**
	1)	Write a note on base modifications in DNA.	4M
	2)	Describe Base Excision Repair pathway (BER) in prokaryotes.	4M
		OR	
	1)	Write a note on non- coding RNAs (ncRNAs)	4M
	2)	Explain the detailed mechanism of action of any one type of ncRNA.	4M
Q6)		**Answer the following questions (Any One) Five Marks Each**	**5 M**
	1)	Write a note on DNA packing in prokaryotes.	5 M
	2)	Draw and explain the structure of tRNA.	5 M

10:30 2/12/22 0/6

Deccan Education Society's
FERGUSSON COLLEGE (Autonomous) Pune-4
Affiliated to SavitribaiPhule Pune University

S.Y. B.Sc. (Semester: III)
Subject: Biotechnology
Paper Title: Metabolic Pathways
Paper Code: BTH 2303
2019 Pattern (2 Credits)

[Time: 2.5 Hours] **[Max. Marks : 50]**

Instructions to the candidates:
1) All questions are compulsory.
2) Neat diagrams must be drawn wherever necessary.
3) Figures to the right side indicate full marks.

Q1) **Answer the following questions (Any Five). Two Marks Each** **10 M**

a) Define 'Metabolic pathways'. What are metabolites?
b) What are the sources of free energy for anabolic reactions? How are they generated?
c) Write ANY TWO activators and inhibitors of Pyruvate kinase.
d) Why synthetic and degradation pathways differ in at least one of their reaction steps?
e) Write ANY TWO rate-limiting steps of glycolysis.
f) Enlist metabolic functions of cytosol.

Q2) **Answer the following questions (Any Four). Three Marks Each** **12 M**

a) Explain the steps of glycogenolysis.
b) Summarize non-oxidative phase of PPP.
c) Illustrate oxidative phosphorylation.
d) Compare hexokinase and glucokinase.
e) Show schematically 'Cori cycle'.

Q3) **Answer the following questions.** **9 M**

a) Illustrate how long-chain fatty acids are transported across inner membrane of mitochondria. 5M
b) Outline β-oxidatation. 4M

OR

a) Give details of ketogenesis. 5M
b) Explain how ketone bodies are utilized in extrahepatic tissues. 4M

Q4) **Answer the following questions (Any Two). Three Marks Each** **6 M**

a) Explain the central role of glutamate in nitrogen metabolism.
b) With reference to most of the mammals, arrange a set of reactions in which excess ammonia is excreted.
c) Explain how are Tyrosine and Cysteine synthesized?

Q5) **Answer the following questions** **8 M**

a) cAMP-dependent protein kinase is important in regulation of glycogen phosphorylase. Justify. 4M

b) Evaluate amphibolic nature of citric acid cycle. 4M

OR

a) Review cholesterol synthesis. How cholesterol is formed from squalene? 4M

b) Validate the significance of fatty acid Synthase through reactions of palmitic acid formation. 4M

Q6) **Answer the following questions (Any One) Five Marks Each** **5 M**

a) When one molecule of palmitic acid is synthesized from acetyl CoA, how much glucose is converted to ribulose-5-phosphate?

B) How is glucose concentration in the blood maintained during rest after a carbohydrate-rich meal?

03/12/2022
10:30am

Deccan Education Society's
FERGUSSON COLLEGE (Autonomous) Pune-4
Affiliated to SavitribaiPhule Pune University

S.Y. B.Sc. (Semester: III)
Subject: Biotechnology
Paper Title: Medical Microbiology
Paper Code: BTH 2304
2019 Pattern (2 Credits)

[Time: 2.5 Hours] **[Max. Marks : 50]**

Instructions to the candidates:

) All questions are compulsory.
) Neat diagrams must be drawn wherever necessary.
) Figures to the right side indicate full marks.

Q1) **Answer the following questions (Any Five). Two Marks Each** **10 M**

a) What are adhesins ?
b) With the help of the examples explain septicemia
c) Why is understanding of microbiome important in humans ?
d) How can a local infection become a systemic infection?
e) Which are the most often used portals of exit?
f) How are zoonoses transmitted to humans?

Q2) **Answer the following questions (Any Four). Three Marks Each** **12 M**

a) Does *Clostridium perfringens* cause a communicable disease? If yes explain
b) Compare the effects of coagulases, Kinases and collagenase in pathogenicity
c) Explain why M protein is important in Influenza virus
d) How will you diagnose a case of filariasis
e) Justify, "Mouth is house for many microorganisms".

Q3) **Answer the following questions.** **9 M**

a) Identify four predisposing factors for disease. 5M
b) How are nosocomial infections primarily transmitted, and how can they be prevented? 4M

OR

a) Differentiate between endotoxin and exotoxin 5M
b) Comment on Changes in the vaginal normal flora 4M

Q4) **Answer the following questions (Any Two). Three** **6 M**

Marks Each

a) Explain three methods of disease transmission.
b) Diagrammatically explain the structure of Dengue virus
c) How is Salk vaccine different than Sabin vaccine?

Q5) **Answer the following questions** **8 M**

a) Discuss role of epidemiologist 4M
b) Describe in detail life cycle of Entameoba 4M

OR

a) Explain the pathogenesis of *Bacillus anthracis*in Anthrax 4M
b) Enlist the events which takes place in Salmonellosis . 4M

Q6) **Answer the following questions (Any One)** **Five Marks Each** **5 M**

a) Put the following in proper sequence, according to the pattern of disease: period of decline. period of convalescence, period of illness. prodromal period. Incubation period
During which periods can a disease be transmitted?
b) Comment on portals of entry

03/12/2022
10:30am

Deccan Education Society's
Fergusson College (Autonomous) Pune-4
S.Y.B.Sc. (Semester III)
Biotechnology
Medical Microbiology and Immunology (BTH2304)
(2016 Pattern)

Time: 2 Hours **Max Marks: 50**

Instructions: a) All questions are compulsory.
b) Figures to right indicate full marks.
c) Draw neat labelled diagrams whenever necessary

Q.1 Answer Any Five of the following questions: **(2x5=10)**

a. Give four functions of phagocytes.
b. Define: i) Epitopes ii) Antigenic determinants.
c. Name four antigen antibody reaction techniques used in research.
d. What is opsonisation?
e. Enlist two portal of entry for pathogenic microorganisms.
f. Define toxins.
g. Give the significance of prions in Medical microbiology.

Q.2 Answer Any Five of the following questions: **(3x5=15)**

a. With help of a diagram explain why thymus is primary lymphoid organ.
b. Inflammation is a bridge between innate and adaptive immune responses Justify.
c. Diagrammatically represent hematopoiesis.
d. Give three points of comparison between classical and alterative pathway of complement.
e. How will you classify disease according to severity.
f. Differentiate between etiology and pathogenesis.
g. Draw a neat labelled diagram Influenza virus.

Q.3 Answer Any Five of the following questions: **(5x5=25)**

a. Describe the pathway which leads to T cell interaction with MHC-II molecule.
b. With help of a diagram describe structure of IgM.
c. Write a note on recombinant vector vaccine and state its significance.
d. Diagrammatically explain Salmonellosis.
e. Elaborate on vector borne infections.
f. Discuss the pathogenesis of Tetanus.
g. Write a short note on Normal flora.

05 DEC 2022

Deccan Education Society's
FERGUSSON COLLEGE (Autonomous) Pune-4
Affiliated to SavitribaiPhule Pune University

S.Y. B.Sc. (Semester: III)
Subject: Biotechnology
Paper Title: Fundamentals of genetics
Paper Code: BTH 2305
2019 Pattern (2 Credits)

[Time: 2.5 Hours] **[Max. Marks : 50]**

Instructions to the candidates:
1) All questions are compulsory.
2) Neat diagrams must be drawn wherever necessary.
3) Figures to the right side indicate full marks.

Q1)		**Answer the following questions (Any Five).** **Marks Each**	**Two**	**10 M**
	a)	Define: Linkage		
	b)	What is reciprocal translocation?		
	c)	Give the significance of two-point cross.		
	d)	Explain the law of independent assortment.		
	e)	`What are homologous chromosomes?		
	f)	What are Barr bodies?		
Q2)		**Answer the following questions (Any Four).** **Marks Each**	**Three**	**12 M**
	a)	Explain maternal inheritance with example.		
	b)	State the difference between Dominance and Epistasis.		
	c)	Write note on Recombination frequency.		
	d)	What is sex linked inheritance?		
	e)	Describe the process of crossing over with its features.		
Q3)		**Answer the following questions.**		**9 M**
	a)	What are complementary and supplementary genes? Explain with one example of each.		5M
	b)	Write difference between Euploidy and Aneuploidy		4M
		OR		
	a)	Write note on "Dosage compensation".		5M
	b)	Explain incomplete dominance and codominance.		4M
Q4)		**Answer the following questions (Any Two).** **Marks Each**	**Three**	**6 M**
	a)	Explain the pairing between normal and inverted		

chromosome.

b) Two cats are mated. One of the parent cats is long-haired (recessive allele).
The litter which results contains two short-haired and three long-haired kittens.
What does the second parent look like, and what is its genotype?

c) What is three-point cross? Explain its significance.

Q5) **Answer the following questions** **8 M**

a) Write note on gene mapping. 4M

b) A man with dark (dominant), curly hair marries a woman with light, straight hair. Their daughter, who happens to have dark hair, marries a man with light, wavy hair. 4M
Answer the following questions about this dark-haired daughter and her family.
a. Draw a Punnett's square for this marriage, and predict the phenotypic ratio among the offspring of the daughter and her husband.
b. What is the chance that they will have a child with hair just like his or her father's?

OR

a) What are the different types of variations in chromosomal structure? 4M

b) Explain the significance of back cross and test cross with the help of an example. 4M

Q6) **Answer the following questions (Any One) Five Marks Each** **5 M**

a) What is translocation? Explain meiotic segregation of chromosomes with reciprocal translocation.

b) What is epistasis? Describe dominant and recessive epistasis with examples.

06/12/2022
O/C
10:30 Am

Deccan Education Society's
FERGUSSON COLLEGE (Autonomous) Pune-4
Affiliated to Savitribai Phule Pune University

S.Y. B.Sc. (Semester: III)
Subject: Biotechnology
Paper Title: Plant Development
Paper Code: BTH 2306
2019 Pattern (2 Credits)

[Time: 2.5 Hours] **[Max. Marks : 50]**

Instructions to the candidates:
1) All questions are compulsory.
2) Neat diagrams must be drawn wherever necessary.
3) Figures to the right side indicate full marks.

Q1) **Answer the following questions (Any Five). Two Marks Each** **10 M**

a) What are phytochromes?
b) Explain term dedifferentiation with example.
c) Elist the functions of ethylene as a plant hormone.
d) Describe pollen grain germination with diagram.
e) Write note on Vernalization.
f) What is developmental plasticity in plants?

Q2) **Answer the following questions (Any Four). Three Marks Each** **12 M**

a) Write a note on *Arabidopsis thaliana* is used as plant development model system.

b) With the help neat labeled diagram, describe structure of embryo sac.

c) Explain the role of auxin in phototropism.
d) Describe embryonic mutants of Arabidopsis.
e) Write functions of ethylene with respect to plant development.

Q3) **Answer the following questions.** **9 M**

a) Describe in detail embryogenesis in dicot plant with suitable diagram. 5M
b) Enlist different plant hormones and describe role of any two in the plant development. 4M

OR

a) Explain how Cytokinin stimulates cell divisions for development of vascular elements. 5M

b) Explain photoperiodic induction for flowering in plants. 4M

Q4) **Answer the following questions (Any Two). Three Marks Each** **6 M**

a) What are circadian rhythms in plants?

b) Describe 3 classes of genes which seem to control the basic patterning of a flower

c) With the help of suitable diagram describe the structure of anther.

Q5) **Answer the following questions** **8 M**

a) Explain vessel formation in plants. 4M

b) Elaborate the role phytochromes in different stages of photomorphogenesis. 4M

OR

a) Describe embryonic mutants of Arabidopsis. 4M

b) Write note on Differentiation, Dedifferentiation, Redifferentiation and Competence. 4M

Q6) **Answer the following questions (Any One) Five Marks Each** **5 M**

a) Explain the role of Abscisic acid in stomatal movements.

b) Write note on "Programmed cell death (PCD) is a normal part of the plant life cycle".

28/11/22 o/c

Deccan Education Society's

FERGUSSON COLLEGE (Autonomous) Pune-4

Affiliated to SavitribaiPhule Pune University

S.Y. B.Sc(Semester 3)

Subject: Biotechnology

Paper Title: English

Paper Code: BTH 2307

2019 Pattern (2 Credits)

[Time: 2.5 Hours] **[Max. Marks : 50]**

Instructions to the candidates:

- All questions are compulsory.
- Neat diagrams must be drawn wherever necessary.
- Figures to the right side indicate full marks.

Q 1. Attempt any five questions. (2 marks each)

1. Identify the tense of the following sentences.

A. My parents recently booked one more flat.

B. We will have visited the Taj Mahal next Sunday.

2. Change the voice of the following sentences.

A. Someone has knocked the door five minutes ago.

B. My colleagues are attending a three-day conference.

3. Choose the most appropriate adjective for the following sentences.

A. Was the food in the party .....?

A. Palatable

B. Disciplined

C. Meticulous

B. The Manager's dressing was .....

A. Meticulous

B. Interesting

C. Productive

4. Choose the most appropriate adverbs for the following sentences.
A. Have you listened to me .....?
A. vigilantly
B. Vigilacly
C. Vigilance

B. His .....responded to the question asked.
A. positively
B. negative
C. fastly

5. Identify whether the following sentences are simple, compound or complex.
A. I reached the venue in time but the cab had already left the station.
B. Even though I don't know the address of Raj's house, I can take you there in time.

6.. Change the voice of the following sentences.
1. The assignment is being checked by the teacher.
2. The project was assigned to Mark and Stella.

Q 2. Answer any four questions. (3 marks each)

1. Supposing that you have recently had an industry visit, write a report on it not in more than 80 words.

2. Write an enquiry email to a company asking for information regarding their internship process.

3. Write an email to the Principal of your college regarding his approval for your participation in a state level debate competition.

4. Write an appreciation letter to your sibling who has just won an award for her/his paper she/ he had presented in a university level seminar.

5. Write a letter to your college HOD apologising for your absence in the FYBSC Freshets' Party organisation committee meeting owing to your severe illness.

Q 3. Answer the following questions. (9marks)

1. Write a critical appreciation of the short story The Luncheon by Somerset Maugham on the basis of the following points – Creative elements, plot, characters and theme. (5)

2. Write an essay on the following topic in not more than 80 words. (4)
What do you prefer- work from home or work from office?

OR

1. Write an essay on the following topic in not more than 80 words. (5)
Effective ways of stress management.

2. Write a critical appreciation of the short story The Eyes Have It by James Bond on the basis of the following points – Creative elements, Plot, Characters and Theme (4)

Q 4. Answer the following questions. (Any two) (3 marks each)

1. Write a short paragraph on **The Importance of Effective Team Work Skills.**
2. Prepare a news item on the inauguration ceremony of a two-day state industrial visit organised by your department.

Q 5. Answer the following questions. (4 marks each)

1. Analyse the character of Lady from the short story The Luncheon by Somerset Maugham.

2. Analyse the character of Narrator from the short story The Eyes Have It by Ruskin Bond.

OR

1. Write a report on any one of the seminars/training sessions you have recently attended.
2. Supposing that you appear for a job placement, prepare your CV mentioning your personal information, educational qualifications, strengths and weaknesses, skills and achievements.

Q 6. Answer any one of the following questions. (5 marks)

1. Prepare a circular for a poster making competition that your department organises as a part of annual gathering.
2. Prepare a circular that invites your department students in order to plan the Communication skills workshop series.

15/11/2022 O/C

Deccan Education Society's
Fergusson College (Autonomous) Pune-4
S.Y. B.Sc.(Biotechnology) Semester II
Cell Biology II (BTH2401)
(2016 Pattern)

Time: 2 Hours **Max. Marks: 50**

Instructions to the candidate
1. **All questions are compulsory.**
2. **Figures to right indicate full marks.**
3. **Draw neat and labelled diagrams wherever necessary.**

Q.1 Attempt any five questions of the following **(10 Marks)**

(a) Write the significance of signal sequences.
(b) What is antiport?
(c) How are IAPs used in apoptosis?
(d) What are caspases?
(e) Write the role of Receptor Tyrosine Kinases.
(f) What are tumors?
(g) Give 2 examples of second messengers and write their roles in one line.
(h) What is secondary active transport?

Q.2 Attempt any five questions of the following **(15 Marks)**

(a) Explain the types of inter-cellular signalling mechanisms.
(b) Elaborate the role of checkpoints in cancer.
(c) Write a note on endocytosis.
(d) How can external survival factors inhibit apoptosis? Write the role of 'Hid' (Drosophila) in it.
(e) What are oncogenes? Explain giving examples.
(f) Explain clonal evaluation of cancer.
(g) Elaborate the JAK-STAT pathway in a cell.
(h) Explain the hedgehog signalling pathway in detail.

Q.3 Attempt any five questions of the following **(25 Marks)**

(a) How is membrane potential generated? Write its significance in cell signalling.
(b) Differentiate between channels and carriers.
(c) Write a note on enzyme-coupled receptors.
(d) How are proteins imported into nucleus? Explain with diagram.
(e) Explain with diagram, the use of v-SNARES and t-SNARES in vesicle-membrane interaction.
(f) How does PI-3 signalling kinase promote cell survival?
(g) Write a note on: Ras activates serine/threonine Phosphorylation cascade that includes MAP kinase.
(h) Explain the role of Ca^{++} as ubiquitous intracellular messenger, by using Ca^{++}-calmodulin as a reference.

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15/11/2022

Deccan Education Society's
Fergusson College (Autonomous), Pune-4

S.Y.B.Sc. (Semester IV)
Subject: Biotechnology
(BTH2401) Immunology (2019 pattern)

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

Instruction to candidates:

i) **All questions are compulsory**

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

Q1) **Attempt any five of the following.** **(2 X 5 =10)** T10

a) Give **FOUR** distinct characteristics of Basophils

b) Define 1) paratopes 2) antigen

c) State true or false with justification:

1.Spleen have lymphatic vessels
2. MALT has combined surface area of 50 m^3

d) Enlist cells of myeloid lineage

e) Write any two functions of IgM

f) What are naïve T cells

g) Which cells require exogenous processing and why?

Q2) **Attempt any five of the following.** **(3 X 5 =15)** T15

a) Draw neat and labelled diagram of Mast cells

b) Discuss about the Alternate Pathway in Complement system activation

c) Write a note on Cellular Immune response

d) Explain the principle of ELISA

e) Comment on Autoimmune therapy.

f) Write a short note on cytokines.

g) Explain in detail about active immunization.

Q3) **Attempt any five of the following.** **(5 X 5 =25)**

a) Explain the working of Thymus

b) Diagrammatically explain the process of inflammation

c) Write a short note on the structure of Antibody

d) Describe about the series of changes that take place in Rheumatoid Arthritis

e) Comment on BCR

f) Justify MHC II is CD 4 restricted

g) How will you perform agglutination reaction.

16/4/2022 O/C

Deccan Education Society's
Fergusson College (Autonomous), Pune-4

S Y B Sc. (Semester IV)
Subject: Molecular Biology-II
(BTH 2402)(2019 pattern)

Time: 2:30 Hrs **Max. Marks: 50**

Instruction to candidates:

i) **All questions are compulsory**
ii) **Figures to the right indicate full marks**
iii) **Use of statistical tables and scientific calculators is allowed.**

Q1) **Attempt any five of the following.** **(2 X 5 =10)**

a) What is the Shine –Dalgarno sequence?

b) What are the different types of suppressor mutations?

c) What are group-I and II introns?

d) Depict the RNA splicing reaction by lariat formation.

e) Give the detailed structure of an eukaryotic gene.

f) What comprises of the holozyme in RNA Pol in prokaryotes?

g) Mention the various point mutations that alter the genetic code with suitable examples.

Q2) **Attempt any five of the following.** **(3 X 5 =15)**

a) Explain gene families and gene clusters with suitable examples.

b) Describe Rho-dependent termination in prokaryotes

c) Illustrate the secondary structure of tRNA.

d) How is the peptide bond formed during translation?

e) Explain the rules of the genetic code

f) What changes does the pre-mRNA transcript undergo in Eukaryotes?

g) What is the Spliceosome complex?

Q3) **Attempt any five of the following.** **(5 X 5 =25)**

a) Differentiate between the Lac and Trp Operons in prokaryotes.

b) Describe the translation process in Prokaryotes with suitable diagrams.

c) Demonstrate how the initiation and elongation complex is formed during translation in eukaryotes.

d) Mention the steps involved in regulating translation of proteins in prokaryotes

e) Explain RNA editing with suitable diagrams.

f) What is genetic code degeneracy?

g) Depict the mechanism of antibiotics against bacteria.

17/11/2022

17/11/2022 O/C

Deccan Education Society's

Fergusson College (Autonomous), Pune-4

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

Subject: Biotechnology

(BTH 2403) Protein Biochemistry and Enzymology (2019 pattern)

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

Instruction to candidates:

i) **All questions are compulsory**
ii) **Figures to the right indicate full marks**
iii) **Use of statistical tables and scientific calculators is allowed.**

Q.1 **Attempt any <u>five</u> questions:** **[2 x 5 =10]**

a) Why dialysis is carried out after salt fractionation step?

b) What are 'anion exchangers'? Why are they called as 'basic ion exchangers'?

c) What is ligand? Name **any two** tags used in protein purification by affinity chromatography.

d) How are analytical ultracentrifuges different from preparative ultracentrifuges?

e) What is 'exclusion limit of a gel'? What is the basis of separation of proteins in GFC?

f) Name **any two** important electrophiles.

g) Enlist the types of secondaty structure.

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

a) Show schematically 'Affinity Chromatography'.

b) How ammonium sulphate fractionation works?

c) Explain the effect of varying pH on enzyme activity.

d) Draw Lineweaver-Burk plot showing competitive inhibition. What are the changes that take place in this type of inhibition with respect to Km, Vm and (Km/Vm) values?

e) Discuss 'metal ion catalysis' with reference to **any one** example of an enzyme.

f) A sample containing following proteins was loaded on Sephadex G-200. Predict order of their elution. i) Myoglobin (Mr =16,000) ii) Catalase (240,000), iii) Cytochrome c (12,000), iv) serum albumin (65,000). Exclusion limit of sephadex is

200,000.

g) Describe beta pleated sheet in detail.

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

a) Derive MM equation based on 'steady state' approach.

b) Explain the catalytic mechanism of serine protease action.

c) Show schematically 'Ion Exchange Chromatography'. A solution containing egg albumin (pI = 4.6), β-lactoglobulin (pI = 5.2), and chymotrypsinogen (pI = 9.5) was loaded onto a DEAE-cellulose column at pH 5.4. Column was eluted with 5.4 pH buffer with increasing salt concentration. What will be the elution pattern?

d) Discuss why Km determination is important? How Km value is determined experimentally?

e) Describe principle of centrifugation and the steps for obtaining sub cellular organelles by this technique.

f) With a suitable example, discuss 'proteolytic processing' as one the enzyme regulation strategies.

g) Explain with suitable example feedback inhibition.

18/11/2022 O/C
M

Deccan Education Society's

Fergusson College (Autonomous), Pune-4

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

Subject: Biotechnology

(BTH 2404)Food and Dairy Microbiology (2019 pattern)

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

Instruction to candidates:

i) **All questions are compulsory**

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

Q1) **Attempt any five of the following.** **(2 X 5 =10)** T10

a) Discuss UTH method in Pasteurization

b) Which bacteria causes brown milk spoilage

c) What is cold sterilization

d) List any two important Milk industry Standards

e) What are probiotics

f) Define perishable foods with 2 examples

g) Explain the concept of TDT in food preservation

Q2) **Attempt any five of the following.** **(3 X 5 =15)** T15

a) What are starter cultures? Discuss the role played by starter culture?

b) Describe various tests conducted to check Mastitis in Cows?

c) Draw a flowchart on Cheese production

d) How will you perform Brucella Ring test

e) Write a note on preservatives used in food.

f) Mention the sequences of events that leads to spoilage of canned food products

g) What factors will affect heat destructions in microorganisms?

Q3) **Attempt any five of the following.** **(5 X 5 =25)** T25

a) Discuss in detail composition of Milk

b) List down the intrinsic factors that influence the microbial growth in food? Explain any 2 in detail

c) What is HACCP? How is HACCP conducted?

d) What types of storage specifications are used after Pasteurisation

e) Elaborate on spoilage of fruits and vegetables.

f) Justify Aspergillus flavus causes Aflatoxosis

g) What are the sources of contamination of milk

19/11/22 O/C

Deccan Education Society's
Fergusson College (Autonomous) Pune-4
S.Y.B.Sc. (Semester IV)
Biotechnology
Plant Development (BTH2405)
(2016 Pattern)

Time: 2 Hours **Max Marks: 50**

Instructions: a) All questions are compulsory.
b) Figures to right indicate full marks.
c) Draw neat labelled diagrams whenever necessary

Q.1 Explain any Five of the following with respect to plant development : **(2x5=10)**

a. Scutellum
b. Redifferentiation
c. Homeotic genes.
d. Photoperiodism
e. Determination
f. Senescence.
g. Pattern formation
h. Plant Growth Regulators.

Q.2 Answer Any Five of the following questions: **(3x5=15)**

a. What are the practical applications of cytokinins.
b. Write short note on Quiscent centre in a root
c. Explain-Patterning of the *Arabidopsis* embryo can be altered by mutation.
d. Describe the process of development of anther in Angiosperms.
e. With the help of suitable example describe programmed cell death in plants.
f. Write short note on structure of anatropous ovule.
g. What are the four phases in the post emergence life of an angiospermic plant

Q.3 Answer Any Five of the following questions: **(5x5=25)**

a. Describe functions of tapetum and nuclear behaviour of tapetal cells.
b. With the help of ABC model explain how homeotic genes control floral organ identity.
c. Explain how cell fate in early *Fucus* development is determined by the cell wall.
d. Write note on double fertilization and triple fusion.
e. With the help of suitable diagrams describe the process of embryo development in monocot plants.
f. Write note on crosstalk among signal pathways.
g. Give detail account of megasporogenesis.

24/11/22 OK

Deccan Education Society's
Fergusson College (Autonomous), Pune-4

S.Y.B.Sc. (Semester IV)
Subject: Biotechnology
(BTH2406)Animal Development(2019 pattern)

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

Instruction to candidates:

i) All questions are compulsory
ii) Figures to the right indicate full marks
iii) Use of statistical tables and scientific calculators is allowed.

Q.1 Attempt any five questions: **[2 x 5 =10]**

a) Discontinuous Oogenesis

b) Polyspermy

c) Ageing

d) Telolecithal egg

e) Pleuripotent Cell

f) Spemann Organiser

g) Zygote

Q.2 Draw neat labelled diagrams **[3 x 5 =15]**

a) Blastula
b) Invagination
c) Sperm
d) Regeneration in hydra
e) Cell cycle during cleavage
f) Graph depicting Bicoid Nanos Hunchback and Caudal mRNA
g) Axoneme

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

a) A single event of spermatogenesis results in many functional sperms. Explain

b) Enlist different morphogenetic movement. Explain the process of gastrulation in frog.

c) Write a note on process of fertilization

d) Maternal effect proteins determine the body plan in *Drosophila*. Explain with example

e) **If neural inducer is incubated in medium for some time and removed. Responder epidermal tissue is added to this conditioned medium. Explain the outcomes of this experiment with examples.**

f) **Write a note on acrosomal reaction**

g) **Explain why oogenesis is not merely meiosis**

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Deccan Education Society's

Fergusson College (Autonomous) Pune-4

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

Environmental Biotechnology (BTH2406)

(Pattern 2016)

Time:-2 Hours **Max. Marks:-50**

Instructions:

1) ***All questions are compulsory.***
2) ***Figures to the right indicate full marks.***
3) ***Draw neat and labelled diagram whenever necessary.***
4) ***Use of scientific calculator is allowed.***

Q.1. Attempt any five out of eight **(2×5=10)**

1) What are the reasons for Ozone Layer Depletion?
2) Name any two ill effects of acid rain.
3) Define biocontrol.
4) Write a note on biosensors.
5) Write a note on transgenic plants.
6) Why is it necessary to perform confirmed test, in MPN test? How is it performed?
7) What is BOD? What are the units in which it is measured?
8) Define biopesticides.

Q.2. Attempt any five out of eight **(3×5=15)**

1) What will be your interpretation if you get the following results during IMViC test?

Medium	Observations
Glucose phosphate broth	Red colour on adding Baritt's reagent?
Simon's citrate agar slant	Blue colouration

2) Write a note on oil spill cleanup.
3) What are trickling filters?
4) Explain the term xenobiotics.
5) Write a note on cometabolism.
6) What is biohydrogen.
7) Write about the use of diversity indices in water quality evaluation.
8) Explain the sedimentation process for textile industry waste management.

Q.3. Attempt any five out of eight **(5×5=25)**

1) Write a note on climate change and global warming.
2) Explain the concept bioremediation in detail.
3) What is EIA? Explain the process of EIA.
4) What are pesticides? Discuss their hazardous effects on environment. What are possible alternatives to pesticides.
5) Define coliforms and explain the presumptive test for coliforms. Add a note on faecal streptococci.
6) State and explain the process of biomedical waste management.
7) Explain the methods of removal of chlorinated hydrocarbons from air.
8) Explain in brief the use of bioindicators in EBT.

14/11/2022 O/C

Deccan Education Society's

FERGUSSON COLLEGE (Autonomous) Pune-4

Affiliated to Savitribai Phule Pune University

Class: S.Y.B.Sc. Biotechnology

Paper Title: Scientific Writing and Communication

Paper Code: BTH 2407

2019 Pattern (2 Credits)

[Time: 2.5 Hours] **[Max. Marks : 50]**

Instructions to the candidates:

1) *Total questions seven and **attempt any five.***
2) *Neat diagrams must be drawn wherever necessary.*
3) *Figures to the right side indicate full marks.*

Q1) **Attempt any five of the following.** **(2 X 5 =10)** T10

a) What is a law in scientific literature?

b) Define: falsification

c) What is a concept in scientific literature?

d) What is an abstract?

e) What are copyrights?

f) Why are authors and their addresses important?

g) Why is introduction important while writing any type of scientific manuscript?

Q2) **Attempt any five of the following.** **(3 X 5 =15)** T15

a) Explain inductive reasoning with an example.

b) What is popular scientific communication?

c) Enlist the guidelines for making an effective oral presentation.

d) What is the difference between a scientific paper and a thesis?

e) What is plagiarism check? Give its significance.

f) Enlist the laws for IP protection.

g) Give the significance of correct language and grammar in scientific communication.

Q3) **Attempt any five of the following.** **(5 X 5 =25)** T25

a) What are the common redundancies used in written communication? Give 10 examples.

b) Elaborate on the R and D of the IMRAD format.

c) Enlist the guidelines for an effective PowerPoint presentation.

d) Give the salient features of a scientific proposal.

e) Explain honesty, objectivity and integrity as scientific ethics.

f) What are acknowledgements?

g) Enlist the rules for thesis submission given by Savitribai Phule Pune University.

28/11/2022 2:30 pm

Deccan Education Society's

Fergusson College (Autonomous), Pune-4

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

Subject: Biotechnology

(BTH3501) Large Scale Manufacturing Processes- I

(2019 pattern)

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

Instruction to candidates:

i) **All questions are compulsory**
ii) **Figures to the right indicate full marks**
iii) **Use of statistical tables and scientific calculators is allowed.**

Q.1 **Attempt any <u>five</u> questions:** **[2 x 5 =10]**

a) Which type of products is formed during trophophase of microbial growth? Give two examples of such products
b) Diagrammatically represent the inoculum buildup of a bacterial production strain starting from lyophilized culture to the production fermenter
c) What are radial flow agitators?
d) Give the application of immobilized enzymes in soft drink production
e) Define aseptic operations and containment.
f) 'Use of percussors can improve the yield and quality of a product'. Justify giving one example
g) Calculate the del factor for a particular design organism if, k= 2.04 per min. and holding time,t=4min.

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

a) Define batch culture. How is the growth rate and generation time of bacteria (in log phase) calculated using growth kinetics.
b) What is dual fermentation? Explain giving one example
c) Diagrammatically represent an Air Lift Fermenter
d) Describe the production process, composition and use of cane molasses
e) Write short note on: Types of aerators
f) Compare and contrast fixed pore and non-fixed pore filters
g) Discuss the role of an indicator organism in designing of medium sterilization.

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

a) 'Modifying the cell permeability of a production strain can improve the yield of a product'. Justify by giving example
b) Define Enzyme immobilization. Explain the Gel entrapment and Adsorption method for immobilization of enzymes with their advantages and

disadvantages.

c) Define fed batch culture and explain the various strategies of its establishment

d) Explain with the help of a diagram the principle, working and use of continuous sterilization technique

e) What are the prerequisites of Plakett and Burman method of medium optimization? How is the data analyzed in this method?

f) How inducers and inhibitors can be used in fermentation media to improve the yield of a product? Explain giving examples.

g) Discuss the different types of valves used in fermentation process.

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O/C
2:30pm

Deccan Education Society's

Fergusson College (Autonomous), Pune-4

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

Subject: Biotechnology

(BTH3502) Introduction to Diagnostic Techniques

(2019 pattern)

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

Instruction to candidates:

i) **All questions are compulsory**
ii) **Figures to the right indicate full marks**
iii) **Use of statistical tables and scientific calculators is allowed.**

Q.1 **Attempt any <u>five</u> questions:** **[2 x 5 =10]**

a) What factors does an ideal detection system have?

b) Differentiate between prenatal screening and diagnosis

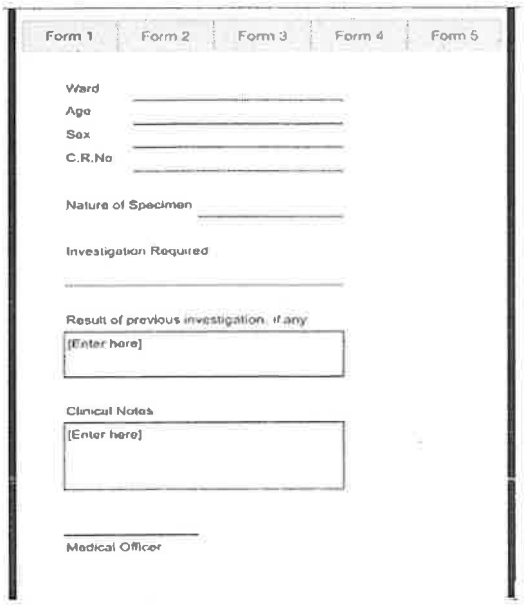
c) How should the following samples be stored?

1. Blood sample
2. CSF

d) In cases of respiratory tract infections which types of samples will a doctor recommend for testing? (Name any two)

e) What is total and free T4?

f) Identify this form and give its significance.



g) Define immunohistochemistry.

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

a) Explain with an example in brief the factors considered while selecting an antimicrobial agent

b) What are the processing steps required for sputum samples before analysis?

c) Write a short note on automation in a hematology laboratory.

d) Laboratory diagnosis of a case suspected to be suffering from albuminuria.

e) List the steps involved in performing a disc diffusion test.

f) What is the difference between culture media and transportation media? Give any 2 examples of transportation media.

g) Explain differences between MIC and MBC.

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

a) What is Antibiotic Susceptibility testing? Explain how the test organism is classified according to the test results.

b) Enlist any 5 indications for prenatal testing.

c) Explain the blood smear examination with respect to differential leukocyte count, RBC morphologic features, WBC morphologic features and number, Platelet morphologic features and number, Infectious agents.

d) What is the significance of blood indices in clinical hematology?

e) Describe the role of bronchial brushings, bronchial washings, bronchial biopsy and BAL fluid examination in diagnosis of pulmonary diseases

f) Explain fixation of samples collected for histopathology.

g) How can you calculate MIC using the broth dilution method?

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

Deccan Education Society's

FERGUSSON COLLEGE (Autonomous) Pune-4

Affiliated to Savitribai Phule Pune University

Class: T. Y. B.Sc. Biotechnology(Semester V)

(BTH 3503)

Genetics and Introduction to Genetic Engineering

2019Pattern

[Time: 2 Hours] **[Max. Marks : 50]**

Instructions to the candidates:

1) *Total questions seven and **attempt any five.***
2) *Neat diagrams must be drawn wherever necessary.*
3) *Figures to the right side indicate full marks.*

Q1) **Q1. Attempt any five of the following.** **(2 X 5 =10)** T10

a) Define: Copy number of a plasmid

b) What is a F^+ cell?

c) Define: Transduction

d) What are plaques?

e) Give the role of Restriction Endonucleases.

f) Give two examples of transposable elements present in humans.

g) What is Microinjection?

Q2) **Q1. Attempt any five of the following.** **(3 X 5 =15)** T15

a) Explain the role of plasmids as vectors.

b) Write a note on selection of transformants with the help of an example.

c) Differentiate between generalized and specialized transduction.

d) Diagrammatically show the working of Ac/Ds system in maize.

e) Enlist the reasons for existence of Somaclonal Variations.

f) Explain the action of polynucleotide kinase.

g) What are artificial chromosomes? Give an example.

Q3) **Attempt any five of the following.** **(5 X 5 =25)** T25

a) Enlist the types of plasmids based on their function and describe each in brief.

b) Draw a neat labelled diagram to explain the process of conjugation.

c) What are Terminal Transferases? Explain their role.

d) Explain the mechanism of Sporophytic self-incompatibility with the help of a neat labelled diagram.

e) Elaborate the concept of cytoplasmic inheritance with the help of an example.

f) Write a note on Polymerases.

g) Describe the Ty elements in yeasts.

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14/11/2022 o/c

Deccan Education Society's

Fergusson College (Autonomous), Pune-4

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

Subject: Biotechnology

(BTH3601) Large Scale Manufacturing Processes- II (2019 pattern)

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

Instruction to candidates:

i) **All questions are compulsory**
ii) **Figures to the right indicate full marks**
iii) **Use of statistical tables and scientific calculators is allowed.**

Q.1 **Attempt any <u>five</u> questions:** **[2 x 5 =10]**

a) What are on line sensors? How can you measure the speed of agitation?
b) Define Oxygen uptake rate and oxygen transfer rate
c) Why spray drying is advantageous for certain products?
d) Give the importance of filter aids during filtration.
e) Define low value high volume products. Give two examples of such products.
f) What do you understand by amortization?
g) Define SOP. Implementation of SOP's is a responsibility of which department in Industry?

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

a) Discuss the role of the following equipment in process control:
   i. Load cells
   ii. Thermistors
b) 'Ion exchange chromatography is effectively used for recovery of certain products. Justify by giving example.
c) Enlist the different types of by-products obtained during Ethanol production and give their uses.
d) Give an equation corelating Oxygen transfer rate with KLa of a fermenter. What is the significance of KLa?
e) Write a short note on Scale up.
f) Draw a well labelled diagram of rotary vacuum filter.
g) Explain how homogenizers can be used in large scale recovery of enzymes.

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

a) Describe the large-scale production process of Polio vaccine.

b) Explain the following terms:
   i. Non-Newtonian fluids
   ii. Bingham Rheology
   iii. Pseudoplastic Rheology

c) Explain the role of liquid - liquid extraction in recovery of a vitamin. What do you understand by counter -current extraction?

d) What are the roles and responsibilities of Quality control department of a pharma/Biotech industry? How and why is the Ames test performed?

e) What is the importance of dissolved oxygen measurement during fermentation? Give any one method of measuring dissolved oxygen?

f) What are Active dry yeasts? Give the flow diagram of Baker's yeast production

g) Give the flow diagram of Penicillin production and explain the recovery process of penicillin.

15/11/2022

Deccan Education Society's
Fergusson College (Autonomous), Pune-4

T.Y.B.Sc. (Semester VI)
Subject: Plant Tissue Culture (BTH3602)
(2019 pattern)

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

Instruction to candidates:

i) **All questions are compulsory**
ii) **Figures to the right indicate full marks**
iii) **Use of statistical tables and scientific calculators is allowed.**

Q.1 **Attempt any five questions:** **[2 x 5 =10]**

a) "Plant cells respond better to tissue culture conditions than animal cells" Express your view.
b) Define "Callus"
c) Enlist the equipment required in media preparation room.
d) What is dedifferentiation and redifferentiation?
e) Write the effect of starvation on cell suspension culture.
f) What is the meaning of "Wound Callus"
g) "Asymmetric hybrid is not a complete hybrid" explain.

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

a) Write differences between organogenesis & somatic embryogenesis
b) Write about meristem culture.
c) "PGRs play important role in obtaining responses under PTC conditions". Justify
d) Write role of any three chemical reagents used in chemical method of sterilization
e) Give importance of root tip culture.
f) Justify: Continuous culture is better than batch culture for industrial purpose.
g) Write advantages of micropropagation technique over conventional methods

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

a) Write about sterilization techniques used in plant tissue culture
b) Compare embryo and endosperm culture
c) Explain the different methods of protoplast fusion
d) Draw neat & labelled diagram of PTC laboratory organization
e) Write note on Somaclonal variations.
f) Discuss the factors that influence the anther culture.
g) Explain the stages of micropropagation.

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2.30 pm

O/e

Total No of Questions: [3] **Seat No.:**

Deccan Education Society's

FERGUSSON COLLEGE (Autonomous) Pune-4

Affiliated to Savitribai Phule Pune University

Class: T.Y.B.Sc. Biotechnology (Semester VI)

Paper Title: Techniques and Applications of Genetic Engineering

Paper Code: BTH 3603

2019Pattern (2 Credits)

[Time: 2.5Hours] **[Max. Marks : 50]**

Instructions to the candidates:

1) *Total questions seven and **attempt any five.***
2) *Neat diagrams must be drawn wherever necessary.*
3) *Figures to the right side indicate full marks.*

Q1) **Q1. Attempt any five of the following.** **(2 X 5 =10)** T10

a) What is PCR?

b) Draw a neat labelled diagram of a plasmid map.

c) What are molecular beacons?

d) Give the application of Cas 9 in genome editing.

e) What are pET vectors?

f) What is TA cloning?

g) Give the need of blocking agents in nucleic acid hybridization protocols.

Q2) **Q1. Attempt any five of the following.** **(3 X 5 =15)** T15

a) Give the principle behind restriction mapping.

b) Give the use of IPTG and X-gal in screening of clones.

c) What is gene therapy? Explain with the help of an example.

d) Explain: site directed mutagenesis with the help of an example.

e) What is colony hybridization? Explain with the help of a neat labelled diagram.

f) What is the strategy used to purify the cloned gene product?

g) Give the similarities and differences between a genomic library and a cDNA library.

Q3) **Attempt any five of the following.** **(5 X 5 =25)** T25

a) Elaborate the steps in construction of a genomic library.

b) Give the importance of Shine Dalgarno sequence and Kozak sequence.

c) Draw a neat labeled diagram to explain Maxam-Gilbert sequencing of DNA.

d) How are recombinant vaccines prepared? Explain with the help of an example.

e) Explain the principle and application of Southern Blotting.

f) Give the applications of Recombinant DNA technology in healthcare.

g) Explain the theory behind alpha complementation and give its application.

17/11/2022 O/C

Deccan Education Society's

Fergusson College (Autonomous), Pune-4

T. Y. B Sc. (Semester VI)

Subject: Animal Tissue Culture

(BTH 3604) (2019 pattern)

Time: 2:30 Hrs **Max. Marks: 50**

Instruction to candidates:

i) **All questions are compulsory**

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

iii) **Use of statistical tables and scientific calculators is allowed.**

Q1) **Attempt any five of the following.** **(2 X 5 =10)**

a) Give two suitable examples for balanced salt solutions used in ATC.

b) What are attachment factors? Give suitable examples.

c) Explain the advantages of serum-free media

d) Give examples of two antibiotics used in ATC with their mode of action.

e) Why is liquid nitrogen used for cryopreservation of cell lines?

f) Name the different plate formats used for mammalian cell culturing?

g) Mention two cell repositories which provide and authenticate cell lines

Q2) **Attempt any five of the following.** **(3 X 5 =15)**

a) What are the advantages of using serum in the media for ATC?

b) What are finite and infinite cell lines? Give suitable examples.

c) Describe the secondary cell line growth conditions

d) How are bicarbonate ions and carbon dioxide responsible for the buffering capacity in the media?

e) Explain organ culture with examples.

f) Mention the different applications of ATC

g) What are the various precautions to be taken before working in the ATC laboratory?

Q3) **Attempt any five of the following.** **(5 X 5 =25)**

a) How are cell lines characterized?

b) Give the detailed procedure for cell line preservation by liquid nitrogen

c) Describe the different methods of establishing primary cell culture with special reference to lymphocyte culture.

d) Explain how insect cell lines are routinely cultured?

e) Explain in detail how cell counting is carried out using a hemocytometer

f) What are the advantages and disadvantages of *in vivo* over *in vitro* cell culturing?

g) Give a detailed over-view of an ATC laboratory with a suitable diagram.

Deccan Education Society's
FERGUSSON COLLEGE (Autonomous) Pune-4
Affiliated to Savitribai Phule Pune University

T.Y. B.Sc. (Semester: VI)
Subject: Biotechnology
Paper Title: Bioanalytical Techniques II
Paper Code: BTH 3605
2019 Pattern (2 Credits)

[Time: 2.5 Hours] **[Max. Marks 50]**

Instruction to candidates:

i) **All questions are compulsory**
ii) **Figures to the right indicate full marks**
iii) **Use of statistical tables and scientific calculators is allowed.**

Q.1 **Attempt any five questions:** **[2 x 5 =10]**

a) Enlist the components of a mass spectrometer.
b) What is fast atom bombardment?
c) Which spectroscopic technique is used for studying free radicals? What is TEMPOL?
d) Define 'biosensor'. Enlist ANY TWO bio recognition elements used in it.
e) Give ANY TWO examples of protein databases.
f) Which two components of a mass spectrometer are always kept in a vacuum? Why?
g) Enlist ANY TWO applications of Bio nanotechnology.

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

a) Why DPPH is used as standard in ESR?
b) What properties of TMS make it a standard in NMR?
c) What types of detectors are used in MS? Show schematically working of ANY ONE.
d) Compare NMR and EPR.
e) Give applications of biosensors.
f) Show schematically 'electron impact ionization'.
g) Enlist various mass analyzers. Discuss working of ANY ONE of them.

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

a) Explain how a Glucometer works.
b) Give importance of constructing phylogenetic trees. Explain ANY ONE method of constructing such trees.
c) Explain the application of bio-nanotechnology in pharmaceuticals.
d) How IR spectroscopy is used for determination of functional groups?
e) Discuss MS applications in protein studies.
f) Explain low resolution and high resolution NMR spectrum of ethanol.
g) Give significance of multiple sequence alignment. Explain ANY ONE method in detail.

02/12/2022

2:30 pm

Deccan Education Society's

FERGUSSON COLLEGE (Autonomous) Pune-4

Affiliated to Savitribai Phule Pune University

F.Y. B.Sc. (Semester: I)

Paper Title: Plant Sciences I **Subject: Biotechnology**

[Time: 2.5 Hours] **2019 Pattern (2 Credits)** **Paper Code: BTH 1105**

Instructions to the candidates: **[Max. Marks : 50]**

1) All questions are compulsory.
2) Neat diagrams must be drawn wherever necessary.
3) Figures to the right side indicate full marks.

Q1) **Answer the following questions (Any Five).** **10 M**

a) Draw neat labelled diagram of chloroplast.
b) Explain the concept of species.
c) What is cambium?
d) What are gymnosperms? Give 4 examples.
e) Describe stone cells with example.
f) State the classification of Aspergillus.

Q2) **Answer the following questions (Any Four).** **12 M**

a) Write note on lichens.
b) Describe the structure of plasmodesmata.
c) Write functions and distribution of stomata with diagram.
d) What is secondary growth in plants?
e) Enlist economic importance of fungi.

Q3) **Answer the following questions.**

a) Describe the structure of SAM with diagram. **9 M**
b) Explain general characters of Gymnosperms. 5M

OR

a) Write differences between dicot and monocot stems. 4M
b) Explain gametophyte and sexual reproduction in Riccia. 5M

Q4) **Answer the following questions (Any Two).**

a) Describe the structure of cycas ovule. 4M
b) What are blue green algae? Describe with one example. **6 M**
c) Explain the term heart wood and sap wood.

Q5) **Answer the following questions**

a) Give account on life cycle of spirogyra. **8 M**
b) Write note on secretory tissues in plants 4M

OR

4M

Q6)

a) Explain Ground tissue system in plants. 4M
b) Write difference between bryophytes and pteridophytes. 4M

Answer the following questions (Any One) **5 M**

a) Explain Bantham and Hooker's System of classification.
b) Describe the life cycle of fern showing alteration of generations.

02/12/2022
2:30pm

Deccan Education Society's

FERGUSSON COLLEGE (Autonomous) Pune-4

Affiliated to Savitribai Phule Pune University

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

Paper Title: Bioanalytical Techniques I

Paper Code: BTH-3505

2019Pattern (2 Credits)

[Time: 2.5 Hours] **[Max. Marks : 50]**

Instructions to the candidates:

1) *Total questions seven and **attempt any five.***
2) *Neat diagrams must be drawn wherever necessary.*
3) *Figures to the right side indicate full marks.*

Q1) **Q1. Attempt any five of the following.** **(2 X 5 =10)** T10

a) Differentiate between isopycnic and density gradient centrifugation. Mention their applications.

b) Enlist any two derivatization methods used for sample treatment in GC.

c) Differentiate between light and electron microscopy in brief.

d) Enlist ANY FOUR factors which affect electrophoretic mobility of a sample.

e) Define pI. How is the pH gradient created in IEF?

f) Mention any two chemicals used in density gradient centrifugation.

g) What is resolution in chromatography? How does an RS value of 1.0 and 1.5 affect the resolution of the column?

Q2) **Q1. Attempt any five of the following.** **(3 X 5 =15)** T15

a) What is the applied centrifugal field at a point equivalent to 5 cm from the center of rotation and an angular velocity of 3000 rad s^{-1}?

b) Mention the applications of Pulsed-field gel electrophoresis.

c) Explain the principle in phase contrast microscopy and any TWO applications.

d) How is 2D-DIGE used to detect/study neuronal diseases?

e) Enlist three applications of gas chromatography.

f) Explain working of a CD spectrometer.

g) Mention the principle and advantages of capillary electrophoresis.

Q3) **Attempt any five of the following.** **(5 X 5 =25)** T25

a) Explain the differences between an analytical and preparative ultracentrifuge. Mention any TWO applications of these techniques.

b) Depict Beer Lambert's law. A 3.15×10^{-6} solution of a colored complex exhibited an absorbance of 0. 267 at 655 nm in a 1.0-cm cuvette. The blank solution had an absorbance of 0.019. Calculate the molar absorption co-efficient of the colored complex.

c) Enlist the different detectors used in chromatography and explain any ONE in detail.

d) What are the advantages and TWO applications of HPLC?

e) Mention the role of the following components in electrophoresis
1. APS
2. TEMED
3. Bromophenol blue
4. Glycerol
5. Bis-acrylamide

f) Explain working and applications of TEM or SEM.

g) A fixed-angle rotor exhibits a minimum radius, r_{min}, at the top of the centrifuge tube of 3.5 cm, and a maximum radius, r_{max}, at the bottom of the tube of 7.0 cm. If the rotor is operated at a speed of 20 000 r.p.m., what is the relative centrifugal field, RCF, at the top, middle and bottom of the centrifuge tube?

06 DEC 2022

Deccan Education Society's
Fergusson College (Autonomous), Pune-4
T.Y.B. Sc. (Semester V)
Department of Biotechnology
Subject: Biosafety and Bioethics (BTH3513)
(2019 pattern)

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

Instruction to candidates:

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

Q.1 **Attempt any five questions:** **[2 x 5 =10]**

a) What are Modern Reproductive Techniques?

b) Define Clinical Trial.

c) Define New Drug

d) Define Biosafety and Bio security

e) What are the common points in Biosafety and Bio security?

f) What are the types of Biosafety Laboratories and their requirements

g) Describe the Biohazard classification

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

a) Define Surrogacy, Gestational carrier and its issues.

b) What are the principles of Committee for the Purpose of Control and Supervision of Experiments on Animals (CPCSEA) under Section 15(1) of Chapter IV

c) Which law governs the Clinical trials in India?

d) Explain in brief Serious Adverse Events and Compensation rules

e) State in brief Biohazard classification

f) What are Biosafety Regulations?

g) What are the types of Biosafety cabinets

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

a) What are the functions of Committee for the Purpose of Control and Supervision of Experiments on Animals (CPCSEA) under Section 15(1) of Chapter IV

b) Explain in brief the requirements of Clinical Trials

c) Mention the Biohazard Risk Groups

d) Explain Biomedical Waste Segregation Chart

e) Explain in brief Primary and secondary barrier systems and explain the Biosafety levels in brief.

f) What are the classes of Biosafety cabinets

g) What are Good laboratory Practices?

06 DEC 2022

Deccan Education Society's
FERGUSSON COLLEGE (Autonomous) Pune-4
Affiliated to Savitribai Phule Pune University
B.Sc.–I (Semester : I)
Subject: Biotechnology

Paper Title: Ecology **Paper Code:BTH1108**

2019 Pattern (2 Credits)

[Time: 2.5Hours] **[Max. Marks : 50]**

Instructions to the candidates:

1) All questions are compulsory.
2) Neat diagrams must be drawn wherever necessary.
3) Figures to the right side indicate full marks.

Q1) **Answer the following questions (Any Five).** 10M

a) Mention any 4 biomes found in the northern Hemisphere
b) Define altruism.
c) What are the main features of savanna ecosystems?
d) What is the Allen's Rule? Give one example.
e) Mention any one pair of predator-prey species from Fergusson college campus.
f) What are the adaptations of plants against predation?

Q2) **Answer the following questions (Any Four).** 12M

a) Explain competition in plants and animals with examples.
b) Mention any 3 deserts found in the world.
c) What is meant by community ecology?
d) Define endemism, give 2 examples.
e) Describe any 3 ways of communication in animals.

Q3) **Answer the following questions** 9 M

a) How are the habitat requirements of amphibians different from that of birds in rainforests? Explain in detail 5M
b) Write a note on food web. Explain a food web from grassland/savanna ecosystems 4M

OR

a) Explain the water cycle with a neatly labelled diagram 5M
b) What factors affect the populations of any wild species? 4M

Q4) **Answer the following questions (Any Two).** 6M

a) Write a note on the evolution of ecological thought.
b) What are the abiotic factors limiting the distribution and abundance of penguins?
c) What are the functions of aquatic ecosystems?

Q5) **Answer the following questions** 8 M

a) Write a note on associative learning in animals 4M

b) What is meant by resource partitioning, explain with examples. 4M

OR

a) Explain the phosphorus cycle in detail. 4M

b) Write a note on ecological niches, give examples of each. 4M

Q6) **Answer the following questions (Any One)** 5M

a) Write in detail the factors limiting the distribution of organisms. Give examples for each factor.

b) Distinguish between r-selected and k-selected species, give examples of each.

03/12/2022
O/C
2:30pm

Deccan Education Society's
FERGUSSON COLLEGE (Autonomous) Pune-4
Affiliated to SavitribaiPhule Pune University
F.Y.BSc (Semester : 1)
Subject: Biotechnology
Paper Title: Introduction to Microbial World
Paper Code: BTH 1106
2019 Pattern (2 Credits)

[Time: 2.5 Hours] **[Max. Marks : 50]**

Instructions to the candidates:

1) All questions are compulsory.
2) Neat diagrams must be drawn wherever necessary.
3) Figures to the right side indicate full marks.

Q1) **Answer the following questions (Any Five).** **10 M**

a) Give two examples of Viruses
b) What are polybetahyroxybutyrate granules?
c) Explain the term Monotrichous flagella.
d) Enlist two features of protozoa.
e) State the function of diaphragm.
f) What is the pre golden era of Microbiology?

Q2) **Answer the following questions (Any Four).** **12 M**

a) Write a short note on Abiogenesis vs Biogenesis
b) Discuss the principle of Spore staining.
c) What are carboxysomes? Where are they located in bacteria.
d) Explain the structure of cell wall of Archaeabacteria.
e) Why is magnification so important in Compound Microscope.

Q3) **Answer the following questions** **9 M**

a) Write a short note on Glycocalyx. 5M
b) Why do we use basic stain in Positive staining 4M

OR

c) Discuss about bacterial flagella. 5M
d) Why do we use fixatives in staining 4M

Q4) **Answer the following questions (Any Two).** **6 M**

a) Explain in detail Gram staining
b) Write in brief characteristics of Algae
c) State the applications of fungi

Q5) **Answer the following questions** **8 M**

a) How do flagellated bacteria run and tumble 4M
b) Write a short note on different parts of Compound Microscope and their 4M

functions .

OR

c) What is acid fastness of bacteria? Explain with the help of staining procedure 4M

d) How is classification of bacteria carried out 4M

Q6) **Answer the following questions (Any One)** **5 M**

a) Describe different stages in the process of sporogenesis in bacteria.

b) Explain in detail about the journey of Louis Pasteur in becoming the Father of Microbiology

05/12/2021
2:30pm

Deccan Education Society's
Fergusson College (Autonomous), Pune-4
T.Y.B.Sc. (Semester V)
Subject:
Biotechnological Skills in Agriculture Industry (BTH3511)
(2019pattern)

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

Instruction to candidates:

i) **All questions are compulsory**
ii) **Figures to the right indicate full marks**
iii) **Use of statistical tables and scientific calculators is allowed.**

Q.1 **Attempt any <u>five</u> questions:** **[2 x 5 =10]**

a) What is leghemoglobin?
b) What are the genes responsible for nodulation?
c) What are different chemical fertilizers?
d) What is Trichoderma?
e) Enlist four examples of phosphate solubilizing biofertilizers.
f) What is *Agaricusbisporus*? Write its classification.
g) What is VAM?

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

a) Discuss the effects of chemical fertilizers on soil.
b) Explain the role of phosphorus and nitrogen in plant growth.
c) Draw diagram of mushroom and mention general characters of mushroom.
d) Explain nitrification and denitrification.
e) Write note on: Need for biofertilizers.
f) What are the different carriers used to prepare biofertilizers.
g) Comment on "Fungi as a biofertilizers"

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

a) What are the fungal diseases of mushroom?
b) Write note on biofertilizers and compare with chemical fertilizers.
c) What are different types of biofertilizers?Explain one in detail.
d) Explain the mechanism of phosphate solubilization.
e) Describe Oyster mushroom cultivation in detail.
f) Comment on infection and nodule organogenesis by *Rhizobium*.
g) Explain the steps in production of *Azotobacter* biofertilizer.

05/12/2022

2:30pm

Deccan Education Society's

FERGUSSON COLLEGE (Autonomous) Pune-4

Affiliated to Savitribai Phule Pune University

B.Sc.–I (Semester : I)

Subject: Biotechnology

Paper Title: Quantitative Methods in Biology I

Paper Code:BTH1107

2019 Pattern (2 Credits)

[Time: 2.5 Hours] **[Max. Marks : 50]**

Instructions to the candidates:

1) All questions are compulsory.
2) Neat diagrams must be drawn wherever necessary.
3) Figures to the right side indicate full marks.

Q1) **Answer the following questions (Any Five).** 10 M

a) Write a note on fourth generation of computers.
b) Distinguish between boot sector and program viruses.
c) What is Unix operating system?
d) What is a population and sample in terms of statistics?
e) Solve: (-5 - 4i)(4 + i)
f) Using the Atomic masses K:38, C:12, O: 16, calculate the molecular mass of K_2CO_3

Q2) **Answer the following questions (Any Four).** 12 M

a) What are Personal Computers? Give some examples of it.
b) Write a note on the history of computers.
c) What is assembly language?
d) State the reasons why categorical variables are different from continuous variables? Give examples.
e) Provide three examples each of data that is suitably represented by box plots and by bar plots.

Q3) **Answer the following questions** 9 M

a) What is software? Explain the application software's and system software's in detail. 5M
b) Write a note on antivirus. State its role in protecting the computer system. 4M

OR

a) Imagine that for your project, you are asked to collect data on the relationship between plant height and number of flowers per plant. You decide to measure this relationship for X such plants. For this project, you have chosen a hill in Pune as your study site. On going there, you realize that the study site within this hill has a slope and a small rivulet flowing at its base. You fear that the slope and water availability would interfere in your main goal--to determine how plant height affects the number of flowers. This plant you are studying happens to be found only on this hill so 5M

you cannot change your study area. How will you then avoid the interfering factor of slope when you design the project?

b) Give examples of the use of statistics in biology. 4M

Q4) **Answer the following questions (Any Two).** 6 M

a) What is multithreading?

b) What is the Central Limit Theorem and how is that useful in analysing data ?

c) What do you mean by bimodal data? give an example and draw a graph

Q5) **Answer the following questions** 8 M

a) Define computer viruses? Who write the computer viruses and what is the purpose of it. 4M

b) Write a note on Primary memory and Cache Memory of the computer. 4M

OR

a) Out of 500 students in a school, 295 play cricket only, 20 play football only, 180 play volleyball only and 5 play no games. If one student is chosen at random, find the probability that 4M

(i) s/he plays volleyball

(ii) s/he plays either cricket or volleyball

(iii) s/he plays neither football nor volleyball.

b) Represent the data by a pie chart- 4M

In a National park there are 1000 species as per the following table given below:

Mammals	Birds	Reptiles	Amphibians	Insects
100	290	75	35	500

Q6) **Answer the following questions (Any One)** **5M**

a) Draw neat-labelled diagram of the organization of computers. Explain each component of it in detail.

b) Imagine that you have finished collecting data for bird diversity in Fergusson College campus recently (Fun fact: Fergusson College campus has 137 bird species reported till date!). You have spread out data collection at three places on campus: IMDR, Third gate, and the hill. Numbers of one set of observations in terms of number of species observes **each month** (Jan- Dec) for each of these locations looks like:

IMDR: 11, 12, 15, 12, 13, 13, 13, 15, 18, 15, 11, 14
Main building: 10, 11, 11, 12, 5, 7, 15, 8, 9, 8, 14, 10
Hill: 17, 18, 12, 13, 17, 16, 14, 11, 11, 10, 23, 38

Based on this data, answer the following:
1) Calculate the mean and mode for all three sites separately (3 marks)
2) What pattern do you see in the mean bird species number across three locations? Describe in words (2 marks)

11/12/22

Deccan Education Society's

FERGUSSON COLLEGE (Autonomous) Pune-4

Affiliated to Savitribai Phule Pune University

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

Subject: Biotechnology

(BTH 3504) Applications in Microbial and Medical Biotechnology (2019 pattern)

[Time: 2.5 Hours] **[Max. Marks : 50]**

Instruction to candidates:

1) **All questions are compulsory**
2) **Figures to the right indicate full marks**

Q1) **Attempt any five of the following.** **(2 X 5 =10)** T10

a) Define biopesticides

b) What are biochips

c) Explain the use of luciferase in bioluminescence

d) Mention the significance of carrier material used in Biofertilisers

e) Explain the term probiotics

f) How can you apply biotechnology in different spheres of life sciences

g) What is microbial leaching

Q2) **Attempt any five of the following.** **(3 X 5 =15)** T15

a) How will you prepare Pullulans?

b) Differentiate between Insitu and Exsitu MEOR

c) Justify " Genetically engineered *Vibrio cholerae* is a good candidate to serve as attenuated vaccine"

d) Discuss in detail about Biopolymers

e) Write a short note on Acoustic wave biosensors

f) What are personalized medicines?

g) Explain in detail about prebiotics

Q3) **Attempt any five of the following.** **(5 X 5 =25)**

a) Diagrammatically represent Subunit Vaccine

b) Discuss different methodology used in bioleaching of metals

c) Elaborate on Monoclonal Antibodies as therapeutic agents

d) Describe about Ex-Vivo Gene therapy

e) What are biosurfactants? Explain the physiological role of biosurfactant?

f) Discuss in detail about human replacement protein wrt growth hormone

g) Explain different methods used for application of biofertilizers