

Syllabus for
B. Sc. (Basic / Hons.) Programme in
Biotechnology
III and IV Semester Syllabus

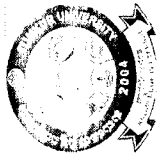
Under

NATIONAL EDUCATION POLICY -2020
NEP-2020

Submitted to
Tumkur University

by

Board of Studies in Biotechnology (UG)
Tumkur University
2022



Course outline for Bachelor of Science (B. Sc., Basic/ Honors) in Biotechnology SEMESTER-III

Sl. No.	Course	Paper	Title of the Paper	No of credits	Total contact hours	Duration of the Exam (Hr)	Marks		
							Formative/ Continuous assessment	End semester Examination	Total
1	Theory: Discipline Specific Core	BTDSC03	Biomolecules	4	56	2	40%	60%	100%
2	Practical: Discipline Specific Core	BTDSC03P	Biomolecules Practical-1	2	56	3	50%	50%	100%

Course outline for Bachelor of Science (B. Sc., Basic/ Honors) in Biotechnology SEMESTER-IV

Sl. No.	Course	Paper	Title of the Paper	No. of credits	Total contact hours	Duration of the Exam (Hr)	Marks		
							Formative/ Continuous assessment	End semester Examination	Total
1	Theory: Discipline Specific Core	BTDSC04	Molecular Biology	4	56	2	40%	60%	100%
2	Practical: Discipline Specific Core	BTDSC04P	Molecular Biology Practical	2	56	3	50%	50%	100%

Course outline of Open Elective courses for Bachelor of Science (B. Sc., Basic/ Honors) in Biotechnology II Year

Sl. No.	Course	Paper	Title of the Paper	No. of credits	Total contact hours	Duration of the Exam (Hr)	Marks		
							Formative/ Continuous assessment	End semester Examination	Total
1	Theory: Open Elective	BTOEC05	Nutrition and Health	3	42	2	40%	60%	100%
2	Theory: Open Elective	BTOEC06	Intellectual Property Rights	3	42	2	40%	60%	100%

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Syllabus Theory and Practical

B.Sc., (Basic/ Honors) Biotechnology, Semester-III

Sl. No.	Course	Paper	Title of the Paper	No. of credits	Total contact hours	Duration of the Exam (Hr)	Marks		
							Formative/ Continuous assessment	End semester Examination	Total
	Theory: Discipline Specific Core	BTDSC03	Biomolecules (Theory)	4	56	2	40%	60%	100%
	Practical: Discipline Specific Core	BTDSC03P	Biomolecules (Practical)	2	56	3	50%	50%	100%

Course code: **BTDSC03**

Course Title: **BIOMOLECULES**

(Theory)

COURSE TITLE	BIOMOLECULES
Course code	BTDSC03
Course credits	04
Total contact hours	56
Duration of ESA (Hour)	02
Formative assessment marks	40
Summative assessment marks	60

Course Outcomes (COs):

The course in 'Biomolecules' provides a basic understanding of the heterogeneous groups of chemical found in the living organisms and also about the chemical compounds that build the living organisms. The course provides learning about markers for diseases diagnosis, and also a better understanding about, how, the coordinated interplay of enzymes, cofactors and hormones help carryout intricate complex metabolic processes. The topics in nucleic acid-, protein-structure and enzyme inhibition inculcate critical thinking process towards inventing/ developing biomaterials and pharmaceutical drugs.

UNIT	Contents	Contact Hours
I	<p>a) Carbohydrates: Introduction, sources and classification of carbohydrates. Structure, function and properties of carbohydrates. Monosaccharides – Isomerism and ring structure, Sugar derivatives – amino sugars and ascorbic acid. Oligosaccharides – Sucrose and Fructose. Polysaccharides-Classification of homo and heteropolysaccharides. Homopolysaccharides - storage polysaccharides (starch and glycogen- structure, reaction, properties), structural polysaccharides (cellulose and chitin-structure, properties). Heteropolysaccharides - glycoproteins and proteoglycans (Brief study). Metabolism: Glycolysis and gluconeogenesis. Kreb's cycle, oxidative phosphorylation.</p>	14

	<p>b) Amino Acids, Peptides and Proteins Introduction, classification and structures of amino acids. Concept of Zwitterion, isoelectric point, pK values. Essential and nonessential amino acids. Peptide bond and peptide. Structural and Functional classification of proteins. Structural organization of proteins [primary, secondary (α), tertiary and quaternary]. Fibrous and globular proteins. Denaturation and renaturation of proteins. General aspects of amino acid metabolism: Transamination, deamination, decarboxylation and urea cycle.</p>	
II	<p>a) Lipids Classification and function of lipids, properties (saponification value, acid value, iodine number, rancidity). Hydrogenation of fats and oils. Saturated and unsaturated fatty acids. General structure and biological functions of -phospholipids, sphingolipids, glycolipids, lipoproteins, prostaglandins, cholesterol, ergosterol. Metabolism: Beta oxidation of fatty acids. Biosynthesis of cholesterol.</p> <p>b) Enzymes Introduction, nomenclature and classification of enzymes. Enzyme activity and specific activity. Factors influencing enzyme activity. Enzyme kinetics. Activation energy and transition state theory. metalloenzymes, Coenzymes and their functions (one reaction involving FMN, FAD, NAD). Enzyme inhibition Irreversible and reversible (competitive, non-competitive and uncompetitive inhibition with an example each). Zymogens (trypsinogen, chymotrypsinogen and pepsinogen). Isozymes (LDH, Creatine kinase, Alkaline phosphatase and their clinical significance).</p>	14
III	<p>a) Vitamins Water and fat soluble vitamins. Dietary source and biological role of vitamins. Deficiency manifestation of vitamin A, B, C, D, E and K</p> <p>b) Nucleic acids Structures of purines and pyrimidines, nucleosides, nucleotides in DNA de-novo and salvage pathway of purine and pyrimidine synthesis.</p> <p>c) Hormones Classification of hormones based on chemical nature and mechanism of action. Chemical structure and functions of the following hormones: Glucagon, Cortisone, Epinephrine, Testosterone and Estradiol.</p>	14
IV	<p>Bioanalytical tools</p> <p>a) Chromatography : Principle, procedure and applications of paper, thin-layer, adsorption and ion-exchange chromatography. Gel-filtration chromatography, affinity chromatography, gas liquid chromatography and high performance liquid chromatography.</p> <p>b) Electrophoresis: Principle, procedure and applications of paper electrophoresis, PAGE, SDS-PAGE & agarose gel electrophoresis. Isoelectric focusing.</p> <p>c) Spectroscopy: Construction, mechanism and applications of UV-Vis spectrophotometry, mass spectroscopy, atomic absorption spectroscopy.</p>	14

References

- 1) Lehninger Principles of Biochemistry- Nelson DL and Cox MM, WH Freeman Pub, 5th Ed, 2008
- 2) Biochemistry- Berg JM and Stryer L, WH Freeman Pub, 5th Ed, 2002
- 3) Enzyme Kinetics and Mechanism-Cook PF and Cleland WW, Garland Science Pub, 1st Ed, 2007
- 4) Biochemistry 6th Edition by U. Sathyanarayana, Elsevier India (2008)
- 5) Essentials of Biochemistry-Fromm HJ and Hargrove M- Springer, 2012
- 6) Fundamentals of Biochemistry- J.L. Jain, Sujay Jain and Nitin Jain, S Chand Publishers, 2007
- 7) Harper's illustrated Biochemistry, 26th Ed, McGraw-Hill companies, 2003
- 8) Text book of Biochemistry- S.P. Singh, CBS Publishers, 5th Ed, 2012

Summative Assessment:	60%		
Formative Assessment :	40%		
Activity	C1	C2	Total
Internal assessment 2 tests	10	10	20
Assignment/ visits (Industry, Institutions and Laboratories)	5	5	10
Seminar/ presentation/ Group discussions	5	5	10
Total	20	20	40

Course code: **BTDC03P**;

Course Title: **BIOMOLECULES**

(PRACTICAL)

COURSE TITLE	BIOMOLECULES – PRACTICAL
Course code	BTDC03P
Course credits	02
Total contact hours	56 (4 h/ week)
Duration of ESA (Hour)	3
Formative assessment marks	25
Summative assessment marks	25

Experiments

- 1) Introduction to basic instruments (Principle, standard operating procedure) with demonstration.
- 2) Definitions and calculations: Molarity, Molality, Normality, Mass percent % (w/w), Percent by volume (% v/v), parts per million (ppm), parts per billion (ppb), Dilution of concentrated solutions.
- 3) Standard solutions, stock solution, solution of acids. Reagent bottle label reading and precautions.
- 4) Preparation of standard buffers- Acetate, Phosphate, Tris and determination of pH of solution using pH meter.
- 5) Estimation of maltose by DNS method
- 6) Determination of α -amylase activity by DNS method
- 7) Estimation of proteins by Bradford method or Lowry's method
- 8) Extraction of protein from soaked/sprouted green gram by salting out method
- 9) Estimation of amino acid by Ninhydrin method
- 10) Separation of amino acids by thin layer chromatography
- 11) Separation of plant pigments by circular paper chromatography
- 12) Native PAGE
- 13) Determination of iodine number of lipids

References

1. An Introduction to Practical Biochemistry, 3rd Edition, (2001), David Plummer; Tata McGraw Hill Edu. Pvt. Ltd. New Delhi, India
2. Biochemical Methods, 1st Edition, (1995), S. Sadashivam, A. Manickam; New Age International Publishers, India
3. Introductory Practical biochemistry, S. K. Sawhney & Randhir Singh (Eds) Narosa Publishing. House, New Delhi, ISBN 81-7319-302-9
4. Experimental Biochemistry: A Student Companion, Beedu Sasidhar Rao & Vijay Deshpande (Ed). I.K International Pvt. LTD, New Delhi. ISBN 81-88237-41-8
5. Standard Methods of Biochemical Analysis, S. K. Thimmaiah (Ed), Kalyani Publishers, Ludhiana ISBN 81-7663-067

Formative (Practical) assessment

Assessment			Total Marks
Formative assessment	Weightage in marks	Summative assessment Practical Exam	
Record	5		50
Test	10		
Attendance	5	25	
Performance	5		
Total	25	25	

Syllabus Theory and Practical

B.Sc., (Basic/ Honors) Biotechnology, Semester-IV

Sl. No.	Course	Paper	Title of the Paper	No. of Total credits contact		Duration of the Exam (Hr)	Marks	
					hours		Formative Continuous assessment	End semester Examination
1	Theory: Discipline Specific Core	BTDSC04	Molecular Biology (Theory)	4	56	2	40%	60%
2	Practical: Discipline Specific Core	BTDSC04P	Molecular Biology (Practical)	2	56	3	50%	50%

Course code: BTDSC04

Course Title: MOLECULAR BIOLOGY

(Theory)

COURSE TITLE	MOLECULAR BIOLOGY
Course code	BTDSC04
Course credits	04
Total contact hours	56
Duration of ESA (Hour)	02
Formative assessment marks	40
Summative assessment marks	60

Course Outcomes (COs):

The course in 'Molecular biology' provides information towards learning the complex mechanisms of 'Central Dogma of molecular biology'. The student will be able to solve the complex mystery of DNA replication, repair and transcription by simply understanding the structure of DNA and the intriguing enzymatic reactions mechanisms that bring about DNA replication, repair and transcription. The course also provides an understanding of translating the information contained in the gene into protein in a precisely regulated manner. The course in Molecular biology is the foundation for genetic engineering and biotechnology.

JNTU	Contents	Contact Hours
I	Nucleic Acids and Molecular basis of life An introduction RNA and experimental proof of DNA as genetic material and types of DNA. Structure and functions of DNA and RNA, Watson and Crick model of DNA and other forms of DNA (A and Z) functions of DNA and RNA including ribozymes.	14
II	DNA Replication and Repair Central dogma of molecular biology. Replication of DNA in prokaryotes and eukaryotes- Enzymes and proteins involved in replication, Theta model, linear and rolling circle model. Polymerases and all enzyme components. The replication complex: Pre-priming proteins, primosome, replisome, unique aspects of eukaryotic chromosome replication, Fidelity of replication DNA damage and Repair mechanism: photo reactivation, excision repair, mismatch repair and SOS repair.	14

Transcription and RNA processing

Transcription in prokaryotes: RNA structure and types, RNA polymerase, role of sigma factor, promoter, Initiation, elongation and termination of RNA biosynthesis.

- III **Transcription in eukaryotes:** Eukaryotic RNA polymerases, transcription factors, promoters, enhancers, mechanism of transcription initiation, promoter clearance and elongation. RNA splicing and processing: processing of pre-mRNA: 5' cap formation, polyadenylation, splicing, rRNA and tRNA splicing. 14

Regulation of gene expression and translation

Genetic code and its characteristics, Wobble hypothesis. Translation- in prokaryotes and eukaryotes- ribosome, enzymes and factors involved in translation. Mechanism of translation- activation of amino acid, aminoacyl-tRNA synthesis, Mechanism- initiation, elongation and termination of polypeptide chain. Fidelity of translation, Inhibitors of translation. Protein folding and modifications, Post translational modifications of proteins.

- IV Gene expression - Regulation of gene expression, Lac operon, Tryptophan operon and Gal operon 14

References

- 1) Lehninger Principles of Biochemistry- Nelson DL and Cox MM, WH Freeman Pub, 5th Ed, 2008
- 2) Biochemistry- Berg JM and Stryer L, WH Freeman Pub, 5th Ed, 2002
- 3) Molecular Biology and Biotechnology- Walker JM and Rapley R, 5th Ed, Royal Society of Chemistry, 2009
- 4) Molecular Biology: Genes to proteins- Tropp B.E., 4th Ed, Jones & Bartlett Publishers, 2012
- 5) Essential of Molecular Biology- Malacinski G.M., Jones & Bartlett Learning, 2005
- 6) Cell and Molecular Biology- Rathogi S.C., 2nd Ed, New Age International, 01-Jan-2006
- 7) Molecular Cell Biology-Lodish H, Berk A, Kaiser CA, Krieger M, Bretscher A., Ploegh H., Amon A Scott M.P., W.H. Freeman Publishers, 2012
- 8) The world of the Cell-Becker, Pearson Education India, 2007
- 9) Human Genetics-Lewis R, Garland Science, 2010

Summative Assessment:	60%		
Formative Assessment :	40%		
Activity	C1	C2	Total
Internal assessment 2 tests	10	10	20
Assignment/ visits (Industry, Institutions and Laboratories)	5	5	10
Seminar/ presentation/ Group discussions	5	5	10
Total	20	20	40

Course code: BTDSC04P;

Course Title: MOLECULAR BIOLOGY

(PRACTICAL)

COURSE TITLE	MOLECULAR BIOLOGY- PRACTICAL
Course code	BTDSC04P
Course credits	02
Total contact hours	56 (4 h/ week)
Duration of ESA (Hour)	3
Formative assessment marks	25
Summative assessment marks	25

Experiments

1. Preparation of models- DNA, DNA-replication, -Transcription. -Translation. *Lac* & *Trp* operon
2. Isolation of DNA and its estimation of DNA by DPA method
3. Isolation of RNA and its estimation of RNA by Orcinol method
4. Column chromatography – gel filtration (Demo)
5. Extraction and partial purification of protein from plant source by Salt precipitation method (Ammonium sulphate precipitation).
6. Extraction and partial purification of protein from animal source by organic solvent method
7. Protein separation by SDS- PAGE Polyacrylamide Gel Electrophoresis (PAGE)
8. Charts on- Conjugation. Transformation and Transduction. DNA replication. Types of RNA

References

1. Walker J.M. and Gingold, E.B. (1983) Molecular Biology & Biotechnology (Indian Edition) Royal Society of Chemistry U.K An
2. Introduction to Practical Biochemistry, 3rd Edition, (2001), David Plummer, Tata McGraw Hill Edu. Pvt. Ltd. New Delhi, India
3. Biochemical Methods, 1st Edition, (1995), S. Sadashivam, A. Manickam; New Age International Publishers, India
4. Introductory Practical biochemistry, S. K. Sawhney & Randhir Singh (Eds) Narosa Publishing House, New Delhi, ISBN 81-7319-302-9
5. Sambrook et al (2000) Molecular cloning Volumes I, II & III, Cold spring Harbor Laboratory Press New York, USA

Practical assessment

		Assessment		Total Marks
Formative assessment		Summative assessment		
Assessment type	Weightage in marks	Practical Exam		
Record	5	25	50	
Test	10			
Attendance	5			
Performance	5			
Total	25	25		

Course code: BTDS04P;

Course Title: MOLECULAR BIOLOGY

(PRACTICAL)

COURSE TITLE	MOLECULAR BIOLOGY- PRACTICAL
Course code	BTDS04P
Course credits	02
Total contact hours	56 (4 h/ week)
Duration of ESA (Hour)	3
Formative assessment marks	25
Summative assessment marks	25

Experiments

1. Preparation of models- DNA, DNA-replication, -Transcription. -Translation. *Lac* & *Trp* operon.
2. Isolation of DNA and its estimation of DNA by DPA method
3. Isolation of RNA and its estimation of RNA by Orcinol method
4. Column chromatography – gel filtration (Demo)
5. Extraction and partial purification of protein from plant source by Salt precipitation method (Ammonium sulphate precipitation).
6. Extraction and partial purification of protein from animal source by organic solvent method
7. Protein separation by SDS- PAGE Polyacrylamide Gel Electrophoresis (PAGE)
8. Charts on- Conjugation, Transformation and Transduction, DNA replication, Types of RNA

References

1. Walker J.M. and Gingold, E.B. (1983) Molecular Biology & Biotechnology (Indian Edition) Royal Society of Chemistry U.K An
2. Introduction to Practical Biochemistry, 3rd Edition, (2001), David Plummer; Tata McGraw Hill Edu. Pvt. Ltd. New Delhi, India
3. Biochemical Methods.1st Edition, (1995), S. Sadashivam, A. Manickam; New Age International Publishers, India
4. Introductory Practical biochemistry, S. K. Sawhney & Randhir Singh (Eds) Narosa Publishing. House, New Delhi, ISBN 81-7319-302-9
5. Sambrook et al (2000) Molecular cloning Volumes I, II & III, Cold spring Harbor Laboratory Press New York, USA

Practical assessment

Assessment			Total Marks
Formative assessment		Summative assessment	
Assessment type	Weightage in marks	Practical Exam	
Record	5	25	50
Test	10		
Attendance	5		
Performance	5		
Total	25	25	

Syllabus for Open Elective Course for B.Sc., (Basic/ Honors) Biotechnology- II Year

Sl. No.	Course	Paper	Title of the Paper	No. of Total credits contact		Duration of the Exam (Hr)	Marks		Total
				hours			Formative/ Continuous assessment	End semester Examination	
	Theory: Open Elective	BTOEC05	Nutrition and Health	3	42	2	40%	60%	100%
2	Theory: Open Elective	BTOEC06	Intellectual Property Rights	3	42	2	40%	60%	100%

Open Elective Course Code: **BTOEC05**

Course Title: **NUTRITION AND HEALTH**

(Theory)

COURSE TITLE	NUTRITION AND HEALTH
Course code	BTOEC05
Course credits	03
Total contact hours	42
Duration of ESA (Hour)	02
Formative assessment marks	40
Summative assessment marks	60

Course Outcome: The open elective course in 'Nutrition and Health', offered to the students of different stream, helps them understand the concept of nutrition for healthy life and sound mind. The course provides knowledge about different nutrients, antioxidants, probiotics, antioxidants and their importance in the formulation of balance diet. Students also learn that the components of a balanced diet will differ according to age, sex, physical activity, physiological state viz., pregnancy, lactation etc. and in different disease conditions.

UNIT	Contents	Contact Hours
I	Introduction Concept of nutrition and health. Definition of Food, Diet and nutrition. Food groups. Food pyramids. Functions of food. Balanced diet. Meal planning. Eat right concept. Functional foods, Prebiotics, Probiotics, and antioxidants	14
II	Nutrients Macro and Micronutrients- Sources, functions and deficiency. Carbohydrates, Proteins, Fats – Sources and calories. Minerals –Calcium, Iron, Iodine. Vitamins – Fat soluble vitamins –A, D, E & K. Water soluble vitamins – vitamin C Thiamine, Riboflavin, Niacin. Water–Functions and water balance. Fibre –Functions and sources. Recommended Dietary Allowance, Body Mass Index and Basal Metabolic Rate.	14

III	<p>Nutrition and Health Methods of cooking affecting nutritional value. Advantages and disadvantages. Boiling, steaming, pressure cooking. Oil/Fat – Shallow frying, deep frying, Baking. Nutrition through lifecycle. Nutritional requirement, dietary guidelines: Adulthood, Pregnancy, Lactation, Infancy-Complementary feeding, Pre-school, Adolescence, geriatric. Nutrition related metabolic disorders: diabetes and cardiovascular diseases.</p>	14
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References

- 1. Sri Lakshmi B. (2002) Nutrition Science. New Age International publishers, New Delhi
- 2. Sri Lakshmi B. (2007) Dietetics. New Age International publishers, New Delhi
- 3. Swaminathan M. (2002) Advanced text book on food and Nutrition, Volume I. Bappa
- 4. Gopalan C., RamaSastry B.V. and S. C. Balasubramanian (2009). Nutritive value of Indian Foods, NIN, ICMR, Hyderabad.
- 5. Madambi S. R. and Rajagopal M. V. (2008), Fundamentals of Foods, Nutrition & diet therapy by New Age International Publishers, New Delhi

Summative Assessment:	60%		
Formative Assessment :	40%		
Activity	C1	C2	Total
Internal assessment 2 tests	10	10	20
Assignment/ visits (Industry, Institutions and Laboratories)	5	5	10
Seminar/ presentation/ Group discussions	5	5	10
Total	20	20	40

Open Elective Course Code: **BTOEC06**

Course Title: **INTELLECTUAL PROPERTY RIGHTS**

(Theory)

COURSE TITLE	INTELLECTUAL PROPERTY RIGHTS
Course code	BTOEC06
Course credits	03
Total contact hours	42
Duration of ESA (Hour)	02
Formative assessment marks	40
Summative assessment marks	60

Course Outcome: The open elective course in 'Intellectual Property Rights' offered to the students of various streams gives them the knowledge about the importance of inventions, patentable inventions and protection of intellectual property like, novel designs, trademarks, copyrights, process and technology patents. Students also learn about the art of writing 'prior art' for patenting and filing in different geographies or filing a PCT through WIPO. The course provides a good understanding of importance of patent rights in global trades covered by WTO, TRIPS, GATT and also about the consequences of patent infringement.

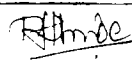


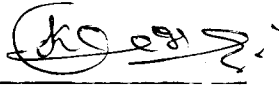
UNIT	Contents	Contact Hours
I	Introduction to Intellectual property rights (IPR): Genesis and scope. Types of Intellectual property rights - Patent, Trademarks, Copyright, Design, Trade secret, Geographical indicators, Plant variety protection. National and International agencies - WIPO, World Trade Organization (WTO), Trade-Related Aspects of Intellectual Property Rights (TRIPS), General Agreement on Tariffs and Trade (GATT).	14
II	Patenting, process, and infringement Basics of patents - Types of patents; Patentable and Non-Patentable inventions, Process and Product patent. Indian Patent Act 1970- Recent amendments; Patent Cooperation Treaty (PCT) and implications. Process of patenting. Types of patent applications: Provisional and complete specifications; Concept of "prior art", patent databases (USPTO, EPO, India). Financial assistance, schemes, and grants for patenting. Patent infringement- Case studies on patents (Basmati rice, Turmeric, Neem)	14
III	Trademarks, Copy right, industrial Designs Trademarks- types, Purpose and function of trademarks, trademark registration, Protection of trademark. Copy right- Fundamentals of copyright law, Originality of material, rights of reproduction, industrial Designs: Protection, Kind of protection provided by industrial design.	14

References

- 1) Manish Arora. 2007. Universal's Guide to Patents Law (English) 4th Edition) -Publisher: Universal Law Publishing House
- 2) Kalyan C. Kankanala. 2012. Fundamentals of Intellectual Property. Asia Law House
- 3) Ganguli, P. 2001. Intellectual Property Rights: Unleashing the knowledge economy. New Delhi: Tata McGraw-Hill Pub
- 4) World trade organization - <http://www.wto.org>
- 5) World Intellectual Property organization - www.wipo.int Office of the comptroller general of Patents, Design & Trademarks - www.ipindia.nic.in

Summative Assessment:	60%		
Formative Assessment :	40%		
Activity	C1	C2	Total
Internal assessment 2 tests	10	10	20
Assignment/ visits (Industry, Institutions and Laboratories	5	5	10
Seminar/ presentation/ Group discussions	5	5	10
Total	20	20	40

Syllabus submitted by the BOS in Biotechnology (UG) Tumkur University

Sl. No.	Name	Signature
1	Dr. Manohar Shinde Chairman BOS in Biotechnology (UG)	
2	Dr. Dwarkanath V. (Member BOS)	
3	Dr. Poornima D (Member BOS)	
4	Dr. Krishna (Member BOS)	

B.Sc. (Basic/ Hons.) Semester III / IV Examination
Model question paper Open Elective (OE, Theory)
Biotechnology

Time: 2h

Max. Marks: 60

NOTE: All sections are compulsory

SECTION - A

1. Answer any *five* of the following

5 x 2 = 10

- a)
- b)
- c)
- d)
- e)
- f)
- g)

SECTION - B

Answer any *six* of the following

6 x 5 = 30

- 2.
- 3.
- 4.
- 5.
- 6.
- 7.
- 8.
- 9.

SECTION - C

Answer any *two* of the following

2 x 10 = 20

- 10.
- 11.
- 12.

Note: Section C may include sub questions a, b

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B.Sc. (Basic/ Hons.) Semester III / IV Examination
Model question paper Discipline Specific Course (DSC, Theory)
Biotechnology

Time: 2h

Max. Marks: 60

NOTE: All sections are compulsory

SECTION – A

Answer any *five* of the following

5 x 2 = 10

- a)
- b)
- c)
- d)
- e)
- f)
- g)

SECTION – B

Answer any *six* of the following

6 x 5 = 30

- 2.
- 3.
- 4.
- 5.
- 6.
- 7.
- 8.
- 9.


SECTION – C

Answer any *two* of the following

2 x 10 = 20

- 10.
- 11.
- 12.

Note: Section C may include sub questions a, b


Prof. Manohar Shinde
Assoc. Prof. in Biochemistry

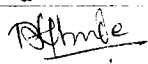


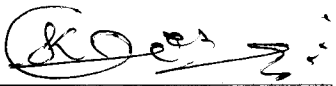
B.Sc. (Basic/ Hons.) Semester III / IV Examination
Model question paper (Practicals)
Biotechnology

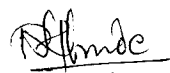
Time: 3 h

Max. Marks:25

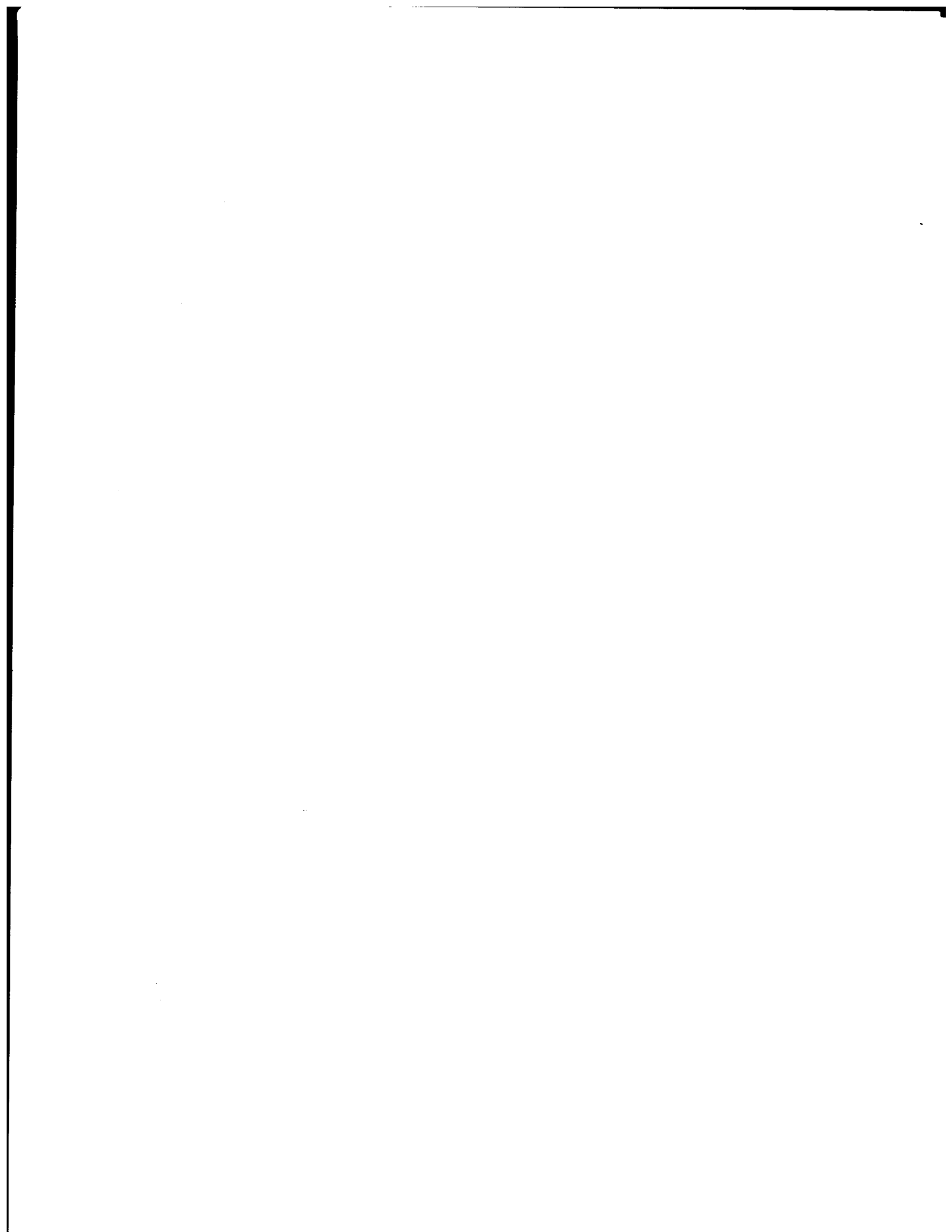
1. Write the principle and procedure of _____ experiment/spotters 05 marks
2. Major experiment (Conduct the experiment and report the results) 15 Marks
(Experiment- 15 marks or Experiment – spotters=15 marks)
3. Viva voce 05 Marks

Submitted by the BOS in Biotechnology (UG) Tumkur University

Sl. No.	Name	Signature
1	Dr. Manohar Shinde Chairman BOS in Biotechnology (UG)	
2	Dr. Dwarkanath V. (Member BOS)	
3	Dr. Poornima D (Member BOS)	
4	Dr. Krishna (Member BOS)	



Prof. Manohar Shinde
BOS&R in Biochemistry
Tumkur University
Tumkur-572103



TUMKUR UNIVERSITY

Department of Biotechnology, University College of Science

Proceedings of BOS meeting in Biotechnology [UG] held on Nov. 21, 2022

Agenda:

1. BOS approval of B.Sc. [Basic/ Hons.] Programme in Biotechnology III and IV semester under NEP-2020.
2. BOS approval of Open Elective theory (OET) courses of B. Sc. [Basic/ Hons.] Programme in Biotechnology II Year under NEP-2020 to be offered to the students of other streams.
3. BOS Approval of scheme outline for B.Sc. [Basic/ Hons.] Programme in Biotechnology III and IV semester under NEP-2020.

Following Members were present in the meeting:

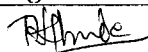

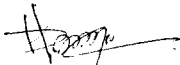

Dr. Manohar Shinde	Professor DOSR in Biochemistry TU	Chairman BOS
Dr. Dwarkanath V.	Assistant Professor, Dept. of Biotechnology UCS, TU	Member BOS
Dr. Poornima D.	Assistant Professor, Dept. of Biotechnology UCS, TU	Member BOS
Dr. Krishna	Assistant Professor, Dept. of Biotechnology UCS, TU	Member BOS

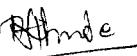
The BOS meeting in Biotechnology (UG) began at 11 AM on Nov. 21, 2022 at the Department of Studies and Research in Biochemistry of Tumkur University, Tumakuru. At the outset, the Chairman Prof. Manohar Shinde welcomes the Members of the BOS and briefs the agenda of the said meeting.

The curricula and the programme outline were provided to the BOS members in advance by E-mail and the hard copy of the syllabus was provided in the meeting. The members of the BOS went through the proposed syllabus of B.Sc. [Basic/ Hons.] Programme in Biotechnology III and IV semester and had detailed discussions.

After due deliberations and detailed discussions on the proposed curricula, the **BOS members unanimously resolved to approve the III and IV semester course curricula, the programme outcomes and the scheme outline of B.Sc. [Basic/ Hons.] Programme in Biotechnology** of Tumkur University. The BOS approved curriculum and scheme outline is attached herewith.

Chairman of BOS in Biotechnology (UG) thanks the members and concludes the meeting.

Sl. No.	Name	Signature
1	Dr. Manohar Shinde Chairman BOS in Biotechnology (UG)	
2	Dr. Dwarkanath V. Member BOS in Biotechnology (UG)	
3	Dr. Poornima D. Member BOS in Biotechnology (UG)	
4	Dr. Krishna Member BOS in Biotechnology (UG)	


Prof. Manohar Shinde
DOSR in Biochemistry
Tumkur University