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UNIVERSITY OF MYSORE

Estd. 1916

VishwavidyanilayaKaryasoudha
Crawford Hall, Mysuru- 570 005

No.AC2(S)/151/2020-21 Dated: 10.10.2022

Notification

Sub:- Syllabus and Examination Pattern of Biotechnology (UG) (III & IV Semester) with effective from the Academic year 2022-23 as per NEP-2020.

Ref:- 1. Decision of Board of Studies in of Biotechnology (UG) meeting held on 25-08-2022.
2. Decision of the Faculty of Science & Technology Meeting held on 15-09-2022.
3. Decision of the Academic Council meeting held on 23-09-2022.

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The Board of Studies in Biotechnology (UG) which met on 25-08-2022 has recommended & approved the syllabus and pattern of Examination of Biotechnology Course (III & IV Semester) with effective from the Academic year 2022-23 as per NEP -2020.

The Faculty of Science & Technology and Academic Council at their meetings held on 15-09-2022 and 23-09-2022 respectively has also approved the above said syllabus and hence it is hereby notified.

The syllabus and Examination pattern is annexed herewith and the contents may be downloaded from the University Website i.e., www.uni-mysore.ac.in.

Draft Approved by the Registrar

DeputyRegistrar(Academic)

Deputy Registrar (Academic)
University of Mysore
Mysore-570 005

To:-

1. All the Principal of affiliated Colleges of University of Mysore, Mysore.
2. The Registrar (Evaluation), University of Mysore, Mysuru.
3. The Chairman, BOS/DOS, in Biotechnology, Manasagangothri, Mysore.
4. The Dean, Faculty of Science & Technology, DoS in Earth Science, MGM.
5. The Director, Distance Education Programme, Moulya Bhavan, Manasagangotri, Mysuru.
6. The Director, PMEB, Manasagangothri, Mysore.
7. Director, College Development Council , Manasagangothri, Mysore.
8. The Deputy Registrar/Assistant Registrar/Superintendent, Administrative Branch and Examination Branch, University of Mysore, Mysuru.
9. The PA to Vice-Chancellor/ Registrar/ Registrar (Evaluation), University of Mysore, Mysuru.
10. Office Copy.

UNIVERSITY OF MYSORE

CURRICULUM FOR
Semester III and IV

B.Sc (Basic/ Hons.) Degree

BIOTECHNOLOGY
(As per NEP-2020 Model Curriculum)

Implementation Year 2021-22

Approved by
BOS in Biotechnology (UG)

DEPARTMENT OF STUDIES IN BIOTECHNOLOGY
MANASAGANGOTRI, MYSURE – 570 006

August 2022

Government of Karnataka

Model Curriculum

Program Name	**B.Sc. Discipline**	Total Credits for the Program	**176**
Core	**Biotechnology**	Starting year of implementation	**2021-22**

Program Outcomes: At the end of the program the student should be able to:

(Refer to literature on outcome-based education (OBE) for details on Program Outcomes)

PO1. Understandingconcepts of Biotechnology and demonstrate interdisciplinary skills acquired in cell biology, genetics, biochemistry, microbiology, and molecular biology

PO2. Demonstrating the Laboratory skills in cell biology, basic and applied microbiology withan emphasis on technological aspects

PO3. Competent to apply the knowledge and skills gained in the fields of Plantbiotechnology, animal biotechnology and microbial technology in pharma, food,agriculture, beverages, herbal and nutraceutical industries.

PO4. Critically analyse the environmental issues and apply the biotechnology knowledgegained for conserving the environment and resolving the problems.

PO5. Demonstrate comprehensive innovations and skills in the fields of biomolecules, celland organelles, molecular biology, bioprocess engineering and genetic engineering ofplants, microbes, and animals with respect to applications for human welfare.

PO6. Apply knowledge and skills of immunology, bioinformatics, computational modelling ofproteins, drug design and simulations to test the models and aid in drug discovery.

PO7. Critically analyse, interpret data, and apply tools of bioinformatics and multi omics invarious sectors of biotechnology including health and Food.

PO8. Demonstrate communication skills, scientific writing, data collection and interpretationabilities in all the fields of biotechnology.

PO9. Learning and practicing professional skills in handling microbes, animals and plants anddemonstrate the ability to identify ethical issues related to recombinant DNA technology,genetic engineering, animals handling, intellectual property rights, biosafety, andbiohazards.

PO10. Exploring the biotechnological practices and demonstrating innovative thinking inaddressing the current day and future challenges with respect to food, health, andenvironment.

PO11. Thorough knowledge and application of good laboratory and good manufacturingpractices in biotech industries.

PO12. Understanding and application of molecular biology techniques and principles inforensic and clinical biotechnology.

PO13. Demonstrate entrepreneurship abilities, innovative thinking, planning, and setting upsmall-scale enterprises or CROs.

Assessment:

Weightage for assessments (in percentage)

Type of Course	Formative Assessment / IA	Summative Assessment
Theory	40	60
Practical	25	25
Projects	-	-
Experiential Learning (Internships etc.)	-	-

Course Content for B.Sc. Biotechnology as Major

Semester III & IV

Semester	Course code	Course Category	Theory/ Practical	Credits	Paper Title	Marks	
						S.A	I.A
3.	**BTC: 103**	DSC- 3	Theory	3	Biomolecules	60	40
			Practical	2	Biomolecules	25	25
		OE- 3	Theory	3	Nutrition and Health	60	40
4.	**BTC:104**	DSC- 4	Theory	3	Molecular Biology	60	40
			Practical	2	Molecular Biology	25	25
		OE- 4	Theory	3	Intellectual Property Rights	60	40

Government of Karnataka

Model Curriculum

Program Name	**BSc Biotechnology**		Semester	**Third Sem**
Course Title	**Biomolecules**			
Course No.	**BTC: 301**	**DSC -3T**	No. of Theory Credits	**4**
Contact hours	**56 hrs**		Duration of ESA/Exam	**2.5 Hours**
Formative Assessment Marks	**40**		Summative Assessment Marks	**60**

Course Pre-requisite (s):

Course Outcomes (COs): At the end of the course the student should be able to:

1. Acquire knowledge about types of biomolecules, structure, and their functions
2. Will be able to demonstrate the skills to perform bioanalytical techniques
3. Apply comprehensive innovations and skills of biomolecules to biotechnology field

Content	Hrs
Unit–I **Carbohydrates:** Introduction, sources, classification of carbohydrates. Structure, function and properties of carbohydrates. Monosaccharides – Isomerism and ring structure, Sugar derivatives – amino sugars and ascorbic acid Disaccharides – Maltose, Lactose and Sucrose Polysaccharides – Classification as homo and heteropolysaccharides, Homopolysaccharides - storage polysaccharides (starch and glycogen- structure, reaction, properties), structural polysaccharides (cellulose and chitin-structure, properties), Heteropolysaccharides - glycoproteins and proteoglycans. Metabolism: Glycolysis and gluconeogenesis, Kreb's cycle, ETC- oxidative phosphorylation. **Amino Acids, Peptides and Proteins:** Introduction, classification and structure of amino acids; Zwitterion, isoelectric point, pK values. Essential and nonessential amino acids. Peptide bond and peptide, Structural organization of proteins - primary, secondary (α helix, β sheets) tertiary and quaternary. Fibrous and globular proteins, Denaturation and renaturation of proteins. General aspects of amino acid metabolism: Transamination, deamination, decarboxylation and urea cycle.	**14**
Unit -II **Lipids:** Classification and function of lipids, Saturated and unsaturated fatty acids, properties (saponification value, acid value, iodine number, rancidity), Hydrogenation of fats and oils. General structure and biological functions of phospholipids, sphingolipids, glycolipids, lipoproteins, prostaglandins, cholesterol, ergosterol. Metabolism: β oxidation of fatty acids. Biosynthesis of palmitate. **Enzymes:** Introduction, nomenclature and classification, enzyme kinetics, factors influencing enzyme activity, metalloenzymes, activation energy and transition state, enzyme activity, specific activity. Coenzymes, cofactors and their functions (one reaction involving TPP, 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 and their clinical significance).	**14**

Unit -III **Vitamins:**Water and fat soluble vitamins, dietary source and biological role of vitamins Deficiency manifestation of vitamin A, B, C, D, E and K **Nucleic acids:** Structure of nucleosides, nucleotides in DNA and RNA. Structure and functions of DNA and RNA, Watson and Crick model of DNA and other forms of DNA (A and Z). Types of RNA (rRNA, tRNA, mRNA, snRNA, hnRNA, miRNA), ribozymes. Metabolism- Overview of biosynthesis and degradation of purine and pyrimidine, salvage pathway. **Hormones:** Classification of hormones based on chemical nature and mechanism of action. Chemical structure and functions of the following hormones: Glucagon, insulin, Epinephrine, Testosterone and Estradiol.	**14**
Unit –IV - Bioanalytical tools : **Electrophoresis:** Principle, procedure and applications of electrophoresis (paper electrophoresis, gel electrophoresis -PAGE, SDS- PAGE & agarose electrophoresis) and isoelectric focusing. **Spectroscopy:** Colorimetry**,** UV-Vis spectrophotometry, Spectrofluorimetry, IR and NMR spectroscopy, atomic absorption spectroscopy, mass spectroscopy **Radioisotope techniques:** Radioactivity, half life, radioisotopes, GM counter, scintillating counting, autoradiography, applications, biosafety	14

Course Articulation Matrix: Mapping of Course Outcomes (COs) with Program Outcomes (POs 1-12)

Course Outcomes (COs) / Program Outcomes (POs)	**Program Outcomes (POs)**											
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**
Acquire knowledge about types of biomolecules, structure, and their functions	✓				✓							✓
Will be able to demonstrate the skills to perform bioanalytical techniques			✓								✓	✓
Apply comprehensive innovations and skills of biomolecules to biotechnology field	✓				✓							✓

Pedagogy: Lectures, Seminars, Industry Visits, Debates, Quiz and Assignments

Summative Assessment = 60 Marks	
Formative Assessment Occasion / type	Weightage in Marks
Attendance	10
Seminar	10
Debates and Quiz	10
Test	10
Total	60 marks + 40 marks = 100 marks

Course Title	**Biomolecules**		Practical Credits	**2**
Course No.	**BTC:301**	**DSC-3P**	Contact hours	48 h

Content

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. Standard solutions, stock solution, solution of acids. Reagent bottle label reading and precautions.
3. Preparation of standard buffers by Hendersen-Hasselbach equation – Acetate, phosphate, Tris and determination of pH of solution using pH meter.
4. Estimation of maltose by DNS method
5. Determination of α-amylase activity by DNS method
6. Estimation of proteins by Biuret method
7. Estimation of amino acid by Ninhydrin method
8. Extraction of protein from soaked/sprouted green gram by salting out method
9. Separation of amino acids by circular paper chromatography
10. PAGE
11. Determination of iodine number of lipids

Practical assessment

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

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, BeeduSasidharRao& Vijay Despande(ed).I.K International Pvt. LTD, NewDelhi. ISBN 81-88237-41-8
5	Standard Methods of Biochemical Analysis, S. K. Thimmaiah (ed), Kalyani Publishers, Ludhiana ISBN 81-7663-067

Program Name	**BSc Biotechnology**		Semester	**Third Sem**
Course Title	**Nutrition and Health**			
Course Code		**OE-3**	No. of Theory Credits	**3**
Contact hours	**Lecture**	42 h	Duration of ESA/Exam	**2.5 Hours**
	Practical	-		
Formative Assessment Marks	40		Summative Assessment Marks	60

Course Pre-requisite(s):

Course Outcomes (COs): At the end of the course the student should be able to:

1. Study the concepts of food, nutrition, diet and health
2. To apply the best practices of food intake and dietary requirements
3. Acquire knowledge about various sources of nutrients and good cooking practices

Content	**42 Hrs**
Unit–I - Introduction	**14 Hrs**
Concepts 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	
Unit -II - Nutrients	**14 Hrs**
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.	
Unit -III – Nutrition and Health	**14 Hrs**
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 disease.	

Pedagogy: Lectures, Seminars, Industry Visits, Debates, Quiz and Assignments

Summative Assessment = 60 Marks	
Formative Assessment Occasion / type	Weightage in Marks
Attendance	10
Seminar	10
Debates and Quiz	10
Test	10
Total	60 marks + 40 marks = 100 marks

References

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

Program Name	**BSc Biotechnology**		Semester	**Fourth Sem**
Course Title	**Molecular Biology**			
Course No.	**BTC: 401**	**DSC -4T**	No. of Theory Credits	**4**
Contact hours	**56 hrs**		Duration of ESA/Exam	**2.5 Hours**
Formative Assessment Marks	40		Summative Assessment Marks	60

Course Pre-requisite (s):

Course Outcomes (COs): At the end of the course the student should be able to:
1. Study the advancements in molecular biology with latest trends.
2. Will acquire the knowledge of structure, functional relationship of proteins and nucleic acids.
3. Aware about the basic cellular processes such as transcription, translation, DNA replication and repair mechanisms.

Content	Hrs
Unit–I –	**14 Hrs**
DNA as genetic material, Replication and Repair: Experimental proof of DNA as genetic material (Griffith's, Avery-Mcleod-McCarty, Martha-Chase). Central dogma, Replication of DNA in prokaryotes and eukaryotes– semiconservative mode (Messelson and Stalh experiment), Theta, linear and rolling circle models. Enzymes and proteins involved in replication-DNA polymerases, helicases, gyrases, ligase, SSB proteins, RNAse H The replication complex: Pre-primming proteins, primosome, replisome, unique aspects of eukaryotic chromosome replication, Fidelity of replication. DNA damage and Repair mechanism: types of damage, photo reactivation, excision repair, mismatch repair and SOS repair	
Unit -II –	**14 Hrs**
Transcription and RNA processing: Transcription in prokaryotes- RNA polymerase, sigma factor, promoter, initiation, elongation and termination. Transcription in eukaryotes: Eukaryotic RNA polymerases, transcription factors, promoters, enhancers, mechanism of transcription initiation, promoter clearance, elongation and termination. RNA processing of pre-mRNA: 5' cap formation, polyadenylation, splicing. Processing of rRNA and tRNA.	
Unit -III –	14 Hrs
Translation: Genetic code and its characteristics, Wobble hypothesis. Translation- in prokaryotes and eukaryotes- ribosomes, enzymes and factors involved in translation. Activation of amino acids, aminoacyl tRNA synthetases. Mechanism of translation- initiation, elongation and termination of polypeptide chain. Fidelity of translation, Inhibitors of translation. Post translational modifications of proteins, Protein folding and targeting- to mitochondria and lysosomes.	
Unit –IV –	14 Hrs
Regulation of gene expression: Prokaryotic gene regulation- operon concept- regulation of *lac* operon and *trp* operon, attenuation control. Eukaryotic gene regulation- Activators, repressors binding to enhancers, coordinated control (tissue specific gene expression), DNA methylation, chromatin remodeling, Translational control of gene expression-ferritin mRNA regulation, RNAi- miRNA and siRNA.	

Course Articulation Matrix: Mapping of Course Outcomes (COs) with Program Outcomes (POs 1-12)

Course Outcomes (COs) / Program Outcomes (POs)	Program Outcomes (POs)											
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**
Study the advancements in molecular biology with latest trends	✓				✓							✓
Will acquire the knowledge of structure, functional relationship of proteins and nucleic acids					✓	✓						✓
Aware about the basic cellular processes such as transcription, translation, DNA replication and repair mechanisms	✓				✓				✓			✓

Pedagogy: Lectures, Seminars, Industry Visits, Debates, Quiz and Assignments

Summative Assessment = 60 Marks	
Formative Assessment Occasion / type	Weightage in Marks
Attendance	10
Seminar	10
Debates and Quiz	10
Test	10
Total	60 marks + 40 marks = 100 marks

Course Title	**Molecular Biology**		Practical Credits	**2**
Course No.	**BTC: 401**	**DSC-4P**	Contact hours	48
Content				
1. Preparation of DNA model 2. Estimation of DNA by DPA method 3. Estimation of RNA by Orcinol method 4. DNA isolation from plant/ animal/ microbial sources 5. Concentration and purity of isolated DNA samples 6. Agarose gel electrophoresis of DNA 7. Charts on- DNA replication, transcription, translation, Types of DNA, RNA				

Practical assessment

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

References	
1	Glick, B.R and Pasternak J.J (1998) Molecular biotechnology, Principles and application of recombinant DNA, Washington D.C. ASM press
2	Howe. C. (1995) Gene cloning and manipulation, Cambridge University Press, USA
3	Lewin, B., Gene VI New York, Oxford University Press
4	Rigby, P.W.J. (1987) Genetic Engineering Academic Press Inc. Florida, USA
5	Sambrook et al (2000) Molecular cloning Volumes I, II & III, Cold spring Harbor Laboratory Press New York, USA
6	Walker J. M. and Ging old, E.B. (1983) Molecular Biology & Biotechnology (Indian Edition) Royal Society of Chemistry U.K
7	Karp. G (2002) Cell & Molecular Biology, 3rdEdition, John Wiley & Sons; I

Program Name	**BSc Biotechnology**		Semester	**Fourth Sem**
Course Title	**Intellectual Property Rights**			
Course Code		**OE-4**	No. of Theory Credits	**3**
Contact hours	**Lecture**	42 h	Duration of ESA/Exam	**2.5 Hours**
	Practical	-		
Formative Assessment Marks	40		Summative Assessment Marks	60

Course Pre-requisite(s):

Course Outcomes (COs): At the end of the course the student should be able to:

1. Knowledge about need and scope of Intellectual property rights
2. Acquire knowledge about filing patents, process, and infringement
3. Knowledge about trademarks, industrial designs, and copyright

Content	42 Hrs
Unit–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 Hrs**
Unit -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)	**14 Hrs**
Unit -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 Hrs**

Pedagogy

Summative assessment = 60 marks theory paper, End semester Exam duration: 2.5 hours	
Formative Assessment Occasion / type	Weightage in Marks
Assignment	10
Seminar	10
Case studies	10
Test	10
Total	40 marks

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.intOffice of the controller general of Patents, Design & Trademarks - www.ipindia.nic.in

Model Theory Question Paper

B.Sc., Biotechnology (Basic /Hons.)
Semester: III & IV (DSC and OE)
(Formative Assessment Marks: 40; Summative Assessment Marks: 60)

Month and Year:
Subject: Biotechnology

Title of the Paper:

Duration: 2.5 Hrs Max marks: 60
Instruction to the candidates: ----------

Q. No	Questions	Marks allotted
1	**Section A**: Answer any FIVE questions	5 × 2=10
a.		
b.		
c.		
d.		
e.		
f.		
g.		
	Section B: Answer any FIVE questions	5 × 6=30
2		
3		
4		
5		
6		
7		
8		
9		
	Section C: Answer any TWO questions	2 × 10=20
10		
11		
12		
13		

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Model Practical Examination Scheme

B.Sc., Biotechnology (Basic /Hons.)
PRACTICAL: DSC-3P, BTC 301
III-SEMESTER (Biomolecules)
(Formative Assessment Marks: 25; Summative Assessment Marks: 25)

Time: 3 Hrs Max Marks: 25

Q1. Any one of the following colorimetric estimations: **12 M**

a. Maltose by DNS method
b. Proteins by Biuret method
c. Amino acid by Ninhydrin Method

Scheme of Valuation

- Principle and procedure-2M
- Conducting experiment -6M
- Calculation/Tabular column /observation -2M
- Result-2M

Q2. Circular paper chromatography for amino acids **08M**

Scheme of Valuation

- Principle and procedure-2M
- Conducting experiment -4M
- Calculation and report -2M

Q3. Viva **05M**

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Model Practical Examination Scheme

B.Sc., Biotechnology (Basic /Hons.)
PRACTICAL: DSC-4P, BTC 401
IV-SEMESTER (Molecular Biology)
(Formative Assessment Marks: 25; Summative Assessment Marks: 25)

Time: 3 Hrs Max Marks: 25

Q1. Any one of the following colorimetric estimations: **12 M**

a. DNA by DPA method
b. RNA by Orcinol method

Scheme of Valuation

- Principle and procedure-2M
- Conducting experiment -6M
- Calculation/Tabular column /observation -2M
- Result-2M

Q2.Comment on A, B, C and D ---------- **08M**

Q3. Viva **05M**

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