

DEPARTMENT OF CHEMISTRY
COURSE CURRICULUM & MARKING SCHEME

B.Sc. V, VI Semester

BIOCHEMISTRY

(Based on Choice Based Credit System)

SESSION : 2025-26



ESTD : 1958

**GOVT. V.Y.T. PG AUTONOMOUS COLLEGE,
DURG, 491001 (C.G.)**

(Former Name – Govt. Arts & Science College, Durg)

NAAC Accredited Grade A⁺, College with CPE - Phase III (UGC), STAR COLLEGE (DBT)

Phone : 0788-2212030

Website - www.govtsciencecollegedurg.ac.in, Email – autonomousdurg2013@gmail.com

DEPARTMENT OF CHEMISTRY
GOVT.V.Y.T.PG AUTONOMOUS COLLEGE, DURG. (C.G.)

Four Year Undergraduate Program
BIOCHEMISTRY
Semester V

Session 202~~5~~26

For DSC

GOVT. V.Y.T.PG AUTONOMOUS COLLEGE DURG
FOUR YEAR UNDERGRADUATE PROGRAM
DEPARTMENT OF CHEMISTRY
COURSE CURRICULUM 2024-25
BIOCHEMISTRY

Part A: Introduction			
Program: FYUP		Class: B.Sc.Biochemistry	Semester - V
		Session:2024-2025	
1	Course Code	BBC 501	
2	Course Title	MOLECULAR BIOLOGY	
3	Course Type	DSC/GEC	
4	Course Learning Outcome (CLO)	This Course will enable the students to: 1. To understand DNA as genetic material, primary, secondary and tertiary structure of DNA and RNA. 2. Replication, Transcription, and Translation and their mechanisms. 3. To understand coding and non-coding regions of eukaryotic genome and their importance. 4. To understand importance of E. coli lac operon, PCR, expression vectors and their importance in Biotechnology. 5. To acquire knowledge about recombinant DNA technology.	
5	Credit Value	3C	1 credit =15 Hours – Learning and Observation
6	Total Marks	Maximum Marks :100	Minimum Passing Marks:40
Part B: Content of the Course			
Total no. of Teaching/ Learning Periods = 45 Periods (45 Hours)			
Unit	Topics (COURSE CONTENTS)		No. of Periods
I	BASIC CONCEPTS OF GENETIC INFORMATION [a.] Nucleic acids as genetic information carriers, experimental evidence e.g. bacterial genetic transformation, Hershey–Chase Experiment, TMV reconstitution experiment. [b.] Central dogma of molecular genetics –current version, reverse transcription and retroviruses. [c.] Primary structure of nucleic acids and their properties, salient features of eukaryotic, prokaryotic and viral genomes; highly repetitive, moderately repetitive and unique DNA sequences. [d.] Basic concepts about the secondary structures of nucleic acids, 5'→3'direction anti-parallel strands, base composition, base equivalence, base pairing and base stacking in DNA molecule. T_m and buoyant density and their relationship with G-C content in DNA.		09

II	STRUCTURAL LEVELS OF NUCLEIC ACIDS AND SEQUENCING [a.] Secondary and Tertiary structure of DNA: Watson and Crick model, A, and Z type of DNA major and minor grooves, chirality of DNA, tertiary structure of DNA. [b.] Structures and properties of RNA: Classes of RNA secondary and tertiary structures. [c.] Nucleic acid hybridization: Cot value and satellite DNA. [d.] Sequencing: Restriction and modification system; sequencing of DNA and RNA	09
III	DNA REPLICATION DNA replication in prokaryotes – conservative, semi conservative and dispersive types, experimental evidence for semi conservative replication. DNA polymerases other enzymes and protein factors involved in replication, Mechanism of replication. Inhibitors of DNA replication. TRANSCRIPTION Transcription in prokaryotes RNA polymerase, promoters, initiation, elongation and termination of RNA synthesis, inhibitors of transcription. Reverse transcriptase, post transcriptional processing of RNA in eukaryotes.	09
IV	TRANSLATION AND REGULATION OF GENE EXPRESSION [a.] Genetic code: Basic features of genetic code, biological significance of degeneracy. Wobble hypothesis, gene within genes and overlapping genes. [b.] Mechanism of translation: Ribosome structure, A and P sites, charged tRNA, f-mat-tRNA initiator codon, Shine Dalgarno consensus sequence (AGGA), formation of 70S initiation complex, role of EF-Tu, EF-Ts, EF-G and GTP, non-sense condons and release factors RF 1 and RF 2. [c.] Regulation of gene Expression in prokaryotes: Enzyme induction and repression, operon concept, Lac operon, Trp operon.	09

V	MUTATION AND REPAIR	
	[a.] Mutation: Molecular basis of mutation, type of mutation, e.g transition, transversion frame shift, insertion, deletion, suppresser sensitive, germinal and somatic, backward and forward mutations, true reversion and suppression, dominant and recessive mutations, spontaneous and induced mutations- Lederberg's replica plating experiment. [b.] Mutagenecity testing: Correlation of mutagenecity and carcinogenecity: Ames testing, Random and site - directed mutagenesis. [c.] DNA Repair: UV repair systems in E Coli, Significance of thymine in DNA. [d.] Recombinant DNA Technology Restriction endonucleases, brief discussion of steps in DNA cloning. Applications of recombinant DNA technology.	09

Part C - Learning Resource

Text Books, Reference Books, Other Resources

1. Molecular Cell Biology (2013) 7th ed., Lodish, H., Berk, A., Kaiser, C.A., Krieger, M., Bretscher, A., Ploegh, H., Amon, A. and Scott, M.P., W.H. Freeman & Company (New York), ISBN:13:978-1-4641-0981-2.
2. Principles of Biochemistry (2008) 3rd ed., Voet, D.J., Voet, J.G. and Pratt, C.W., John Wiley & Sons, Inc. (New York), ISBN:13: 978-0470-23396-2
3. Molecular Biology of the Gene (2008) 6th ed., Watson, J.D., Baker, T.A., Bell, S.P., Gann, A., Levine, M. and Losick, R., Cold Spring Harbor Laboratory Press, Cold Spring Harbor (New York), ISBN:0-321-50781 / ISBN:978-0-321-50781-5.
4. Lehninger: Principles of Biochemistry (2013) 6th ed., Nelson, D.L. and Cox, M.M., W. H. Freeman & Company (New York), ISBN:13: 978-1-4292-3414-6 / ISBN:10-14641-0962- 1.
5. Principles of Genetics (2010) 5th ed., Snustad, D.P. and Simmons, M.J., John Wiley & Sons Asia, ISBN:978-0-470-39842-5.

E-learning Resources

<https://www.genome.gov/genetics-glossary/DNA-Replication>
<https://www.nature.com/scitable/topicpage/gene-expression-14121669/>
<https://www.genome.gov/genetics-glossary/Mutation>
<https://www.frontiersin.org/articles/10.3389/fmicb.2020.624830/full>

PART D: ASSESSMENT AND EVALUATION	
Suggested Continuous Evaluation Methods:	
Maximum Marks:	100 Marks
Continuous Comprehensive Evaluation (CCE):	20 Marks
Semester End Exam (SEE):	80 Marks
Internal Assessment:	Internal Test of 20 Marks and Assignment of 20 Marks
Continuous Comprehensive Evaluation (CCE)	
Semester End Exam (SEE)	Pattern -FOUR Questions (A, B, C, D)from each Unit Total = 80 Marks Pattern -FOUR Questions (A, B, C, D)from each Unit Question A & B(Compulsory)Very short answer type(2 each) 04 x 5 = 20 Marks Question - C: Short answer type question 05 x 5 = 25 Marks Question -D: Long answer type question 07 x 5 = 35 Marks Total = 80 Marks

Name & Signature of Members of Board of Studies

Chairperson/H.O.D.  Subject Expert..... (University Nominee) Subject Expert.....  19/04/25 Subject Expert..... Representative..... (Industry)Representative..... (Alumni)  Representative..... (Professor Science Faculty Other Dept.)	Departmental members:  Dr. Sunitha B. Mathew  Dr. Sornasen  Dr. Neha The Neha The Dr. Preena Kathane  Dr. Gushma Yadav 
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GOVT. V.Y.T.PG AUTONOMOUS COLLEGE DURG
FOUR YEAR UNDERGRADUATE PROGRAM
DEPARTMENT OF CHEMISTRY
COURSE CURRICULUM 2024-25

Lab Course

Part A: Introduction			
Program:		Class: B.Sc. Biochemistry	Semester -V Session:2024-2025
1	Course Code	BBCL 05	
2	Course Title	LAB COURSE BIOCHEMISTRY-V	
3	Course Type	DSC/GEC	
4	Course Learning Outcome (CLO)	Course Outcomes (COs) On successful completion of the course, the student shall be able to: CO1- Demonstrate assay for nucleic acid by various methods. CO2- Demonstrate isolation process of DNA from different samples. CO3- Apply electrophoresis technique for different isolated compounds. CO4- Illustrate PCR techniques. CO5- Illustrate SDS-PAGE techniques by biomolecules.	
5	Credit Value	1C	1 credit =15 Hours – Learning and Observation
6	Total Marks	Maximum Marks : 50	Minimum Passing Marks: 20
S.No.	List of Experiments		
1.	Estimation of DNA by diphenylamine method .		
2.	Effect of temperature on the viscosity of DNA using Ostwald's viscometer.		
3.	Extraction of RNA and its estimation by Orcinol method		
4.	Estimation of Hemoglobin by measuring total iron in blood .		
5.	Estimation of calcium and phosphorus in serum & urine.		

Part C - Learning Resource	
Text Books, Reference Books, Other Resources	
Recommended Books	
1. Molecular Cell Biology (2013) 7th ed., Lodish, H., Berk, A., Kaiser, C.A., Krieger, M., Bretscher, A., Ploegh, H., Amon, A. and Scott, M.P., W.H. Freeman & Company (New York), ISBN:13:978-1-4641-0981-2. 2. Principles of Biochemistry (2008) 3rd ed., Voet, D.J., Voet, J.G. and Pratt, C.W., John Wiley & Sons, Inc. (New York), ISBN:13: 978-0470-23396-2 3. Molecular Biology of the Gene (2008) 6th ed., Watson, J.D., Baker, T.A., Bell, S.P., Gann, A., Levine, M. and Losick, R., Cold Spring Harbor Laboratory Press, Cold Spring Harbor (New York), ISBN:0-321-50781 / ISBN:978-0-321-50781-5. 4. Lehninger: Principles of Biochemistry (2013) 6th ed., Nelson, D.L. and Cox, M.M., W. H. Freeman & Company (New York), ISBN:13: 978-1-4292-3414-6 / ISBN:10-14641-0962- 1. 5. Principles of Genetics (2010) 5th ed., Snustad, D.P. and Simmons, M.J., John Wiley & Sons Asia, ISBN:978-0-470-39842-5.	

6. The World of the Cell, Wayne M. Becker, Lewis J. Kleinsmith, Jeff Hardin, Gregory Paul Bertoni, 7th Edition.

7. Gene Machine, Venki Ramakrishnan

E-learning Resources

<https://link.springer.com/article/10.1007/s11368-019-02427-y>

https://biocyclopedia.com/index/biotechnology_methods/biochemistry/estimation_of_rna_by_the_orcinol_method.php

<https://www.sciencedirect.com/topics/biochemistry-genetics-and-molecular-biology/dna-binding>

<https://www.ncbi.nlm.nih.gov/pmc/articles/PMC2874567/>

<https://pubmed.ncbi.nlm.nih.gov/22546956/>

Part D: Assessment and Evaluation

Suggested Continuous Evaluation Methods:

Maximum Marks:

50 Marks

(Will include Internal assessment, Lab records and End Semester Viva/Voce and performance)

Semester End Exam (SEE)

Laboratory performance: As per Dept.
(LOCF)

Name & Signature of Members of Board of Studies.

Example

M. K. Dwivedi
05/07/2024

(Dr. M. K. Dwivedi)
Subject Expert

Dr. Arun Mishra
05/7/24

(Dr. Arun Mishra)
H. Mahabey
05/07/2024

(Dr. Hemlata Mahabey)

Dr. V.S. Geete

Dr. A. K. P. Mai

Dr. S. D. Deshmukh
05/7/24

S. C. Tiwari
5.7.24

(Dr. S. C. Tiwari)

Dr. Sunitha B. Mathew

(Dr. Sunitha B. Mathew)

Dr. Prema Kathane
05/7/24

Dr. A. Kashyap

Dr. Bhawana Jain

DEPARTMENT OF CHEMISTRY
GOVT.V.Y.T.PG AUTONOMOUS COLLEGE, DURG. (C.G.)

Four Year Undergraduate Program
BIOCHEMISTRY
Semester VI

Session 2024-25

For
DSC / GEC

GOVT. V.Y.T.PG AUTONOMOUS COLLEGE DURG
FOUR YEAR UNDERGRADUATE PROGRAM
DEPARTMENT OF CHEMISTRY
COURSE CURRICULUM 2024-25
BIOCHEMISTRY

Part A: Introduction			
Program: FYUP		Class: B.Sc. Biochemistry	Semester - VI Session:2024-2025
1	Course Code	BBC 601	
2	Course Title	NUTRITIONAL, CLINICAL & ENVIRNONMENTAL BIOCHEMISTRY	
3	Course Type	DSC/GEC	
4	Course Learning Outcome (CLO)	This Course will enable the students to: 1. To understand normal constituents of urine, blood and their significance in maintaining good health. 2. Understand the mechanisms of causation of diseases of liver and kidney. 3. To understand the current concepts related to mechanism of Cancer. 4. To understand the variations in the levels of triglycerides and lipoproteins and their relationship with various diseases. To get acquainted with the role of enzymes in diagnosis of various diseases.	
5	Credit Value	3C	1 credit =15 Hours – Learning and Observation
6	Total Marks	Maximum Marks :100	Minimum Passing Marks:40
Part B: Content of the Course			
Total no. of Teaching/ Learning Periods = 45 Periods (45 Hours)			
Unit	Topics (COURSE CONTENTS)		No. of Periods
I	NUTRITIONAL BIOCHEMISTRY NUTRITION AND DIETARY HABITS [a.] Introduction and definition of foods and nutrition. Factors determining food acceptance, physiological, energy, body building (growth and development). Regulation of body temperature. Physiology and nutrition of carbohydrates, fats, proteins and water. Vitamins A, D, E, K, Vit B-Complex and Vit C and minerals like Ca, Fe and Iodine and their biological functions. Basic food groups: energy giving foods, body building foods and protective foods. [b.] Composition of balanced diet, recommended dietary allowances (RDA) for average Indian, locally available foods, inexpensive quality foods and food Stuff's rich in more than one nutrients. Balanced vegetarian diets, emphasis on nutritional adequacy.		09

II	Nutritive and Calorific Value of Foods [a.] Basic concepts of energy expenditure, units of energy, measurement of energy expenditure by direct or indirect calorimetry, calculation of non protein RQ with respect to carbohydrates and lipids. Determination of heat production of the diet. The basal metabolism and methods of measuring basal metabolic rate (BMR); energy requirements during growth, pregnancy, lactation and various physiological activities. Calculation of energy expenditure of average man and woman. [b.] Specific dynamic action (SDA) of foods, nutritive value of various kinds of foods generally used by Indian population. Planning of dietary regimes for infants, during pregnancy and old age. Malnutrition, its implications and relationship with dietary habits and prevention of malnutrition specially protein-calories malnutrition (Kwashiorkor and Marasmus) by improvement of diets. Human milk and its virtues, breast vs formulated milk feeding. Food preservation standards, food adulterations and precautions, government regulations on preservation and quality of food.	09
III	CLINICAL BIOCHEMISTRY BASIC CONCEPT OF CLINICAL BIOCHEMISTRY [a.] Definition and scope of clinical biochemistry in diagnosis, a brief review of units and abbreviations used in expressing concentration and standard solutions. Quality control. Manual vs automation in clinical laboratory. [b.] Collection and preservation of biological fluids (blood, serum, plasma, urine and CSF). Chemical analysis of blood, urine and CSF. Normal values for important constituents (in SI units) in blood (plasma /serum), CSF and urine, clearance test for urea.	09
IV	(I) CLINICAL ENZYMOLOGY [a.] Definition of functional and non functional plasma enzymes, isoenzyme and diagnostic tests. Enzyme patten in health and diseases with special mention of plasma lipase, amylase, cholinesterase, alkaline and acid phosphate, SGOT, SGPT, LDH and CPK. [b.] Functional test of kidney, liver and gastric fluids. (II) DISEASE RELATED TO METABOLISM Hypo and hyper – glycemia, glycogen storage diseases, lipid mal-absorption and steatorrhea, sphingolipidsosis; role of lipoproteins. Inborn errors of amino acid metabolism – alkaptonuria, phenyl – ketonuria, albinism, gout and hyper – uricemia.	09

V	ENVIRONMENTAL BIOCHEMISTRY [a.] Air pollution Particulate matter, compounds of carbon, sulphur, nitrogen and their interactions, methods of their estimation, their effect on atmosphere. [b.] Water pollution Types of water bodies and their general characteristics, major pollutants in domestic, agricultural and industrial wastes, methods of their estimation, effects of pollutants on plants and animals, treatment of domestic and industrial wastes, solid wastes and their treatment.	09
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Part C - Learning Resource

Text Books, Reference Books, Other Resources

TEXT BOOKS Recommended :

1. Text book of biochemistry Thomas M Devin , John Wiley & Sons , NY .

Reference Books :

1. Modern nutrition in health and diseases by Whol and Goodhart.
2. Human nutrition and Dietetics by S Davidson and Passmore: ELBS Zurich.
3. Tietz fundamental of clinical Chemistry by Cart A Burtis & ER Ashwood Saunders WB Co.
4. Lecture Notes on Clinical Biochemistry – LG Whitby, AF Smith , GJ Beckett, SM Walker, Blackwell Sci Inc.

Part D: Assessment and Evaluation

Suggested Continuous Evaluation Methods:

Maximum Marks: 75 Marks

Continuous Comprehensive Evaluation (CCE): 15Marks

Semester End Exam (SEE): 60 Marks

Internal Assessment: Continuous Comprehensive Evaluation(CCE)	Internal Test- One of 15 Marks + Assignment/Seminar-One of 15 Marks	Best of test and Assignment shall be considered against 15 marks
Semester End Exam (SEE)	Pattern -FOUR Questions (A, B, C, D)from each Unit Question - A & B: (Compulsory) Very short answer type (01each) 02 x 5 = 10 Marks Question - C: Short answer type question 03 x 5 = 15 Marks Question -D: Long answer type question 07 x 5 = 35 Marks Total = 60 Marks	

PART D: ASSESSMENT AND EVALUATION**Suggested Continuous Evaluation Methods:****Maximum Marks:** 100 Marks**Continuous Comprehensive Evaluation (CCE):** 20 Marks**Semester End Exam (SEE):** 80 Marks**Internal Assessment:**

Continuous Comprehensive Evaluation (CCE)

Internal Test of 20 Marks and Assignment of 20 Marks

**Semester
End Exam
(SEE)****Pattern -FOUR Questions (A, B, C, D)from each Unit****Total = 80 Marks**
Pattern -FOUR Questions (A, B, C, D)from each Unit**Pattern -FOUR Questions (A, B, C, D)from each Unit****Total = 80 Marks**
Pattern -FOUR Questions (A, B, C, D)from each UnitQuestion A & B(Compulsory)Very short answer type(2 each) $04 \times 5 = 20$ Marks

Question - C: Short answer type question

 $05 \times 5 = 25$ Marks

Question -D: Long answer type question

 $07 \times 5 = 35$ Marks**Total = 80 Marks****Name & Signature of Members of Board of Studies**

Chairperson/H.O.D.

Subject Expert.....

(University Nominee)

Subject Expert.....

Subject Expert.....

Representative.....

(Industry)Representative.....

(Alumni)

Representative.....

(Professor Science Faculty Other Dept.)

Departmental members:

Dr. Anil P. Dhar

Dr. Sunita B. Mathur

Dr. Soma Sen.

Neha She

Dr. P. Kathane

Dr. Sushma Yadav

GOVT. V.Y.T.PG AUTONOMOUS COLLEGE DURG
FOUR YEAR UNDERGRADUATE PROGRAM
DEPARTMENT OF CHEMISTRY
COURSE CURRICULUM 2024-25

Lab Course

Part A: Introduction			
Program:		Class: B.Sc. Biochemistry	Semester -VI
		Session:2024-2025	
1	Course Code	BBCL 06	
2	Course Title	LAB COURSE BIOCHEMISTRY-VI	
3	Course Type	DSCGEC	
4	Course Learning Outcome (CLO)	Course Outcomes (COs) On successful completion of the course, the student shall be able to: CO1- Demonstrate assay for creatine and creatinine in urine. CO2- Demonstrate immunoglobulins by precipitation with saturated ammonium sulphate. CO3- Apply electrophoresis technique for different isolated compounds. CO4- Illustrate PCR techniques. CO5- Illustrate SDS-PAGE techniques by biomolecules.	
5	Credit Value	1C	1 credit =15 Hours – Learning and Observation
6	Total Marks	Maximum Marks : 250	Minimum Passing Marks: 20

S.No.	List of Experiments
1.	Estimation of creatine and creatinine in urine.
2.	Estimation of immunoglobulins by precipitation with saturated ammonium sulphate.
3.	Denaturation of enzyme, studies on DNA.
4.	Separation of proteins by column chromatography.
5.	Determination of proteins by dye binding assay.
6.	Separation of proteins by SDS- polyacrylamide gel electrophoresis.

Part C - Learning Resource

Text Books, Reference Books, Other Resources

Recommended Books

1. Molecular Cell Biology (2013) 7th ed., Lodish, H., Berk, A., Kaiser, C.A., Krieger, M., Bretscher, A., Ploegh, H., Amon, A. and Scott, M.P., W.H. Freeman & Company (New York), ISBN:13:978-1-4641-0981-2.
2. Principles of Biochemistry (2008) 3rd ed., Voet, D.J., Voet, J.G. and Pratt, C.W., John Wiley & Sons, Inc. (New York), ISBN:13: 978-0470-23396-2
3. Molecular Biology of the Gene (2008) 6th ed., Watson, J.D., Baker, T.A., Bell, S.P., Gann, A., Levine, M. and Losick, R., Cold Spring Harbor Laboratory Press, Cold Spring Harbor (New York), ISBN:0-321-50781 / ISBN:978-0-321-50781-5.
4. Lehninger: Principles of Biochemistry (2013) 6th ed., Nelson, D.L. and Cox, M.M., W. H. Freeman & Company (New York), ISBN:13: 978-1-4292-3414-6 / ISBN:10-14641-0962- 1.
5. Principles of Genetics (2010) 5th ed., Snustad, D.P. and Simmons, M.J., John Wiley & Sons Asia, ISBN:978-0-470-39842-5.

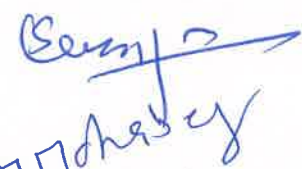
Part D: Assessment and Evaluation**Suggested Continuous Evaluation Methods:****Maximum Marks:****050 Marks****(Will include Internal assessment, Lab records and End Semester Viva/Voce and performance)****Semester End
Exam (SEE)**

Laboratory performance: As per Dept. (LOCF)

Name & Signature of Members of Board of Studies


05/07/2024
Dr. M. R. G. Divedi
Subject Expert


05/7/24
(Dr. Arun Mishra)

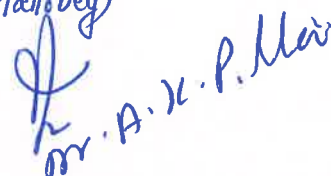

05/07/2024
(Dr. Hemlata Mahabey)


Dr. A. K. P. Meher


5/7/24
(Dr. S. D. Deshmukh)


05/07/24
(Dr. Anju Jha)

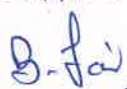

Dr. V. S. Geste


Dr. A. K. P. Meher


5.7.24
(Dr. S. C. Tiwari)


Dr. Sunitha B. Mathew


05/7/24
(Dr. Preerna Kethane)


Dr. Bhawana Jain

DEPARTMENT OF CHEMISTRY
GOVT.V.Y.T.PG AUTONOMOUS COLLEGE, DURG. (C.G.)

Four Year Undergraduate Program
BIOCHEMISTRY
Semester V/VL

Session 2024-25

For DSE – I

GOVT. V.Y.T.PG AUTONOMOUS COLLEGE DURG
FOUR YEAR UNDERGRADUATE PROGRAM
DEPARTMENT OF CHEMISTRY
COURSE CURRICULUM 2024-25
BIOCHEMISTRY

Part A: Introduction			
Program: FYUP		Class: B.Sc.Biochemistry Semester – V/VI	Session:2024-2025
1	Course Code	BBC 801	
2	Course Title	GENE REPLICATION, EXPRESSION AND REGULATION	
3	Course Type	DSE - I	
4	Course Learning Outcome (CLO)	On successful completion of the course, the student shall be able to: CO.1 – Distinguish the process of replication in prokaryotes as well as eukaryotes. CO.2 – Distinguish the process of transcription in prokaryotes as well as eukaryotes. CO.3 – Distinguish the process of translation in prokaryotes as well as eukaryotes. CO.4 – Discuss the process of transcriptional regulation in prokaryotes as well as eukaryotes. CO.5 – Explain the process of DNA damage and various DNA repair mechanisms.	
5	Credit Value	3C	1 credit =15 Hours – Learning and Observation
6	Total Marks	Maximum Marks :100	Minimum Passing Marks:40
Part B: Content of the Course			
Total no. of Teaching/ Learning Periods = 45 Periods (45 Hours)			
Unit	Topics (COURSE CONTENTS)		No. of Periods
I	Basic Concepts of Genetic Information Salient features of Eukaryotic, prokaryotic and viral genomes; highly repetitive, moderately repetitive and unique DNA sequences. T _m and buoyant density and their relationship with G-C content in DNA. Chirality of DNA, tertiary Structure of DNA. Structure and properties of RNA: secondary and tertiary structures. Nucleic acid hybridization: Cot value and satellite DNA		09
II	DNA replication: Features of replication, enzymes and proteins in DNA replication, E coli DNA polymerases, stages of replication initiation, elongation and termination. Replication In Eukaryotes: end replication problem, telomerase, various modes of replication. Comparison of replication in prokaryotes and eukaryotes. Inhibitors of DNA replication.		09

III	Transcription in prokaryotes: RNA polymerases, transcription cycle in bacteria, sigma factor, bacterial promoters, identification of DNA binding sites by DNA footprinting, various stages of RNA synthesis, initiation, elongation and termination, rho-dependent and rho-independent termination. Inhibitors of transcription and applications as antimicrobial drugs. Transcription in eukaryotes: Comparison between prokaryotic and eukaryotic transcription. The three classes of eukaryotic RNA polymerases, transcription by RNA polymerase II, RNA polymerase II core promoters, general transcription factors, transcription by RNA polymerase I and III. Inhibitors of eukaryotic transcription and their applications RNA Processing: Types of RNA processing- polyadenylation and capping, the spliceosome machinery, splicing pathways, group I and group II introns, alternative splicing, exon shuffling and RNA editing	09
IV	Translation: Genetic code and its characteristics, triplet nature, degenerate, deciphering the genetic code, Wobble hypothesis. Suppressor tRNAs. Exceptions to the nearly universal genetic code. Messenger RNA, transfer RNA, charging of tRNA. The structure of ribosome. Three stages of translation-initiation, elongation and termination. Translation in eukaryotes. Regulation of translation. Comparison of prokaryotic and eukaryotic protein synthesis. Inhibitors of translation and their clinical importance	09
V	Regulation of gene expression in prokaryotes: Principles of gene regulation, negative and positive regulation, concept of operons, regulatory proteins, activators, repressors, DNA binding domains, regulation of lac operon and trp operon. Regulatory RNAs in bacteria, small RNA and riboswitches. Regulation of gene expression in eukaryotes: Gene regulation by chromatin remodeling, regulation of galactose metabolism in yeast, action of enhancers and insulators, working of activators and repressors, concept of combinatorial control. Regulatory RNAs in eukaryotes: synthesis and mechanism of siRNA and miRNA..	09

Part C - Learning Resource

Text Books, Reference Books, Other Resources

1. Molecular Cell Biology (2013) 7th ed., Lodish, H., Berk, A., Kaiser, C.A., Krieger, M., Bretscher, A., Ploegh, H., Amon, A. and Scott, M.P., W.H. Freeman & Company (New York), ISBN:13:978-1-4641-0981-2.
 2. Principles of Biochemistry (2008) 3rd ed., Voet, D.J., Voet, J.G. and Pratt, C.W., John Wiley & Sons, Inc. (New York), ISBN:13: 978-0470-23396-2
 3. Molecular Biology of the Gene (2008) 6th ed., Watson, J.D., Baker, T.A., Bell, S.P., Gann, A., Levine, M. and Losick, R., Cold Spring Harbor Laboratory Press, Cold Spring Harbor (New York), ISBN:0-321-50781 / ISBN:978-0-321-50781-5.
 4. Lehninger: Principles of Biochemistry (2013) 6th ed., Nelson, D.L. and Cox, M.M., W. H. Freeman & Company (New York), ISBN:13: 978-1-4292-3414-6 / ISBN:10-14641-0962-1.
 5. Principles of Genetics (2010) 5th ed., Snustad, D.P. and Simmons, M.J., John Wiley & Sons Asia, ISBN:978-0-470-39842-5.
- E-learning Resources <https://www.genome.gov/genetics-glossary/DNA-Replication>
<https://www.nature.com/scitable/topicpage/gene-expression-14121669/>
<https://www.genome.gov/genetics-glossary/Mutation>
<https://www.frontiersin.org/articles/10.3389/fmicb.2020.624830/full>

PART D: ASSESSMENT AND EVALUATION	
Suggested Continuous Evaluation Methods:	
Maximum Marks:	100 Marks
Continuous Comprehensive Evaluation (CCE):	20Marks
Semester End Exam (SEE):	80 Marks
Internal Assessment:	Internal Test of 20 Marks and Assignment of 20 Marks
Continuous Comprehensive Evaluation (CCE)	
Semester End Exam (SEE)	Pattern -FOUR Questions (A, B, C, D)from each Unit Total = 80 Marks Pattern -FOUR Questions (A, B, C, D)from each Unit Pattern -FOUR Questions (A, B, C, D)from each Unit Total = 80 Marks Pattern -FOUR Questions (A, B, C, D)from each Unit Total = 80 Marks Question A & B(Compulsory)Very short answer type(2 each) 04 x 5 = 20 Marks Question - C: Short answer type question 05 x 5 = 25 Marks Question -D: Long answer type question 07 x 5 = 35 Marks Total = 80 Marks

Name & Signature of Members of Board of Studies

Chairperson/H.O.D.....	Departmental members:
Subject Expert.....	Dr. Agari P. Khar
(University Nominee)	Dr. Sunita B. Mathur
Subject Expert.....	Neha Sharma
Subject Expert.....	Dr. P. Kathane
Representative.....	Dr. Sushma Yadav
(Industry)Representative.....	
(Alumni).....	
Representative.....	
(Professor Science Faculty Other Dept.)	

GOVT. V.Y.T.PG AUTONOMOUS COLLEGE DURG
FOUR YEAR UNDERGRADUATE PROGRAM
DEPARTMENT OF CHEMISTRY
COURSE CURRICULUM 2024-25

Lab Course

Part A: Introduction			
Program:		Class: B.Sc. Biochemistry Semester -V/VI	Session:2024-2025
1	Course Code	BBCL 07	
2	Course Title	LAB COURSE BIOCHEMISTRY-V	
3	Course Type	DSE -I	
4	Course Learning Outcome (CLO)	Course Outcomes (COs) On successful completion of the course, the student shall be able to: CO1- Demonstrate assay for nucleic acid by various methods. CO2- Demonstrate isolation process of DNA from different samples. CO3- Apply electrophoresis technique for different isolated compounds. CO4- Illustrate PCR techniques. CO5- Illustrate SDS-PAGE techniques by biomolecules.	
5	Credit Value	1C	1 credit =15 Hours – Learning and Observation
6	Total Marks	Maximum Marks :250	Minimum Passing Marks:10

Part B: List of Experiments	
S.No.	List of Experiments
1.	Estimation of DNA by diphenylamine method.
2.	Effect of temperature on the viscosity of DNA using Oswald's viscometer.
3.	Extraction of RNA and its estimation by Orcinol method.
4.	Isolation and estimation of RNA from yeast.
5.	Agarose Gel Electrophoresis and separation of DNA
6.	Isolation of DNA from bacteria/eukaryotic cells and check its purity
Note: This is tentative list; the teachers concern can add more program as per requirement.	

Part C - Learning Resource	
Text Books, Reference Books, Other Resources	
Recommended Books 1.Molecular Cell Biology (2013) 7th ed., Lodish, H., Berk, A., Kaiser, C.A., Krieger, M.,Bretscher, A.,Ploegh, H., Amon, A. and Scott, M.P., W.H. Freeman & Company (NewYork), ISBN:13:978-1-4641-0981-2. 2.Principles of Biochemistry (2008) 3rd ed., Voet, D.J., Voet, J.G. and Pratt, C.W., JohnWiley & Sons,Inc. (New York), ISBN:13: 978-0470-23396-2 3.Molecular Biology of the Gene (2008) 6th ed., Watson, J.D., Baker, T.A., Bell, S.P.,Gann,	

PART D: ASSESSMENT AND EVALUATION**Suggested Continuous Evaluation Methods:****Maximum Marks:** 100 Marks**Continuous Comprehensive Evaluation (CCE):** 20 Marks**Semester End Exam (SEE):** 80 Marks**Internal Assessment:**

Continuous Comprehensive Evaluation (CCE)

Internal Test of 20 Marks and Assignment of 20 Marks

**Semester
End Exam
(SEE)****Pattern -FOUR Questions (A, B, C, D)from each Unit****Total = 80 Marks**
Pattern -FOUR Questions (A, B, C, D)from each Unit**Pattern -FOUR Questions (A, B, C, D)from each Unit****Total = 80 Marks**
Pattern -FOUR Questions (A, B, C, D)from each UnitQuestion A & B(Compulsory)Very short answer type(2 each) $04 \times 5 = 20$ Marks

Question - C: Short answer type question

 $05 \times 5 = 25$ Marks

Question -D: Long answer type question

 $07 \times 5 = 35$ Marks**Total = 80 Marks****Name & Signature of Members of Board of Studies**

Chairperson/H.O.D.....

Subject Expert.....

(University Nominee)

Subject Expert.....

Subject Expert.....

Representative.....

(Industry)Representative.....

(Alumni).....
Representative.....

(Professor Science Faculty Other Dept.)

Departmental members:

Dr. Bani P. Pillai

Dr. Smita B. Mathur

Dr. Soma Sen.

Neelam

Dr. P. Katharine

Dr. Sushma Yadav

FOUR YEAR UNDERGRADUATE PROGRAM (2024-28)

Department of Biochemistry

Course Curriculum

PART-A: Introduction			
Program: FYUP	Class: B.Sc. Biochemistry	Semester- V	Session: 2024-2025
1	CourseCode	BCSC-05T	
2	CourseTitle	MOLECULAR BASIS OF INFECTIOUS DISEASES	
3	CourseType	DSE-II	
4.	Course Learning Outcome (CLO)	<i>On successful completion of the course, the students shall be able to:</i> ➤ Understand various classes of microbial infectious agents, their mode of action, biology of the diseases, transmission of diseases, the concepts of treatment, and drug resistance for various antimicrobial agents. ➤ Demonstrate molecular basis of diagnosis and treatment of diseases as well as strategies for development of vaccines against these diseases. ➤ Explain the details of important infectious diseases such as tuberculosis, AIDS, malaria, filariasis, etc. ➤ Understand the significance of hygiene, sanitation, vaccination in prevention of infectious diseases.	
5	Credit Value	3 Credits	1 Credit=15 Hours-learning & Observation
6	Total Marks	Max.Marks: 100	Min Passing Marks: 40
PART-B: Content of the Course			
Total No. of Teaching-learning Periods (01 Hr. per period)- 45 Periods (45Hours)			
Unit Topics (Course contents)		No. of Periods	
I	Classification of infectious agents: Bacteria, Viruses, protozoa and fungi. Past and present emerging and re-emerging infectious diseases and pathogens. Source, reservoir and transmission of pathogens, Antigenic shift and antigenic drift. Host parasite relationship, types of infections associated with parasitic organisms. Overview of viral and bacterial pathogenesis. Infection and evasion.	9	
II	Overview of diseases caused by bacteria: Detailed study of tuberculosis: History, causative agent, molecular basis of host specificity, infection and pathogenicity, Diagnostics, Therapeutics, inhibitors and vaccines. Drug resistance and implications on public health. Other bacterial diseases including Typhoid, Diphtheria, Pertussis, Tetanus, Typhoid and Pneumonia.	9	
III	Overview of diseases caused by Viruses: Detailed study of AIDS, history, causative agent, pathogenesis, Diagnostics, Drugs and inhibitors. Other viral diseases including hepatitis, influenza, rabies, chikungunya and polio.	9	
IV	Overview of diseases caused by Parasites: Detailed study of Malaria, history, causative agents, Vectors, life cycle, Host parasite interactions, Diagnostics, Drugs and Inhibitors, Resistance, Vaccine development. Other diseases including leishmaniasis, amoebiasis.	9	
V	Overview of diseases caused by other organisms: Fungal diseases, General characteristics. Medical importance of major groups, pathogenesis, treatment.	9	

PART-C: Learning Resources**Text Books, Reference Books and Others****Text Books Recommended-**

1. Klein's Microbiology (2008) 7th Ed., Prescott, Harley, Willey, J.M., Sherwood, L.M., Woolverton, C.J. Mc Graw Hill International Edition (New York) ISBN: 978-007-126727.
2. Principles and practices of Infectious diseases, 7th edition, Mandell, Douglas and Bennett. S, Volume, 2. Churchill Livingstone Elsevier. ISBN: 978-0-443-06839-3
3. Sherris Medical Microbiology: An Introduction to Infectious Diseases. (2010). Kenneth J. Ryan, C. George Ray, Publisher: McGraw-Hill. ISBN-13: 978-0071604024 ISBN- 10: 0071604022
4. Medical Microbiology. (2012). Patrick R. Murray, Ken S. Rosenthal, Michael A. Pfaller, Elsevier Health Sciences. ISBN: 978-0-323-08692-9.

Online Resources-**e-Resources/e-books and e-learning portals**

- ▶ <https://www.genome.gov/genetics-glossary/DNA-Replication>
- ▶ <https://www.sciencedirect.com/science/article/pii/S0009912013001677>
- ▶ <https://pubmed.ncbi.nlm.nih.gov/2372029/>
- ▶ <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3243375/>

PART-D: Assessment and Evaluation**Suggested Continuous Evaluation Methods: Maximum****Marks: 75 Marks****Continuous Internal Assessment (CIA): 15 Marks****End Semester Exam (ESE): 60 Marks**

Continuous Internal Assessment (CIA): (By Course Teacher)	Internal Test/Quiz-(2): 15 + Assignment/Seminar- One of 15 marks	Best of test and Assignment shall be considered against 15 marks
End Semester Exam (ESE):	Pattern- Four Question (A, B, C, D) from each Unit Question- A & B: (Compulsory) Very short answer type (01 each) 2 x 5 = 10 marks Question C: Short answer type question 3 x 5 = 15 marks Question D: Long answer type question 7 x 5 = 35 marks Total = 60 marks	

PART D: ASSESSMENT AND EVALUATION		
Suggested Continuous Evaluation Methods:		
Maximum Marks:		100 Marks
Continuous Comprehensive Evaluation (CCE):		20 Marks
Semester End Exam (SEE):		80 Marks
Internal Assessment:		Internal Test of 20 Marks and Assignment of 20 Marks
Continuous Comprehensive Evaluation (CCE)		
Semester End Exam (SEE)	Pattern -FOUR Questions (A, B, C, D)from each Unit Total = 80 Marks Pattern -FOUR Questions (A, B, C, D)from each Unit Question A & B(Compulsory)Very short answer type(2 each) 04 x 5 = 20 Marks Question - C: Short answer type question 05 x 5 = 25 Marks Question -D: Long answer type question 07 x 5 = 35 Marks Total = 80 Marks	

Name & Signature of Members of Board of Studies

Chairperson/H.O.D.....  Subject Expert..... (University Nominee) Subject Expert.....  Subject Expert..... Representative..... (Industry)Representative..... (Alumni)  Representative..... (Professor Science Faculty Other Dept.)	Departmental members:   Dr. Soma Sen.  Neha Jha Dr. P. K. Kothane  Dr. Sushma Yadav 
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FOUR YEAR UNDERGRADUATE PROGRAM (2024-28)

Department of Biochemistry

Course Curriculum

PART-A: Introduction		
Program: FYUP Class: B.Sc. Biochemistry Semester- V Session: 2024-2025		
1	Course Code	BCSE-02P
2	Course Title	MOLECULAR BASIS OF INFECTIOUS DISEASES
3	Course Type	Discipline Specific Elective-II (Practical)
4	Course Learning Outcomes (CLO)	▶ Students will acquire the knowledge to isolate bacteria from water/sewage samples, to stain bacteria, fungi, acid fast bacilli and to perform important diagnostic tests for infectious diseases such as WIDAL test. ▶ Students will be exposed to permanent slides of pathogens in order to get hands-on training to know nature of various pathogens causing diseases.
5	Credit Value	1 Credit Credit = 30 Hours Laboratory or Field learning Training
6	Total Marks	Max. Marks: 50 Min Passing Marks: 20
PART-B: List of Experiments		
Total No. of learning-Training/performance Periods: 30 Periods (30 Hours)		
Module	No. of Period	Topics (Course contents)
Lab./Field Training/Experiment Content of Course		➤ Permanent slides of pathogens. Mycobacterium tuberculosis, Leishmania, Plasmodium falciparum ➤ 2. WIDAL test ➤ 3. Gram staining ➤ 4. Acid fast staining ➤ 4. PCR based diagnosis ➤ 5. Dot Blot ELISA

PART-C: Learning Resources		
Text Books, Reference Books and Others		Page 14
Text Books Recommended-		
▶ Klien's Microbiology (2008) 7th ed., Prescott, Harley, Wiley, J.M., Sherwood, L.M., Woolverton, C.J. McGraw Hill International Edition (New York) ▶ Jawetz, Melnick & Adelberg's Medical Microbiology 27th ed., McGraw Hill Education		
Online Resources-		
e-Resources/e-books and e-learning portals		
▶ https://link.springer.com/article/10.1007/s00217-008-0998-4 ▶ https://www.cdc.gov/nchs/data/nhanes/nhanes0304/113cmet.gdf		
PART-D: Assessment and Evaluation		
Suggested Continuous Evaluation Methods: Maximum Marks:		
Continuous Internal Assessment (CIA): 15 Marks		
End Semester Exam (ESE): 60 Marks		
Continuous Internal Assessment (CIA): (By Course Teacher)	Internal Test/Quiz-(2): 15 + Assignment/Seminar- One of 15 marks	Best of test and Assignment shall be considered against 15 marks
End Semester Exam (ESE):	Pattern- Four Question (A, B, C, D) from each Unit Question- A & B: (Compulsory) Very short answer type (01 each) 2 x 5 = 10 marks Question C: Short answer type question 3 x 5 = 15 marks Question D: Long answer type question 7 x 5 = 35 marks Total = 60 marks	

PART D: ASSESSMENT AND EVALUATION**Suggested Continuous Evaluation Methods:****Maximum Marks:** 100 Marks**Continuous Comprehensive Evaluation (CCE):** 20 Marks**Semester End Exam (SEE):** 80 Marks**Internal Assessment:**

Continuous Comprehensive Evaluation (CCE)

Internal Test of 20 Marks and Assignment of 20 Marks

**Semester
End Exam
(SEE)****Pattern -FOUR Questions (A, B, C, D)from each Unit****Total = 80 MarksPattern -FOUR Questions (A, B, C, D)from each Unit****Pattern -FOUR Questions (A, B, C, D)from each Unit****Total = 80 MarksPattern -FOUR Questions (A, B, C, D)from each Unit**Question A & B(Compulsory)Very short answer type(2 each) $04 \times 5 = 20$ Marks

Question - C: Short answer type question

 $05 \times 5 = 25$ Marks

Question -D: Long answer type question

 $07 \times 5 = 35$ Marks**Total = 80 Marks****Name & Signature of Members of Board of Studies**

Chairperson/H.O.D.....

Departmental members:

Subject Expert.....

(University Nominee)

Subject Expert.....

Subject Expert.....

Representative.....

(Industry)Representative.....

(Alumni).....
Representative.....

(Professor Science Faculty Other Dept.)

Mr. Brian Pillai

Neha She

Dr. P. Kathane

Dr. Sushma Yadav

DEPARTMENT OF CHEMISTRY
GOVT.V.Y.T.PG AUTONOMOUS COLLEGE, DURG. (C.G.)

Four Year Undergraduate Program
BIOCHEMISTRY
Semester VI

Session 2024-25

For
DSE - I

GOVT. V.Y.T.PG AUTONOMOUS COLLEGE DURG
FOUR YEAR UNDERGRADUATE PROGRAM
DEPARTMENT OF CHEMISTRY
COURSE CURRICULUM 2024-25
BIOCHEMISTRY

Part A: Introduction			
Program: FYUP		Class: B.Sc. Biochemistry Semester - V/VI	Session:2024-2025
1	Course Code	BBC 802	
2	Course Title	BIOTECHNOLOGY	
3	Course Type	DSE - I	
4	Course Learning Outcome (CLO)	On successful completion of the course, the student shall be able to: 1.The students will acquire basic knowledge of recombinant DNA technology, DNA manipulation in prokaryotes and eukaryotes. 2.engineering of DNA molecules using restriction and modification enzymes. 3.They will get acquainted with the use of cloning and expression vectors, creation of genomic and cDNA libraries and their applications. 4.Students will also understand the methods for production of proteins using recombinant DNA technology. 5.application in industrial systems.	
5	Credit Value	3C	1 credit =15 Hours – Learning and Observation
6	Total Marks	Maximum Marks :100	Minimum Passing Marks:40
Part B: Content of the Course			
Total no. of Teaching/ Learning Periods = 45 Periods (45 Hours)			
Unit	Topics (COURSE CONTENTS)		No. of Periods
I	Principles of gene cloning: Restriction and modification systems, restriction endonucleases and other enzymes used in manipulating DNA molecules. Ligation of DNA molecules, DNA ligase, sticky ends, blunt ends, linkers and adapters, homopolymer tailing, Synthetic oligonucleotides.		09
II	Plasmids and bacteriophages as vectors for gene cloning. Cloning vectors based on E. coli plasmids, pBR322, pUC8, pGEM3Z. Viruses as vectors, cloning vectors based on M13 and λ bacteriophage.		09
III	Uptake of DNA by cells, Selection and identification for transformed cells, Transfection. Chemical and physical methods of DNA introduction into cells. Direct selection, marker rescue. cDNA and Genomic libraries, Southern and Northern hybridization.		09
IV	Plant genetic engineering: gene isolation, gene transfer systems, Ti plasmid, plant virus vectors, electroporation, microinjection, microprojectile technology, Transgenic plants and animals. Production of recombinant proteins by eukaryotic cells. Fusion tags such as, polyhistidine, glutathione, maltose binding proteins and their role in purification of recombinant proteins		09

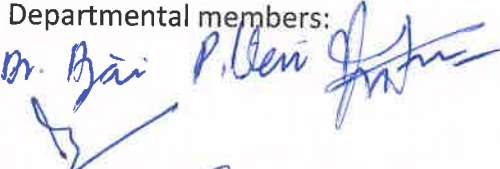
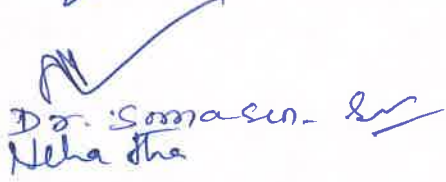
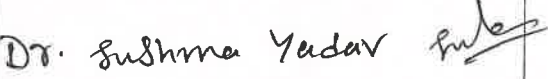
V	Fermentation technology – Fermentors, general design of fermentor, fermentation processes, production of alcohols, antibiotics, steroids and enzymes. Enzyme Technology - Large scale production of enzymes, enzyme reactors. Enzyme electrodes, biosensors.	09
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Part C - Learning Resource	
Text Books, Reference Books, Other Resources	
Suggested readings : 1. Principles of Gene Manipulation and Genomics (2006) 7th ed., Primrose, S.B., and Twyman, R. M., Blackwell publishing (Oxford, UK) 2. Gene Cloning and DNA Analysis (2010) 6th ed., Brown, T.A., Wiley-Blackwell publishing (Oxford, UK) 3. Molecular Biotechnology: Principles and Applications of Recombinant DNA (2010) 4th ed., Glick B.R., Pasternak, J.J. and Patten, C.L., ASM Press (Washington DC) 4. Molecular Cloning: A laboratory manual (2014), 4nded., Michael R Green and J. Sambrook Cold spring Harbor laboratory press (3vol.) https://www.klimud.org/public/atlas/idrar/web/www.irvingcrowley.com/cls/fund.htm https://www.mayoclinic.org/tests-procedures/prothrombin-time/about/pac-20384661 https://www.ncbi.nlm.nih.gov/books/NBK482339/ https://www.ncbi.nlm.nih.gov/pmc/articles/PMC6709845	

Part D: Assessment and Evaluation		
Suggested Continuous Evaluation Methods: Maximum Marks: 75 Marks Continuous Comprehensive Evaluation (CCE): 15Marks Semester End Exam (SEE): 60 Marks		
Internal Assessment: Continuous Comprehensive Evaluation(CCE)	Internal Test- One of 15 Marks + Assignment/Seminar-One of 15 Marks	Best of test and Assignment shall be considered against 15 marks
Semester End Exam (SEE)	Pattern -FOUR Questions (A, B, C, D)from each Unit Question - A & B: (Compulsory) Very short answer type (01each) 02 x 5 = 10 Marks Question - C: Short answer type question 03 x 5 = 15 Marks Question -D: Long answer type question 07 x 5 = 35 Marks Total = 60 Marks	

PART D: ASSESSMENT AND EVALUATION	
Suggested Continuous Evaluation Methods:	
Maximum Marks:	100 Marks
Continuous Comprehensive Evaluation (CCE):	20 Marks
Semester End Exam (SEE):	80 Marks
Internal Assessment:	Internal Test of 20 Marks and Assignment of 20 Marks
Continuous Comprehensive Evaluation (CCE)	
Semester End Exam (SEE)	Pattern -FOUR Questions (A, B, C, D)from each Unit Total = 80 Marks Pattern -FOUR Questions (A, B, C, D)from each Unit Pattern -FOUR Questions (A, B, C, D)from each Unit Total = 80 Marks Pattern -FOUR Questions (A, B, C, D)from each Unit Question A & B(Compulsory)Very short answer type(2 each) 04 x 5 = 20 Marks Question - C: Short answer type question 05 x 5 = 25 Marks Question -D: Long answer type question 07 x 5 = 35 Marks Total = 80 Marks

Name & Signature of Members of Board of Studies

Chairperson/H.O.D..... 	Departmental members:
Subject Expert.....	
(University Nominee)	
Subject Expert..... 	
Subject Expert.....	
Representative.....	
(Industry)Representative.....	
(Alumni)..... 	
Representative.....	
(Professor Science Faculty Other Dept.)	

GOVT. V.Y.T.PG AUTONOMOUS COLLEGE DURG
FOUR YEAR UNDERGRADUATE PROGRAM
DEPARTMENT OF CHEMISTRY
COURSE CURRICULUM 2024-25

Lab Course

Part A: Introduction			
Program:		Class: B.Sc. Biochemistry Semester -VI	Session:2024-2025
1	Course Code	BBCL 06	
2	Course Title	LAB COURSE BIOCHEMISTRY-VI	
3	Course Type	DSCGEC - I	
4	Course Learning Outcome (CLO)	On successful completion of the course, the student shall be able to: 1.Students will learn the experimental techniques of recombinant DNA technology. 2.biotechnological applications. 3.separation of DNA fragments by Agarose gel electrophoresis. 4.isolation of plasmid DNA from E. coli, transformation of E. coli cells, digestion of plasmid DNA, 5.amplification of a DNA fragment by PCR, etc.	
5	Credit Value	1C	1 credit =15 Hours – Learning and Observation
6	Total Marks	Maximum Marks : 50	Minimum Passing Marks 20

S.No.	List of Experiments
1.	1. Agarose gel electrophoresis for separation of DNA fragments
2.	2. Isolation of plasmid DNA from E. coli.
3.	3. Transformation of E. coli cells with plasmid DNA.
4.	4. Digestion of plasmid DNA with restriction enzymes.
5.	5. Amplification of a DNA fragment by PCR.
6.	6. Complementation of β -galactosidase for Blue and White selection.

Part C - Learning Resource

Text Books, Reference Books, Other Resources

Suggested readings :

1. Principles of Gene Manipulation and Genomics (2006) 7th ed., Primrose, S.B., and Twyman, R. M., Blackwell publishing (Oxford, UK)
2. Gene Cloning and DNA Analysis (2010) 6th ed., Brown, T.A., Wiley-Blackwell publishing (Oxford, UK)
3. Molecular Biotechnology: Principles and Applications of Recombinant DNA (2010) 4th ed., Glick B.R., Pasternak, J.J. and Patten, C.L., ASM Press (Washington DC)
4. Molecular Cloning: A laboratory manual (2014), 4nded., Michael R Green and J. Sambrook Cold spring Harbor laboratory press (3vol.)

<https://www.klimud.org/public/atlas/idrar/web/www.irvingcrowley.com/c/s/fund.htm> <https://www.mayoclinic.org/tests-procedures/prothrombin-time/about/pac-20384661>

<https://www.ncbi.nlm.nih.gov/books/NBK482339/>

<https://www.ncbi.nlm.nih.gov/pmc/articles/PMC6709845>

Part D: Assessment and Evaluation

Suggested Continuous Evaluation Methods:

Maximum Marks:

50 Marks

(Will include Internal assessment, Lab records and End Semester Viva/Voce and performance)

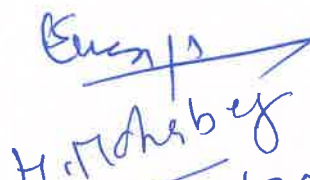
Semester End
Exam (SEE)

Laboratory performance: As per Dept. (LOCF)

Name & Signature of Members of Board of Studies

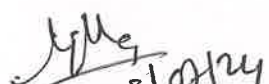

05/07/2024
Dr. Manisha Dwivedi
Sub. Expert


05/7/24
(Dr. Arun Mishra)


05/07/2024
(Dr. Hemlata Mahabey)


Dr. A. Karkey


05/7/24
(Dr. S. D. Deshmukh)


05/07/24
(Dr. Anju Jha)

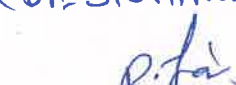

Dr. S. Geete


Dr. A. K. P. Khat


5.7.24
(Dr. S. C. Tiwari)


05.07.24
(Dr. Sunitha Mathew)


05/7/24
(Dr. Prema Kathane)


Dr. Bhawana Jain.

FOUR YEAR UNDERGRADUATE PROGRAM (2024-28)
Department of Biochemistry
Course Curriculum

PART-A: Introduction		
Program: FYUP Class : B.Sc. Biochemistry Semester-VI Session:2024-2025		
1	CourseCode	BCSE-04T
2	CourseTitle	Plant Biochemistry
3	CourseType	Discipline Specific Elective (Theory) DSE –II
4	Course Learning Outcomes (CLO)	<i>On successful completion of the course, the students shall be able to:</i> ▶ Learning outcomes for this course include detailed understanding of metabolic processes specific for plants such as nitrate assimilation, photosynthesis, respiration, nitrogen fixation. ▶ Understand the role of different metabolic pathways in plant growth and development. ▶ Understand insight to various stressful conditions of the environment that affect plant growth and productivity ▶ Understand the defense mechanisms in plants due to which plants survive under stresses.
5	Credit Value	3 Credits <i>Credit=15Hours- learning & Observation</i>
6	Total Marks	Max. Marks: 100 Min. Passing Marks: 40
PART-B: Content of the Course		
Total No. of Teaching-learning Periods (01Hr.perperiod) – 45 Periods (45Hours)		
Unit	Topics (Course contents)	No.of Period
I	Nitrogen metabolism: assimilation of nitrate, structural features of nitrate reductase and nitrite reductase, incorporation of ammonia into organic compounds, regulation of nitrate assimilation. Biological nitrogen fixation by free living and in symbiotic association; structure and function of the enzyme nitrogenase.	09
II	Photosynthesis- Photosynthetic apparatus, pigments of photosynthesis, role of carotenoids, photosystems I and II, their location; Hill reaction, photosynthetic electron transport and generation of NADPH & ATP, cyclic and non-cyclic photo phosphorylations, complexes associated with thylakoid membranes; light harvesting complexes, path of carbon in photosynthesis-C3 and C4 pathway of carbon reduction and its regulation, Photorespiration.	09
III	Special features of secondary plant metabolism, terpenes (classification, biosynthesis), lignin, tannins, pigments, phytochrome, waxes, alkaloids, biosynthesis of nicotine, functions of alkaloids, cell wall components. Toxins of plant origin- mycotoxins, phytohemagglutinins, lathyrrogens, nitriles, protease inhibitors, protein toxins.	09
IV	Stress metabolism in plants- Environmental stresses, salinity, water stress, heat, chilling, anaerobiosis, pathogenesis, heavy metals, radiations and their impact on plant growth and metabolism, criteria of stress tolerance. Antioxidative defense system in plants – reactive oxygen species and their generation, Enzymic and non-enzymic components of antioxidative defense mechanism.	09
V	Electron transport system in plants: Chemiosmotic theory, ATP synthase and mechanism of ATP synthesis. Antioxidative defense system in plants – reactive oxygen species and their generation, enzymic and non-enzymic components of antioxidative defense mechanism.	09
Keywords Electron transport, Nitrogen assimilation, secondary metabolites, Reactive oxygen species.		

PART-C: Learning Resources**Text Books, Reference Books and Others****Text Books Recommended-**

- ▶ Buchann (2015), Biochemistry and Molecular Biology of Plants, 2nd ed. Publisher: I K. International. ISBN-IO: 8188237116, ISBN- 978047 0714218
- ▶ Taiz and Zeiger, Plant Physiology, 5th edition, Sinauer Associates Inc. ISBN-13: 978-0878938667, ISBN-IO: 0878938664
- ▶ Caroline Bowsher, Martin Steer, Alyson Tobin (2008), Plant Biochemistry, Garland science ISBN 978-0-8153-4121-5.
- ▶ P. M. Dey and J. B. Harborne (Editors) (1997), Plant Biochemistry, Publisher: Academic Press ISBN-10: 0122146743, ISBN-13: 978-0122146749

PART-D: Assessment and Evaluation**Suggested Continuous Evaluation Methods:****Maximum Marks: 100 Marks****Continuous Comprehensive Evaluation (CCE): 20 Marks****Semester End Exam < SEE): 80 Marks****Internal Assessment:**

Continuous Comprehensive Evaluation (CCE)

Internal Test:

20 Marks

Assignment -

20**Semester End Exam < SEE)**Pattern – **Four** Questions – A, B, C, D

Question A & B are compulsory, Section C and D will have internal choices.

Question – A & B: Very short answer type (02 each) 04 x 5 = 20 Marks

Question – C: Short answer type question 05 x 5 = 25 Marks

Question – D: Long answer type question 07 x 5 = 35 Marks

Total = 80 Marks

FOUR YEAR UNDER GRADUATE PROGRAM (2024-28)

Department of Biochemistry

Course Curriculum

PART-A: Introduction		
Program: Bachelor in Science (Degree/Honors)		Semester - VI Session: 2024-2025
1	Course Code	BCSE-04P
2	Course Title	Plant Biochemistry
3	Course Type	Discipline Specific Elective (Practical)
4	Course Learning Outcomes (CLO)	On successful completion of the course, the students shall be able to: ▶ Determine the contents of photosynthetic pigments, ascorbic acid, phenols, tannins, hydrogen peroxide in plant samples. ▶ Understand the spectral patterns of photosynthetic pigments. ▶ Perform extraction and assay enzymes like urease from Jack bean.
5	Credit Value	1 Credit Credit = 30 Hours Laboratory or Field learning / Training
6	Total Marks	Max. Marks: 50 Min. Passing Marks: 20
PART-B: Content of the Course		
Total No. of learning - Training / performance Periods: 30 Periods (30 Hours)		
Module	Topics (Course contents)	
Lab./Field Training/ Experiment Contents of Course	▶ Estimation of chlorophylls and carotenoids from grass/spinach leaves ▶ Estimation of ascorbic acid, phenols, tannins in fruits and vegetables ▶ Determination of radical scavenging activity of plant extracts ▶ Estimation of hydrogen peroxide in tissue extracts ▶ Extraction and assay of urease from Jack bean. Separation of photosynthetic pigments by TLC and determination of absorption Spectra.	
Keywords	Photosynthetic pigments, ascorbic acid, phenols, tannins,	

Name and Signature of Convener & Members of CBoS:

PART-C: Learning Resources**Text Books, Reference Books and Others*****Text Books Recommended-***

- ▶ Buchann (2015), Biochemistry and Molecular Biology of Plants, 2nd ed. Publisher: I K International. ISBN-IO: 8188237116, ISBN- 978047 0714218
- ▶ Taiz and Zeiger, Plant Physiology, 5th edition, Sinauer Associates Inc. ISBN-13: 978-0878938667, ISBN-10: 0878938664
- ▶ Caroline Bowsher, Martin Steer, Alyson Tobin (2008), Plant Biochemistry, Garland Science ISBN 978-0-8153-4121-5.
- ▶ P.M Dey and J.B. Harborne (Editors) (1997), Plant Biochemistry, Publisher: Academic Press ISBN-10: 0122146743, ISBN-13: 978-0122146749

PART-D: Assessment and Evaluation**Suggested Continuous Evaluation Methods:****Maximum Marks: 50 Marks****(Will include Internal assessment, Lab records and End Semester Viva/Voce and performance)**

Semester End Exam < SEE)	Laboratory performance: As per Dept. (LOCF)
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DEPARTMENT OF CHEMISTRY
GOVT.V.Y.T.PG.AUTONOMOUS COLLEGE, DURG. (C.G.)

Four Year Undergraduate Program

BIOCHEMISTRY

Session 2024-25

For SEC

GOVT. V.Y.T.PG AUTONOMOUS COLLEGE DURG
FOUR YEAR UNDERGRADUATE PROGRAM
DEPARTMENT OF CHEMISRTY
COURSE CURRICULUM 2024-25
BIOCHEMISTRY

PART A: INTRODUCTION				
Program: U.G.		Class: B.Sc.		Session:2024-2025
1	Course Code	BBCS01		
2	Course Title	Environmental Biochemistry		
3	Course Type	SEC		
4	Course Learning Outcome (CLO)	This Course will enable the students to: CO1: Understand about Sources and Effect of Pollution. CO2: Learn about hazards and risk assessment.		
5	Credit Value	2Credits	1 credit =15 Hours – Learning and Observation	
6	Total Marks	Maximum Marks :50		Minimum Passing Marks:40

PART B: CONTENT OF THE COURSE	
Total no. of Teaching/ Learning Periods = 30Periods (30 Hours)	
Topics (COURSE CONTENTS)	No. of Periods
Environmental Pollution: Major types. Outdoor and indoor air pollution, structure, sources, health effects and control strategies;	05
water pollution, soil contamination, noise pollution and electromagnetic radiations: Sources, health effects and control strategies.	05
Pesticide toxicity: Insecticides, fungicides, herbicides and bio pesticides.	05
Toxicology of food additives; Occupational hazards and risk assessment.	05
Metal toxicity: arsenic, mercury, lead, cadmium and fluoride.	05

PART C - LEARNING RESOURCES**Text Books, Reference Books, Other Resources****Reference Books**

Environmental Biochemistry Neelima Rajvaidya, Dilip Kumar Markandey
APH Publishing, 2005 –

Environmental biochemistry by U Satyanarayana, M.Sc., Ph.D., F.I.C., F.A.C.B.

Environmental Biochemistry Author Victor Perry ISBN 9781639891801 Publication
Year (2022)

Textbook of Environmental Biochemistry Harender K. Gaur ISBN: 9788181524478,
8181524470 Edition: First, 2018

Bioremediation for Environmental Pollutants Sustainable Materials Editor(s) :
Inamuddin ISBN: 978-981-5123-50-0

Online Resources: (e- Resources/ e- Books/ e- Learning Portals)

<https://www.sciencedirect.com/topics/medicine-and-dentistry/enzymology>

<https://www.jbc.org/Enzymology>

<https://www.biologyonline.com/dictionary/coenzyme>

<https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3770912/>

<https://www.eposters.net/redirect/?ID=16026&UID=0&Type=poster>

https://link.springer.com/chapter/10.1007/978-0-387-35141-4_34

<https://www.sciencedirect.com/topics/biochemistry-genetics-and-molecular-biology/enzyme-immobilization>

Assessment and Evaluation

PART D: ASSESSMENT AND EVALUATION			
Evaluation Methods: Internal (CCE) + External Assessment (ESE)			
Assessment	Mode	Max. Marks	Min. Marks
Theory	ESE	25	10
Project	On Course Content	25	10
	Total Marks	50	20

Name & Signature of Members of Board of Studies.

M. A.
05/07/2024
Dr. Megendra D. Dedi
S.D.
05/7/24
(Dr. S.D. Deshmukh)
S.C.
5-7-24
(Dr. S.C. Tiwari)

Abu
05/7/24
(Dr. Abu Mishra)
Ajay
05/07/24
(Dr. Ajay Singh)
Sunitha
05.07.24
(Dr. Sunitha Mathew)

Bhawan
05/07/2024
(Dr. Hemlata Mahabey)
V.S. Goel
05/7/24
(Dr. V.S. Goel)
P. Kathane
05/7/24
(Dr. P. Kathane)
B. Jain
Dr. Bhawan Jain
A. Karjap
A. K. Bhatia

DEPARTMENT OF CHEMISTRY

GOVT.V.Y.T.PG.AUTONOMOUS COLLEGE, DURG. (C.G.)

Four Year Undergraduate Program

BIOCHEMISTRY

Session 2024-25

For SEC - II

GOVT. V.Y.T.PG AUTONOMOUS COLLEGE DURG
FOUR YEAR UNDERGRADUATE PROGRAM
DEPARTMENT OF CHEMISRTY
COURSE CURRICULUM 2024-25
BIOCHEMISTRY

PART A: INTRODUCTION			
Program: U.G.		Class: B.Sc.	Session:2024-2025
1	Course Code	BBCS0-II	
2	Course Title	INTER PRETATION OF CLINICAL LABORATORY DATA	
3	Course Type	SEC	
4	Course Learning Outcome (CLO)	This Course will enable the students to: CO1: Understand about Laboratory factors. CO2: Learn about Clinical factors.	
5	Credit Value	2Credits	1 credit =15 Hours – Learning and Observation
6	Total Marks	Maximum Marks :50	Minimum Passing Marks:20

PART B: CONTENT OF THE COURSE	
Total no. of Teaching/ Learning Periods = 30Periods (30 Hours)	
Topics (COURSE CONTENTS)	No. of Periods
A student of <u>V/5</u> semester will have project work. The project has to be carried out in the department. For this course student will have to interpret data given in the pseudo/hypothetical clinical report (at least 01). This Clinical laboratory test reports may be one of any aged group patients /healthy (male/female) subject will be interpret in following criteria. There are many variables that must be considered when interpreting the results of any laboratory or diagnostic test.	05
Patient factors: The time of day, fasting, postprandial, supine, upright, age, gender, climate, effects of drugs, and the effects of diet may all affect test results.	05
Laboratory factors: Lab situations to consider are: instrumentation (lab equipment used and blood draw equipment used); child or adult, laboratory methodology for performing the tests, laboratory techniques used, the actual lab procedure may yield false-positive or false-negative results, chemicals or reagents used in the lab may be out-dated or contaminated or defective, clerical errors may occur that will give wrong test results, technical errors (problems with the machines that perform some automated tests) may occur that give false results, a variety of human errors in the lab may occur (mixing the wrong chemicals, wrong proportions, etc.).	05
Clinical Factors: Special notations should be made on the laboratory test request form when it is particularly germane to a test: time when the blood is drawn , relation to meals (glucose), intravenous infusions (electrolytes), source of specimen (arterial, venous, capillary). Any other aspects which is taken as important by guide/supervisor/teacher.	05

Assessment and Evaluation

PART D: ASSESSMENT AND EVALUATION			
Evaluation Methods: Internal (CCE) + External Assessment (ESE)			
Assessment	Mode	Max. Marks	Min. Marks
Theory	ESE	25	
Project	On Course Content	25	
	Total Marks	50	

Name & Signature of Members of Board of Studies.

M. L. a
05/07/2024
Dr. Mrigendra Divedi

lep
05/7/24
(Dr. Arun Mishra)

Sumit
05/07/2024
(Dr. Hemlata Mahabay)

S. D. D.
5/7/24
(Dr. S. D. Dashmukh)

A. J. J.
05/07/24
(Dr. Ajju Jha)

Dr. V. S. Gecte

S. C. T.
5-7-24
(Dr. S. C. Tiwari)

Dr. A. K. Pillai

Dr. Sunil B. Mathew
05.07.24

Dr. Prerna Kathane
05/7/24

Dr. A. Karlyop

B. Jain
Dr. Bhawana Jain

Department of Chemistry
Govt. V.Y.T. PG Autonomous
College Durg (C.G.)



Value added Course

2024-25

Govt. V. Y. T. PG Autonomous College, Durg
Department of Chemistry
Value Added Course: *Chemistry of Food, Nutrition and Preservation*
Course Duration: 30hrs.

Course outcome:

Upon successful completion of the course, students are expected to be able:

CO1: To have knowledge about the basics of foodscience and its significance

CO2: To gain insight of nutrition and itsimportance

CO3: To learn about the food preservation and itsutility

CO4: To know about food contaminants, additives, food standards and food laws

CO5: To imbibe the practical skills of food preservation, food processing and quantitative estimation

Module- 1

(4 lectures/hrs.)

Basic of Food Science:Basic concept on Food, Nutrition and Nutrients - Nutrition,Malnutrition and Health: Scope of Nutrition; Classification of food;Food group and food pyramids; Classification of nutrients;Balanced Diet.

Module - 2

(8 lectures/hrs.)

Nutrition: Dietary fibers (composition, properties), Minerals and trace elements - Calcium, Iron, Iodine, Zinc and Copper(biochemicaland physiological role, bioavailability and requirement), Vitamins (examples, biochemical and physiological requirements, deficiency and excess), Water (requirement, water balance), basic idea about community nutrition (objective and importance of various programmes).

Module - 3

(6 lectures/hrs.)

Food preservation: definition, objectives and principles of food preservation. Different methods of food preservation.Preserved Products: Jam, Jelly, Marmalade, Sauces, Pickles,Squashes,Syrups-types, composition and manufacture, selection, cost, storage, uses and nutritional aspects.

Module- 4

(4 lectures/hrs.)

Contamination of Food and Food Safety:

Contamination of food- physical and chemical contaminants (Heavy metals and Pesticides). Intentional andunintentional additives, Food additives- Antimicrobial agents, antioxidant, sweeteners and colors.

Food laws and standards, Food safety, Food Hazards of biological origin.

Food Standards: ISI, Agmark, FPO, MPO, PFA, FSSAI.

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Neha

Module – 5 (Practical)

(8 hrs.)

Practical based on following heads:

- Food preservation by drying/dehydrating/freezing/pasteurization
- Processing of jams/jellies/sauces/pickles
- Quantitative estimation of carbohydrates/proteins/lipids/trace elements/vitamins in foods
- Food contamination test

Reference/suggested books

1. SrilakshmiB(2017): Nutrition Science, 6th Multicolour Ed. New Age International (P)Ltd.
2. RodayS(2012): Food Science and Nutrition, 2nd Ed. Oxford University Press.
3. Mann J and TruswellS(2017): Essentials of Human Nutrition, 5th Ed. Oxford University Press.
4. Wilson K and Walker J(2000): Principles and Techniques of Practical Biochemistry, 5th Ed. Oxford University Press.
5. Sadasivan S and ManikamK(2007): Biochemical Methods, 3rd Ed. New Age International (P) Ltd.
6. Oser B L(1965). Hawk's Physiological Chemistry, 14th Ed. McGraw-Hill Book
7. GopalanC, Rama Sastri BV and Balasubramanian SC(2016): Nutritive value of Indian Foods, Indian Council of Medical Research.
8. Subalakshmi G and Udipi SA(2006): Food processing and preservation, 1st Ed. New Age International(P)Ltd.
9. SrilakshmiB(2018): Food Science, 7th Colour Ed. New Age International (P) Lt
10. Potter NN and Hotchkiss JH(1999): Food science, 5th Ed., Springer.

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Devgan

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GENERAL INFORMATION

1. Duration of Course: 30 hrs.
3. Eligibility: UG/PG regular students
4. Participants per Batch: 30

TEACHING METHODOLOGY

Teaching Mode: Synchronous (Online live)/Asynchronous (Online videos/ PDFs)

Some of the following methods of delivery may be adopted:

- A) Lecture
- B) Pdf/ Video
- C) Demonstration Video/Experimental
- D) Group Discussion

ASSESSMENT & CERTIFICATE

Assessment:

The assessment will be done by the department. Both theory and practical examinations will be conducted online/offline using synchronous and asynchronous modes based on suitable LMS

Pass regulation:

Minimum passing marks for Practical: 60%

Minimum pass marks for Theory: 40%

Certificate:

Successful candidates will be issued certificate by the College

ASSESSMENT GUIDELINE:

Assessment will be based on the following:

1. Written exam – Objective/subjective
2. Experiment and Viva-voce
3. Project work and presentation
4. Sessional-Attendance and punctuality

The following marking pattern to be adopted while assessing:

S.No.	Parameters	Assessable outcome	Marks
1.	Writing/Comprehension skill	Remember and Understand	60
2.	Analytical/Applied skill	Apply and Analyse	30
3.	Project work/Presentation skill	Evaluate and Create	20
4.	Sessional- regularity and performance	Aptitude and Attitude	10
Total			100

Name & Signature of Members of Board of Studies.

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Dr. Mrigendra Awasthi

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5/7/24
(Dr. S.D. Dashgupta)

S. C.
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(Dr. S.C. Tiwari)

Arjun
05/7/24
(Dr. Arjun Mishra)

Anju
05/07/24
(Dr. Anju Jha)

Sunitha
05.07.24
(Dr. Sunitha B. Mathew)

Dr. P. K.
19/4/25 (Dr. P. K. Khatun)
05/7/24
(Dr. P. Khatun)

H. Mahabey
05/07/2024
(Dr. Hemlata Mahabey)

V. S. Geete
Dr. V. S. Geete

A. B. Jain
Dr. A. B. Jain

B. Jain
Dr. B. Jain
Dr. Bhawana Jain

