



KARNATAK UNIVERSITY, DHARWAD
ACADEMIC (S&T) SECTION
ಕರ್ನಾಟಕ ವಿಶ್ವವಿದ್ಯಾಲಯ, ಧಾರವಾಡ
ವಿದ್ಯಾಮಂಡಳ (ಎಸ್&ಟಿ) ವಿಭಾಗ



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NAAC Accredited
'A' Grade 2014

website: kud.ac.in

No. KU/Aca(S&T)/SSL-394A/2022-23/1056

Date: 23 SEP 2022

ಅಧಿಸೂಚನೆ

ವಿಷಯ: 2022-23ನೇ ಶೈಕ್ಷಣಿಕ ಸಾಲಿನಿಂದ ಎಲ್ಲ ಸ್ನಾತಕ ಕೋರ್ಸುಗಳಿಗೆ 3 ಮತ್ತು 4ನೇ ಸೆಮಿಸ್ಟರ್
NEP-2020 ಮಾದರಿಯ ಪಠ್ಯಕ್ರಮವನ್ನು ಅಳವಡಿಸಿರುವ ಕುರಿತು.

- ಉಲ್ಲೇಖ: 1. ಸರ್ಕಾರದ ಅಧೀನ ಕಾರ್ಯದರ್ಶಿಗಳು(ವಿಶ್ವವಿದ್ಯಾಲಯ 1) ಉನ್ನತ ಶಿಕ್ಷಣ ಇಲಾಖೆ ಇವರ
ಆದೇಶ ಸಂಖ್ಯೆ: ಇಡಿ 260 ಯುಎನ್ಇ 2019(ಭಾಗ-1), ದಿ:7.8.2021.
2. ವಿಜ್ಞಾನ & ತಂತ್ರಜ್ಞಾನ ನಿಖಾಯ ಸಭೆಯ ಠರಾವುಗಳ ದಿನಾಂಕ: 06.09.2022
3. ವಿಶೇಷ ವಿದ್ಯಾವಿಷಯಕ ಪರಿಷತ್ ಸಭೆಯ ನಿರ್ಣಯ ಸಂ. 01, ದಿನಾಂಕ: 17.09.2022
4. ಮಾನ್ಯ ಕುಲಪತಿಗಳ ಆದೇಶ ದಿನಾಂಕ: 22-09-2022

ಮೇಲ್ಕಾಣಿಸಿದ ವಿಷಯ ಹಾಗೂ ಉಲ್ಲೇಖಗಳನ್ವಯ ಮಾನ್ಯ ಕುಲಪತಿಗಳ ಆದೇಶದ ಮೇರೆಗೆ, 2022-23ನೇ
ಶೈಕ್ಷಣಿಕ ಸಾಲಿನಿಂದ ಅನ್ವಯವಾಗುವಂತೆ, ವಿಜ್ಞಾನ & ತಂತ್ರಜ್ಞಾನ ನಿಖಾಯದ ಎಲ್ಲ ಸ್ನಾತಕ ಕೋರ್ಸುಗಳ ರಾಷ್ಟ್ರೀಯ ಶಿಕ್ಷಣ ನೀತಿ
(NEP)-2020 ರಂತೆ 3 ಮತ್ತು 4ನೇ ಸೆಮಿಸ್ಟರ್‌ಗಳಿಗಾಗಿ ವಿಶೇಷ ವಿದ್ಯಾವಿಷಯಕ ಪರಿಷತ್ ಸಭೆಯ ಅನುಮೋದಿತ
ಪಠ್ಯಕ್ರಮಗಳನ್ನು ಪ್ರಕಟಪಡಿಸಿದ್ದು, ಸದರ ಪಠ್ಯಕ್ರಮಗಳನ್ನು ಕ.ವಿ.ವಿ. www.kud.ac.in ಅಂತರ್ಜಾಲದಿಂದ ಡೌನ್‌ಲೋಡ
ಮಾಡಿಕೊಳ್ಳಲು ಸೂಚಿಸುತ್ತಾ, ವಿದ್ಯಾರ್ಥಿಗಳು ಹಾಗೂ ಸಂಬಂಧಿಸಿದ ಎಲ್ಲ ಬೋಧಕರ ಗಮನಕ್ಕೆ ತಂದು ಅದರಂತೆ
ಕಾರ್ಯಪ್ರವೃತ್ತರಾಗಲು ಕವಿವಿ ಅಧೀನದ / ಸಂಲಗ್ನ ಮಹಾವಿದ್ಯಾಲಯಗಳ ಪ್ರಾಚಾರ್ಯರುಗಳಿಗೆ ಸೂಚಿಸಲಾಗಿದೆ.

ಅಡಕ: ಮೇಲಿನಂತೆ

(Handwritten signature)
ಕುಲಸಚಿವರು.

ಗೆ,

ಕರ್ನಾಟಕ ವಿಶ್ವವಿದ್ಯಾಲಯದ ವ್ಯಾಪ್ತಿಯಲ್ಲಿ ಬರುವ ಎಲ್ಲ ಅಧೀನ ಹಾಗೂ ಸಂಲಗ್ನ ಮಹಾವಿದ್ಯಾಲಯಗಳ
ಪ್ರಾಚಾರ್ಯರುಗಳಿಗೆ. (ಕ.ವಿ.ವಿ. ಅಂತರ್ಜಾಲ ಹಾಗೂ ಮಿಂಚಂಚೆ ಮೂಲಕ ಬಿತ್ತರಿಸಲಾಗುವುದು)

ಪ್ರತಿ:

1. ಕುಲಪತಿಗಳ ಆಪ್ತ ಕಾರ್ಯದರ್ಶಿಗಳು, ಕ.ವಿ.ವಿ. ಧಾರವಾಡ.
2. ಕುಲಸಚಿವರ ಆಪ್ತ ಕಾರ್ಯದರ್ಶಿಗಳು, ಕ.ವಿ.ವಿ. ಧಾರವಾಡ.
3. ಕುಲಸಚಿವರು (ಮೌಲ್ಯಮಾಪನ) ಆಪ್ತ ಕಾರ್ಯದರ್ಶಿಗಳು, ಕ.ವಿ.ವಿ. ಧಾರವಾಡ.
4. ಅಧೀಕ್ಷಕರು, ಪ್ರಶ್ನೆ ಪತ್ರಿಕೆ / ಗೌಪ್ಯ / ಜಿ.ಎ.ಡಿ. / ವಿದ್ಯಾಮಂಡಳ (ಪಿ.ಜಿ.ಪಿ.ಎಚ್.ಡಿ) ವಿಭಾಗ, ಸಂಬಂಧಿಸಿದ
ಕೋರ್ಸುಗಳ ವಿಭಾಗಗಳು ಪರೀಕ್ಷಾ ವಿಭಾಗ, ಕ.ವಿ.ವಿ. ಧಾರವಾಡ.
5. ನಿರ್ದೇಶಕರು, ಕಾಲೇಜು ಅಭಿವೃದ್ಧಿ / ವಿದ್ಯಾರ್ಥಿ ಕಲ್ಯಾಣ ವಿಭಾಗ, ಕ.ವಿ.ವಿ. ಧಾರವಾಡ.



KARNATAK UNIVERSITY, DHARWAD

B.Sc. (Hons) Programme

DRAFT SYLLABUS FOR

BIOTECHNOLOGY

DISCIPLINE SPECIFIC COURSE (DSCC), OPEN ELECTIVE COURSE

(OEC) FOR SEM III & IV

UNDER

NATIONAL EDUCATION POLICY (NEP)

Effective from 2022-23

Karnatak University, Dharwad

B.Sc. Semester-III

Subject: Biotechnology

Discipline Specific Course (DSCC)

Course No.BIT103T

Title of the Course: Biomolecules (Theory)

The course Biomolecules in III semester has two papers(TheoryPaper-I for 04 credits & Practical Paper-II for 2 credits) for 06 credits: Both the papers are compulsory. Detail of the courses are as under.

Course No./ Course code	Type of Course	Theory/Practical	Credits	Instruction Hour per week	Total No. of Lectures/Hours/ Semester	Duration of Exam	Formative Assessment Marks	Summative Assessment Marks	Total Marks
BIT103T/033BIT011	DSCC	Theory	04	04	56hrs.	2hrs	40	60	100

Course Outcome (CO):

After completion of course(Theory), students will be able to:

CO1: Describe the structure and function of biomolecules

CO 2: Appreciate and illustrate the chemical composition of the genetic material and its multiplication

CO 3: Describe the process of gene expression in prokaryotes and eukaryotes

CO 4: Explain the concept of transposition, mutation and DNA repair mechanism

GEN103T: Biomolecules	Total Hrs:56
Unit-I	14hrs
<p>Carbohydrates: Introduction, sources, classification of carbohydrates. Structure, function and properties of carbohydrates. Monosaccharides – Isomerism and ring structure, Sugar derivatives – amino sugars and ascorbic acid</p> <p>Oligosaccharides – Sucrose and Fructose</p> <p>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 (Brief study). Metabolism: Glycolysis and gluconeogenesis, Kreb's cycle, oxidative phosphorylation.</p> <p>Amino Acids, Peptides and Proteins: Introduction, classification and structure of amino acids. Concept of – Zwitterion, isoelectric point, pKa values. Essential and nonessential amino acids. Peptide bond and peptide, classification of proteins based on structure and function, Structural organization of proteins [primary, secondary (α, β, tertiary and quaternary)]. Fibrous and globular</p>	

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

Books recommended :

1. Nelson, D. L., Lehninger, A. L., & Cox, M. M. (2008). *Lehninger principles of biochemistry*. Macmillan.
2. Voet, D., Voet, J. G., & Pratt, C. W. (2016). *Fundamentals of biochemistry: life at the molecular level*. John Wiley & Sons.
3. Satyanarayana, U. (2021). *Biochemistry, 6e-E-book*. Elsevier Health Sciences.
4. Campbell, M. K., Farrell, S. O., & McDougal, O. M. (2016). *Biochemistry*. Cengage Learning.
5. Walker, J. M. (2000). *Principles and techniques of practical biochemistry*. Cambridge University Press.

B.Sc. Semester-III

Subject: Biotechnology

Discipline Specific Course (DSCC)

Course No.-BIT1033P

Title of the Course: Biomolecules (Practical)

Course No.	Type of Course/ course code	Theory /Practical	Credits	Instruction Hour per week	Total No. of Lectures/Hours/ Semester	Duration of Exam	Formative Assessment Marks	Summative Assessment Marks	Total Marks
GEN1033P / 033BIT012	DSCC	Practical	02	04	52hrs	3hrs	25	25	50

Course Outcome(CO):

After completion of course(Practical), students will be able to:

CO1: Acquire knowledge about biomolecules, structure, and their functions

CO2: Will be able to demonstrate the skills to perform bioanalytical techniques

CO3: Apply comprehensive innovation and skills of biomolecules to biotechnology field

List of the Experiments for 52hrs/Semesters

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 Henderson-Hasselbalch equation – Acetate, Phosphate, Tris and determination of pH of solution using pH meter.
4. Estimation of reducing sugars/ maltose by DNS method
5. Determination of α -amylase activity by DNS method
6. Estimation of proteins by Bradford method/ 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 plant pigments by circular paper chromatography
10. Separation of amino acids by thin layer chromatography
11. Native PAGE
12. Determination of iodine number of lipids

**Other practical may be added according to requirement and feasibility*

Books recommended :

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

General instructions:

Scheme of Practical Examination (distribution of marks):25 marks for Semester end examination

1. Major Question ----- 6Marks
2. Minor Question -----4Marks
3. Identification(A-E)-----8Marks
4. Viva -----2Marks
5. Journal-----5Marks

Total25marks

Note: Same Scheme may be used for IA(Formative Assessment)examination

B.Sc. Semester–III

Subject: Biotechnology

Open Elective Course (OEC)

(OEC for other students)

Course No.: BIT103E

Title of the Course: Nutrition and Health (Elective Theory)

Course No. / Course code	Type of Course	Theory /Practical	Credits	Instruction Hour per week	Total No. of Lectures/Hours /Semester	Duration of Exam	Formative Assessment Marks	Summative Assessment Marks	Total Marks
BIT103E 003BIT051	OEC	Theory	03	03	42hrs	2hrs	40	60	100

Course Outcome(CO):

After completion of course, students will be able to:

CO1: Study the concepts of food, nutrition, diet and health

CO2: To apply the best practices of food intake and dietary requirements

CO3: Acquire knowledge about various sources of nutrients and good Cooking practices

GEN103E: Nutrition and Health	Total Hrs:42
Unit-I	14hrs
Introduction: 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, nutraceuticals, Prebiotics, Probiotics, and antioxidants	
Unit-II	14hrs
Nutrients: Macro and Micronutrients - Sources, functions and deficiency. Carbohydrates, Proteins, Fats – Sources and calories. Minerals –Calcium, Iron, Iodine. Vitamins – Fat soluble vitamins –A, D, E & K. Water soluble vitamins – vitamin C Thiamine, Riboflavin, Niacin. Water–Functions and water balance. Fiber –Functions and sources. Recommended Dietary Allowance, Body Mass Index and Basal Metabolic Rate	
Unit-III	14hrs
Nutrition and Health: Methods of cooking affecting nutritional value. Advantages and disadvantages. Boiling, steaming, pressure cooking. Oil/Fat – Shallow frying, deep frying. Baking. Nutrition through lifecycle. Nutritional requirement, dietary guidelines: Adulthood, Pregnancy, Lactation, Infancy- Complementary feeding, Pre-school, Adolescence, geriatric. Nutrition related metabolic disorders- diabetes and cardiovascular disease	

Books recommended :

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., Rama Sastry 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 College Publishers

Details of Formative assessment (IA) for DSCC theory/OEC:40%weightage for total marks

Pedagogy: Lecture, Assignments, Interactive Sessions, ICT, Group Discussion

Formative Assessment 40 (Weightage in Marks includes: Written Tests, Activities/Assignment/Seminar/Presentation &Attendance)			
Assessment Occasion/type	C1	C2	Total Marks
Written Test (2)	10	10	20
Seminar/Presentation/Activity	10	---	10
Case work/Assignment/Field work/Project work etc	---	10	10
Total	20	20	40

Faculty of Science
04-Year UG Honors programme:2021-22

**GENERAL PATTERN OF THE THEORY QUESTION PAPER FOR DSCC/
 OEC
 (60 marks for semester end Examination with 2 hrs duration)**

Part-A

1. Question number 1-06 carries 2 marks each. Answer any 05 questions :10 marks

Part-B

2. Question number 07-11 carries 05 Marks each. Answer any 04 questions :20 marks

Part-C

3. Question number 12-15 carries 10 Marks each. Answer any 03 questions :30 marks

(Minimum 1 question from each unit and 10 marks question may have sub questions for 7+3 or 6+4 or 5+5 if necessary)

Total: 60 Marks

Note: Proportionate weightage shall be given to each unit based on number of hours prescribed.

B.Sc. Semester-IV

Subject: Biotechnology

Discipline Specific Course (DSCC)

Course No.: BIT104T

Title of the Course: Molecular Biology (Theory)

The course Human Genetics and Genetic Counselling in IVsemester has two papers (Theory Paper -I for 04 credits & Practical paper-II for 2 credits) for 06 credits: Both the papers are compulsory. Details of the courses are asunder.

Course No. / Course code	Type of Course / course code	Theory /Practical	Credits	Instruction hour per week	Total No. of Lectures/Hours/ Semester	Duration of Exam	Formative Assessment Marks	Summative Assessment Marks	Total Marks
BIT104T / 034BIT011	DSCC	Theory	04	04	56hrs	2hrs	40	60	100

Course Outcome(CO):

After completion of course(Theory), students will be able to:

- CO1:** Study the advancements in molecular biology with latest trends
- CO2:** Will acquire the knowledge of structure, functional relationship of proteins and nucleic acids
- CO3:** Aware about the basic cellular processes such as transcription, translation, DNA replication and repair mechanisms.

Syllabus-Course4(Theory):Molecular Biology	Total Hrs:56
Unit-I	14hrs
Molecular basis of life and Nucleic Acids: An introduction RNA and experimental proof of DNA as genetic material and types of DNA. Structure and functions of DNA and RNA, Watson and Crick model of DNA and other forms of DNA (A and Z) functions of DNA and RNA including ribozymes. Recombination mechanisms - transformation, conjugation and transduction.	
Unit-II	14hrs
DNA Replication and Repair: Replication of DNA in prokaryotes and eukaryote- Enzymes and proteins involved in replication, Theta model, linear and rolling circle model. Polymerases and all enzyme components. The replication complex: Pre priming proteins, primosome, replisome, unique aspects of eukaryotic chromosome replication, Fidelity of replication DNA damage and Repair mechanism: photo reactivation, excision repair, mismatch repair and SOS repair.	

Unit-III	14hrs
<p>Transcription and RNA processing: Central dogma, RNA structure and types of RNA, Transcription in prokaryotes RNA polymerase, role of sigma factor, promoter, Initiation, elongation and termination of RNA chains.</p> <p>Transcription in eukaryotes: Eukaryotic RNA polymerases, transcription factors, promoters, enhancers, mechanism of transcription initiation, promoter clearance and elongation RNA splicing and processing: processing of pre-mRNA: 5' cap formation, polyadenylation, splicing, rRNA and tRNA splicing</p>	
Unit-IV	14hrs
<p>Regulation of gene expression and translation: Genetic code and its characteristics, Wobble hypothesis Translation- in prokaryotes and eukaryotes- ribosome, enzymes and factors involved in translation. Mechanism of translation- activation of amino acid, aminoacyl tRNA synthesis, Mechanism- initiation, elongation and termination of polypeptide chain. Fidelity of translation, Inhibitors of translation. Protein folding and modifications, Post translational modifications of proteins.</p> <p>Gene regulation in prokaryotes - operon concept (lac and trp).</p> <p>Gene regulation in eukaryotes - transcriptional activation, galactose metabolism in yeast.</p>	

Books recommended :

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 UK
7. Karp. G (2002) Cell & Molecular Biology, 3rdEdition, John Wiley & Sons; I

B.Sc. Semester – IV
Subject: Genetics Discipline Specific Course (DSCC)
Course No: BIT104P
Course Name: Molecular Biology (Practical)

Course No. / Course code	Type of Course	Theory /Practical	Credits	Instruction Hour per week	Total No. of Lectures/Hours/ Semester	Duration of Exam	Formative Assessment Marks	Summative Assessment Marks	Total Marks
BIT104P /034BIT012	DSCC	Practical	02	04	52hrs.	3hrs	25	25	50

Course Outcome(CO):

After completion of course (Practical), students will be able to:

CO 1 :Understand the techniques of nucleic acid estimation techniques

CO 2 :Perform extraction, purification of proteins and its molecular weight detection

CO 3 :Learn the process of reproduction in bacteria

CO 4 : Understand nucleic acid replication and its types

List of the Experiments for 52hrs./Semesters

1. Preparation of DNA model
2. Estimation of DNA by DPA method
3. Estimation of RNA by Orcinol method
4. Column chromatography – gel filtration (Demo)
5. Extraction and partial purification of protein from plant source by Ammonium sulphate precipitation.
6. Extraction and partial purification of protein from animal source by organic solvents.
7. Protein separation by SDS-Polyacrylamide Gel Electrophoresis (PAGE)
8. Charts on- Conjugation, Transformation and Transduction, DNA replication, Types of RNA

Books recommended :

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 UK
7. Karp. G (2002) Cell & Molecular Biology, 3rdEdition, John Wiley & Sons.

General instructions:

Scheme of Practical Examination (distribution of marks): 25 marks for Semester end examination

1. Major Question ----- 6Marks
2. Minor Question -----4Marks
3. Identification(A-E)-----8Marks
4. Viva -----2Marks
5. Journal-----5Marks

Total25marks

Note: Same Scheme may be used for IA(Formative Assessment)examination

B.Sc. Semester-IV

Subject: Biotechnology

Open Elective Course (OEC for other students)

Course No.:BIT104E

Title of the Course: Intellectual Property Rights

Course No. /Course code	Type of Course /Course code	Theory /Practical	Credits	Instruction Hour per week	Total No. of Lectures/Hours/ Semester	Duration of Exam	Formative Assessment Marks	Summative Assessment Marks	Total Marks
BIT104E / 004BIT051	OEC	Theory	03	03	42hrs.	2hrs	40	60	100

Course Outcome(CO):

After completion of course, students will be having basic knowledge of:

CO 1 :Knowledge about need and scope of Intellectual property rights

CO 2 :Acquire knowledge about filing patents, process, and infringement

CO 3 :Knowledge about trademarks, industrial designs, and copyright

Syllabus-OEC4:Title-H Intellectual Property Rights	Total Hrs:42
Unit-I	14hrs
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)	
Unit-II	14hrs
Basics of patents - Types of patents; Patentable and Non-Patentable inventions, Process and Product patent. Indian Patent Act 1970; Recent amendments; Patent Cooperation Treaty (PCT) and implications. Process of patenting. Types of patent applications: Provisional and complete specifications; Concept of “prior art”, patent databases (USPTO, EPO, India). Financial assistance, schemes, and grants for patenting. Patent infringement- Case studies on patents (Basmati rice, Turmeric, Neem)	
Unit-III	14hrs
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	

Books recommended :

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 comptroller general of Patents, Design & Trademarks - www.ipindia.nic.in

**Details of Formative assessment (IA) for DSCC
theory/OEC:40%weightagefortotalmarks**

Pedagogy: Lecture, Assignments, Interactive Sessions, ICT, Group Discussion

Formative Assessment 40 (Weightage in Marks includes: Written Tests, Activities/Assignment/Seminar/Presentation &Attendance)			
Assessment Occasion/type	C1	C2	Total Marks
Written Test (2)	10	10	20
Seminar/Presentation/ Activity	10	---	10
Case work/Assignment/Field work/Project work etc	---	10	10
Total	20	20	40

**Faculty of Science
04-Year UG Honors programme:2021-22**

**GENERAL PATTERN OF THE THEORY QUESTION PAPER FOR DSCC/
OEC
(60 marks for semester end Examination with 2 hrs duration)**

Part-A

1. Question number 1-06 carries 2 marks each. Answer any 05 questions :10m
arks

Part-B

2. Question number 07-11 carries 05 Mark each. Answer any 04 questions :20m
arks

Part-C

3. Question number 12-15 carries 10 Mark each. Answer any 03 questions :30marks
(Minimum 1 question from each unit and 10 marks question may have subque
stions for 7+3 or 6+4 or 5+5 if necessary)

Total:60Marks

Note: Proportionate weightage shall be given to each unit based on number of hours prescribed.
