JAYPEE INSTITUTE OF INFORMATION AND TECHNOLOGY

INTEGRATED M. TECH BIOTECHNOLOGY

1st Semester

SEMESTER 1

Detailed Syllabus

Lecture-wise Breakup

Course Code	21B19GE112	**Semester** Odd	**Semester :** I **Session** 2022 -2023 Month from **July-December**
Course Name	**Bridge Course 2**		
Credits	2	**Contact Hours**	2
Faculty (Names)	**Coordinator(s)**	Dr. Susinjan Bhattacharya	
	Teacher(s) (Alphabetically)	Dr. Susinjan Bhattacharya	

COURSE OUTCOMES		**COGNITIVE LEVELS**
C115.1	Explain the theory of natural selection and mechanisms underlying evolution	Understand Level (C2)
C115.2	Recall methods of reproduction in plants and animals	Remember Level (C1)
C115.3	Identify new developments in agricultural biotechnology	Apply Level (C3)
C115.4	Summarize global environmental problems.	Understand Level (C2)

Module No.	**Subtitle of the Module**	**Topics in the module**	**No. of Lectures for the module**
1.	Evolution of Life	Origin of life; biological evolution and evidences for biological evolution (palaeontology, comparative anatomy, embryology and molecular evidences); Darwin's contribution, modern synthetic theory of evolution; mechanism of evolution - variation (mutation and recombination) and natural selection with examples, types of natural selection; Gene flow and genetic drift; Hardy–Weinberg's	6

		principle; adaptive radiation; human evolution.	
2.	Reproduction	Modes of reproduction - asexual and sexual reproduction; asexual reproduction, binary fission, sporulation, budding, gem-mule formation, fragmentation, vegetative propagation in plants	5
3.	Agri-biotechnology	Animal husbandry, Plant breeding, tissue culture, single cell protein	5
4.	Environmental Issues	Radioactive waste management; ozone layer depletion; deforestation; exemplifying casestudy as success story addressing environmental issue(s).	4
Total number of Lectures			**20**

Scheme of Evaluation:

Mid Term Examination: 30 marks

End Term Examination: 30 marks

Teacher's Assessment: 60 marks

PBL component: The students at the end of the course can utilize their knowledge in agro-based research and industries.

Recommended Reading material: Author(s), Title, Edition, Publisher, Year of Publication etc. (Text books, Reference Books, Journals, Reports, Websites etc. in the IEEE format)

1.	The Origin and Nature of Life on Earth: The Emergence of the Fourth Geosphere. E. Smith, H. J. Morowitz, Cambridge University Press, 2016, ISBN 978-1-107-12188-1.
2.	Agricultural Biotechnology. S. S. Purohit, J.W. Albright. Agrobios (India) Jodhpur, 2005.
3.	Environmental Biotechnology. A. Scragg, R. Tyagi. Oxford University Press, 2004.

Course Code	**18B11CI111**	**Semester Odd (specify Odd/Even)**	**Semester** I **Session** 2022-2023 **Month from:** July to December
Course Name	**Fundamental of Computer Programming – I (NBA Code: C111)**		
Credits	4	**Contact Hours**	3L+1T
Faculty (Names)	**Coordinator(s)**	Dr. Shikha Jain	
	Teacher(s) (Alphabetically)	Dr. Shikha Jain	

COURSE OUTCOMES		**COGNITIVE LEVELS**
C111.1	Explain the basic structure of HTML web page using different tags such as table, links, formatting and frame etc.	Understand (C2)
C111.2	Make use of Cascading style sheets and Java Scripts to develop web pages.	Apply (C3)
C111.3	Explain SQL queries using MySQL to create database tables and retrieve the data from a single table.	Understand(C2)
C111.4	Demonstrate the simple python programs using the constructs such as lists, tuples, dictionaries, conditions, and loops.	Understand(C2)
C111.5	Classify Number System and explain Basics of Computer Systems	Understand (C2)

Module No.	**Title of the Module**	**Topics in the Module**	**No. of Lectures**
1.	HTML	The basic structure of HTML and tags such as Headings, Paragraphs, Formatting, images, Tables, Lists and Frames	8
2.	Cascading Style Sheets	CSS Introduction, Syntax, colors, backgrounds, borders, fonts, links, list, tables, Text.	6
3.	Java Script	JS introduction, Syntax, Comments, Variables, Operators, Arithmetic, Assignment, Data Types, Functions, and Strings	8
4.	Structure Query Language	SQL Intro, Syntax, Select, Insert, Update, Delete, min, max, count, avg, sum, wildcards, constraints, and primary key	5
5.	Python	Python Intro, Syntax, Variables, Numbers, Casting, Strings, Operators, Lists, Tuples, Sets, Dictionaries, If	10

		else, While loops, For Loops, For Loops, Functions	
6.	Number System and Introduction to Computes	Binary, Decimal, Octal ,and Hexadecimal number system, Conversion, Introduction to Computer, Memory, CPU, ALU	5
		Total number of Lectures	42

Project based learning: Students in a group 2-3 will make a basic website for a product/ service of their choice using the concepts of HTML and CSS acquired during the semester. It will give practical experience of website design and develop their team work spirit. The knowledge gained will enhance their employability in the IT sector.

Evaluation Criteria Components
Maximum Marks
T1 20
T2 20
End Semester Examination 35
TA 25 (Attendance:10, Assignment:10, quiz:5)
Total 100

Recommended Reading material: Author(s), Title, Edition, Publisher, Year of Publication, etc. (Text books, Reference Books, Journals, Reports, Website,s etc. in the IEEE format)

1.	Laura Lemay, Rafe Colburn, Jennifer Kymin,"Mastering HTML, CSS & JavaScript Web Publishing", BPB Publications
2.	Ivan Bayross, "Web Enabled Commercial Applications Development Using HTML, JavaScript, DHTML and PHP",BPB Publication
3.	Martin C. Brown, "The Complete Reference Python", TMH
4.	AviSilberschatz, Henry F. Korth, and S. Sudarshan, "Database System Concepts", 6th edition, McGrawHill, 2010.
5.	User manuals supplied by department for SQL and Python

Course Code	**18B15CI111**	**Semester** Odd **(Specify Odd/Even)**	**Semester: I Session** 2022-2023 **Month from:** July to December
Course Name	**Computer Programming Lab I**		
Credits	2	**Contact Hours**	**0-0-4**
Faculty (Names)	**Coordinator(s)**	Dr. K Vimal Kumar	
	Teacher(s) (Alphabetically)	Mradula Sharma, Dr. Pawan Singh Mehra, Dr. Shikha Jain, Dr. K Vimal Kumar	

COURSE OUTCOMES		**COGNITIVE LEVELS**
CO1	Demonstrate basic structure of HTML web page using different tags.	Understand (C2)
CO2	Develop web pages using table tag, formatting tag, and hyperlinks.	Apply (C3)
CO3	Make use of Cascading style sheets and Java Scripts to develop web pages.	Apply (C3)
CO4	Explain SQL queries using MySQL to create database tables and retrieve the data from a single table.	Understand (C2)
CO5	Demonstrate the simple python programs using the constructs such as lists, tuples, dictionaries, conditions, and loops.	Understand (C2)

Module No.	**Title of the Module**	**List of Experiments**	**CO**
1.	Web page development using HTML	Basic structure of HTML, heading and formatting tags and attributes	CO1
2.	Table, hyper link and image insertion on webpage	Make use of anchor tag, image tag and table tag with different attributes.	CO2

3.	Cascading Style sheets	Make use of style sheets to develop more creative web page	CO3
4.	Java Script	Develop interactive web page using java script.	CO3
5.	Structured Query Language	Insert, Update and Delete operation on single table using SQL.	CO4
6.	Basic Programming on Python	Write a python program using the constructs such as lists, tuples, dictionaries, conditions, and loops.	CO5

PBL- Students in a group of 4-5 will be designing an efficient solution to any real-world problem using appropriate HTML, Style sheets, and Database concepts which they studies in the course.

Evaluation Criteria

Components	**Maximum Marks**
Eval 1	15
Eval 2	15
Eval 3	15
Lab Test 1	20
Lab Test 2	20
TA	15
PBL	20 (Students will submit the mini project in a group of 2- 3 members)
Total	**100**

Recommended Reading material: Author(s), Title, Edition, Publisher, Year of Publication etc. (Text books, Reference Books, Journals, Reports, Websites etc. in the IEEE format)

1.	Laura Lemay, Rafe Colburn, Jennifer Kymin," Mastering HTML, CSS & JavaScript Web Publishing" , BPB Publications
2.	Ivan Bayross, "Web Enabled Commercial Applications Development Using HTML, JavaScript, DHTML and PHP", BPB Publication
3.	Martin C. Brown, "The Complete Reference Python", TMH
4.	AviSilberschatz, Henry F. Korth, and S. Sudarshan, "Database System Concepts", 6th edition, McGrawHill, 2010.
5.	User manuals for mySQL& Python supplied by the department.

Course Code	18B15GE112	**Semester:** Even	**Semester:** 2 **Session:** 2021 -22 Month: Feb - June
Course Name	Workshop		
Credits	1.5	**Contact Hours**	03

Faculty (Names)	**Coordinator(s)**	Prabhakar Jha, Nitesh Kumar
	Teacher(s) (Alphabetically)	Chandan Kumar, Deepak Kumar, Madhu Jhariya, Nitesh Kumar. Prabhakar Jha, Rahul Kumar, Vimal Saini

COURSE OUTCOMES		**COGNITIVE LEVELS**
C179.1	Tell the basic of manufacturing environment and various safety measures associated with it.	Remembering Level (C1)
C179.2	Apply the appropriate tools to fabricate joints utilizing work-bench tools.	Applying Level (C3)
C179.3	Create various prototypes in the carpentry trade, fitting trade, and welding trade	Creating Level (C6)
C179.4	Demonstrate the working principle of lathe, shaper and milling machines and able to fabricate the prototypes of desired shape and accuracies.	Understanding Level (C2)

Module No.	**Title of the Module**	**List of Experiments**	**CO**
1.	Carpentry	Preparation of T joint as per the given specification. Preparation of dovetail joint/ cross lap joint as per given specification.	**C179.2, C179.3**
2.	Welding Shop	To study Gas welding and Arc welding equipment and various safety measures associated with it. To make butt joint and lap joint.	**C179.1**, **C179.2, C179.3**
3.	Sheet Metal Shop	To prepare a square tray using GI sheet. To prepare a funnel using GI sheet.	**C179.2, C179.3**

4.	Fitting Shop	To prepare V- groove fit as per given specifications. To prepare square fit as per given specifications.	**C179.2, C179.3**
5.	Machine Shop	To perform turning, facing and grooving operation on Lathe. To perform slotting operation on Shaper Machine. To perform face milling operation on Milling Machine.	**C179.4**

Evaluation Criteria

Components	**Maximum Marks**
Viva 1	20
Viva 2	20
Report file, Attendance, and D2D Work (30)]	60 [File Work (20) + Attendance (10)+(Experimental
Total	**100**

Project based learning: Here students are divided in groups and learn about the applying of appropriate tools to fabricate joints utilizing work-bench tools which helps them in creating various prototypes in the field of

engineering and technology. In the present workshop laboratory with the application of the course outcomes,

students prepare their projects like robotic car, cutting of electronic board made of wood, etc. where application of carpentry shop, sheet metal shop and fitting shop is required.

Recommended Reading material: Author(s), Title, Edition, Publisher, Year of Publication etc. (Text books, Reference Books, Journals, Reports, Websites etc. in the IEEE format)

1.	Hajra Choudhury S.K., Hajra Choudhury A.K. and Nirjhar Roy S.K., "Elements of Workshop Technology", Vol. I 2008 and Vol. II 2010, Media promoters and publishers private limited, Mumbai
2.	Kalpakjian S. And Steven S. Schmid, "Manufacturing Engineering and Technology",4th edition, Pearson Education India Edition, 2002.
3.	Rao P.N., "Manufacturing Technology", Vol. I and Vol. II, Tata Mc GrawHill House, 2017.
4.	John K.C., Mechanical Workshop Practice, 2nd Edition, PHI, 2010
5.	Roy A. Lindberg, "Processes and Materials of Manufacture", 4th edition, Prentice Hall India, 1998

6.	Gowri P.Hariharan and A. Suresh Babu," Manufacturing Technology – I" Pearson Education, 2008
7.	Raghuwanshi B.S., Workshop Technology Vol. I & II, Dhanpath Rai & Sons.

Course Code	**15B11MA112**	Semester Odd	**Semester I Session** 2022-2023
Course Name	**Basic Mathematics 1**		
Credits	4	**Contact Hours**	3-1-0
Faculty (Names)	**Coordinator(s)**	Dr. Himanshu Agarwal	
	Teacher(s) (Alphabetically)	Dr. Himanshu Agarwal	

COURSE OUTCOMES		**COGNITIVE LEVELS**
After pursuing the above-mentioned course, the students will be able to:		
C107.1	explain the concepts of sets, relation and functions.	Understanding Level (C2)
C107.2	illustrate the concepts of complex numbers and their powers including roots.	Understanding Level (C2)
C107.3	discuss the concepts of limits, continuity and differentiability and solve related problems of differential calculus.	Applying Level (C3)
C107.4	utilize integral calculus to evaluate area under the curve.	Applying Level (C3)
C107.5	explain matrices and determinants to solve the system of linear equations.	Applying Level (C3)

Module No.	**Title of the Module**	**List of Experiments**	**CO**
1.	Sets, Relations and Functions	Sets and their representation. Union, intersection and compliment. Mapping or function. One-one, onto mappings, Inverse and composite mappings, Relation and their representation, types of relations, equivalence relation, partial order relation.	10

2.	Complex Numbers	Definition and geometrical representation. Algebra. Complex conjugate. Modulus and amplitude. Polar form. DeMoivre's theorem. Roots of complex numbers. Simple functions.	8
3.	Differential Calculus	Basic concept of limit and continuity. Derivative. Rules of differentiation. Tangent to a curve. Taylor's series. Maxima and minima.	8
4	Integral Calculus	Antiderivative. Fundamental theorem of calculus (statement only). Integrals of elementary functions. Substitution and partial fractions. Definite integral as a limit of sum. Properties of definite integrals. Application to areas and lengths.	8
5.	Matrices and Determinants	Matrices and Determinants: Algebra of matrices. Determinant of a square matrix. Properties of determinants. Some simple type of matrices. Inverse of a matrix. Solution of equations.	8
		Total number of Lectures	42

Project based learning: Students will be divided in a group of 4-5 to collect literature and submit a report on applications of matrix in mathematical modelling of biosciences related phenomenon.

Evaluation Criteria
Components Maximum
Marks

T1 20

T2 20

End Semester Examination 35

TA 25 (Quiz, Assignments, Tutorial, PBL) Total 100

Recommended Reading material: Author (s), Title, Edition, Publisher, Year of Publication etc. (Text books, Reference Books, Journals, Reports, Websites etc. in the IEEE format)

1.	Hass, J., Heil, C., Weir, M. D., Thomas Calculus, 14th Ed., Pearson Education, 2018.
2.	Mathematics Textbook for Class XI, NCERT, 2019.
3.	Mathematics Textbook for Class XII, NCERT, 2019.
4.	Sharma, R.D., Mathematics, Dhanpat Rai Publications, New Delhi, 2018.

Course Code	15B11HS112	**Semester**: Odd	**Semester**: I **Session 2022-23** **Month: July-December**
Course Name	English		
Credits	3	**Contact Hours**	2-0-2
Faculty (Names)	**Coordinator(s)**	Dr Monali Bhattacharya & Dr Ekta Srivastava	
	Teacher(s) (Alphabetically)	Dr Ankita Das, Dr AnshuBanwari, Dr Ekta Srivastava, Dr Monali Bhattacharya, Dr Nilu Chaudhary, Ms Puneet Pannu ,	

COURSE OUTCOMES		**COGNITIVE LEVELS**
C114.1	Develop an understanding and appreciate the basic aspects of English as a communication tool.	Understand (C2)
C114.2	Apply grammar concepts and vocabulary skills in presentation and in spoken and written communication.	Apply (C3)
C114.3	Demonstrate an understanding of different forms of literature and rhetorical devices	Understand (C2)
C114.4	Examine literature as reflection of individual and society	Analyse (C4)
C114.5	Compose different forms of professional writing	Create (C6)
C114.6	Apply Phonetics through theory and practice for better pronunciation	Apply (C3)

Module No.	**Title of the Module**	**Topics in the Module**	**No. of Lectures for the module**
1.	English as a Communication Tool	Basic aspects of English: LSRW: Listening, Speaking, Reading, Writing Non-Verbal Communication: Body Language, Voice Modulation, Posture; Presentation Techniques: Self-Presentation Strategies; Types of Strategic Presentation; PPT Presentations; Using Gambits to refine Group Discussions and Interview Skills Phonetics: Pronunciation, Stress, Rhythm, Intonation	9
2.	Grammar & Vocabulary	Parts of Speech and Agreement of Noun-Verb; Noun-Pronoun; Tense, Aspect, Mood and Voice Vocabulary Enrichment techniques: The concept of Word Formation; Root words from foreign languages and their use in English; Acquaintance with prefixes and suffixes from foreign languages in English to form derivatives; Synonyms, Antonyms, Homonyms, Homophones, Collocation. Error Analysis	6

3	Language through Literature	**Forms of Literature & Rhetorical Devices** **Short Story** ·Too Bad by Isaac Asimov **Poem** ·Where the mind is without fear by Rabindra Nath Tagore **One act Play** Refund by Fritz Karinthy **Famous Speech** Swami Vivekanand's Chicago Speech	5
3.	Professional Application/Writing	Textual Organization ·Letter Writing, Email Etiquettes, Feedbacks and Review Writing ·Notice, Agenda and Minutes ·Format of Report Writing ·CV and Resume	8
		Total number of Lectures	**28**

Practical Modules

Syllabus for Reading Modules	**No. of Hours in Lab: 7**
Practical for Learning Comprehension Strategies of Reading through Activities: • Summarizing • Sequencing • Inferencing • Comparing and contrasting; Drawing conclusions • Self-questioning • Problem-solving; • Newspaper reading and comprehension • Relating background knowledge • Distinguishing between fact and opinion • Finding the main idea, important facts, and supporting details	5 Hrs
Practice Quick Reading through SKY Read up-Speed Up Software or SAT/CAT/IELTS exercises.	2 Hrs
Syllabus for Listening Modules	No. of Hours in Lab: 7
Practical for Mastering the Skill of Listening through Activities:	

• **Listening for the Main Idea; Listening for Detail: 5 Ws and H questions; Listening in sequence: for order following Through Ted Talks** • **Listening with vocabulary through Bingo** • **Listening for understanding personal & social connotations through News Brief, Interviews.** • **Listening for non-verbal connotations through Audio-Videos and Movie Clips** • **Listening for Functional Language: understanding choice of words for same situation.**	5 Hrs
Practice Listening through software of Sky IELTS Listening Exercises or Podcasts	2 Hrs

Syllabus for Speaking Modules	**No. of Hours in Lab: 7**
Activities based on Usage of Grammar Concepts in Communication: • Spoken vs. Written language- Formal and Informal English (Bingo); • Practice through JAM Session- Situational Dialogues – Greetings – Taking; Leave – Introducing Oneself and Others. Making Requests and Seeking Permissions - Telephone Etiquette.	2 Hrs
Activities for Vocabulary Enrichment: • Cue Cards based Activities: Practice: Learning new words and and usage through various connotations and denotations; • Practice through News Briefs & Peer Learning	2 Hrs
Activities for learning Public Speaking: • Exposure to Structured Talks - Non-verbal Communication: Practice: Situational Dialogues –Navigating Memory Lanes and Re-creating through Role-Play- Expressions in Various Situations; • Practice of Phonetics, Stress and Intonation while Making a Short Speech, Extempore and Making a Presentation	3 Hrs

Syllabus for Writing Modules	**No. of Hours in Lab: 7**
Grammar Practice & Exercises: • Jumbled Paragraphs for grammar learning • Picking the Out of Context sentence in a Jumbled Paragraph for proper communication. • Application of right grammar concepts	2 Hrs
Practical on Different forms of writing, like persuasive writing, expository, narrative, descriptive	1 Hr
Cohesion in Writing: Application of Discourse Markers:	2 Hrs

• Enriched vocabulary patterns in sentence structuring • Fill in the missing vocabulary items in sentences • Fill in the missing structural items in sentences • Finish the text (Cloze Writing) • Bring cohesion in writing with proper tense usage	
Picture composition & Precis Writing: • Using Action Words • Activity writing • Information Transfer • Experience Sharing	2 Hrs

Evaluation Criteria

Components	**Maximum Marks**
T1	20
T2: LAB Exam	20
End Semester Examination	35
TA	25 (Project, Lab Test, Lab File Assessment)
Total	**100**

PBL Component: The creative writing project is to be done in a group of 3-4 students. Students will be asked to choose one specific word that impacts all six dimensions of their life-mental, physical, emotional, relational, spiritual and financial. The simplicity of choosing one word makes it a catalyst for life change. The word chosen should serve as the underlying theme for the creative activity. (Examples of some words could be Power, Passion, Gratitude, Compassion, Integrity, Humility to name a few). Students will Craft/Create/Compose either a poem, prose piece (short story) or one act play on the above highlighting the choice of the word, justifying their choice and the use of literary devices to make their piece of art appealing and effective. The creative write-up should be attempted in 1-2 pages, using Times New Roman 12 font with single spacing. The students will also attach a page to enumerate the following:

1. Identify the devices used.
2. Highlight the contribution of each group member against his/her name in complete work.

Recommended Reading material: Author(s), Title, Edition, Publisher, Year of Publication etc. (Text books, Reference Books, Journals, Reports, Websites etc. in the IEEE format)

1.	**C.L.Bovee, J.V.Thill, M.Chaturvedi**, *Business Communication Today*,9th Ed, Pearson Education, copyright@ Dorling Kinderslay (India) Pvt Ltd,2009
2.	**Kelly M. Quintanilla and S.T.Wahl**, *Business and Professional Communication*, Sage Publications Pvt India Ltd,2011
3.	**S. Kumar and Pushp Lata,** *Communication Skills*, Oxford University Press,1st, Ed. 2011
4.	**R.K Bansal, and J.B Harrison**, *Spoken English for India*, Orient Longman, 2018
5	**M A Yadugiri,** The Pronunciation of English: Principles and Practice, Viva Books Pvt. Ltd, India, 2015
6	**Rabindranath Tagore,** *"Where the Mind is without Fear"***,** BK Classics

7	**A. R. Rizvi,** 'Effective Technical Communication' 2nd edition, McGraw Hill Education Private Limited, Chennai, 2018.
8	**Raymond Murphy,** English Grammar in Use, 5th edition, Cambridge University Press, 2019.
9	**Hewings, M**. *English Pronunciation in Use*. Advanced. Cambridge: CUP, 2009
10	**Krishna Mohan and N. P. Singh**, *Speaking English Effectively* 2nd Edition. Macmillan Publishers India Ltd. Delhi. 2011
11	**Isaac Asimov,** *"Too Bad"***,** Robot Visions, ROC Books, New York, NY, USA, 1991
12	**Suresh Kumar, E. &Sreehari, P**. *A Handbook for English Language Laboratories*. New Delhi: Foundation, 2009.
13	**Fritz Karinthy,** "*The Refund*", A Play in One Act adapted by Percival Wilde, French's Acting Edition, London, 1958
14	**Swami Vivekananda &Sankar Srinivasan, "Sisters**& Brothers of America: Speech at World Parliament of Religions, Chicago, 1893", Creative Space Independent Publishing Platform, 2015

Course Code	**15B11PH112**	**Semester: Odd**	**Semester: I Session:** 2022-2023. **Month from:** July to December
Course Name	**Physics for Biotechnology**		
Credits	4	**Contact Hours**	4
Faculty (Names)	**Coordinator(s)**	Prof. Anirban Pathak	
	Teacher(s) (Alphabetically)	Anirban Pathak	

COURSE OUTCOMES		**COGNITIVE LEVELS**
C103.1	Relate historical development of optics, atomic physics and biomechanics to the modern concepts.	Remembering (C1)
C103.2	Explain the relevant concepts of optics, biomechanics, laser, atomic structure, bio-fluid mechanics, allometry and statistical distribution	Understanding (C2)
C103.3	Apply of mathematical principles and laws of physics in handling physical problems with a specific focus on the biological systems.	Applying (C3)
C103.4	Logically analyze biological systems using the laws of physics or biophysics	Analyzing (C4)

Module No.	**Title of the Module**	**Topics in the Module**	**No. of Lectures for the module**
1.	Physical Optics	Basic idea of wave and its mathematical representation, Physical optics in biotechnology, Analytical treatment of interference in Young's Double Slit experiment, Intensity distribution of fringe system, Fresnel's biprism, Newton's rings, Michelson interferometer and its application in measurement of thickness of thinfilms, Introduction to diffraction (limited to Fraunhofer class) from Single slit, double slit and Diffraction grating, Polarization, Birefringence, Practical polarizers, Quarter wave plates and half wave plates, Production and analysis of different types of polarized light. Optical activity, polarimeters and applications of optical activity in biological sciences.	19

2.	Biomechanics and allometry	Laws of Newtonian mechanics, Rigidity modulus, basic ideas of biomechanics and allometry, sports biomechanics	4
3.	Bio-fluid mechanics	Surface tension, Viscosity and flow of Newtonian fluid (e.g., blood) in elastic channel (e.g., artery), Basic ideas of rheology, biofluid mechanics and, polar and non- polar solvents	6
4.	Atomic Structure	Origin of spectral lines, spin and orbital angular momentum, Quantum numbers, Atoms in magnetic field, Zeeman effect.	7
5.	Statistical Distributions and Lasers	Principle and working of laser, Ruby Laser, Applications of lasers in biotechnology.	4
		1	**40**

Evaluation Criteria
Components Maximum Marks

T1 20

T2 20

End Semester Examination 35

TA 25 [2 Quizzes (10 M), Attendance (10 M) and Class performance (5 M)]

Total 100

Recommended Reading material: Author(s), Title, Edition, Publisher, Year of Publication etc. (Text books, Reference Books, Journals, Reports, Websites etc. in the IEEE format)

1.	Ghatak, *Optics*, Tata McGraw Hill.
2.	A. Beiser, *Concepts of Modern Physics*, Mc Graw Hill International.
3.	Size, Function, and life story, William A Calder III, Dover, New York, 1996
4.	An Introduction to Biomechanics: Solids and Fluids, Analysis and Design by Jay D. Humphrey, Sherry L. Delange, Springer, New York, 2003.

Project based Learning: Short projects will be assigned to students as assignments to develop an understanding of the role of physics in biotechnology with specific attention to applications of lasers, interferometers, etc. The projects related to allometry will develop their analytic capabilities and provide first exposure to R& D activities

Course Code	**15B17PH171**	**Semester** Odd	**Semester** I **Session** 2022-2023..**Month from:** July to December
Course Name	**Physics Lab-1**		
Credits	01	**Contact Hours**	02
Faculty (Names)	**Coordinator(s)**	Himanshu Pandey and Anshu D. Varshney	
	Teacher(s) (Alphabetically)	Alok Pratap Singh Chauhan, Amit Verma, Anuj Kumar, Anuraj Panwar, Anshu D. Varshney, Bhubesh Chander Joshi, D. K. Rai, Dinesh Tripathi, Manoj Kumar, ManojTripathi, N. K. Sharma, Navendu Goswami, Prashant Chauhan, S. C. Katyal, Sandeep Chhoker, Swati Rawal, Vikas Malik, Vivek Sajal	

COURSE OUTCOMES		**COGNITIVE LEVELS**
C170.1	Recall optics and modern physics principles behind the experiments.	Remembering (C1)
C170.2	Explain the experimental setup and the principles involved behind the experiments performed.	Understanding (C2)
C170.3	Plan the experiment and set the apparatus and take measurements.	Applying (C3)
C170.4	Analyze the data obtained and calculate the error.	Analyzing (C4)
C170.5	Interpret and justify the results.	Evaluating (C5)

Module No.	**Title of the Module**	**List of Experiments**	**CO**
1.	Optics	**1.** To determine the wavelength of sodium light with the help of Newton's rings setup **2.** To determine the wavelength of sodium light with the help of Fresnel's Bi-prism **3.** To find the specific rotation of cane- sugar solution by a polarimeter at room temperature, using half-shade / Bi-quartz device. **4.** To determine the dispersive power of the material of a prism with the help of a spectrometer. **5.** To determine the wavelength of prominent spectral lines of mercury light by a plane transmission grating using normal incidence method	1-5

2.	Modern Physics	**6.** To study the Photoelectric effect and determine the value of Planck's constant. **7.** Determination of Planck's constant by measuring radiation in a fixed spectral range.	1-5
3.	Electricity and Magnetism	**8.** To verify Stefan's law by electrical method. **9.** To determine the resistance per unit length of Carey Foster's bridge wire and specific resistance of the material of the given wire using Carey Foster's bridge. **10.** To study the variation of magnetic field with distance, along the axis of Helmholtz galvanometer, and to estimate the radius of the coil.	1-5

Evaluation Criteria
Components Maximum Marks
Mid Term Viva (V1) 20

End Term Viva (V2)
20 D2D 60

Total 100

Recommended Reading material: Author(s), Title, Edition, Publisher, Year of Publication etc. (Text books, Reference Books, Journals, Reports, Websites etc. in the IEEE format)

1.	Dey and Dutta, *Practical Physics*, Kalyani Publication.
2.	Experiment hand-outs.