Jaypee Institute of Information Technology

B.Tech. Biotechnology

Semester III

Course Descriptions

Detailed Syllabus
Lecture-wise Breakup

Course Code	15B11HS211	**Semester: ODD (specify Odd/Even)**	**Semester:** III **Session 2020-21** **Month from:** July to December
Course Name	Economics		
Credits	03	**Contact Hours**	2-1-0

Faculty (Names)	**Coordinator(s)**	Dr.Praveen Sharma, Dr.Sakshi Varshney
	Teacher(s) (Alphabetically)	Dr.Amba Agarwal, Dr.Anshu Banwari, Dr.Kanupriya MisraBakhru, Mr.Manas Ranjan Behra, Dr.Mukta Mani, Dr.Praveen Sharma, Dr.Sakshi Varshney, Dr.Shirin Alavi

COURSE OUTCOMES		**COGNITIVE LEVELS**
C206-1.1	*Explain* the basic micro and macroeconomics concepts.	Understanding (Level 2)
C206-1.2	*Analyze* the theories of demand, supply, elasticity and consumer choice in the market.	Analyzing (Level 4)
C206-1.3	*Analyze* the theories of production, cost, profit and break even analysis	Analyzing (Level 4)
C206-1.4	*Evaluate* the different market structures and their implications for the behavior of the firm.	Evaluating (Level 5)
C206-1.5	*Examine* the various business forecasting methods.	Analyzing (Level 4)
C206-1.6	*Apply* the basics of national income accounting and business cycles to Indian economy.	Applying (Level 3)

Module No.	**Title of the Module**	**Topics in the Module**	**No. of Lectures for the module**
1.	Introduction	Economics Definition, Basic economic problems, Resource constraints and welfare maximization. Micro and Macroeconomics. Production Possibility Curve. Circular flow of economic activities.	2
2.	Basics of Demand, Supply and Equilibrium	Demand side and supply side of the market. Factors affecting demand & supply. Elasticity of demand & supply – price, income and cross-price elasticity. Market equilibrium price.	3
3.	Theory of Consumer Choice	Theory of Utility and consumer's equilibrium. Indifference Curve analysis, Budget Constraints, Consumer Equilibrium.	2
4.	Demand forecasting	Regression Technique, Time-series Smoothing Techniques: Exponential, Moving Averages Method	6
5.	Production theory and analysis	Production function. Isoquants, Isocostlines, Optimal combination of inputs. Stages of production, Law of returns, Return to scale.	3
6.	Cost Theory and Analysis	Nature and types of cost. Cost functions- short run and long run Economies and diseconomies of scale	3
7.	Market Structure	Market structure and degree of competition Perfect competition, Monopoly, Monopolistic competition, Oligopoly	5

8	National Income Accounting	Overview of Macroeconomics, Basic concepts of National Income Accounting,	3
9	Macro Economics Issues	Introduction to Business Cycle, Inflation-causes, consequences and remedies: Monetary and Fiscal policy.	3
		Total number of Lectures	30

Evaluation Criteria

Components	**Maximum Marks**
T1	20
T2	20
End Semester Examination	35
TA	25 (Test +Quiz+ Attendance)
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.	H.C. Petersen, W.C. Lewis, *Managerial Economics*, 4th ed., Pearson Education 2001.
2.	D. Salvatore, Managerial Economics in a Global Economy, 8th ed., Thomson Asia, 2015.
3.	S. Damodaran, Managerial Economics, 2nd ed., Oxford University Press, 2010.
4.	M. Hirschey, Managerial Economics, 15th ed., Thomson Asia, 2019.
5.	P.A. Samuelson, W.D. Nordhaus, Economics, 19th ed., Tata Mc-Graw Hill, 2010.
6.	S.K. Misra & V. K. Puri, Indian Economy, 37th ed., Himalaya Publishing House, 2019.

Detailed Syllabus
Lecture-wise Breakup

Course Code	15B11BT211	**Semester** Odd **(specify Odd/Even)**	**Semester: III Session** 2020-21 **Month from:** July to December
Course Name	**Biochemistry**		
Credits	4	**Contact Hours**	4 (3+1)

Faculty (Names)	**Coordinator(s)**	Dr. Garima Mathur
	Teacher(s) (Alphabetically)	Dr. Garima Mathur Dr. Smriti Gaur

COURSE OUTCOMES		**COGNITIVE LEVELS**
C211.1	Summarize concepts of cell biology	Understand level (Level II)
C211.2	Explain the structure and function of biological molecules	Understand level (Level II)
C211.3	Analyze enzyme kinetic data and regulation of enzyme activity	Analyze level (Level IV)
C211.4	Identify the key molecules involved in regulation of metabolic pathways and disorders	Apply level (Level III)

Module No.	**Title of the Module**	**Topics in the Module**	**No. of Lectures for the module**
1.	**Molecular design of life**	Cell structure and function Biological Membranes: structure and function	**4**
2.	**Structure and properties of biomolecules**	Structure & properties of carbohydrates Structure & properties of proteins Structure & properties of lipids Structure & properties of nucleic acids	**7**
3.	**Enzymes**	Mechanisms of Enzyme action, Enzyme Kinetics Enzyme Regulation, Enzyme inhibition	**5**
4.	**Metabolism: Basic concepts and design**	Types of metabolic pathways, energy transformation in cellular processes, Energetic coupling, Phosphoryl transfer potential, ATP-ADP cycle, regulation of metabolic pathways	**2**
5.	**Carbohydrate metabolism and regulation**	Glycolysis, gluconeogenesis, TCA, oxidative phosphorylation, Glyoxylate cycle, Glycogen metabolism, Pentose phosphate pathway	**8**
6.	**Metabolism of fatty acids and regulation**	Biosynthesis of fatty acids Oxidation of saturated and unsaturated Fatty acids Ketogenesis Lipid transport and storage	**6**
7.	**Metabolism of amino acids and regulation**	Protein turn over and amino acid degradation, urea cycle and its regulation	**4**
8.	**Metabolism of nucleotides and regulation**	Nucleotide biosynthesis: Salvage and de Novo pathway	**3**
9.	**Metabolic integration**	Integration of metabolic pathways Inborn errors in metabolism	**3**

Total number of Lectures	**42**

Evaluation Criteria

Components	**Maximum Marks**
T1	20
T2	20
End Semester Examination	35
TA	25 (Class test 1, Class test 2, Assignment)
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.	V.B. Rastogi, K.R. Aneja. Zubay's Principles of Biochemistry, Fifth Edition, Medtech, 2017
2.	J. M. Berg, J. L. Tymoczko, L. Stryer, Biochemistry, 8th Edition. Freeman and company, 2015
3.	D. L. Nelson and M. M. Cox, Lehninger Principles of Biochemistry, 7th Edition, W. H. Freeman, 2017

Detailed Syllabus
Lab-wise Breakup

Course Code	(15B17BT271)	**Semester** Odd	**Semester:** III **Session** 2020-21 **Month from:** July to December
Course Name	Biochemical Techniques lab		
Credits	1	**Contact Hours**	2(C-1,C-2,C-3)

Faculty (Names)	**Coordinator(s)**	Dr. Vibha Rani
	Teacher(s) (Alphabetically)	Prof. Neeraj Wadhwa Dr. Sujata Mohanty Dr. Shweta Dang Dr. Ashwani Mathur Dr. Shaini Mani Dr. Garima Mathur
Course Description: Synthesis of proteins, lipids, nucleic acids. Use of current biochemical and molecular techniques to plan and carry out experiments related to bio molecules including isolation, purification and kinetics of enzymes.		

COURSE OUTCOMES		**COGNITIVE LEVELS**
CO271.1	Demonstrate proficiency in calculations and reagent preparation	Understand level (Level II)
CO271.2	Explain fundamental biochmical principles related to structure and functions of biomolecules	Understand level (Level II)
CO271.3	Identify methods used to study various biomolecules	Apply level (Level III)
CO271.4	Able to examine the enzyme kinetics in biochemical reactions	Analyzing level (Level IV)

Module No.	**Title of the Module**	**List of Experiments**	**CO**
1.	**Preparation of reagents**	**Calculations and reagent preparations**	**C1**
2	**Preparation of Buffers and standards**	**Preparation of buffers, working solutions and standards**	**C2**
3	Total Protein Isolation	Isolation of total cell protein from plant / microbe	C2
4	Separation and Identification of	Separation and identification of different compounds in a mixture by chromatography methods: ● Paper chromatography	C3

	Compounds in a Mixture	• Thin layer chromatography(TLC) • Column chromatography • Virtual lab demonstration	
5	Separation of Proteins	Analysis of proteins by SDS-polyacrylamide gel electrophoresis (SDS-PAGE)	C3
6	Enzyme Activity	To study amylase activity in total cell protein from plant / microbe	C4
		Total no. of labs-12	

Evaluation Criteria

Components	**Maximum Marks**
Mid-Semester lab-viva/ test	20
End-Semester lab-viva/ test	20
Day to Day performance (Learning laboratory Skills and handling Laboratory Equipments, attendance)	45
Laboratory record	15
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.	Protein Purification Handbook from Amersham Biosciences, 2018
2.	Introduction to Practical Biochemistry, editors: S.K. Sawhney & Randhir Singh, 2005
3.	Understanding Enzymes Function, Design, Engineering, and Analysis, editor: Allan Svendsen; Pan Stanford Publishing Pte. Ltd.. 2016
4.	Protein Sample Preparation Handbook; GE Healthcare Life Sciences

Course Description

Course Code	15B17EC271	**Semester -:** Odd (specify Odd/Even)	**Semester:** III **Session** 2020-21 **Month from**: July to December
Course Name	Electrical Science-2 Lab for Biotechnology		
Credits	2	**Contact Hours**	2

Faculty (Names)	**Coordinator(s)**	Kaushal Nigam & Mandeep Narula
	Teacher(s)	Amit Goyal, Ankur Bhardwaj, Atul Srivastava, Alok Joshi, Abhishek Kashyap, Bhagirath Sahu, Bajrang Bansal Dhiksha Chandola, Gaurav Verma, Jyoti Vyas, Jasmine Saini, Monika, Madhu Jain, Priyanka Kwatra, Rachna Singh, Ruby Beniwal, Shruti Kalra, Sajai Vir Singh, Satyendra Kumar, Shradha Saxena, Shamim Akhtar, Vishal Saxena, Vijay Khare, Vimal Kumar Mishra, Vinay Aaand Tikkiwal, and Vivek Dwivedi

COURSE OUTCOMES		**COGNITIVE LEVELS**
C204.1	Understand Transient analysis and steady state response of series RC circuit.	Understanding (Level II)
C204.2	Acquire the knowledge of circuits like Adder, Subtractor, Integrator, differentiator; inverting and non inverting amplifier circuits realized using Op-amp IC-741.	Analyzing (Level IV)
C204.3	Study and Implementation of the different logic gates.	Remembering (Level I)
C204.4	Construct Adder, Subtractor and Multiplexer circuits using logic gates.	Applying (Level III)

Module No.	**Title of the Module**	**List of Experiments**	**Cos**
1.	Study of Transient Analysis in the Network Circuit	Transient analysis of a series RC circuit for a given time constant.	C204.1
2.	Study and Analysis of Parallel Resonance Circuits	Analysis of Parallel Resonance circuits	C204.1

3.	Study and Analysis of Series Resonance Circuits	Analysis of Series Resonance circuits.	C204.1
4.	Study and Analysis of Inverting and Non-inverting by Op-Amp	To realize inverting and non inverting amplifier configuration using Op-Amp IC-741.	C204.2
5.	Study and Analysis of Adder and Substractor by Op-Amp	To realize adder and substractor circuits using Op-Amp IC-741	C204.2
6.	Study and Analysis of Differentiator and Integrator by Op-Amp	To realize differentiator and integrator circuits using Op-Amp IC-741.	C204.2
7.	Study of Logic Gates and Verification of Boolean Laws	Verification of the truth tables of logic gates using ICs	C204.3
8.	Study and Implement of Basics Logics Gates using Universal Logic Gates	To implement basic logic gates AND, OR, NOT using NAND and NOR gates.	C204.3
9.	Perform the Boolean Expression using Universal Gates	To implement the Boolean expressions using NAND gates only: $(i)X = \underline{A + B}$ $(ii)Y = \underline{A}B + C\underline{D}$ $(iii)Z = \underline{(A + \underline{B})(C + \underline{A})}$	C204.3
10.	Design and Implementation of Adders	To realize a Half Adder, Full Adder using logic gates.	C204.4
11.	Design and Implementation of Subtractors	To realize a Half Subtractor , Full Subtractor using logic gates.	C204.4
12.	Design and Implementation of Multiplexer	To realize 4:1 Multiplexer using NAND gates.	C204.4
13.	Study and Implement of Voltage	To implement a Voltage Comparator circuit using Op-Amp	C204.2

	Comparator using Op-Amp		
14.	Study of Square Waveform using Op-Amp	To generate a Square Waveform using Op-Amp	C204.2
15.	Study and Analysis of Filter in Op-Amp	To design a First Order Low Pass Filter	C204.2

Evaluation Criteria

Components	**Maximum Marks**
Viva1	20
Viva2	20
Report file, Attendance, and D2D	60 (15+15+30)
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.	**Richard C. Dorf, James A. Svoboda, "Introduction to Electric Circuits," Wiley; 7 Edition, 2006**
2.	**M. Morris Mano, "Digital Design," 3rd Edition, PHI, 2002**
3.	**A. A. Kumar, "Fundamentals of Digital Circuits," 3rd Edition, PHI Learning Pvt. Limited, 2014**
4.	**D. Roy Choudhary and Shail B. Jain, " Linear Integrated Circuit," 2nd Edition, NAILP, 20 03**

Detailed Syllabus

Lecture-wise Breakup

Course Code	15B11EC211	**Semester(specify Odd/Even)**	**Semester** III **Session 2020-21** **Month from** July to December
Course Name	Electrical Science -2		
Credits	4	**Contact Hours**	3-1-0

Faculty (Names)	**Coordinator(s)**	Ashish Goel, Satyendra Kumar
	Teacher(s) (Alphabetically)	Atul Kumar Shrivastava, Deeksha Chandola, Garima Kapur, Jyoti Vyas, Kaushal Nigam, Kirmender Singh, Madhu Jain, Mandeep Narula , Nisha Venkatesh, Priyanka Kwatra, Rachna Singh, Ruby Beniwal, Sajai Vir Singh, Shradha Saxena, Shruti Kalra, Vimal Kumar Mishra

COURSE OUTCOMES		**COGNITIVE LEVELS**
C203.1	Study and analyze the first-order and second-order passive circuits.	Analyzing Level (C4)
C203.2	Demonstrate the operational amplifier and logic gates and their applications in analog and digital system design.	Understanding Level (C2)
C203.3	Define the basics of signals, systems and communication.	Remembering Level (C1)
C203.4	Illustrate the electrical machines, transformers and analogous of electrical & mechanical systems.	Understanding Level (C2)

Module No.	**Title of the Module**	**Topics in the Module**	**No. of Lectures for the module**
1.	Transient Analysis	First order network analysis, sequential switching, Differential equation approach for DC and Non constant source, second order network analysis using differential equation approach for DC and non-constant source.	8
2.	Operational Amplifiers	Introduction to Operational Amplifiers, Basic Concepts and their Applications like Comparators, Inverting and Non-inverting Amplifier, Subtractor, Adder, Integrator and Differentiator circuits.	6
3.	Basics of digital electronics	Introduction to Boolean algebra, logic circuits and logic gates, multiplexers and decoders. Introduction to Flip-flops.	10
4.	Introduction of Signals and Systems	Basic overview of Signals and Systems, Signal types and their representation- Time Domain, Frequency Domain.	4

5.	Introduction of Communications	Basics of digital communication and analogue communication.	3
6.	Machines	Introduction to dc motors and dc generators, three phase and single phase induction motors.	3
7.	Single Phase Transformer	Principle of operation, construction, e.m.f. equation, equivalent circuit, power losses, efficiency (simple numerical problems), introduction to auto transformer.	4
8.	Analogous Electrical and Mechanical Systems	Analogy between mechanical and electrical quantities: Analogous quantities, Analogous equations. Conversion between systems: electrical to mechanical and mechanical to electrical systems.	3
		Total number of Lectures	41

Evaluation Criteria

Components	**Maximum Marks**
T1	20
T2	20
End Semester Examination	35
TA	25
Total	**100**

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

1.	Dorf, R.C. and Svoboda, J.A., Introduction to Electric Circuits. John Wiley & Sons.
2.	Mano, M.M., Digital Design. Pearson Education Asia.
3.	Oppenheim, A.V., Willsky, A.S. and Nawab, S.H., Signals and Systems. Prentice-Hall.
4.	A. Anand Kumar, Signals and Systems, PHI Learning Private Limited
5.	A.E. Fitzgerald, C. Kingsley Jr. and At. D. Umans, Electric Machinery, Fifth edition, Mc Graw Hill.
6.	D.C. Kulshreshtha, Basic Electrical Engineering, Mc Graw Hill.
7.	I. J Nagrath and M. Gopal, Control Systems Engineering, New age International, Fifth edition, Fifth edition, 2009.

Detailed Syllabus

Lecture-wise Breakup

Subject Code	**15B11GE301**	**Semester: ODD**	**Semester:** III **Session: 2020-21** **Month from:** July to December
Subject Name	**Environmental Studies**		
Credits	**0**	**Contact Hours**	**3**

Faculty (Names)	**Coordinator(s)**	1. Dr. Krishna Sundari S
	Teacher(s) (Alphabetically)	1. Dr. Krishna Sundari S 2. Manisha Singh 3. Dr. Rachana 4. Ms. Ekta Bhat

COURSE OUTCOMES		**COGNITIVE LEVELS**
CO205.1	Explain diversity of environment, ecosystem resources and conservation.	Understand Level (C2)
CO205.2	Identify hazards related to environmental pollution and safe management practices	Apply Level(C3)
CO205.3	Apply modern techniques for sustainable Urban planning and Disaster management	Apply Level(C3)
CO205.4	Recall Government regulations, Environmental Policies, Laws & ethics	Understand Level (C2)
CO205.5	Survey ground situation on specific environmental aspects, examine risks involved, make a field report and present the findings	Analyzing Level(C4)

Module No.	**Subtitle of the Module**	**Topics in the module**	**No. of Lectures for the module**
1.	The Multidisciplinary nature of environment, Biodiversity	Definition, scope and importance, Need for public awareness, Types of Ecosystems, World Biomes, Ecosystem functioning, Diversity of flora and fauna, species and wild life diversity, Biodiversity hotspots, threats to biodiversity, Case studies.	6
2.	Natural resources, Energy consumption & conservation	Water, Land, Energy (Renewable, non-renewable, wind, solar, hydro, Biomass), Mineral, Forest, & Food resources, Global Conventions on Energy, Kyoto protocol, Case studies.	10
3.	Pollution, hazardous waste management	Air, Water & Land, chemical, noise pollution, sources & causes, effects, Electronic waste, nuclear hazards, Case studies.	8

4.	Urban planning, human communities, Disaster management	Sustainable building, Disaster Management and Contingency Planning, human population, resettlement, rehabilitation environmental movements, environmental ethics, Critical issues concerning Global environment Urbanization, population growth, global warming, climate change, acid rain, ozone depletion etc Case studies.	8
5.	Environmental Policies, Laws, Regulations & ethics	Regulation of technology and innovation, Policy and laws, Different Acts such as: Environmental Protection Act, Air and Water Acts, Wildlife and Forest Acts), US-EPA, National Environmental Policy; Function of pollution control boards (SPCB and CPCB), their roles and responsibilities, Case studies.	4
6	Field Work/	Explore the current environment related occurrences at national and international level, Study of successful sustainable measures, a know-how of industries in local region and their possible effects, measure of water, air and land quality, Visit to a local polluted site-Urban/Rural /Industrial / Agricultural, Study of simple ecosystems.	6
Total number of Lectures			**42**

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.	Benny Joseph, Environmental Studies Simplified, 3rd Edition, McGraw Hill Education, India, Published 2nd August, 2017
2.	Erach Bharucha, Textbook of Environmental Studies for UG Courses, 3rd Edition, Orient Black Swan, Published 1st Jan 2013
3.	Issues of the Journal: Down to Earth, Published by Centre for Science and Environment (CSE), Delhi

EVALUATION:

Mid Semester Examination - 30 marks (To be held along with T-2 Exam)

End Semester Examination - 40 marks

Teachers Assessment (TA) - 30 marks

Structure of Grading Academic Performance: Mandatory to Pass, grade will be awarded

Detailed Syllabus
Lab-wise Breakup

Course Code	(15B17BT371)	**Semester** ODD **(specify Odd/Even)**	**Semester** III **Session 2020-21** **Month from** July to December
Course Name	THERMODYNAMICS AND CHEMICAL PROCESSES LAB		
Credits	1	**Contact Hours**	2**(C-1,C-2,C-3)**

Faculty (Names)	**Coordinator(s)**	Ms EKTA BHATT
	Teacher(s) (Alphabetically)	PROF. PAMMI GAUBA Dr SHWETA DANG Ms EKTA BHATT

COURSE OUTCOMES		**COGNITIVE LEVELS**
C270.1	Apply and Demonstrate the concept of Heat capacity and Specific gravity and Heat Transfer	Applying (Level 3)
C270.2	Explain and Apply the concept of Material Balance	Applying (Level 3)
C270.3	Demonstrate movement of solute and solvent	Understanding (Level 2)
C270.4	Make use of Computational tools to study the thermodynamic properties	Applying (Level 3)

Module No.	**Title of the Module**	**Topics in the Module**	**CO**
1.	**Heat Capacity**	To study Specific Heat capacity of metals and rate of drying of samples.	CO1
2.	**Specific Gravity**	To study specific gravity of fluids.	CO1
3.	**Enthalpy of Neutralization**	To study heat of solution and enthalpy of neutralization.	CO1
4.	**Eutectic point**	To study Eutectic point of mixtures of solids.	CO1
5.	**Material Balance**	To study the concept of material balance and chemical changes. To design experiments for Material balance	CO2
6.	**Movement of solute and solvent**	To determine movement of solute and solvent using dialysis membrane	CO3
7.	**Computations Tools**	To study the thermodynamic properties of DNA sequences using computations tools	CO4

Evaluation Criteria

Components	**Maximum Marks**
Mid Viva (Written exam)	20
Final Viva (Written exam)	20
D2D (Report/Attendance/Experiment)	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.	Zemansky W and Dittman H.R. “Heat and Thermodynamics” McGraw Hill
2.	Doran P.M. “ Bioprocess Engineering Principles”
3.	Himmelblau ,D.M., ”Basic Principles and calculations in chemical engineering ,” Prentice hall of India, New Delhi
4.	B.G.Kyle, “Chemical and process Thermodynamics” PHI learning Pvt Ltd

Detailed Syllabus
Lecture-wise Breakup

Course Code	**15B11BT311**	**Semester** ODD Semester	**Semester:** III **Session 2020-21** **Month from:** July to December
Course Name	THERMODYNAMICS & CHEMICAL PROCESSES		
Credits	4	**Contact Hours**	**3+1**

Faculty (Names)	**Coordinator(s)**	Prof. Pammi Gauba
	Teacher(s) (Alphabetically)	Prof. Pammi Gauba Dr. Ashwani Mathur

COURSE OUTCOMES		COGNITIVE LEVELS
CO201.1	Define laws of thermodynamics and their application	Remembering (Level 1)
CO201.2	Explain material and energy balance	Understanding (Level 2)
CO201.3	Demonstrate knowledge of free energy, internal energy, enthalpy, entropy, phase rules for one component and two component systems, Gibb's free energy, fugacity for solutions and vapour-liquid equilibrium,	Understanding (Level 2)
CO201.4	Make use of thermodynamics principles for biomolecular interaction	Applying (Level 3)
CO201.5	Apply knowledge of fluid rheology and heat transfer in biological systems and problems	Applying (Level 3)

Module No.	Subtitle of the Module	Topics in the module	No. of Lectures for the module
1.	**Thermodynamics**	Introduction and fundamental concept of thermodynamic terms.	1
2.	**First law of thermodynamics**	Concept of open and closed systems, state and path functions, reversible and irreversible processes, equilibrium, phase rule.	6
3.	**Second law of thermodynamic**s	Statement of second law of thermodynamics, concept of entropy, calculation of entropy changes, ideal work and lost work. Applications of 1^{st} and 2^{nd} laws to steady /unsteady processes in closed /open systems. Applications to compression and expansion processes.	7
4.	**Material Balances-I**	Material balances in systems involving physical changes- Overall and component balances, material balance and problems involving simultaneous equations for simple systems.	5
5.	**Material Balances-II**	Material balances in systems involving Chemical changes- Chemical / Biochemical reactions and their stoichiometry, concept of yield and conversion, solving material	4

		balance problems involving single and multiple chemical reactions	
6.	**Energy balance**	Energy balance for closed systems. Mass and energy balance for open systems. Application in Biological systems	**4**
7.	**Fluid flow of mixing**	Classification of fluids, Fluids in motion, Viscosity, momentum transfer ,Non-Newtonian fluids, Viscosity Measurement	**6**
8.	**Heat transfer**	Heat transfer equipments, Mechanism of heat transfer, conduction, Heat transfer between fluids, Design equations for heat transfer systems and applications of design equations.	9

Evaluation Criteria

Components	**Maximum Marks**
T1 Examination	20
T2 Examination	20
End Term Examination	35
TA (MCQ, Class Test / Assignment)	25
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.	Basic and Applied Thermodynamics (Second Edition), P.K. Nag, McGraw Hill Education (India) Pvt. Ltd., 2015
2.	Molecular Thermodynamics, Donald A McQuarrie & J.D. Simon, Viva Books, 2018

Detailed Syllabus
Lab-wise Breakup

Course Code	15B17CI372	**Semester** Odd-Special	**Semester** III **Session** 2020 -21 **Month from** June'21 **to** July'21
Course Name	Database System & Web Lab		
Credits	0-0-1	**Contact Hours**	2

Faculty (Names)	**Coordinator(s)**	Payal Khurana Batra, Prantik Biswas
	Teacher(s) (Alphabetically)	Dr. Anita Sahoo, Dr. Neetu Sardana , Prantik Biswas

COURSE OUTCOMES		**COGNITIVE LEVELS**
CI271.1	1. Explain the basic concepts of Database systems and Web components.	Understand (Level II)

CI271.2	2. Develop web page using HTML, CSS with client side scripting using javascript.	Apply (Level III)
CI271.3	3. Develop a simple web application with client and server side scripting using Javascript and PHP and connect to a given relational database.	Apply (Level III)
CI271.4	4. Programming PL/SQL including stored procedures, stored functions, cursors, Triggers.	Apply (Level III)
CI271.5	5. Design and implement a database schema for a given problem-domain and normalize a database.	Creating (Level VI)
CI271.6	6. Design a Project based on database management	Create (Level VI)

Module No.	**Title of the Module**	**List of Experiments**	**CO**
1.	Introduction to MySQL commands.	1. MySQL Create, Insert, Update, Delete and Select Statements.	CI271.1
2.	Client Side Web Technology	1. Design web page using SGML, HTML 5, DHTML, CSS, Java script.	CI271.2
3.	Server Side Web Technology	1. Develop a web application with client and server side scripting using Javascript. 2. Develop a web application with client and server side scripting using PHP. 3. Design web application with databased connectivity. 4. Design web application with entering user data into database. 5. Desig web application for user - databse interaction through PHP.	CI271.3 , CI271.5
4.	SQL	Simple Queries, Sorting Results (ORDER BY Clause), SQL Aggregate Functions, Grouping Results (GROUP BY Clause),Subqueries, ANY and ALL,Multi-Table Queries, EXISTS and NOT EXISTS, Combining Result Tables (UNION, INTERSECT, EXCEPT),Database Updates	CI271.4
5.	Procedural Language	1. Write PL/SQL program for storing data using procedures. 2. Write PL/SQL program for storing data using stored functions. 3. Write PL/SQL program for storing data using cursors and Triggers.	CI271.4

6.	Project	Students are expected to designed web application based on Php or JavaScript and connect with databased to execute insert, update, retrieve and delete data queries.	CI271.5 , CI271.6

Evaluation Criteria

Components	**Maximum Marks**
Lab Test-1	**20**
Lab Test-2	**20**
Day-to-Day (Project, Lab Assessment, Attendance)	**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.	Henry F Korth, Abraham Silberschatz, S. Sudurshan, Database system concepts, 5th Edition, McGraw-Hill,2006
2.	Ramez Elmasri , Shamkant B. Navathe , Fundamentals of Database Systems, 4th Edition, Pearson Education, 2006.
3.	Ramakrishnan, Gehrke, Database Management Systems, Mcgraw-Hill, 3rd Edition, Addison-Wesley,2006.
4.	Thomas Connolly, Carolyn Begg, Database Systems-A Practical Approach to design, Implementation and Management, 3rd Edition, Addison-Wesley,2002.
5.	"PHP and MYSQL Manual" by Simon Stobart and Mike Vassileiou

Probability and Statistics (15B11MA412)

Course Description

Course Code	15B11MA412	**Semester: Odd**	**Semester: III, Session:** 2020-21 **Month:** Aug 2020- Dec 2020
Course Name	Probability and Statistics		
Credits	4	**Contact Hours**	3-1-0
Faculty (Names)	**Coordinator(s)**	Dr. Richa Sharma	
	Teacher(s) (Alphabetically)	Dr. Richa Sharma	

COURSE OUTCOMES		**COGNITIVE LEVELS**
After pursuing the above mentioned course, the students will be able to:		
C202.1	demonstrate different diagrammatic representation of data and explain the measures of central tendency, dispersion and asymmetry.	Understanding Level (C2)
C202.2	explain the concepts of probability theory and Bayes' theorem.	Understanding Level (C2)
C202.3	explain and solve the problems of probability distributions along with their mean, variance & moment generating functions.	Applying Level (C3)
C202.4	explain sampling theory and apply test of hypothesis on small and large samples.	Applying Level (C3)

C202.5	apply the method of least squares for curve fitting and explain correlation and regression.	Applying Level (C3)

Module No.	**Title of the Module**	**Topics in the Module**	**No. of Lectures for the module**
1.	Classification of Data	Classification of data, graphic and diagrammatic representation of data, measures of central tendency and dispersion i.e. mean and standard deviation, measures of skew ness and kurtosis.	6
2.	Probability	Sample space and events, Permutations and combinations, Probability of an event, Axioms of probability, Equiprobable spaces, Conditional probability, Multiplication and addition theorems, Bayes' theorem, Independent events.	10
3.	Random Variables	Random Variable, Discrete and continuous distributions, Mean and variance of a random variable	4
4.	Probability Distributions	Binomial, Uniform, Normal and Poisson distributions.	8
5.	Sampling Theory	Test of hypothesis and significance. Test based on Exact (Small) Sampling- Chi-square test, t test and F test.	10
6.	Correlation and Regression	Curve fitting by the method of least squares, Correlation and regression.	4
		Total number of Lectures	**42**

Evaluation Criteria

Components	**Maximum Marks**
T1	20
T2	20
End Semester Examination	35
TA	25 (Quiz , Assignments, Tutorials, 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.	**Walpole, R.E, Myers, R.H., Myers S.I and Ye. K**., Probability and Statistics for Engineers and Scientists, 8th Ed., Pearson, 2007
2.	**Papoulis, A. & Pillai, S.U.**, Probability, Random Variables and Stochastic Processes, Tata McGraw-Hill, 2002.
3.	**Spiegel, M.R.,** Statistics (Schaum's oulines), McGraw-Hill, 1995
4.	**Veerarajan, T.,** Probability, Statistics and Random Processes, 3rd Ed. Tata McGraw-Hill, 2008.
5.	**Johnson, R.A.**, Miller and Freund's Probability and Statistics for Engineers, 8th Ed., PHI Learning Private limited, 2011
6.	**Palaniammal, S.,** Probability and Random Processes, PHI Learning Private limited, 2012