SCHOOL OF SCIENCES

UNIVERSITY
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"CELEBRATING DREAMS"

DEPARTMENT OF BIOTECHNOLOGY & MICROBIOLOGY

ITM University Gwalior Campus, NH-44, Turari, Gwalior, (M.P.) - 475 001 INDIA
mail: info@itmuniversity.ac.in, web: www.itmuniversity.ac.in

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Department of Life Science

Dated: 25/09/2020

Minutes of Meeting (BOS)

Meeting of Board of Studies in Department of Life Science, School of Sciences of ITM University Gwalior held on 25/09/2020 using an online mode i.e. by sending whole syllabi and Scheme through email

The following members were present:

S.No	Name of Faculty	Designation	Signature
1.	Dr. Richa Kothari	Chairman	Richa Kothari
2.	Prof. Ajit Kumar	External Expert (Assistant Professor (Level 3), Centre for Bioinformatics Dy. Director (P & T), Digital Learning Centre, M.D University, Rohtak	25/09/2020
3.	Dr. Sonia Johri	Dean Academics	
4.	Dr. Rita Sharma	Member	Rsharma
5	Dr. Santosh Kumar	CSE , School of Sciences	Santosh K.
6.	Dr. Sujeet Kumar Mrityunjay	Member	25/09/2020

The following decisions were taken in the meeting

1. Syllabi of B.Sc Biotechnology/ Microbiology (Hons.) first year with minor corrections has been approved.
2. Scheme of examination B.Sc Biotechnology/Microbiology has been approved.

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Department of Life Science

- Changes has been incorporated in the syllabus of BSBT/MB 101 Fundamentals of Biochemistry, BSBT/MB 102 Bioinstrumentation, BSBT/MB 103 General Microbiology, BSBT/MB 105Animal Diversity, BSBT/MB 106 Plant Diversity and the syllabuses were revised in the first semester.

- Changes has been incorporated in the syllabus of BSBT/MB 303 Molecular Biology, BSBT/MB 305 Genetics, the syllabuses were revised in the third semester.

- Changes has been incorporated in the syllabus of BSBT/MB 501 Organic mechanism in Biology, BSBT 502 Environmental Biotechnology, and BSBT/MB 503 Genomics and proteomics the syllabuses were revised in the fifth semester.

- New Courses has been added:
  - ✓ BSBT/MB 406- Ecology, wild life, Environment and evolution in 4th sem B.Sc. Biotechnology & Microbiology
  - ✓ BT/MB 105- Applied Biotechnology and Microbiology in 1st sem M.Sc Biotechnology & Microbiology.
  - ✓ BT/MB 104- Bioanalytical Techniques in 1st sem M.Sc Biotechnology & Microbiology

3. Syllabi of M.Sc. Biotechnology/Microbiology first year with minor corrections has been approved.

4. Scheme of examination M.Sc. Biotechnology/Microbiology has been approved.

Annexure 1: **Syllabus of new courses has been attached .**

Board of studies recommended the above resolutions to be presented in the Academic Council for further approval.

*As per the University Norms changes can be made accordingly.

Read and confirmed.

25/09/2020		
Dr. Ajit Kumar External Expert BOS	**Dr. Richa Kothari** Chairperson (Dean School of Sciences) BOS	**Dr. Sonia Johri** Dean Academics
	25/09/2020	
Dr. Rita Sharma Member (BOS)	**Dr. Sujeet Kumar Mrityunjay** Course Coordinator Microbiology	**Dr. Santosh Kumar** Exam Superintendent

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Syllabus-2020-2021

(SOS)(BSc_Biotechnology)

Title of the Course	Ecology, Wild Life, Environment and Evolution
Course Code	BSBT 406 (T)

Part A

Year		**Semester**		**Credits**	L	T	P	C
					3	0	1	4
Course Type	Theory only							
Course Category	Discipline Core							
Pre-Requisite/s	Student must be aware with the basic knowledge of ecosystem, environemnt and wild life		**Co-Requisite/s**					
Course Outcomes & Bloom's Level	**CO1-** Students will be competent in basic forest management principles and evaluation of forest stands for health, wildlife habitat and lumber use.**(BL1-Remember)** **CO2-** Students will understand the factors affecting the need to find sustainable practices for production of food, feed and fiber crops and how to implement them.**(BL2-Understand)** **CO3-** Students will be able to apply knowledge to solve problems related to wildlife conservation and management.**(BL3-Apply)** **CO4-** Students will be able to find detailed information on a topic from print as well as online information sources.**(BL4-Analyze)** **CO5-** Students will be able to critically evaluate current events and public information related to wildlife conservation and management as being scientifically-based or opinion-based and contribute to the knowledge base of information.**(BL5-Evaluate)**							
Coures Elements	Skill Development ✕ Entrepreneurship ✕ Employability ✓ Professional Ethics ✕ Gender ✕ Human Values ✓ Environment ✓		**SDG (Goals)**	SDG2(Zero hunger) SDG3(Good health and well-being) SDG4(Quality education) SDG6(Clean water and sanitation) SDG7(Affordable and clean energy) SDG8(Decent work and economic growth) SDG9(Industry Innovation and Infrastructure) SDG11(Sustainable cities and economies) SDG14(Life below water) SDG15(Life on land)				

Part B

Modules	Contents	Pedagogy	Hours
I	Concept of Ecosystem-Biotic and Abiotic factors, Energy flow in ecosystem, Food web and food chain, Ecological pyramids. Biogeochemical cycles of C,O2, N & P. Population Concept- Characteristics of population .Community Concept- Succession, periodicities, Indicators	Lecture method, group demonstartion, charts, pictorial methods, national park visits	8
II	Environment factors, Climatic factors: Composition and stratification of atmosphere, global climate, precipitation temperature, light, wind. Topographic factors, Edaphic factors (soil): Biotic factors: Interaction between plants and animals, positive and negative interactions, alleopathy.	Lecture method, group demonstartion, charts, pictorial methods, national park visits	8
III	Levels of Organisation, Population and Communities: concepts of autecology, synecology; concept of biological diversity; habitat and ecological niche. Distribution and characteristics of populations; population dynamics; Ecological Speciation. Ecotone and edge effect; methods of studying vegetation; dynamics of communities; plant succession, processes, type; primary and secondary succession; climax concepts.	Lecture method, group demonstartion, charts, pictorial methods, national park visits	9
IV	Ecosystems: Structure, biotic and the abiotic components, trophic organization, source of energy, autotrophy, heterotrophy, parasitism; food chains and webs; ecological pyramids. Energy flow; principles, grazing and detritus food chains, models of energy flow; ecosystem productivity, Measurement of productivity & ecological efficiencies. Biogeochemical cycles; dynamics: hydrologic cycle & gaseous cycles.	Lecture method, group demonstartion, charts, pictorial methods, national park visits	8
V	Diversity of Ecosystems: Aquatic: fresh water (lotic and lentic), marine (Pelagic and benthic) estuarine: major terrestrial biomes: tundra, temperate and tropical. Principles of phytogeography; phytogeogarphical divisions of India. Endemism; hotspots, Vegetation of Gwalior. Conservation of natural resources. Wild Life Management.	Lecture method, group demonstartion, charts, pictorial methods, national park visits	8

Part C

Modules	Title	Indicative-ABCA/PBL/ Experiments/Field work/ Internships	Bloom's Level	Hours
I	To analyse the soil of various locations	PBL	BL4-Analyze	1 week
II	To analyse the water quality of various rivers and ponds available in your city	PBL	BL4-Analyze	15 days
III	To check the pH, Conductivity,, orgaqnic matter , texture, porosity etc. of soil	Experiments	BL2-Understand	3
IV	Study of vegetation by quadrat: Frequency, abundancy, quadrant etc	PBL	BL5-Evaluate	1 week
V	To study of wild life through visit to any national park	Field work	BL2-Understand	8
VI	Phytogeographical study of ITM University campus	PBL	BL4-Analyze	1 week

Part D(Marks Distribution)

Theory					
Total Marks	**Minimum Passing Marks**	**External Evaluation**	**Min. External Evaluation**	**Internal Evaluation**	**Min. Internal Evaluation**
100	40	40	12	60	
Practical					
Total Marks	**Minimum Passing Marks**	**External Evaluation**	**Min. External Evaluation**	**Internal Evaluation**	**Min. Internal Evaluation**
100	50	40	20	60	

Part E

Books	Singh, J.S. singh, S.P. and Gupta, S. (2006) Ecology Environment and Resource Conservation. Anamaya Publications, New Delhi Sharma, P.D. (2010) Ecology and Environment, (8th Ed.) Rastogi Publications, Meerut
Articles	https://education.nationalgeographic.org/resource/wildlife-conservation/
References Books	Wilkinson, D.M. (2007). Fundamental Processes in Ecology. An Earth System Approach. Oxford. Daubenmier, R.F. (1970). Plants and Environment: A text book of Plant Autoecology, Wiley Eastern Private Limited Daubenmier, R.F. (1970). Plants Communities, Willey Eaastern Private Limited Odum, E. (2008) Ecology. Oxford and IBH Publisher.
MOOC Courses	https://nptel.ac.in/courses/102104073
Videos	https://nptel.ac.in/courses/102104073

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Syllabus-2020-2021

(SOS)(MSc_Biotechnology)

Title of the Course	Applied Biotechnology and Microbiology
Course Code	BT 105 (T)

Part A

Year		**Semester**		**Credits**	L	T	P	C
					4	0	0	4
Course Type	Theory only							
Course Category	Discipline Core							
Pre-Requisite/s	Student must be aquainted with the basic knowledge of biotechnological and microbiological applications			**Co-Requisite/s**				
Course Outcomes & Bloom's Level	**CO1-** To understand professional and scientific communication approaches for microbiology and biotechnology settings.**(BL2-Understand)** **CO2-** Demonstrate comprehensive understanding of organizational processes and product development pipelines**(BL2-Understand)** **CO3-** Distinguish among diverse methods and technologies and their applications in microbiology and biotechnology**(BL3-Apply)** **CO4-** Appraise the current regulatory, quality control, and legal frameworks that impact biotechnology and ethical behaviors that foster positive and productive interactions in diverse microbiology and biotechnology settings.**(BL4-Analyze)**							
Coures Elements	Skill Development ✗ Entrepreneurship ✗ Employability ✓ Professional Ethics ✗ Gender ✗ Human Values ✗ Environment ✓		**SDG (Goals)**	SDG4(Quality education) SDG8(Decent work and economic growth)				

Part B

Modules	Contents	Pedagogy	Hours
I	Functional Genomics and Proteomics -- Approaches to analyze differential expression of genes; Gene tagging; Gene trapping; Gene silencing; Knockout mutants; Approaches to proteome analysis; Dynamic modulation of protein structure and function	Tutorials, Collaborative, Demonstrations, Project methods Experiments,	8
II	Molecular biology tools for Environmental management, rDNA technology in waste treatment, Genetically modified organisms in Waste management, Genetic Sensors, Metagenomics, Bioprospecting, Nanoscience in Environmental management, Biosensors development to monitor pollution	Tutorials, Collaborative, Demonstrations, Project methods, Hands on experience, Experiments,	8
III	Bioremediation: In situ and ex-situ techniques, advantages of bioremediation. Phytoremediation: Phytoremediation of xenobiotics and bioaccumulation of metals using plants. Biodegradation of petroleum constituents and associated heavy metal, case study with example	Tutorials, Collaborative, Demonstrations, Project methods, Hands on experience, ABL Experiments,	8
IV	Nanotechnology in medicine Basics of nanotechnology, nanomaterials and nanoparticles, nanotools, Nanoparticles in cancer therapeutics, Nanodiagnostics. In vitro nanodiagnostics – nanobiochips and nanobiosensors, cantilever biosensors, nanoproteomics In vivo nanodiagnostics– gold nanoparticles, nanotubes, quantum dots– nanobiochips and nanobiosensors, cantilever biosensors, nanoproteomics.	Tutorials, Collaborative, Demonstrations, Project methods, Hands on experience, Experiments, Video lectures	8
V	Pharmacology & Drug development Introduction to Pharmacology Concept of Essential Drugs Routes of Drug Administration Introduction to Drug Discovery and Development. Hurdles in Drug Development Sources of Drugs Approaches to Drug Discovery Pharmacovigilance Factors affecting drug response	Tutorials, Collaborative, Demonstrations, Project methods, Hands on experience, Experiments,	8

Part C

Modules	Title	Indicative-ABCA/PBL/ Experiments/Field work/ Internships	Bloom's Level	Hours
1	Grams staining	Experiments	BL2-Understand	3

Part D(Marks Distribution)

Theory					
Total Marks	**Minimum Passing Marks**	**External Evaluation**	**Min. External Evaluation**	**Internal Evaluation**	**Min. Internal Evaluation**
100		40	12	60	

Practical					
Total Marks	**Minimum Passing Marks**	**External Evaluation**	**Min. External Evaluation**	**Internal Evaluation**	**Min. Internal Evaluation**

Part E

Books	Prentice hall, International, Katzung, B.G;Basic and Clinical Pharmacology ;7th Edition Mehra.J.K;Drug interaction;Basic Bussiness Publ, Bombay
Articles	
References Books	Lippincott, Williams and Wilkins;Remington Pharmaceutical Sciences. Chattopadhyay K K "Microbial Genomics And Proteomics" by Niyaz Ahmed;Introduction to Nanoscience and Nanotechnology
MOOC Courses	https://nptel.ac.in/courses/105107173 https://nptel.ac.in/courses/118106019
Videos	https://nptel.ac.in/courses/105107173 https://nptel.ac.in/courses/118106019

Course Articulation Matrix

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO
CO1	2	2	1	2	1	2	1	-	-	-	-	-	2	2	1
CO2	1	1	2	2	-	1	-	-	-	-	1	-	1	3	2
CO3	1	2	2	2	1	1	1	-	-	-	-	-	1	1	2
CO4	3	2	1	1	2	1	-	-	-	-	-	-	1	1	1
CO5	1	2	-	2	2	3	-	-	-	-	-	-	2	3	1
CO6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

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Syllabus-2020-2021

(SOS)(MSc_Biotechnology)

Title of the Course	Bioanalytical Techniques
Course Code	BT-104[T]

Part A

Year		**Semester**		**Credits**	L	T	P	C
					4	0	0	4
Course Type	Theory only							
Course Category	Discipline Core							
Pre-Requisite/s	To be familiar with the basic instruments present in the laboratory and their working principles.		**Co-Requisite/s**					
Course Outcomes & Bloom's Level	**CO1-** To remember and understand and learn the basic microscopic & centrifugation techniques **(BL1-Remember)** **CO2-** To understand the separation of components using various techniques like chromatography, electrophoresis, centrifugation etc**(BL2-Understand)** **CO3-** To utilize the separation techniques in order to distinguish the different types of molecules present in the sample.**(BL3-Apply)** **CO4-** To evaluate, identify and compare the molecules on the basis of bioanalytical techniques.**(BL4-Analyze)** **CO5-** To purify the specific protein/molecules/compound for its further utilization in food, dairy, chemical and beverage industries**(BL5-Evaluate)**							
Coures Elements	Skill Development ✕ Entrepreneurship ✕ Employability ✓ Professional Ethics ✕ Gender ✕ Human Values ✕ Environment ✕	**SDG (Goals)**	SDG4(Quality education)					

Part B

Modules	Contents	Pedagogy	Hours
I	Microscopy: Light microscopy, Bright & Dark Field microscopy, Fluorescence microscopy, Phase Contrast microscopy, TEM, SEM, Centrifugation: Basic principle, Factors affecting Sedimentation velocity, Standard Sedimentation Coefficient, types of centrifugations, instrumentation and applications.	Tutorials, Collaborative, Demonstrations, Project methods Experiments,	10
II	Chromatography: Principle, types, instrumentation and applications: Column, Affinity chromatography, Ion exchange chromatography, HPLC . Electrophoresis: Principle, types and applications, Isoelectric-focusing, 2D gel electrophoresis, SDS-PAGE, Native-PAGE, Western blotting.	Tutorials, Collaborative, Demonstrations, Project methods, Hands on experience, Experiments,	10
III	Spectroscopy: Basic principles, instrumentation and applications of UV-visible spectrophotometry, IR Spectrophotometry, Atomic absorption spectroscopy: Flame emission spectroscopy. Polarimetry: Principle, instrumentation and applications	Tutorials, Collaborative, Demonstrations, Project methods, Hands on experience, ABL Experiments, experience, ABL Experiments,	9
IV	ESR: Principle, instrumentation and applications, NMR Principle, and applications, circular dichroism (CD) Principle, and applications, GC Mass: Basic principle, instrumentation and applications, Mass spectroscopy.	Tutorials, Collaborative, Demonstrations, Project methods, Hands on experience, Experiments, Video lectures	8
V	X Ray crystallography: Principle and application. Autoradiography: Principles, and applications. Flow cytometry	Tutorials, Collaborative, Demonstrations, Project methods, Hands on experience, Experiments,	8

Part C

Modules	Title	Indicative-ABCA/PBL/ Experiments/Field work/ Internships	Bloom's Level	Hours
I	Qualitative analysis of various plant pigments using thin layer chromatography	PBL	BL4-Analyze	5
II	To plot bacterial growth curves using U.V.Visible spectroscopy	PBL	BL4-Analyze	6 days

Part D(Marks Distribution)

Theory					
Total Marks	**Minimum Passing Marks**	**External Evaluation**	**Min. External Evaluation**	**Internal Evaluation**	**Min. Internal Evaluation**
100	40	40	12	60	

Practical					
Total Marks	**Minimum Passing Marks**	**External Evaluation**	**Min. External Evaluation**	**Internal Evaluation**	**Min. Internal Evaluation**
0	0	0	0	0	0

Part E

Books	Wilson.K;Principles and Techniques of Biochemistry and Molecular Biology;7th Edition; (2010) Sheehan .D;Physical Biochemistry: Principles and Applications 2nd Edition, John Wiley & Sons (2009)
Articles	https://www.sciencedirect.com/topics/earth-and-planetary-sciences/spectrophotometry https://www.mdpi.com/journal/chromatography
References Books	Rodney F. Boyer,Hall.P.P;;Biochemistry Laboratory: Modern Theory and Techniques, ; 2nd Edition (2010). Talluri.S;Bioanalytical Techniques;I.K. Internationlal Publishing House Pvt. Ltd. (2012) Dua .S and Garg.N,Biochemical methods of analysis: Theory and applications. Alpha Science Intl Ltd; 1st Edition (2010)
MOOC Courses	https://nptel.ac.in/courses/102103044
Videos	https://nptel.ac.in/courses/102103044

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DEPARTMENT OF FOOD TECHNOLOGY

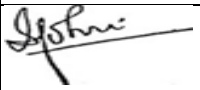
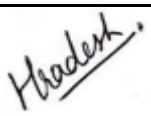
ITM University Gwalior Campus, NH-44, Turari, Gwalior, (M.P.) - 475 001 INDIA
mail: info@itmuniversity.ac.in, web: www.itmuniversity.ac.in

Department of Food Technology

Dated: 20/09/2020

Minutes of Meeting (BOS)

Meeting of Board of Studies in Department of Food Technology, School of Sciences of ITM University Gwalior held on 20/09/2020 using an online mode. The following members were present:

S.No	Name of Faculty	Designation	Signature
1.	Dr. Richa Kothari	Chairman (Dean)	
2.	Dr. Sonia Johri	Dean Academics	
3.	Dr. Mithilesh Jaiswal	External Expert Scientist, (Biotech) – Health and Nutrition Division, Tropilite Foods Pvt Ltd., Gwalior,	
4.	Dr.Hradesh Rajput	Member (Coordinator)	
5.	Dr. Ankit Dayal	Member	

The following decisions* were taken in the meeting

1. Syllabus of first year B.Sc Food Technology (Hons.) has been approved without any corrections.

(Enclosure-1)

2. Scheme of first year examination B.Sc Food Technology has been approved.

(Enclosure-2)

3. Syllabus of first year M.Sc. Food Technology has been approved without any corrections.

(Enclosure-3)

4. Scheme of first year examination M.Sc. Food Technology has been approved.

(Enclosure-4)

Signature

*Chairman should mention the decision effective from **September 2020**

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BSC (PCM/CS)

School of Sciences

Minutes of Meetings

The chairman and coordinator welcomed the members of the board and outlinedthe changes to be made with the approval of the board as given here

1. Minutes of previous Board of studies were reviewed.
2. Some new topics are included in the syllabi of Chemistry and title of the subjects are changed

Following subject syllabus are revised

(i) Abstract Algebra in III semester

(ii) Advanced Calculus in IV semester

(iii) Physical Chemistry – II in II semester

(iv) Organic Chemistry – II in III semester

(v) Inorganic Chemistry – II in III semester

Read and confirmed.

Dr. Vishnu Narayan Mishra

Dr. Richa Kothari

Dr. Sonia Johri

Dr. Y.C. Goswami

Dr. Gajanan Pandey

Dr. Manish Sharma

Dr. P. Shrivastava

Dr. Dinesh Singh Tomar

Dr. Ranjana Goswami

Dr. Rupali Rastogi

Dr Uday P Gahlaut

Dr. Hema Purushwani

Dr. Sanjay Jain

Dr. Chanda Purushwani

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Syllabus-2020-2021

(SOS)(BSc_PCM)

Title of the Course	Organic Chemistry – II
Course Code	BSCH0305[T]

Part A

Year	2nd	**Semester**	3rd	**Credits**	L	T	P	C
					3	0	1	4
Course Type	Embedded theory and lab							
Course Category	Discipline Core							
Pre-Requisite/s	Student should have basic knowledge of organic chemistry			**Co-Requisite/s**	student should have knowledge of hybridization, chemical bonding, alkane, alkene and alkynes			
Course Outcomes & Bloom's Level	**CO1-** CO1: Able to recognize different functional groups by given only graph of peaks**(BL1-Remember)** **CO2-** CO2 Able to understand different classes of alcohols, write down structure of phenol and phenoxide ion**(BL2-Understand)** **CO3-** CO3 Able to write the order of reactivity of different carboxylic acid derivatves**(BL3-Apply)** **CO4-** CO4 Students are able to recognize mechanism of different reactions related to carbonyl compounds.**(BL4-Analyze)** **CO5-** CO5 CO5: Able to recognize structures of acid halides, esters, amides, acid anhydrides**(BL5-Evaluate)**							
Course Elements	Skill Development ✓ Entrepreneurship ✗ Employability ✓ Professional Ethics ✗ Gender ✗ Human Values ✗ Environment ✗		**SDG (Goals)**	SDG4(Quality education)				

Part B

Modules	Contents	Pedagogy	Hours
Unit 1	Electromagnetic Spectrum: Absorption spectra Ultraviolet (UV) absorption spectroscopy- absorption laws (Beer Lambert Law), Molar absorptivity, Presentation and analysis of UV spectra, Types of electronic transitions, Effect of conjugation. Concept of chromophore and auxochrome. Bathochromic, hypsochromic, Hyperchromic and hypochromic shifts. UV spectra of conjugated enes and enones. Infra red (IR) absorption spectroscopy- Molecular vibrations, Hookes law, selection rules, intensity and position of IR bands, Measurement of IR spectrum, finger print region, characteristic absorption of various functional groups and interpretation of IR spectra of simple organic compounds.	Ice Breaking session, Short videos, Review Summarizing, Tutorials sessions, lecture methods	8 hrs
Unit 2	A – Alcohols: Classification and nomenclature. Monohydric alcohols- Nomenclature, methods of formation, reduction of aldehydes, ketones, carboxylic acids and esters, Hydrogen bonding, acid nature and reactions of alcohols. Dihydric alcohols-nomenclature, methods of formations, chemical reactions of vicinal glycols, oxidative cleavage [Pb(OAc)4 and HIO4] and pinacol-pinacolone rearrangement. Trihydric alcohols- Nomenclature, methods of formation, chemical reactions of glycerols, B. Phenols: Nomenclature, structure and bonding. Preparations of phenols, Physical properties and acidic character, comparative acidic strength of alcohols and phenols, resonance stabilization of phenoxide ions. Reactions of phenols- Electrophillic aromatic substitution, acylation and carboxylation: Mechanism of Fries rearrangement, Claisen rearrangement, Gattermann synthesis, Hauben-Hoesche reaction, Lederer manasse reaction and Reimer Teiman reaction	Audio/Video clips, group discussion, lecture methods, quiz	8 hrs
Unit 3	Aldehydes ad ketones: Nomenclature, structure of the carbonyl group, Synthesis of Aldehydes and ketones with particular reference to the synthesis of Aldehydes from acid chlorides, synthesis of Aldehydes and ketones using 1,3 dithianes, synthesis of ketones from nitriles and form carboxylic acids physical properties. Mechanism of nucleophillic additions to carbonyl group with particular emphasis on benzoin, aldol, Perkin and Knoevenagel condensations Condensdation with ammonia and its derivatives, Witting and Mannich reaction. Use of acetals as protecting groups,	Summarizing, PBL (small working models), Quiz, Virtual Lab, Tutorials sessions, Expert Lecture methods	8 hrs

	Oxidation of Aldehydes, Baeyer¬ Villiger oxidation of ketones, Cannizaro reaction, MPV		
Unit 4	A Carboxylic Acids: Nomenclature, structure and bonding, physical properties and acidity of carboxylic acids, Effects of substituents on acid strength, Preparation of carboxylic acids and reactions of carboxytlic acids, Hell-Volhard-Zelinsky reaction, Synthesis of acid chlorides, esters and amides. Reduction of carboxylic acids, Mechanism of decarboxylation. Methods of formation and chemical reactions of halo acids, hydroxyl acids, Malic, Tartaric and citric acids, Methods of formation and chemical reaction of unsaturated monocarboxylic acids, Dicarboxylic acids-Methods of formation and effect of heat and dehydrating agents. B Ether: Nomenclature of ethers and methods of their formation. Physical properties and chemical reactions. Cleavage and auto oxidation, Ziesel's method.	Summarizing, PBL (small working models), Quiz, Virtual Lab, Tutorials sessions, Expert Lecture methods	8hrs
Unit 5	Organic compounds of Nitrogen: Preparation of nitro¬ alkanes and nitro-arene. Chemical reactions of nitro-alkanes, Mechanism of nucleophillic substitution in nitro-arenes and their reductions in neutral acidic and alkaline media Halonitroarenes; reactivity, structure and nomenclature of amines, physical properties, stereochemistry of amines, separation of mixture primary, secondary and tertiary amines, Structural features effecting basicity of amines, Amine salts as phase transfer catalyst, Preparation of alkyl and aryl amine (reduction of nitro compounds, nitriles), reductive amination of aldehydic and ketonic compounds, Gabriel-Phthalamide reaction Haffmann-Bromamide reaction, Reactions of Amines, Electrophilic aromatic substitution in aryl amines, reaction of amines with nitrous acids, Synthetic transformations of aryl diazonium salts, Azo coupling..	Summarizing, PBL (small working models), Quiz, Virtual Lab, Tutorials sessions, Expert Lecture methods	8hrs

Part C

Modules	Title	Indicative-ABCA/PBL/ Experiments/Field work/ Internships	Bloom's Level	Hours
1	To identify given organic Compound (Oxalic acid.)	Experiments	BL4-Analyze	2 hrs
6	Separate the coloured components present in the mixture of red and blue inks by ascending paper chromatography and find their Rf values.	Experiments	BL5-Evaluate	2hrs
7	To measure the absorbance (or transmittance) a coloured substance in a solution by using a spectrophotometer.	Experiments	BL4-Analyze	2hrs
8	To Verify Beer-Lambert Law using spectrophotometer.	Experiments	BL5-Evaluate	2hrs
9	To prepare and characterize a sample of p-nitro acetanilide from acetanilide.	PBL	BL6-Create	8hrs
2	To identify given organic Compound (Resorcinol).	Experiments	BL4-Analyze	2hrs
3	To identify given organic Compound (Benzoic acid).	Experiments	BL4-Analyze	2hrs
4	To identify given organic Compound (Glucose).	Experiments	BL4-Analyze	2hrs

Part D(Marks Distribution)

Theory					
Total Marks	**Minimum Passing Marks**	**External Evaluation**	**Min. External Evaluation**	**Internal Evaluation**	**Min. Internal Evaluation**
100	40	40	12	60	
Practical					
Total Marks	**Minimum Passing Marks**	**External Evaluation**	**Min. External Evaluation**	**Internal Evaluation**	**Min. Internal Evaluation**
100	40	40	20	60	

Part E

Books	M.M.N. Tondon Unified Chemistry
Articles	https://www.chemistryworld.com/organic-chemistry/211.subject
References Books	Morrison, Boyd Organic ChemistryJerry March Advance Organic Chemistry I.L.Finar Organic Chemistry Singh Mukharjee Reaction mechanism in organic Chemistry O.P. Agarwal Reaction and reagent
MOOC Courses	onlinecourses.nptel.ac.in/noc24_cy12/previewonlinecourses.swayam2.ac.in/cec24_cy04/
Videos	onlinecourses.swayam2.ac.in/cec24_cy04/

Part F

Project 1	No project available
Project 2	No project available
Project 3	No project available
Project 4	No project available
Project 5	No project available

Course Articulation Matrix

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	1	1	1	1	3	-	-	-	-	-	3	-	1	1	2
CO2	1	1	1	1	3	-	-	-	-	-	3	-	1	1	3
CO3	1	1	1	1	3	-	-	-	-	-	3	-	1	1	3
CO4	1	1	1	1	3	-	-	-	-	-	3	-	1	1	3
CO5	1	1	1	1	3	-	-	-	-	-	3	-	1	1	2
CO6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

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Syllabus-2020-2021

(SOS)(BSc_PCM)

Title of the Course	Physical Chemistry-II
Course Code	BSCH 0204[T]

Part A

Year	1st	**Semester**	2nd	**Credits**	L	T	P	C
					3	0	1	4
Course Type	Embedded theory and lab							
Course Category	Discipline Electives							
Pre-Requisite/s	Student should have basic knowledge of Physical Chemistry			**Co-Requisite/s**	student should have knowledge of the concepts and principles of physics to understand chemical systems			
Course Outcomes & Bloom's Level	**CO1-** CO1 Able to remember the basic terms of thermodynamic. Able to predict the energy change in heat capacities at constant volume and pressure and their relationship. Able to drive Joule's law and its application. Able to derive relationship between modification of distribution law when solute undergoes dissociation **(BL1-Remember)** **CO2-** CO2 Able to understand the meaning of phase, component and degree of freedom**(BL2-Understand)** **CO3-** CO3 To apply the concepts of electrochemistry**(BL3-Apply)** **CO4-** CO4 Able to recognize the reaction of electrochemical cells and type**(BL4-Analyze)** **CO5-** CO5 Able to evaluate the behavior of ideal and non ideal solutions**(BL5-Evaluate)**							
Course Elements	Skill Development ✓ Entrepreneurship ✗ Employability ✓ Professional Ethics ✗ Gender ✗ Human Values ✗ Environment ✗		**SDG (Goals)**	SDG4(Quality education)				

Part B

Modules	Contents	Pedagogy	Hours
Unit 1	Thermodynamics: Basic concepts of thermodynamics, First law of Thermodynamics: Need for the law, Different statements of the law, Carnot cycle and its efficiency. Carnot theorem, Thermodynamic scale of temperature, concept of Entropy as a state function. Entropy as a function of P & T and T & V entropy change in physical change, Clausius inequality entropy as criteria of spontaneity and equilibrium. Entropy change in ideal gases and mixing of gases. Nernst heat theorem, statement and concept of residual entropy, evaluation of absolute entropy from heat capacity data Gibbs and Helmholtz functions. Gibbs function (G) and Helmholtz function (H) as a thermodynamic quantities, A and G as a criteria for thermodynamic equilibrium and spontaneity their advantage over entropy change.	Ice Breaking session, Short videos, Review Summarizing, Tutorials sessions, lecture with ppt	8 hrs
Unit 2	Phase Equilibrium: Statement and the meaning of terms: phase component and the degree of freedom, thermodynamic derivation of the Gibbs phase rule, one component system: water, CO2 and S system, two component system: solid-liquid equilibrium, simple eutectic system: Bi-Cd: Pb-Ag system, Desilverisation of lead. Solid Solution: Systems in which compound formation with congruent melting point (NaCl-H2O) and (CuSO4-H2O) system, Freezing Mixtures: acetone-dry ice. Liquid-Liquid mixtures: Ideal liquid mixtures. Raoult's and Henry's law, Non-ideal system, azeotropes: HCl-H2O and ethanol water system	Audio/Video clips, group discussion, lecture with ppt, quiz	8 hrs
Unit 3	Electrochemistry I Electrical transport, conduction in metals and in electrolyte solutions, specific and equivalent conductivity, measurement of equivalent conductance, effect of dilution on conductivity, migration of ions and Kohlrausch law, Arrhenius theory of electrolyte dissociation and its limitations, Weak and strong electrolytes, Ostwald's dilution law, theory of strong electrolytes, DHO theory and equation. Transport numbers, determination of transport numbers by Hittorf method and moving boundary method.	Summarizing, PBL (small working models), Quiz, Virtual Lab, Tutorials sessions, Expert Lecture, lecture with ppt	8 hrs
Unit 4	Electrochemistry – II Types of reversible electrodes: Gas – metal ion, metal-metal ion, metal – insoluble salt anion and redox electrodes, Electrodes reactions, Nernst equation, derivation of cell EMF and single	Summarizing, PBL (small working models), Quiz,Virtual Lab, Tutorials sessions, Expert Lecture, lecture with ppt	8 hrs

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	electrode potential, Standard hydrogen electrode, Reference electrodes, standard electrode potential, electrochemical series and its significance. Electrolytic and galvanic cells, reversible and irreversible cells, conventional representation of electrochemical cells, Concentration cell with and without transport, liquid junction potential, application of concentration cells, valency of ions, solubility product and activity coefficient, potentiometric titration, Definition of pH and pK, determination of pH using hydrogen, quinhydrone and glass electrodes by potentiometric methods. Buffers: mechanism of buffer action, Henderson Hazel equation, hydrolysis of salts.		
Unit 5	Surface Chemistry:- Adsorption, and absorption, types of adsorption, adsorption of gases and liquids in solid adsorbent, Freundlich and Langmuir adsorption isotherms, surface area and determination of surface area. Catalyst: characteristics of catalyzed reactions, classification of catalysis, application of catalysts, miscellaneous examples.	Summarizing, PBL (small working models), Quiz, Virtual Lab, Tutorials sessions, Expert Lecture	8 Hrs

Part C

Modules	Title	Indicative-ABCA/PBL/ Experiments/Field work/ Internships	Bloom's Level	Hours
1	Determination of transition temperature of given substance by thermometric method.	Experiments	BL3-Apply	2 hrs
2	To study the phase diagram of two component system by cooling curve method	Experiments	BL4-Analyze	2hrs
3	To determine the enthalpy of neutralization of strong acid, strong base	Experiments	BL5-Evaluate	2hrs
4	Verification of Beers Law	Experiments	BL5-Evaluate	2hrs
5	To determine the melting point of the given sample	Experiments	BL4-Analyze	2hrs
6	To determine the boing point of a given sample	Experiments	BL4-Analyze	2hrs
7	To determine the percentage composition of a mixture of water and ethyl alcohol by surface tension method	Experiments	BL4-Analyze	2hrs
8	To determine the percentage composition of a mixture of water and ethyl alcohol by viscosity method	Experiments	BL4-Analyze	2hrs

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Part D(Marks Distribution)

Theory					
Total Marks	**Minimum Passing Marks**	**External Evaluation**	**Min. External Evaluation**	**Internal Evaluation**	**Min. Internal Evaluation**
100	40	40	20	60	20
Practical					
Total Marks	**Minimum Passing Marks**	**External Evaluation**	**Min. External Evaluation**	**Internal Evaluation**	**Min. Internal Evaluation**
100	40	40	20	60	0

Part E

Books	M.M.N. Tondon Unified Chemistry
Articles	https: //www.physchemres.org/article_1934 13.html
References Books	Puri Sharma Pathania Physical Chemistry
MOOC Courses	https: //nptel.ac.in/courses/102104062 https: //nptel.ac.in/courses/104104130 https: //nptel.ac.in/courses/104106132
Videos	https://archive.nptel.ac.in/courses/104/106/104106089/

Part F

Project 1	No project available
Project 2	No project available
Project 3	No project available
Project 4	No project available
Project 5	No project available

Course Articulation Matrix

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	1	-	2	-	-	-	-	-	-	-	-	-	1	1	-
CO2	1	-	2	3	-	-	-	-	-	-	-	-	1	1	-
CO3	1	-	-	2	-	-	-	-	-	-	-	-	1	1	-
CO4	1	-	-	2	-	-	-	-	-	-	-	-	1	1	-
CO5	1	-	2	3	-	-	-	-	-	-	-	-	1	1	-
CO6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

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Syllabus-2020-2021

(SOS)(BSc_PCM)

Title of the Course	Advanced Calculus
Course Code	BSMA0405[T]

Part A

Year	2nd	**Semester**	4th	**Credits**	L	T	P	C
					3	1	0	4
Course Type	Theory only							
Course Category	Discipline Core							
Pre-Requisite/s	Basics Differentiation , Integrations, , Continuity ,convergence and divergence of Sequence and Series			**Co-Requisite/s**	Function,, Limit , Sequence and Series			
Course Outcomes & Bloom's Level	**CO1-** To remember basic concept of Real Analysis which used in various problems of sciences. **(BL1-Remember)** **CO2-** To understand and identify the Convergence of sequences various test for convergence of sequences , limit ,continuity and differentiability of function partial differentiation, Envelops , maxima and minima , Double and Triple Integral volume and surface of solids.((**BL2-Understand)** **CO3-** To apply the concept of limit continuity and differentiability partial differentiation ,Taylors theorem , LaGrange's method , double and triple integrals to solve various problems of physical and allied sciences**(BL3-Apply)** **CO4-** To analyze and draw connection among the ideas of LaGrange's theorem and Beta Gama function , volume and surface and there properties to solve various problems of physical and allied sciences**(BL4-Analyze)** **CO5-** To evaluate Double and Triple integral , Partial differentiation , Convergence of series also identifying and provide the various applications related to them**(BL5-Evaluate)**							
Course Elements	Skill Development ✓ Entrepreneurship ✕ Employability ✓ Professional Ethics ✕ Gender ✕ Human Values ✕ Environment ✕		**SDG (Goals)**	SDG4(Quality education)				

Part B

Modules	Contents	Pedagogy	Hours
UNIT01	Definition of a sequence, , Bounded and monotonic sequences, Theorems on limits of sequences, Cauchy's convergence criterion, series of non-negative terms, comparison test, Cauchy's integral test, Cauchy's root test, Ratio tests, Raabe's tests, Logarithmic tests, Alternating series, Leibnitz's test, Absolute and Conditional convergence	Audio/Video clips, group discussion, lecture with PPTs, quiz	10
UNIT02	Continuous of functions of single variable, sequential continuity, Properties of continuous functions, Uniform continuity, and chain rule of differentiability, Mean value theorems and their geometrical interpretations, Darboux's intermediate value theorem for derivatives	Audio/Video clips, group discussion, lecture with ppt	10
UNIT03	Limit and continuity of functions of two variables, Partial differentiation, Change of variables, Euler's theorem on homogeneous functions, Taylor's theorem for functions of two variables, Jacobins.	Audio/Video clips, group discussion, lecture with PPTs, classroom presentations, Analysis	10
UNIT04	Envelopes, Evolutes, Maxima and Minima of functions of two variables, Lagrange multiplier method, Beta and Gamma Functions.	Audio/Videoclips, group discussion, lecture with PPTs, Quiz	8
UNIT05	Double and triple integrals, Volumes and surfaces of solids of revolution, Dirichlet's integrals, Change of order of integration in double integrals.	Audio/Video clips, group discussion, lecture with PPTs, Quiz	8

Part D(Marks Distribution)

Theory					
Total Marks	**Minimum Passing Marks**	**External Evaluation**	**Min. External Evaluation**	**Internal Evaluation**	**Min. Internal Evaluation**
100	40	40	12	60	28
Practical					
Total Marks	**Minimum Passing Marks**	**External Evaluation**	**Min. External Evaluation**	**Internal Evaluation**	**Min. Internal Evaluation**
0	0	0	0	0	0

Part E

Books	R. R. Goldbeg,Real Analysis,Oxford & I. B. H. Publishing Co. New Delhi
Articles	
References Books	D. Soma Sundaram and B. Choudhary,A first Course in Mathematical Analysis,Narosa Publishing House, New Delhi, 1997
MOOC Courses	
Videos	

Part F

Project 1	No project available
Project 2	No project available
Project 3	No project available
Project 4	No project available
Project 5	No project available

Course Articulation Matrix

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	1	-	-	-	2	2	-	2	-	-	-	-	1	-	1
CO2	3	3	1	3	3	2	-	1	-	1	-	-	2	-	2
CO3	3	2	-	1	3	-	-	-	-	-	-	-	1	3	2
CO4	3	2	-	2	-	-	-	-	-	-	-	-	-	3	1
CO5	2	1	-	1	-	-	-	-	-	-	-	-	-	2	-
CO6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

OMVEER SINGH

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