GANPAT UNIVERSITY

FACULTY OF SCIENCE

TEACHING AND EXAMINATION SCHEME

Programme	Bachelor of Science	Branch/Spec.	Biotechnology
Semester	IV		
Effective from Academic Year	2016-17	Effective for the batch Admitted in	July 2015

Subject Code	Subject Name	Teaching scheme												Examination scheme (Marks)					
		Credit						Hours (per week)						Theory			Practical		
		Lecture(DT)			Practical(Lab.)			Lecture(DT)			Practical(Lab.)			CE	SEE	Total	CE	SEE	Total
		L	TU	Total	P	TW	Total	L	TU	Total	P	TW	Total						
UBTA401CEM	CELLULAR METABOLISM-II	03		03				03		03				40	60	100		100	100
UBTA402FOM	FUNDAMENTALS OF MICROBIOLOGY	03		03				03		03				40	60	100			
UPBA403PRA	PRACTICAL MODULE-IV				03		03				06		06						
UCHA401IPC	INORGANIC AND PHYSICAL CHEMISTRY-V	03		03				03		03				40	60	100			
UCHA402OAC	ORGANIC AND ANALYTICAL CHEMISTRY-VI	03		03				03		03				40	60	100			
UPCA403PRA	PRACTICAL MODULE-IV				03		03				06		06					100	100
UENA401ENG	ENGLISH-IV	02		02				02		02				40	60	100			
	OPEN SUBJECT – 1	02		02				02		02				40	60	100			
Total		16		16	06		06	16		16	12		12	240	360	600		200	200

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Programme	Bachelor of Science		Branch/Spec.	Biotechnology	
Semester	IV		Version	1.0.1.0	
Effective from Academic Year	2016-17		Effective for the batch Admitted in	July 2015	
Subject code	UBTA 401 CEM-II	Subject Name	Cellular Metabolism –II		

Teaching scheme						Examination scheme (Marks)			
(Per week)	Lecture(DT)		Practical(Lab.)		Total		CE	SEE	Total
	L	TU	P	TW					
Credit	03		03		06	Theory	30	70	100
Hours	03		06		09	Practical	--	100	100

Pre-requisites:

Students should have basic knowledge of Metabolism of Biomolecules of 10+2 level

Learning Outcome:

The course will help the student to understand basic aspects of cellular metabolism.

Theory syllabus

Unit	Content	Hrs
1	1.1 Amino acid metabolism: Oxidation, Transamination, Deamination, Oxidative decarboxylation and amino acid biosynthesis 1.2 Urea cycle 1.3 Lipid metabolism.: Lipid oxidation (Beta Oxidation) 1.4 Fatty acid biosynthesis	15
2	2.1 Catabolism of nucleotides 2.2 Overview of biosynthesis of nucleotides of nucleotides 2.3 Oxidative phosphorylation: ETC of mitochondria, electron carriers, complexes of ETC 2.4 ATP generation coupled to electron transport	15
3	3.1 Photophosphorylation in bacteria, 3.2 Photophosphorylation in plants 3.3 Carbohydrate synthesis coupled to photophosphorilation. C3 cycle. 3.4 C4 cycle	15
4	4.1 Membrane transport: Diffusion, Activeand Passive transport 4.2 Introduction to signal transduction pathways 4.3 Types of signaling receptors 4.4 Signaling pathways: epinephrine, insulin	15

Text Books

1	Textbook of Biochemistry by satyanarayan

Reference Books

1	**Boyer,**1999, Concepts in Biochemistry, Thomson
2	**Lehninger,** Principles of Biochemistry
3	**Voet Donald**, Fundamentals of Biochemistry
4	**Stryer,** Biochemistry
5	**David White**, The Physiology and Biochemistry of prokaryotes

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Programme	Bachelor of Science	Branch/Spec.	Biotechnology
Semester	IV	Version	1.0.1.0
Effective from Academic Year	2016-17	Effective for the batch Admitted in	July 2015
Subject code	**UBTA 402 FOM**	Subject Name	**Fundamentals of Microbiology**

Teaching scheme						Examination scheme (Marks)			
(Per week)	Lecture(DT)		Practical(Lab.)		Total		CE	SEE	Total
	L	TU	P	TW					
Credit	03	-	-	-	03	Theory	30	70	100
Hours	03	-	-	-	03	Practical	-	100	100

Pre-requisites:

Students should have basic knowledge of nature of Microorganisms of 10+2 level

Learning Outcome:

The course will help the student to understand various kind of microorganisms and its significance.

Theory syllabus

Unit	Content	Hrs
1	**1.1 Bacteria:** Major Characteristics of microorganism. Taxonomic groups , General methods of classifying bacterial Nomenclature, Introduction to Bergey‟s manual 1.2 **Fungi:** General characteristics and Economic importance of fungi. 1.3 **Algae and Protozoa:** Biological and economical importance 1.4 **Virus:** General characteristics, structure and Classification of Bacteriophage. Lytic cycle and lysogenic cycle	15
2	2.1 Types of bacteria based on Carbon , energy, electron sources and pH, temperature and O2 requirement 2.2 Culture Media and its types, Methods of isolation of bacteria 2.3 Reproduction in bacteria, Bacterial growth curve 2.4 Methods Measurement of microbial growth	15
3	3.1Introduction of terms: Sterilization, Disinfection, Antiseptic, Germicide, Chemotherapy, Antibiotic etc. 3.2 Physical Agents: Mode of action and application of Temperature. Radiation and filtration 3.3 Chemical Agents: Mode of action and application of Phenol, alcoholic and halogen compounds 3.4 Chemical Agents: Mode of action and application of Heavy metals and Gaseous agents	15
4	4.1Introduction to terms: infection, pathogen, virulence, carrier, nosocomial and opportunistic infections, sepsis, septicemia, septic shock, virulence factors etc 4.2 Microbial Pathogenesis: Representative diseases to be studied in detail are **Bacteria:** Cholera, typhoid, tuberculosis, **Viruses:** AIDS, Fungi: mycoses **Protozoa:** amoebiasis 4.3 Overview on Origin of Chemotherapy 4.4 Antibiotics: Class of antibiotics based on mode of action, Antifungal & Antiviral antibiotic	15

Text Books

1	Pelczar, M.J., Chan, E.C.S. and N.R. Kreig (1993). “Microbiology” 5th Edition, Tata Mc Graw Hill
2	Presscott, M. J., Harley, J.P. and D.A. Klein (2002). “Microbiology”, 5th Edition, WCB Mc Graw Hill

Reference Books

1	Stanier, R.Y., Adelberg, E.A. and J.I. Ingram. (1991). “General Microbiology”, 5th Edition, Printice

	Hall of India Pvt. Ltd., New Delhi.
2	A.S. Rao (1997). " Introduction to Microbiology". Printice-Hall of India Pvt. Ltd., New Delhi.
3	Dubey, R. C. and D. K. Maheshwari (2000). "General Microbiology". S. Chand, New Delhi
4	Experiments in Microbiology. Himalaya Publishing House, Mumbai
5	Gopal Reddy, M., M. N. Reddy, DVR Saigopal and K.V. Mallaiah (2007). " Laboratory
6	H.A.Modi," A Handbook of Elementary Microbiology"(2014),Shanti Prakashan, Ahmedabad

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Programme	Bachelor of Science	Branch/Spec.	Biotechnology
Semester	IV	Version	1.0.1.0
Effective from Academic Year	2016-17	Effective for the batch Admitted in	July 2015
Subject code	**UPBA 403 PRA**	Subject Name	**PRACTICAL MODULE - IV**

Teaching scheme						Examination scheme (Marks)			
(Per week)	Lecture(DT)		Practical(Lab.)		Total		CE	SEE	Total
	L	TU	P	TW					
Credit			03		06	Theory			
Hours			06		08	Practical	--	100	100

Pre-requisites:

Students should have basic knowledge of Microorganisms and their nutrition 10+2 level.

Learning Outcome:

The course will help the student to understand diversity and nature of Microorganisms.

Practical content

Content
Introduction to culture media , and growth on solid media and in liquid media 02 Introduction to Isolation techniques - Streak plate, pour plate, spread plate 03 Standard plate count technique 04 Isolation of Yeast and Molds 05 Study the effect of Environment on growth –Temperature, 06 Study the effect of Environment on growth – pH, 07 Study the effect of Chemicals on microbial growth. 08 Study the effect of Heavy metal on microbial growth. 09 Study the effect of Antibiotics 10 Study of Biochemical test : **Test for carbohydrate:** Sugar fermentation, M-R,VP, Citrate utilization , TSI, Starch **Test for Nitrogen substrate**: Indol ,H2S, Urea, Protein, Phenylalanine, Ammonia, **Growth on specific media:** EMB, Mac Conky;‟ agar, Catalase test 11 Study of pure culture: E. coli, Bacillus, Proteus vulgar, staphylococcus, cocci. 12 Isolation of Bacteriophage Lipid estimation 14 Amino acid estimation 15 Quantification of DNA 16 Urea estimation by DAM 17 Genetic problems based on Mendelian genetics.

Text Books

1	Practical Biochemistry, Jayraman

Reference Books

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Programme	Bachelor of SCIENCE	Branch/Spec.	Biotechnology
Semester	IV	Version	1.0.0.0
Effective from Academic Year	2016-17	Effective for the batch Admitted in	July 2015
Subject code	UCHA 401 IPC	Subject Name	Inorganic and Physical Chemistry-V

Teaching scheme						Examination scheme (Marks)			
(Per week)	Lecture(DT)		Practical(Lab.)		Total		CE	SEE	Total
	L	TU	P	TW					
Credit	3					Theory			
Hours	3					Practical			

Pre-requisites:

- Before studying inorganic and physical chemistry all students have basic knowledge of inorganic compounds, molecular structure, Molecular orbital theories, basics of physical chemistry and knowledge related to UG level chemistry.

Learning Outcome:

- Applications and limitations of crystal field theory.
- Understanding of magnetic properties of co-ordination complexes.
- Knowledge of boron chemistry.
- Understanding of ionic equilibrium.
- Knowledge of conductometric titrations.
- Basic concept of electrochemistry and related theories.

Theory syllabus

Unit		Content	Hrs
1		**Application of CFT**	
	1.1	Application of C.F.T. 2015. For determination of color of complex., 2. Use of C.F.S.E. value. Limitation of C.F.T. Isomerism in complexes.	
		Magnetic Properties of Co-Ordination Compound	
	1.2	Type of magnetic behavior Method of determining magnetic susceptibility Spin only formula. Magnetic properties for 3rd metal complexes.	
02		**Boron Hydride**	
		Introduction. Classification of Hydrides. Preparation, Properties structure and use of Diborone. Bridge bonding in B_2H_6 (M.O. and SP^3 approach.). Structure of higher Borones: B_4H_{10} , B_5H_9 , B_5H_{11}, B_6H_{10} & $B_{10}H_{14}$	
03		**Ionic Equilibrium**	
		Only Introduction. Electrolysis, Ionic Equilibrium, Resistance, Conductance, Specific conductance, Equivalent Conductance, Molar Conductance, Equivalent conductance at Infinite Dilution.	

		Type of Conductrometric Titration Acid-Base Titration 1. Strong Acid Vs Strong Base. 2. Strong Acid Vs Weak Base. 3. Weak Acid Vs Strong Base. 4. Weak Acid Vs Weak Base. 5. Strong Acid + Weak Acid Vs Strong Base. Hydrolysis of Salt Classification of Salt. 1. Strong Acid & Strong Base. 2. Strong Acid & Weak Base. 3. Weak Acid & Strong Base. 4. Weak Acid & Weak Base. Numerical.	
04	Electro Chemistry		
		Introduction of terms. Oxidation, Reduction, Redox, Anode, Cathode, Electrode, Half Cell, Oxidation and Reduction Potential. Electochemical cell (Galvenic cell) & Representation cell. Electrochemical series and its significance. Nearst equation of cell EMF and single electrode potential. Describe the Electrode. 1. Metal-Metal ion Electrode., 2.. Standard Hydrogen Electrode. 3. Calomel Electrode., 4. Weston standard Electrode. 5. Glass Electrode., 6. Quienhydrogen Electrode. Application of cell potential. 2015. Equilibrium constant. 2. Free energy. 3. pH Numerical.	

Practical content

Text Books	
1	Advance Inorganic chemistry, by Satya Prakash, G.D. Tuli, S. K. Basu, R.D. Madan and S.Chand Vol-II.
2	Physical Chemistry (question and answer) by R. N. Madan, G.D. Tully and S. Chand.
Reference Books	
1	Advance physical chemistry by Gurdeep Raj.
2	Principal of Physical Chemistry by Puri, Sharma and Pathania.
3	Chemical Thermodynamics by R.P. Rastogy and R.R. Mishra.
4	Essential of Physical Chemistry by B.S. Bahal, Arn Bahal and G.D. Tully.
5	Physical chemistry by P.W. Atkins, 5^{th} ed., Oxferd, 1994, 7^{th} ed., 2002.
6	Physical chemistry by R.A. Alberty and R.J. Silbey, John Wiley, 1995.
7	Physical chemistry by G.H. Barrow, 5^{th} ed., Mac Graw Hill,1998, 6^{th} ed.
8	Physical chemistry by W.J.Moore, 4^{th} ed., Orient Longmans, 1969.

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FACULTY OF SCIENCE

Programme	Bachelor of SCIENCE	Branch/Spec.	CHEMISTRY
Semester	IV	Version	1.0.1.0
Effective from Academic Year	2016-17	Effective for the batch Admitted in	July 2015
Subject code	UCHA 402 OAC	Subject Name	Organic and Analytical Chemistry-IV

Teaching scheme						Examination scheme (Marks)			
(Per week)	Lecture(DT)		Practical(Lab.)		Total		CE	SEE	Total
	L	TU	P	TW					
Credit	3					Theory			
Hours	3					Practical			

Pre-requisites:

- Before studying organic and analytical chemistry all students have basic knowledge of organic compounds, general organic chemistry, carbohydrates, heterocyclic compounds, UV spectroscopy, volumetric analysis and knowledge related to UG level chemistry.

Learning Outcome:

- Interoduction of heterocyclic compounds and their nomenclature.
- Chemistry of five membered heterocyclic compounds.
- Knowledge of carbohydrate chemistry and various carbohydrate compounds.
- Understanding of polynuclear aromatic hydrocarbons and their chemistry.
- Nomenclature and physical properties of cycloalkanes.
- Understanding of various theories of strain in cycloalkanes.
- Understanding the Basics of UV-Vis spectroscopy.
- Understanding of precipitation and complexometric titrations.

Theory syllabus

Unit		Content	Hrs
1	1.1	**Heterocyclic Compound**	
		Introduction. Nomenclature. Molecular orbital picture and aromatic characteristics of Pyrrole, Furan and Thiophene. Method of synthesis for Pyrrole, Furan and Thiophene. Chemical reactions for Pyrrole, Furan and Thiophene. Basicity of Pyrrole.	
	1.2	**Carbohydrades**	
		Introduction. Definition. Classification of Mono Sacharides. Nomenclature. Reactions of Glucose and Fructose. (Methylation, Acetylation, Oxidation with Br_2 water and con. HNO_3, Reaction With HCN, NH_2OH, Osazone formation and Epimerisation.)	
02	2.1	**Polynuclear Aromatic Hydrocarbons**	
		Nomenclature of Naphthalene & Anthracene derivatives. Synthesis of Naphthalene & Anthracene by Haworth Synthesis.	

		Reaction of Naphthalene & Anthracene 1. Oxidation 2. Reduction 3. Dehydrogenation 4. Nitration 5. Halogenation 6. Sulphonation 7. Friedal-Craft Reaction • Orientation of electrophillic substitution in Naphthalene. • Synthesis of alpha –α and –β substituted Naphthalene derivatives (By Howath Synthesis only). • Synthesis of 9- & 9,10- substituted Anthracene derivatives (by howath Synthesis only).	
		Cyclo Alkane	
	2.2	Nomenclature. Physical property. Method of preparation. Chemical properties of cyclo alkanes. Bayer‟s Strain theory. Orbital picture of angle strain. Heats of combustion and relative stabilities of Cycloalkane. Strainless ring theory.	
	Ultraviolet Spectroscopy		
03		Types of electronic transitions. Effect of conjugation. Concept of Chromophore and Auxochrome. Bathochromic, Hypsochromic, Hyperchromic and Hypochromic shifts. Woodward-fisher rules. Problems of conjugated enes, enones and aromatic ketones, aldehydes, acids and esters using empirical rules.	
		Theory of Precipation	
	4.1	Precipitation Titration, The Moh’r method, Fajan’s method, Volhard’s method, Construction of precipitation titration curve.	
04		**Complex Metric EDTA Titration**	
	4.2	Type, Indicator, Masking and demasking. Construction of the titration curves.	
Practical content			
Text Books			
1	Organic Chemistry by Morrision and Boyd. 4th ed., Pearson Education-2003		
2	Text book of Organic Chemistry by Arun Bahal, B.S. Bahl, S.Chand.		
Reference Books			

1	Advance Organic Chemistry by Jerry March.
2	Advance Organic Chemistry by Arun Bahal and B. S. Bahal.
3	Organic Chemistry Vol. I & II by S.M. Mukherjee, S.P. Singh, R. P. Kapoor.
4	Reaction Mechanism and Reagent in Organic Chemistry by Gurdeep R. Chatwal 4^{th} ed., Himalaya pub.
5	Organic Chemistry by Pine, Hendriction, Cram and Hammond 4 ed. By P. S. Kalsi.
6	Spectroscopy of Organic compounds 6^{th} ed., by P.S. kalsi.
7	Organic Chemistry by I.R. Finar.
8	Organic Spectroscopy by William and Kemp.
9	Spectroscopic methods in organic chemistry by Dudley H. Williams and lan Fleming.
10	Analytical chemistry by G.D. Christian, J.wiley.
11	Fundamental of Analytical Chemistry by D. A. Skoog.
12	Analytical Chemistry- principals by J.H. Kennedy.
13	Analytical Chemistry principals and techniques by L.G. Hargis.
14	Principles of Instrumental Analysis by D.A. Skoogs.
15	Qualitative Analysis by R. A. Day.

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Programme	Bachelor of SCIENCE	Branch/Spec.	CHEMISTRY
Semester	IV	Version	1.0.1.0
Effective from Academic Year	2016-17	Effective for the batch Admitted in	July 2015
Subject code	UPCA 403 PRA	Subject Name	Practical Module : IV

Teaching scheme						Examination scheme (Marks)			
(Per week)	Lecture(DT)		Practical(Lab.)		Total		CE	SEE	Total
	L	TU	P	TW					
Credit	2					Theory			
Hours	2					Practical			

Pre-requisites:

- Before performing these practicals, students have basic knowledge of laboratory chemicals, inorganic & organic compounds and their properties, theories related to volumetric analysis, chromatography, organic estimations, apparatus and instruments which are used in performing chemistry practicals.

Learning Outcome:

- Qualitative analysis of mixtures of inorganic ions.
- Volumetric analysis for the determination of various metals.
- Estimation of organic compounds by various methods.
- Separation of radicals using paper chromatography.

Practical syllabus

Inorganic Chemistry

Inorganic Qualitative analysis (Any 7 mixture out of 10)
Mixture containing 4 Redicals.
(Except PO_4^{-3}, BO_3^{-3}, ASO_4^{-3}, ASO_3^{-3}, O^{-2}).

Analytical Chemistry

A. Volumetric Analysis of Cu, Zn, Ni (Any Three)
   1. To determine the amount of Zn by EDTA method.
   2. To determine the amount of Ni by EDTA method.
   3. To determine the amount of Cu by Iodometry method.
   4. To determine the amount of Cu by EDTA method.

B. Estimation of Glucose / Aniline / Phenol (Any Two)
   1. To determine the amount of Aniline by brominating method.
   2. To determine the amount of Phenol by brominating method.
   3. To determine the amount of Glucose by Oxidation method.

C. Paper Chromatography 1^{st} & 3^{rd} Group Radicals.

Practical content

Text Books	
1	

Reference Books	
1	
2	

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Programme	Bachelor of SCIENCE	Branch/Spec.	Biotechnology
Semester	IV	Version	1.0.1.0
Effective from Academic Year	2016-17	Effective for the batch Admitted in	July 2015
Subject code	UENA 401 ENG	Subject Name	English IV

Teaching scheme						Examination scheme (Marks)			
(Per week)	Lecture(DT)		Practical(Lab.)		Total		CE	SEE	Total
	L	TU	P	TW					
Credit	2					Theory			
Hours	2					Practical			

Pre-requisites:

- Students should have basic knowledge of English Language and grammar.
- Students should have ability to speak and write correct sentences in their day to day language.
- Students should be familiar with correct usage of language.

Learning Outcome:

- Knowledge of English grammar.
- Understanding of prose and composition.
- Development of communication skills.
- Development of vocabulary.
- Knowledge of letter writing for various official purposes.

Theory syllabus

Unit	Content	Hrs
1	Selected Prose	
	How much land does a man need- Leo Tolstoy The Mother- Somerset Maugham A true story- Mark Twain	
2	Basic English Grammar	
	Adverb clause, Adjective clause	
3	Note-making and Précis writing	
	Unseen paragraphs for Note-making Unseen paragraphs for précis	
4	Composition	
	Memo Writing, Notice, Agenda and Minutes Writing, Complaint Letters, Adjustment Letters	

Practical content

Text Books

1	Twelve selected short stories by C. S. Sharma
2	Business Communication by Rodha Doctor and Aspi Doctor

Reference Books

1	Business Communication by Urmila Rai and S. M. Rai
2	High-School English Grammar Wren and Martin
3	Technical Communication by Meenakshi Raman and Sangeeta Sharma

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FACULTY OF SCIENCE

Programme	Bachelor of SCIENCE	Branch/Spec.	CHEMISTRY/BIOTECHNOLOGY/MICROBIOLOGY/PHYSICS/MATHEMATICS
Semester	IV	Version	1.0.0.0
Effective from Academic Year	2016-17	Effective for the batch Admitted in	July 2015
Subject code	UDMB 401 DMT	Subject Name	DISASTER MANAGEMENT –II

Teaching scheme						Examination scheme (Marks)			
(Per week)	Lecture(DT)		Practical(Lab.)		Total		CE	SEE	Total
	L	TU	P	TW					
Credit	2	-	0	-	2	Theory	40	60	100
Hours	2	-	0	-	2	Practical	00	00	00

Pre-requisites:

- Students should have advance knowledge of different disasters.
- Students should have ability to think over the serious issues in the society.
- Students should be familiar with the preventive methods of disasters.

Learning Outcome:

- Knowledge of different NGOs working methods during disaster.
- Understanding the needs and expectations of relief camps at the level of post disaster.
- Development of new strategies of Relief Operations.
- Development of mental and physical strength as an individual.
- Knowledge of Government Policies towards disaster.

Theory syllabus

Unit	Content	Hrs
1	**Man Made Disasters:**	15
	1.1 War and Terrorism, Riots and Demonstrations, Residential and Industrial, Fires, Transportation Accidents, Nuclear Power Accidents, Hazardous Materials and Toxic Emission, Utility Failure.	
2	**Problems regarding victims and its awareness and Planning for disaster management:**	15
	1.1 Saving Victims – First Twenty-Four Hours, Conducting Medical Relief Operations, Managing Relief Operations, Psychological Issues, Carrying Out Rehabilitation Work. **1.2** Local Disaster Management Cell, How to Prepare a Business Recovery Plan? Government Response in Disaster.	

Practical content

Reference Books