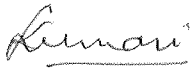


**Members of Board of Studies of FYUGP Syllabus as per Guidelines of the
Binod Bihari Mahto Koyalanchal University, Dhanbad**

1. Dr. Leelawati Kumari
Head, University Department of Chemistry, BBMKU


-Chairperson

2. Sri Rajendra Prasad Singh
University Department of Chemistry, BBMKU

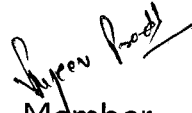

-Member

3. Dr. Dharmendra Kumar Singh
University Department of Chemistry, BBMKU.


-Member

Two Experts for UG

4. Dr. Rajeev Pradhan
Assistant Professor, Department of Chemistry,
P.K.R.M. College, Dhanbad


-Member

5. Sri Gopal Prajapati
Assistant Professor, Department of Chemistry,
K.B. College, Bermo


-Member

Binod Bihari Mahto Koyalanchal University, Dhanbad

Subject: Chemistry

FYUGP NEP 2020 (From session 2023 onwards)

UG Syllabus

Minor from Vocational

Semester II

Minor – 2A (MN-2A) Chemistry of food, nutrition and preservation

Credits – 4

Lectures – 60 Hours

FM = 75 (No Internal Exam) + 25 (Practical/Viva-Voce/Demonstration/Skill-Test) = 100

Instructions to External Examiner:

- In all **Nine** questions to be set there shall be two groups, i.e., **A** and **B**.
- **Group A** is compulsory which will contain three questions.
- Question no. **1** will be very short answer type/Objective type consisting of five questions of **1 mark** each.
- Question no. **2 & 3** will be of short answer type of **5 marks** each.
- **Group B** will contain descriptive type, six questions* of **Fifteen marks** each, out of which any four are to be answered.

*Question no.9 will be short-answer type. There will be four options of which any two are to be answered carrying equal marks covering the whole syllabus.

Learning Outcomes:

After successfully completing this course, the students will be able:

1. To know about the basic of human physiological system and food science
2. To learn about the nutrition and its importance
3. To learn about the food preservation and its utility.

Unit	Topic	Lectures
Unit 1:	Basics of human physiological system and food science:	
1.1	Digestive System: Structure and functions of G.I. tract, Process of digestion and absorption of food, Structure and functions of liver, gall bladder and pancreas.	5
1.2	Basic concept on Food, Nutrition and Nutrients (Nutrition, Malnutrition and Health: Scope of Nutrition.)	3
1.3	Classification of Food	3
1.4	Classification of Nutrients.	3
Unit 2:	Nutrition:	
2.1	Dietary fibers (composition, properties and Minerals and trace elements (biochemical and physiological role, bioavailability and requirement with examples)	5

2.2	Vitamins (examples, biochemical and physiological requirements, deficiency and excesses)	5
2.3	Water (requirement, water balance)	3
2.4	Basic idea about community nutrition (objective, importance of various programmes)	3
Unit 3:	Food preservation:	
3.1	Food preservation: definition, objectives and principles of food preservation.	3
3.2	Different methods of food preservation	3
3.3	Preserved Products: Jam, Jelly, Marmalade, Sauces, Pickles, Squashes, Syrups-types, composition and manufacture, selection, cost, storage, uses and nutritional aspects.	5
3.4	Food Standards : ISI, Agmark, FPO, MPO, PFA, FSSAI.	4
Total Lectures		45

Reference/suggested books

1. Srilakshmi B (2017): Nutrition Science, 6th Multicolour Ed. New Age International (P) Ltd.
2. Roday S(2012): Food Science and Nutrition, 2nd Ed. Oxford University Press.
3. Mann J and Truswell S(2017) : Essentials of Human Nutrition, 5th Ed. Oxford University Press.
4. Wilson K and Walker J(2000): Principles and Techniques of Practical Biochemistry, 5th Ed. Oxford University Press.
5. Sadasivan S and Manikam K(2007): Biochemical Methods, 3rd Ed. New Age International (P) Ltd.
6. Oser B L(1965). Hawk's Physiological Chemistry, 14th Ed. McGraw-Hill Book
7. Gopalan C , Rama Sastri BV and Balasubramanian SC(2016): Nutritive value of Indian Foods, Indian Council of Medical Research.
8. Subalakshmi G and Udipti, SA(2006): Food processing and preservation, 1st Ed. New Age International (P)Ltd.
9. Potter NN and Hotchkiss JH(1999): Food science, 5th Ed , Springer.

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for

Binod Bihari Mahto Koyalanchal University, Dhanbad

Subject: Chemistry

FYUGP NEP 2020 (From session 2023 onwards)

UG Syllabus

Minor from Vocational Paper

Semester II

Minor – 2A (Practical) (MN-2A-P) Food, Pharmaceutical & Clinical Analysis

Practical/Viva-Voce/Demonstration/Skill-Test based on the above theory content.

FM = 25 [End Semester = 25] No Internal Examination. Duration of Course = $15 \times 2 = 30$ hrs

Instruction to Question Setter for

End Semester Examination (ESE):

There will be one Practical Examination of 3Hrs duration. Evaluation of Practical Examination will be as per the following guidelines:

Experiment = 15 marks

Practical record notebook = 05 marks

Viva-voce = 05 marks

1. Estimation of blood Glucose
2. Determination of Vitamin-C in Food Sample.
3. Identification of Mono, Di and Polysaccharides.
4. Identification of Proteins.

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Binod Bihari Mahto Koyalanchal University, Dhanbad
Subject: Chemistry
FYUGP NEP 2020 (From session 2023 onwards)
UG Syllabus
Minor from Vocational
Semester IV

Minor – 2B (MN-2B) Fermentation Science and Technology

Credits – 4

Lectures – 60 Hours

FM = 75 (No Internal Exam) + 25 (Practical/Viva-Voce/Demonstration/Skill-Test) = 100

Instructions to External Examiner:

- In all **Nine** questions to be set, there shall be two groups, i.e., **A** and **B**.
- **Group A** is compulsory which will contain **three** questions.
- Question no. **1** will be very short answer type/Objective type consisting of five questions of **1 mark** each.
- Question no. **2 & 3** will be of short answer type of **5 marks** each.
- **Group B** will contain descriptive type, six questions* of **Fifteen marks** each, out of which any four are to be answered.

*Question No.9 will be short-answer type. There will be four options of which any two are to be answered carrying equal marks covering the whole syllabus.

Learning outcomes:

After completing this course the learner will be able to:

1. Employ the process for maintenance and preservation of microorganisms.
2. Analyze the various aspects of the fermentation technology and apply for Fermentative production.
3. Demonstrate proficiency in the experimental techniques for microbial production of enzymes: amylase and protease, bioproduct recovery.

Unit	Topic	Lectures
Unit 1	Microbial culture	
1.1	Preparation of microbial culture.	3
1.2	Preparation and sterilization of fermentation media.	3
1.3	Isolation and improvement of industrially important microorganisms.	3
Unit 2	Fermentation	
2.1	Maintenance and preservation of microorganisms.	3
2.2	Metabolic regulations and overproduction of metabolites.	3
2.3	Kinetics of microbial growth and product formation.	3

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Unit 3	Metabolites, Fermented products	
3.1	Scope and opportunities of fermentation technology.	5
3.2	Principles of fermentation: Submerged, solid state, batch, fed-batch and continuous culture.	5
3.3	Fermentative production of vinegar, alcohol (ethanol, wine, beer), acids (citric acid and gluconic acid), amino acids (lysine and glutamic acid) and antibiotics (penicillin and streptomycin).	7
Unit 4	Enzyme production, Bioproduct recovery	
4.1	Microbial production of enzymes: Amylase and Protease.	5
4.2	Bioproduct recovery.	5
	Total Lectures	45

Suggested readings

1. Waites M.J. (2008). Industrial Microbiology: An Introduction, 7th Edition, Blackwell Science, London, UK.
2. Prescott S.C., Dunn C.G., Reed G. (1982). Prescott & Dunn's Industrial Microbiology, 4th Edition, AVI Pub. Co., USA.
3. Reed G. (2004). Prescott & Dunn's industrial microbiology, 4th Edition, AVI Pub. Co., USA.
4. JR Casida L.E. (2015). Industrial Microbiology, 3rd Edition, New Age International (P) Limited Publishers, New Delhi, India.
5. Waites M.J., Morgan N.L., Rockey J.S. and Higton G. (2001) Industrial Microbiology: An Introduction. 1st Edition, Blackwell Science, London, UK.
6. Pelczar M.J., Chan E.C.S. and Krieg N.R. (2003) Microbiology. 5th Edition, Tata McGraw-Hill Publishing Company Limited, New Delhi.

DHANBAD JHARKHAND
धनबाद झारखण्ड

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Binod Bihari Mahto Koyalanchal University, Dhanbad

Subject: Chemistry

FYUGP NEP 2020 (From session 2023 onwards)

UG Syllabus

Minor from Vocational Paper

Semester IV

Minor – 2B (Practical) (MN-2B-P) Fermentative Production

Practical/Viva-Voce/Demonstration/Skill-Test based on the above theory content.

FM = 25 [End Semester = 25] No Internal Examination. Duration of Course=15×2=30 hrs

Instruction to Question Setter for

End Semester Examination (ESE):

There will be one Practical Examination of 3Hrs duration. Evaluation of Practical Examination will be as per the following guidelines:

Experiment = 15 marks

Practical record notebook = 05 marks

Viva-voce = 05 marks

1. Microbial Culture on Agar Plates
2. Fermentative Production of Vinegar
3. Microbial Production of Amylase Enzyme

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Binod Bihari Mahto Koyalanchal University, Dhanbad

Subject: Chemistry

FYUGP NEP 2020 (From session 2023 onwards)

UG Syllabus

Minor from Vocational

Semester VI

Minor – 2C (MN-2C) Chemistry in Everyday Life**Credits – 4****Lectures – 60 Hours****FM= 75(No Internal Exam)+25(Viva-Voce/Demonstration/Practical/Skill-Test) =100****Instructions to External Examiner:**

- In all Nine questions to be set there shall be two groups, i.e., A and B.
- **Group A** is compulsory which will contain **three** questions.
- Question No. 1 will be Very Short Answer type/Objective type consisting of five questions of **1 mark** each.
- Question no. 2 & 3 will be of Short answer type of **5 marks** each.
- **Group B** will contain descriptive type, six questions* of **Fifteen marks** each, out of which any **four** are to be answered.

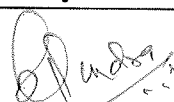
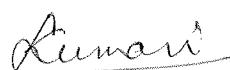
*Question no.9 will be short-answer type. There will be four options of which any **two** are to be answered carrying equal marks covering the whole syllabus.

Learning Outcomes:

After successfully completing this course, the students will be able:

1. Develop their understanding on Human Physiology.
2. Define and describe the principle of some common health hazards.
3. Evaluate the radicals and their destroying enzyme.
4. Understand the chemistry of everyday use Chemicals.

Unit	Topic	Lectures
Unit 1:	Respiration and energy production in human body	
1.1	Respiration, Respiratory enzymes, brief outline of hemoglobin and myoglobin, oxygen transport mechanism in body, co-operativity	2
1.2	Respiration in lower animals, hemocyanin, hemerythrin.	2
1.3	Energy production in body, ATP; enzyme responsible for food digestion, mechanism of food digestion, active site of cytochrome c-oxidase.	5
Unit 2:	Chemical aspects of some common health hazards	
2.1	Anemia, sickle cell anemia, leukemia, blood pressure irregularation, blood sugar, arthritis, carbon monoxide poisoning in mines, cyanide poisoning, fluorosis etc.	9
Unit 3:	Significance of Radical chemistry in living system	


3.1	Radical production in environment, superoxide and peroxide, health impact, action of radicals, cell mutation, diseases caused by free radical, cancer, radical quencher, anti-oxidants, natural anti-oxidants like vegetables, beverages like tea and coffee, fruits.	8
3.2	Radical destroying enzymes: superoxide dismutase, catalase, peroxidase, mechanism of action.	5
Unit 4: Chemistry of Materials		
4.1	Soaps and Detergents – their action, Biofuels – production of biofuels and its utility as alternative fuel source, Fibers: natural fibers, cotton, wool, silk, rayon, artificial fibers, polyamides, acrylic acid, PVC, PVA	8
4.2	Examples of natural biodegradable polymers, cellulose, cellulose acetate, cellophane, soy protein, corn, zein protein, wheat gluten protein, synthetic biodegradable polymers. Use of polymeric materials in daily life.	6
Total Lectures		45

Reference/suggested books

1. Kaim W, Bioinorganic Chemistry, Vol 4, Brigitte Scwederski, Wiley, 1994.
2. Crichton R. H. Biological Inorganic Chemistry – An Introduction, Elsevier, 2008.
3. Berg J. M., Tymoczko J. L., Stryer I. Biochemistry, W. H. Freeman, 2008.
4. Bertini, I., Gray, H. B., Lippard, S. J. and Valentine, J. S. (1994) Bioinorganic Chemistry. University Science Books (1994)
5. Lippard S., Berg J. M. Principles of Bioinorganic Chemistry; University Science Books 1994.
6. Polymer science, V. R. Gowariker, N. V.Viswanathan, J. Sreedhar, New Age International.

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Binod Bihari Mahto Koyalanchal University, Dhanbad

Subject: Chemistry

FYUGP NEP 2020 (From session 2023 onwards)

UG Syllabus

Minor from Vocational Paper
Semester VI

Minor – 2C (Practical) (MN-2C-P) Chemistry in Everyday Life

Practical/Viva-Voce/Demonstration/Skill-Test based on the above theory content.

FM = 25 [End Semester = 25] No Internal Examination. Duration of Course=15×2=30 hrs

**Instruction to Question Setter for
End Semester Examination (ESE):**

There will be one Practical Examination of 3Hrs duration. Evaluation of Practical Examination will be as per the following guidelines:

Experiment = 15 marks

Practical record notebook = 05 marks

Viva-voce = 05 marks

1. Analysis of soaps and detergents.
2. Analysis of Biofuels - flash point, pour point, cloud point
3. Testing of adulterant in food, oil and vegetable.

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Binod Bihari Mahto Koyalanchal University, Dhanbad
Subject: Chemistry
FYUGP NEP 2020 (From session 2023 onwards)
UG Syllabus
Minor from Vocational
Semester VIII

Minor – 2D (MN-2D) **Electrochemistry and Corrosion in Polymer-based Paint Technology**

Credits – 4

Lectures – 60 Hours

FM = 75 (No Internal Exam) + 25 (Practical/Viva-Voce/Demonstration/Skill-Test) = 100

Instructions:

- In all **Nine** questions to be set, there shall be two groups, i.e., **A** and **B**.
 - **Group A** is compulsory which will contain **three** questions.
 - Question No. **1** will be Very Short Answer Type/Objective type consisting of five questions of **1 mark** each.
 - Question no. **2 & 3** will be of Short answer type of **5 marks** each.
 - **Group B** will contain descriptive type, six questions* of **Fifteen marks** each, out of which any four are to be answered.
- *Question No.9 will be short-answer type. There will be four options of which any **two** are to be answered carrying equal marks covering the whole syllabus.

Learning outcomes:

After completing this course the learner will be able to:

1. Understand the fundamentals of electrochemistry and its applications in corrosion science.
2. Analyze the mechanisms of corrosion and degradation of metallic substrates.
3. Explore the role of polymer-based paints in corrosion prevention and mitigation.
4. Examine the synthesis, properties, and applications of polymer-based paints.
5. Develop practical skills in paint formulation, application, and testing techniques.
6. Evaluate the environmental impact and sustainability considerations of paint technology.

Unit	Topic	Lectures
Unit 1	Introduction to Electrochemistry	
1.1	Basic principles of electrochemistry	2
1.2	Electrochemical cells and electrodes	2

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1.3	Electrochemical reactions and thermodynamics	2
Unit 2	Corrosion Fundamentals	
2.1	Types and forms of corrosion	2
2.2	Corrosion mechanisms: chemical, electrochemical, and metallurgical	3
2.3	Factors influencing corrosion processes	2
Unit 3	Corrosion Protection Methods	
3.1	Cathodic protection, Anodic protection, Inhibitors and passivation, Coatings and barriers	3
Unit 4	Polymer Chemistry and Paint Technology	
4.1	Introduction to polymers and polymerization techniques	3
4.2	Properties of polymers relevant to paint technology	3
4.3	Formulation of polymer-based paints	3
Unit 5	Paint Formulation and Application	
5.1	Pigments and additives	3
5.2	Solvents and resin systems	3
5.3	Application techniques: spraying, brushing, dipping	3
5.4	Curing and film formation	3
Unit 6	Environmental and Sustainability Considerations	
6.1	Environmental impact of paint technology	3
6.2	Sustainable practices in paint formulation and application	3
6.3	Regulatory compliance and green initiatives	2
Total Lectures		45

Suggested readings

1. "Corrosion Engineering: Principles and Practice" by Pierre R. Roberge .
2. "Polymer Chemistry: An Introduction" by Malcolm P. Stevens .
3. "Paint and Coating Testing Manual: Fourteenth Edition of the Gardner-Sward Handbook" by Joseph V. Koleske .

Additional Resources:

- o Journal articles from reputable sources (e.g., Journal of Coatings Technology and Research, Progress in Organic Coatings).
- o Industry standards and specifications from organizations like ASTM International and NACE International.

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Binod Bihari Mahto Koyalanchal University, Dhanbad

Subject: Chemistry

FYUGP NEP 2020 (From session 2023 onwards)

UG Syllabus

Minor from Vocational Paper

Semester VIII

Minor – 2D (Practical) (MN-2D-P) Electrochemistry and Corrosion in Polymer-based Paint Technology

Practical/Viva-Voce/Demonstration/Skill-Test based on the above theory content.

FM = 25 [End Semester = 25] No Internal Examination. Duration of Course=15×2=30 hrs

Instruction to Question Setter for

End Semester Examination (ESE):

There will be one Practical Examination of 3Hrs duration. Evaluation of Practical Examination will be as per the following guidelines:

Experiment =15 marks

Practical record notebook = 05 marks

Viva-voce = 05 marks

1. Examine the effect of different electrolyte concentrations on the rate of electrolysis of a copper sulfate solution using copper electrodes.
2. Investigate the effect of primer application on the adhesion and durability of different types of paint coatings applied to metal substrates subjected to accelerated weathering conditions.

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