

GUJARAT VIDYAPITH: AHMEDABAD
Faculty of Science and Applied Science, Sadra,
Department of Biogas Research and Microbiology
Course Structure For B.Sc Microbiology (Semester I to VI)
Effective from June 2023

Availability of time for direct teaching in each semester = 15weeks = 517.5 hours (15weeks × 34.5 hours)

Monday to Friday (excluding prayer and recess)= 30 hours (6 hours × 5 days)

Saturday (excluding prayer and recess) = 4.5 hours

Therefore 1week = 34.5 hours

B.Sc.Semester-1							
Sr. No.	Broad Category of Course	Subject Name	Semester	Hours		Credits	
				Theory	Practical	Theory	Practical
1	Major (Core)	Microbiology	First	45	45	3	1.5
2	Minor	Chemistry	First	45	45	3	1.5
3	Multidisciplinary	Physics	First	45	45	3	1.5
4	Ability Enhancement course	English	First	25	-	1.5	-
5	Value added Courses	Gandhian Thought	First	30	-	2	-
6	Value added Courses	Alternative Energy Sources/ Human Nutrition	First	30		2	
7	Skill Enhancement Course	Basic Electrical, Electronics and Solar Equipment Repair and Maintenance	First	-	90	-	3
8	Community Life	Community Life	First	-	-	-	-
Total				220	225	14.5	7.5

Available Total Credits= 22 Total required hours per semester=445

Total available hours per semester=517.5 hours

Available hours per week= 34.5 hours

Calculation of required hours per week

14.5 credits for theory=14.5 hours

7.5 credits for practicals=15 hours

Total required hours per week=29.5 hours, Extra hours =5 hours (we can arrange tutorial class, remedial class, library class and other co-curricular activities during these hours).

GUJARAT VIDYAPITH : AHMEDABAD
Faculty of Science and Applied Science
Department of Biogas Research and Microbiology
BSc. Semester-I
MIC -101 Introduction to Microbial World
(Syllabus of Theoretical portion) (In force from June, 2023)
(External Evaluation: 60% + Internal Evaluation: 40%)
(Total Teaching Hours=45, Credit=03)

Unit 1		Microbial World	Teaching Hours: 12
	➤	Introduction: microbes in our lives	01
	➤	Distribution of microorganisms in nature	01
	➤	Introduction to taxonomy	03
		• Binomial system of nomenclature	
		• Carl Woese's three domain, kingdom, Whittaker's five kingdom concept of classification	
	➤	Major Groups of Microorganism	03
		• Difference between prokaryotic and eukaryotic microorganisms	
		• Prokaryotic microbes: Eubacteria and Archeobacteria	
		• Eukaryotic microbes: fungi (yeasts and molds), protozoa, algae	
		• Acellular microbes: viruses	
	➤	Introduction to methods of classifying Bacteria	04
		• Taxonomic groups (Taxa)	
		• The Goals of classification	
		• A) Intuitive method	
		• B) Numerical taxonomy	
		• C) Genetic relatedness	
		i) Nucleic acid base composition	
		ii) Nucleic acid hybridization	
		iii) Nucleic acid sequencing	
Unit 2		History of Microbiology	11
	➤	The discovery of microorganisms	04
		• Microbiology and the origin of life	
		• Contribution of A. V. Leeuwenhoek in the discovery of microscope	
		• Spontaneous generation vs. biogenesis	
	➤	Golden age of microbiology	07
		• Germ theory of fermentation	
		• Pure culture technique and Koch's Postulates	
		• Contribution of Joseph Lister in Antisepsis	
		• Contribution of Edward Jenner and Louis Pasteur in immunology	
		• Birth of modern chemotherapy: contribution of Paul Ehrlich, Alexander Fleming and Selman A. Waksman	
Unit 3		Scope and Relevance of Microbiology	10
	➤	Microbiology as a field of biology	01

	➤	Widening horizons	06
		• Medical microbiology	
		• Agricultural microbiology: Contributions of Sergei N. Winogradsky and Martinus W. Beijerinck and development of enrichment culture technique	
		• Public health microbiology	
		• Microbial ecology	
		• Food and dairy microbiology	
		• Industrial microbiology	
	➤	Microbiology and modern biology: molecular biology	02
	➤	Future of microbiology	01
Unit 4		Microscopy and Specimen Preparation	12
	➤	Light microscopy	05
		• Principle of bright-field microscopy: resolving power, numerical aperture, limit of resolution and magnification	
		• Component parts of the compound light microscope	
		• Principle, working and applications of dark-field, fluorescence, and phase-contrast microscopy	
	➤	Preparation of specimens for light microscopy	04
		• Wet-mount and hanging-drop techniques	
		• Microbiological stains: acidic, basic, and neutral dyes	
		• Smear preparation, fixation, use of mordants, intensifiers, decolorizers	
		• Simple staining of the smear: positive and negative staining	
	➤	Electron microscopy: principle, working and applications of transmission and scanning electron microscopy	03

REFERENCE

1. Microbiology: An Introduction G. J. Tortora, B. R. Funke, C. L. Case, 11th Edition (Indian Edition) (2016). Pearson India Education Services Pvt. Ltd., Noida (UP), India
2. Microbiology Pelczar JR., Chan ECS, Krieg NR, 5th Edition (1993), McGraw-Hill Book Company, NY
3. Principles of Microbiology R. M. Atlas, 2nd Edition (Indian Edition) (2015) McGraw Hill Education (India) Private Limited, New Delhi, India.
4. Prescott L, Harley J P, and Klein D A, (2008), Microbiology, 7th edn. Wm C. Brown - McGraw Hill, Dubuque, IA.

GUJARAT VIDYAPITH : AHMEDABAD
Faculty of Science and Applied Science
Department of Biogas Research and Microbiology
BSc. Semester-I
MIC -101 Introduction to Microbial World
(Syllabus of Practical portion) (In force from June, 2023)
(External Evaluation: 60% + Internal Evaluation: 40%)
(Total Teaching Hours=45, Credit=1.5)

Practical No	Exercise	Teaching Hours
1	Microbiology Good Laboratory Practices (GLP): rules and safety	01
2	Introduction to size, shape, labeling (if required) and uses of laboratory glass wares/plastic wares: test tube, pipette, conical flask, volumetric flask, petri dish, measuring cylinder, coplin jar, burette, beaker, glass spreader	02
3	Cleaning and preparation of glassware for sterilization	03
4	Disposal of laboratory waste and cultures	01
5	Study of principle, component parts and operation of the compound light microscope	02
6	Study of principles and working of laboratory instruments: autoclave, hot air oven, incubator, water bath, bacteriological filters, centrifuge, rotary shaker, pH meter, colorimeter	10
7	pH adjustment of solution by use of pH strip and pH meter	02
8	Study of hay infusion by hanging drop method	03
9	Simple staining of bacteria: positive, curd (simple staining) and negative staining	09
10	Study of permanent slides/photomicrographs of different groups of microorganisms	
	A) Permanent slides of prokaryotic microbes (bacteria): <i>Staphylococci, Bacilli, Spirochetes, Actinomycetes</i>	03
	B) Permanent slides of eukaryotic microbes: • Fungi: <i>Yeast, Mucor, Penicillium</i> • Algae: <i>Diatoms, Spirogyra, Chlamydomonas</i> • Protozoa: <i>Amoeba, Paramecium, Euglena</i>	06
	C) Photomicrographs of acellular microbes (viruses): HIV, TMV, Bacteriophage T2	03

ક્રમ	અભ્યાસક્રમ સમિતિના સભ્યનું નામ		સહી	ક્રમ	અભ્યાસક્રમ સમિતિના સભ્યનું નામ		સહી
1	ડૉ. નીરજ શેઠ	ડીન અને અધ્યક્ષ		5	ડૉ. શ્રીનિવાસ મૂર્તિ	આંતરિક સભ્ય	
2	ડૉ. રાઠેશભાઈ પટેલ	બાહ્ય તજજ્ઞ		6	ડૉ. નિખિલ ભટ્ટ	આંતરિક સભ્ય	
3	ડૉ. એસ. આર. દવે	બાહ્ય તજજ્ઞ		7	શ્રીમતી પિત્તીબહેન શુક્લ	આંતરિક સભ્ય	
4	ડૉ. દેવ્યાબીબહેન ટીપરે	બાહ્ય તજજ્ઞ		8	શ્રી અરવિંદભાઈ ડુગરેચિયા	આંતરિક સભ્ય	

GUJARAT VIDYAPITH : AHMEDABAD
Faculty of Science and Applied Science
Department of Biogas Research and Microbiology
B.Sc. Semester-I
Minor Course :CHEM-101: Physical Chemistry
(Syllabus of theoretical portion) (In force from June, 2023)
(External Evaluation: 60% + Internal Evaluation: 40%)
(Total Teaching Hours=45, Credit=03)

Learning Outcomes:

After studying this paper student will be able to.....

- know about the Ostwald dilution law and its limitations
- understand pH scale and relation between pH and pOH
- explain hydrolysis of salts and derive various relation about hydrolysis of salt
- calculate pH, $[H^+]$ and $[OH^-]$ of diluted acid-base solutions
- define buffer capacity and buffer limit of buffer solution and understand properties of buffer solutions and action of buffer solutions in adjustment of pH
- calculate the amount of constituents to prepare buffer solutions
- define Molar volume, Surface tension, Parachor, Viscosity, Molar refraction and Optical activity
- understand procedure of determination of surface tension, parachor, viscosity, molar refraction and optical activity
- calculate surface tension, parachor, viscosity, molar refraction and optical activity using given enough data
- define catalyst and catalysis, adsorption, absorption, positive adsorption, negative adsorption, adsorbate, desorption
- describe types of catalyst and adsorption
- state the application of adsorption

Note: Each unit must be given equal weightage in examinations

Unit-1: Ionic equilibrium (15 Hours)

1.1 Degree of ionization (1hour)

1.2 Ostwald dilution law and its limitations (1hour)

1.3 pH scale (2hours)

- Definition of pH and importance of pH scale
- Relation between pH and concentration of H^+ in solution
- pH range of acidic, basic solution
- Introduction about pOH, relation between pH and pOH, ionic product of water (K_w)

1.4 Hydrolysis of salts (from weak acid [HA] and strong base [BOH]) including derivation of

$$\bullet K_h = \frac{[HA][OH^-]}{[A^-]} \text{ (2hours)}$$

$$\bullet K_h = \frac{K_w}{K_a}$$

$$\bullet h = \sqrt{\frac{K_h}{C}}$$

- $pH = \frac{1}{2}[pK_w + pK_a + \log C]$

1.5 Hydrolysis of salts (from weak base [BOH] and strong acid [HA]) including derivation of

- $K_h = \frac{[BOH][H^+]}{[B^+]} \text{ (2hours)}$

- $K_h = \frac{K_w}{K_b}$

- $h = \sqrt{\frac{K_h}{C}}$

- $pH = \frac{1}{2}[pK_w - pK_b - \log C]$

1.6 Hydrolysis of salts (from weak acid [HA] and weak base [BOH]) including derivation of

- $K_h = \frac{[HA][BOH]}{[A^-][B^+]} \text{ (2hours)}$

- $K_h = \frac{K_w}{K_a \times K_b}$

- $h = \sqrt{K_h}$

- $pH = \frac{1}{2}[pK_w + pK_a - pK_b]$

1.7 Buffer solutions (2hours)

- Properties of buffer solutions
- Buffer capacity and buffer limit of buffer solution
- pH of buffer formed from weak acid and its salt including derivation of Henderson-Hasselbach equation
- pOH of buffer formed from weak base and its salt including derivation of Henderson-Hasselbach equation
- Action of buffer solutions in adjustment of pH during addition of acid or Base
- Buffer standards
- Importance of buffer solutions

1.8 Numericals based on topics 1.3 to 1.7 (3hours)

References

1. Chemistry and Chemical Reactivity (fourth edition), John C. Kotz and Paul Treichel, Jr., Saunders college publishing, New York (1999)
2. Fundamental of Analytical Chemistry (seventh edition), Douglas A. Skoog, Donald M. West and F. James Holler, Saunders college publishing, New York (1996)
3. Quantitative Chemical Analysis (sixth edition), Daniel C. Harris, W.H. Freeman (Publisher)

Unit-2: Physical properties and molecular structure (15 Hours)

2.1 Additive and constitutive properties (1hour)

2.2 Molar volume: (2hours)

- Additivity of molar volume
- Calculation of approximate molar volumes of given compound

2.3 Surface tension: (2hours)

- Definition, unit

- Derivation of formula of relative surface tension of liquid
 - Use of stalagmometer in determination of relative surface tension of liquid
 - Numericals
- 2.4 Parachor: **(2hours)**
- Relation between parachor, surface tension and molar volume
 - Calculation of approximate parachor of given compound
 - Application of parachor
 - Numericals
- 2.5 Viscosity: **(2hours)**
- Definition, unit
 - Derivation of formula of relative viscosity of liquid
 - Use of Ostwal's viscometer in determination of relative viscosity of given liquid
 - Numericals
- 2.6 Molar refraction: **(2hours)**
- Definition and applications
 - Molar refraction of mixture
 - Measurement of refraction index by Abbe refractometer
 - Numerical
- 2.7 Optical activity: **(2hours)**
- Definition, measurement by polarimeter
 - d / (+) / dextro, l / (-) / levo concept
 - Numericals
- 2.8 Dipole moment, its measurement and its application **(2hours)**

References

1. Text book of Physical Chemistry (second edition), Samuel Glasstone, Macmillan India Ltd., pp.524-556 (1991)
2. Encyclopedia of Industrial Chemical Analysis (volume-3), Foster Dee Snell and Clifford L. Hilton, Inter science publishers(John Wiley and Sons,Inc.,New York), pp. 584-598, 768-774 (1966)
3. Catalysis:Principles and Applications, B.Vishwanathan, S.Sivasanker, A.V. Ramaswamy, Narosa Publishing House(2002).

Unit-3: (A) Catalysis (8 Hours)

- 3(A).1 Definition of catalyst and catalysis**(1 hour)**
- 3(A).2 Types of catalyst: positive catalyst, negative catalyst and auto catalyst**(1 hour)**
- 3(A).3 Catalytic reaction: homogeneous catalytic reaction and Heterogeneous catalytic reaction**(1 hour)**
- 3(A).4 Characteristics of catalyst**(1 hour)**
- 3(A).5 Action of finely divided catalyst**(1 hour)**
- 3(A).6 Catalytic promoters or activators**(1 hour)**
- 3(A).7 Catalytic poisons or anticatalysts**(1 hour)**
- 3(A).8 Enzyme catalyst: definition and characteristics**(1 hour)**

Unit-3: (B) Adsorption (7 Hours)

- 3(B).1 Definition of adsorption, absorption, positive adsorption, negative adsorption, adsorbate, desorption**(1 hour)**
- 3(B).2 Types of adsorption (physical adsorption, chemical adsorption)**(2 hours)**
- 3(B).3 Adsorption of gases by solids**(1 hour)**

3(B).4 Freudlich and langmuir adsorption isotherm(derivation)(2 hours)

3(B).5 Application of adsorption(1 hour)

References

- 1.Catalysis:Principles and Applications, B.Vishwanathan, S.Sivasanker, A.V. Ramaswamy, Narosa Publishing House(2002).
2. Essential of Physical Chemistry ., B.S.Bahl, G.D. Tuli and Arun Bahl , S.Chand New Delhi(2006)

-----XXX-----XXX-----XX-----

GUJARAT VIDYAPITH : AHMEDABAD
Faculty of Science and Applied Science
Department of Biogas Research and Microbiology
B.Sc. Semester-I
Minor Course:CHEM-101: Physical Chemistry
(Syllabus of practical portion) (In force from June, 2023)
(External Evaluation: 60% + Internal Evaluation: 40%)
(Total Teaching Hours=45, Credit=1.5)

Learning Outcomes:

After performing following practicals student will be able to.....

- prepare percentage solution
- prepare and standardize acid(mono and di basic)-base (mono and di acidic)solution
- determine density, surface tension,viscosity, refractive index of organic liquids

(A) Solution preparation (21 Hours)

- (1) General introduction ,Percentage solution: %v/v, %w/v(**3hours**)
- (2)Preparation and standardization of sodium hydroxide solution(approximately 0.1 N) (**3 hours**)
- (3)To determine normality of given HCl/HNO₃ solution using standard sodium hydroxide Solution(**3 hours**)
- (4) Preparation and standardization of hydrochloric acid solution (approximately 0.1 N) (**3hours**)
- (5) To determine normality of given NaOH/KOH solution using standard hydrochloric acid solution(**3 hours**)
- (6) Preparation of molar and normal solution of H₂SO₄ (**3 hours**)
- (7)Preparation of molar and normal solution of Na₂CO₃(**3 hours**)

(B) Experiments of Physical chemistry (24 Hours)

- (1) To measure the density of a given liquid by R.D. bottle(**3hours**)
- (2) To determine the relative surface tension of a liquid with respect to water at room temperature by Stalagmometer(**3hours**)
- (3) To determine the surface tension of methyl alcohol, ethylalcohol and n-hexane at room temperature and calculate the atomic parachors of carbon, hydrogen and oxygen(**6hours**)
- (4) To determine the relative viscosity of a liquid with respect to water at room temperature by Ostwald's viscometer(**6 hours**)
- (5) To determine the composition of a given mixture consisting of two miscible liquids, A and B by viscosity measurement(**3 hours**)
- (6) To determine the refractive index of a given liquid and find its specific and molar refractivities(**3 hours**)

-----XXX-----XXX-----XXX-----

GUJARAT VIDYAPITH, AMADAVAD
FACULTY OF SCIENCE AND APPLIED SCIENCE
BIOGAS RESEARCH AND MICROBIOLOGY DEPARTMENT

SEMESTER 1

PHY-101 PHYSICS I

(Syllabus of theoretical portion) (In Force from June 2023)

Total marks: 100

(Internal evaluation: 40 Marks + External evaluation: 60 Marks)

Total teaching hours: 45 hours, Credit =03+1.5)

Learning outcomes

On successful completion of the course students will be able to:

- Have gained basic knowledge of laser and working of different type of lasers
- Understand the basics of modern optics like Fiber optics
- Have a basic knowledge of semiconductor physics
- Acquire knowledge about how a semiconductor diode rectifies an input ac signal
- To understand production of X-ray and its applications. Also get the information about X-ray diffraction techniques and its applications

UNIT 1	X-RAYS	11hrs
	<ul style="list-style-type: none">• Discovery of X-rays• Production of X-rays• Origin of X-rays• Properties of X-rays• Diffraction of X-rays• Bragg's law• Crystallography by powder diffraction method• Crystal rotating method• Applications of X-rays	

References: ❖ Engineering Physics By R. K. Gaur and S. L. Gupta

UNIT 2	(A) LASER	06hrs
	<ul style="list-style-type: none">• Introduction: Absorption, Spontaneous and Stimulated (Induced) Emission of Radiation	

- Basic principle and operation of a laser
- Population Inversion
- Pumping and active system
- Ruby laser- its construction and working
- Gas laser (He-Ne laser- its construction and working)
- Applications/Uses of Laser

References: ❖ Engineering Physics By R. K. Gaur and S. L. Gupta
 ❖ An introduction to LASERS- Theory and applications By M. N. Avadhanulu, S chand and Comp Ltd.

(B) FIBER OPTICS

05hrs

- Principle of optical fiber
- Structure of optical fiber
- The numerical aperture
- Applications of fiber optics

References ❖ Engineering Physics By R. K. Gaur and S. L. Gupta
 ❖ Spectroscopy by Gurdeep Chatwal, Himalaya Publication House

UNIT 3 SEMICONDUCTOR AND ITS DEVICES I

12hrs

- Energy level in solids,
- Valance band,
- conduction band and forbidden band
- conductor semiconductor and insulator
- chemical bonds in semi conductor like germanium and silicon
- pure or intrinsic semiconductor
- impurity or extrinsic semiconductor
- super conductivity
- properties of super conductor
- types of super conductor
- theories on super conductivity

References: ❖ Modern electronics instrumentation and measurement techniques by Helfrick and Cooper, PHI
 ❖ Engineering Physics By R. K. Gaur and S. L. Gupta
 ❖ Electronic devices and circuits By Allen Motter shead

UNIT 4 SEMICONDUCTOR AND ITS DEVICES II

11hrs

- The p-n junction
- The unbiased diode

- Forward and Reverse biased diodes – its characteristics
- Half wave rectifier
- Full wave rectifier
- Bridge rectifier
- Zener diode & its characteristics
- Zener effect and Avalanche effect
- Varactor Diode
- Light Emitting Diode
- Photo diode

References: ❖ Modern electronics instrumentation and measurement techniques by Helfrick and Cooper, PHI
❖ Engineering Physics By R. K. Gaur and S. L. Gupta
❖ Electronic devices and circuits By Allen Mottershead

GUJARAT VIDYAPITH, AMADAVAD
FACULTY OF SCIENCE AND APPLIED SCIENCE
BIOGAS RESEARCH AND MICROBIOLOGY DEPARTMENT
SEMESTER 1
PHY-101 PHYSICS I

(Syllabus of Practical portion) (In Force from June 2023)

Total marks: 100

(Internal evaluation: 40 Marks + External evaluation: 60 Marks)

Total practical hours: 45hr, Credit =1.5)

-
1. To study half wave rectifier with and without filter.
 2. To study full wave rectifier with and without filter.
 3. To study bridge rectifier with and without filter.
 4. To study the characteristics of Zener diode and use as voltage regulator.
 5. To study various logic gates.
 6. Determination of Miller Indices
 7. Diode characteristics
 8. To study the error and analyze the given data having errors and propagated also to find the percentage errors of the given problems.
 9. Photodiode characteristics
 10. Determination of Miller Indices

Gujarat Vidyapith, Ahmedabad
Faculty of Science and Applied Science
B.Sc. (Microbiology) and B.Voc (Home Science)
Semester I
AEC 101: Compulsory English
To Be Effective from 2023-24

Credit: 1.5

No. of Hours: 25

Internal Evaluation: 40

Semester-End Examination: 60

Objectives: The paper aims to develop reading and comprehension ability of the students. It also aims to enable students to identify grammatical categories as used in a text and make them to use it on their own in small writing passages.

Learning Outcomes:

1. Comprehensive understanding of texts and passages
2. Understanding of different vocabularies, sentence structures and one-word substitute
3. Students will understand the prescribed grammatical categories

Unit No.	Title	Teaching Methodology	Weightage and Duration
1	Unit 1: Reading and Comprehension 1.1 Dolly at the Dentist's by G. B. Shaw 1.2 A Sense of the Future by J.Bronowski	1. Classroom lectures 2. Slide Show on analyzing text 3. PPT on Story Teaching 4. You Tube Videos on using different dictionaries and finding their pronunciation	40% 06 Hours
2	Unit 2: Grammatical Categories 1. Noun: Number and Gender 2. Articles 3. Simple Present Tense 4. Present Continuous Tense 5. Simple Past Tense 6. Past Continuous Tense 7. Subject-Verb Agreement	1. Classroom lectures 2. PPT on Noun, Different Exercises, Parts of Speech, Subject-Verb Agreement 3. You Tube Videos on learning articles, Parts of Speech, Subject-verb Concord and Tenses.,	40% 15 Hours

3	Unit 3: Writing Skills This unit will focus on writing simple descriptive passages on the experiments the students carried out. 1. Describing an Experiment	1. Classroom lectures 2. PPT on Writing 3. You Tube Videos on Writing skills	20% 04 Hours

References:

Alexander, L.G. 1990 . *Longman English Grammar Practice for Intermediate Students*.

Longman Group (Ltd.), UK, p. 110.

Azar, B. S. 1992. *Fundamentals of English Grammar*. 2nd ed. New York: Pearson ESL. ISBN: 0-13-338278-8. [Workbook: ISBN 0-13-347097-0, Teacher's guide: ISBN 0-13-347105-5, Answer key: ISBN 0-13-338534-5]

Azar, B. S. 1996. *Basic English grammar*. 2nd ed. New York: Pearson ESL. ISBN: 0-13-368317-6. [Teacher's guide: ISBN 0-13-368325-7, Answer key: ISBN 0-13-518119-4]

Azar, B. S. 1998. *Understanding and using English grammar*. 2nd ed. New York: Pearson ESL. ISBN: 0-13-943614-6. [Workbook: ISBN 0-13- 952839-3, Teacher's guide: ISBN 0-13-928565-2, Answer keys: ISBN 0-13-932898-X and 0-13946393-3]

Greenbaum, S. and R. Quirk. 1990. *A student's grammar of the English language*. New York: Longman. ISBN: 0-582-05971-2.

Thaker P.K. and others. Ed. 1997. *Developing English Skills*. New Delhi: OUP

Wren, P. C. and H. Martin. *High School English Grammar and Composition*. (Gujarati). Trans. Dr. Usha Upadhyay and Jegeesha Upadhyay. New Delhi: S. Chand, 2013.

GUJARAT VIDYAPITH, AMADAVAD
FACULTY OF SCIENCE AND APPLIED SCIENCE
BIOGAS RESEARCH AND MICROBIOLOGY DEPARTMENT
SEMESTER 1

GT-101 Gandhian Thought (ગાંધીવિચાર)
(Syllabus of theoretical portion) (In Force from June 2023)

Total marks: 100

(Internal evaluation: 40 Marks + External evaluation: 60 Marks)

Total teaching hours: 30 hours, Credit = 02)

Learning Outcome

(1) વિદ્યાર્થીઓ ગાંધીજીના જીવન અને વિચારોથી પરિચિત થશે.

(2) વિદ્યાર્થીઓ ગાંધી વિચારના વૈશ્વિક પ્રભાવોથી અવગત થશે.

એકમ-1 ગાંધીજીના જીવનની મુખ્ય ઘટનાઓનું રેખાચિત્ર

1.1 બાળપણ (1869 થી 1888)

- માતા, પિતા, રંભાદાઈ, પત્ની, મિત્રો, શાળા અને નાટકોનો પ્રભાવ

1.2. લંડનનો સમય (1888 થી 1891)

- ‘સભ્ય’ બનવા પ્રયાસ
- અભ્યાસ અને ધાર્મિક વાંચન
- શાકાહારી મંડળી
- સાદગી તરફ પ્રયાણ

1.3. દક્ષિણ આફ્રિકાનો સમય (1893 થી 1914)

- રંગભેદનો પરિચય અને અપમાન
- જીવનશૈલીના પ્રયોગો : ફિનિક્સ વસાહત, ટોલ્સટોય ફાર્મ
- સત્યાગ્રહની શરૂઆત

1.4. ભારતનો સમય (1915 થી 1948)

- આશ્રમ જીવન : કોચરબ આશ્રમ, સાબરમતી આશ્રમ, સેવાગ્રામ આશ્રમ
- અસહયોગ આંદોલન
- ભારત છોડો આંદોલન

એકમ-2

2.1. ગાંધીવિચાર : સત્ય અને અહિંસા

2.2. ગાંધીજીની પદ્ધતિ

- વ્યક્તિગત પરિવર્તન માટે વ્રતો અને સામાજિક પરિવર્તન માટે રચનાત્મક કાર્યક્રમો

2.3. ગાંધીવિચારના મૂળતત્ત્વો

- (1) સ્વદેશી (2) સ્વરાજ (3) સર્વોદય (4) સત્યાગ્રહ

2.4. ગાંધીવિચારનો વૈશ્વિક પ્રભાવ

- માર્ટિન લ્યુથર કિંગ
- નેલ્સન મંડેલા
- આંગ સાન સૂકી
- દલાઈ લામા

સંદર્ભ સૂચિ

- (1) ગાંધીજી સંક્ષિપ્ત આત્મકથા, નવજીવન પ્રકાશન મંદિર
- (2) કૃષ્ણા કૃપલાની, ગાંધી : એક જીવની, નેશનલ બુક ટ્રસ્ટ, ઇન્ડિયા
- (3) Gandhiji : My Experiments with Truth, Navajivan Publishing House, Ahmedabad
- (4) Gandhiji from Yeravada Mandir, Navajivan Publishing House, Ahmedabad
- (5) Gandhiji : Constructive Programme (It's Meaning & Place) Navajivan Publishing House, Ahmedabad
- (6) M. K. Gandhi, Sarvodaya (The Welfare of All) Navajivan Publishing House, Ahmedabad
- (7) Krishna Kripalal, 'Gandhi : A Life', National Book Trust, India
- (8) પ્રફુલ્લ દવે, ગાંધીની ડ્રૂપળો, વિચારવલોણું પરિવાર, અમદાવાદ.
- (9) Prabhu R.R. and U.R. Rao. The Mind of Mahatma Gandhi (Elected -----) Navajivan Publishing House, Ahmedabad

GUJARAT VIDYAPITH, AMADAVAD
FACULTY OF SCIENCE AND APPLIED SCIENCE
BIOGAS RESEARCH AND MICROBIOLOGY DEPARTMENT
SEMESTER 1

Human Nutrition (Value added course)

(Syllabus of theoretical portion) (In Force from June 2023)

Total marks: 100

(Internal evaluation: 40 Marks + External evaluation: 60 Marks)

Total teaching hours: 30 hours, Credit =02)

Unit 1: Basic Concepts in Human Nutrition

Basic terms used in nutrition

- Understanding relationship between food, nutrition and health
- Functions of food-Physiological, psychological and social
- Basic food groups and concept of balanced diet

Unit 2: Nutrients, Vitamins and Minerals

Energy- Functions, sources and concept of energy balance. Functions, Recommended Dietary Allowances, dietary sources, effects of deficiency and/ or excess consumption on health of the following nutrients:

- Carbohydrates and dietary fibre,
- Lipids
- Proteins
- Fat soluble vitamins-A, D, E and K
- Water soluble vitamins – Thiamin, Riboflavin, Niacin, Pyridoxine, Folate Vitamin B12 and Vitamin C
- Minerals – Calcium, Iron, Zinc and Iodine

RECOMMENDED READINGS

- Wardlaw and Tinsel MG, Insel PM (2004). Perspectives in Nutrition. Sixth Edition, McGraw Hill.
- Srilakshmi B (2012). *Nutrition Science*.⁴¹ Revised Edition, New Age International Publishers.
- Khanna K, Gupta S, Seth R, Passi SJ, Mahna R, Pun S (2013). Textbook of Nutrition and Dietetics. Phoenix Publishing House Pvt. Ltd.
- ICMR(2010) Recommended Dietary Allowances for Indians. Published by National Institute of Nutrition, Hyderabad.
- Chadha R and Mathur P eds. (2015). Nutrition : A Lifecycle Approach. Orient Blackswan, New Delhi.
- Seth V and Singh K (2006). *Diet Planning through the Life Cycle: Part 1 Normal Nutrition. A Practical Manual*. Elite Publishing House Pvt. Ltd. New Delhi.
- Gopalan C, Rama Sastri BV, Balasubramanian SC (1989) *Nutritive Value of Indian Foods*. National Institute of Nutrition, ICMR, Hyderabad.

GUJARAT VIDYAPITH, AMADAVAD
FACULTY OF SCIENCE AND APPLIED SCIENCE
BIOGAS RESEARCH AND MICROBIOLOGY DEPARTMENT
SEMESTER 1

Alternative Energy Sources (Value added course)
(Syllabus of theoretical portion) (In Force from June 2023)

Total marks: 100

(Internal evaluation: 40 Marks + External evaluation: 60 Marks)

Total teaching hours: 30 hours, Credit =02)

UNIT 1	Conventional and Renewable Energy Sources Introduction Uses and Limitations of conventional energy sources Uses of renewable energy sources Benefits of renewable energy sources Limitations of renewable energy sources Opportunities for development of renewable energy sources in India Comparison between conventional and renewable energy sources A role of Gujarat Energy Development Agency (GEDA) National energy problems and its remedies Future Scope of Energy Resources	10 h
UNIT 2	Solar Energy and Wind Energy Solar Energy <ul style="list-style-type: none">• Introduction to Solar energy• Merits and Limitation of Solar Energy Conversion and Utilization History of Direct Solar Energy Utilization• Technologies Based on Capture of Heat from Sunlight Solar Water Heating Systems,• Solar Cookers,• Solar Steam Generating System for Cooking• Passive Solar Heating/ Cooling of Building• Solar Air Conditioning• Solar Refrigeration• Solar Distillation• Salt Production and Solar Ponds• Solar Wood Seasoning• Solar Cold Drying for crop Wind Energy	10 h

- Introduction to Wind energy
- Merits and Limitations
- Classification of Wind Mill
- Wind Turbine Efficiency
- Power of a Wind Turbine
- Wind Power duration Characteristics
- Wind Generators
- Water pumping wind mill
- Effect on environment

UNIT 3

UNIT-3: Ocean Energy and Tidal Energy Ocean Energy

10 h

Introduction to energy from ocean

Ocean energy resources

Calculation of energy obtained from ocean

Advantage and limitation of oceans energy

conversion technology India's first oceans thermal

energy conversion

Cogeneration of electricity and fresh water from open cycle OTEC

Tidal Energy

Tidal Current

High and Low Tides

Tidal Energy conversion

Tidal power

Single basin tidal schemes

Double basin scheme and multi basin scheme

Details about plant and equipment

Economic aspects about tidal energy conversion plant

Tidal energy resources in India

References books:

- (1) Energy Technology-Nonconventional, Renewable & Conventional
S. Rao and Dr. B. B. Parulekar, Khanna Publishers,
- (2) Solar Energy Utilization D. Rai, Khanna Publishers
- (3) Non-Conventional Energy Sources D. Rai, Khanna Publishers, ISBN No. 81-7409-073-8
- (4) Renewable Energy Sources-Their Impact on Global Warming and Pollution Tasneem Abbasi and S. A. Abbasi, PHI Learning Pvt. Ltd.
ISBN No. 978-81-203-3994-1
- (5) Advanced in Solar Energy Technology H.P. Garg, D. Reidel Publishing Co., Dordrecht.
- (6) Solar Energy S.P. Sukhatme, Tata McGraw Hill Company Ltd., New Delhi
- (7) Solar Energy M P Agrawal,
- (8) Advance in Solar Energy Technology

- (9) Geothermal Energy: An Alternative Resource for the 21st Century Harsh K. Gupta and Roy Sukanta.
- (10) Energy and Environment E. H. Thorndike, Addison-Wesley 1976
- (11) Energy, Resources and Policy R. C. Dorf, Addison-Wesley 1978

GUJARAT VIDYAPITH : AHMEDABAD
Faculty of Science and Applied Science, Sadra, Dist: Gandhinagar
Department of Biogas Research and Microbiology
B.Sc. Semester-I

Skill Enhancement (Basic Electrical, Electronics and Solar Equipment Repair and Maintenance)

(Syllabus of theoretical portion) (In force from June, 2023)

(External Evaluation: 60% + Internal Evaluation: 40%)

(Total Hours=90, Credit=03)

Basic Electrical, Electronics and Solar Equipment Repair and Maintenance

BASIC ELECTRICAL

(15 HOURS)

- 1) Sources of electricity
- 2) Basic house wiring

BASIC ELECTRONICS

(45 HOURS)

- 1) Introduction to electronic equipments
- 2) Introduction to electronic components
- 3) Identification and testing of electronic components
- 4) Soldering and de-soldering
- 5) Project eg. Preparation of automatic light; door bell; water level sensor, indicator, controller; smoke sensor etc.

SOLAR EQUIPMENT REPAIR AND MAINTENANCE

(30 HOURS)

- 1) Introduction, repair and maintenance of solar equipments eg. Solar street lights, solar home lights, solar lantern etc.