

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 (Introduction to microbial world)	First	30	60	2	2
2	Minor	Chemistry (Physical Chemistry)	First	30	60	2	2
3	Multidisciplinary	Physics	First	45	45	3	1.5
4	Ability Enhancement course	English	First	30	-	2	-
5	Value added Courses	Gandhian Thought	First	45	-	3	-
6	Skill Enhancement Course	Basic Electrical, electronics and solar equipment repair and maintenance	First	-	75	-	2.5
7	Community Life	Community life	First	-	-	-	-
Total				180	240	12	08

Available Total Credits= 20 Total required hours per semester=420

Total available hours per semester=517.5 hours

Available hours per week= 34.5 hours

Calculation of required hours per week

12 credits for theory=12 hours

08 credits for practicals=16 hours

Total required hours per week=28.0 hours, Extra hours =6.5 hours (we can arrange tutorial class, remedial class, library class and other co-curricular activities during these hours).

B.Sc.Semester-2							
Sr. no	Broad Category of Course	Subject Name	Semester	Hours		Credits	
				Theory	Practical	Theory	Practical
1	Major(Core)	Microbiology (Basic Bacteriology)	Second	30	60	2	2
2	Minor	Chemistry (Inorganic Chemistry)	Second	30	60	2	2
3	Multidisciplinary	Physics	Second	45	45	3	1.5
4	Ability Enhancement course	English	Second	30	-	2	-
5	Value added Courses	Environment Education (UGC)	Second	45	-	3	-
6	Skill Enhancement Course	Physico chemical analysis of soil and water	Second	-	75	-	2.5
8	Community Life	Community Life	Second	-	-	-	-
Total				180	240	12	08

Available Total Credits= 20 Total required hours per semester=420

Total available hours per semester=517.5 hours

Available hours per week= 34.5 hours

Calculation of required hours per week

12 credits for theory=**12 hours**

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Total required hours per week=28.0 hours, Extra hours =6.5 hours (we can arrange tutorial class, remedial class, library class and other co-curricular activities during these hours).

UG Certificate: Students who opt to exit after completion of the first year and have secured 40 credits will be awarded a UG certificate **if, in addition, they complete one vocational course or internship / Apprenticeship of 4 credits during the summer vacation of the first year.** These students are allowed to re-enter the degree programme within three years and complete the degree programme within the stipulated maximum period of seven years.

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=30, Credit=02)

Learning Objectives

- Students will get an insight into the world of microorganisms.
- Know the historical developments and major milestones leading to the development of microbiology as a separate discipline of science.
- Will have a broad perspective of the scope of microbiology.
- Be familiar with techniques like microscopy and staining procedures used to study microorganisms.

Unit 1		Microbial World	Teaching Hours: 07
	➤	Introduction: microbes in our lives	0.5
	➤	Distribution of microorganisms in nature	0.5
	➤	Introduction to taxonomy	01
		• Binomial system of nomenclature	
		• Carl Woese's three domain, kingdom, Whittaker's five kingdom concept of classification	
	➤	Major Groups of Microorganism	02
		• 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	03
		• Taxonomic groups (Taxa)	
		• The Goals of classification	
		• A) Intuitive method	
		• B) Numerical taxonomy	
		• C) Genetic relatedness	
Unit 2		History of Microbiology	08
	➤	The discovery of microorganisms	03
		• Microbiology and the origin of life	
		• Contribution of A. V. Leeuwenhoek in the discovery of microscope	
		• Spontaneous generation vs. biogenesis	
	➤	Golden age of microbiology	05
		• 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	07
	➤		Microbiology as a field of biology	01
	➤		Widening horizons	04
		•	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	01
	➤		Future of microbiology	01
Unit 4			Microscopy and Specimen Preparation	08
	➤		Light microscopy	03
		•	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	03
		•	Wet-mount and hanging-drop techniques	
		•	Microbiological stains: acidic, basic, and neutral dyes	
		•	Smear preparation, fixation, use of mordents, intensifiers, decolorizers	
		•	Simple staining of the smear: positive and negative staining	
	➤		Electron microscopy: principle, working and applications of transmission and scanning electron microscopy	02

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 - McGrawHill, 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=60, Credit=2.0)

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 glasswares/plastic wares: test tube, pipette, conical flask, volumetric flask, petri dish, measuring cylinder, coplin jar, burette, beaker, glass spreader	04
3	Cleaning and preparation of glassware for sterilization	03
4	Disposal of laboratory waste and cultures	02
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	14
7	pH adjustment of solution by use of pH strip and pH meter	03
8	Study of hay infusion by hanging drop method	03
9	Simple staining of bacteria: positive, curd (simple staining) and negative staining	12
10	Study of permanent slides/photomicrographs of different groups of microorganisms	
	A) Permanent slides of prokaryotic microbes (bacteria): Staphylococci, Bacilli, Spirochetes, Actinomycetes	04
	B) Permanent slides of eukaryotic microbes: • Fungi: Yeast, Mucor, Penicillium • Algae: Diatoms, Spirogyra, Chlamydomonas • Protozoa: Amoeba, Paramecium, Euglena	08
	C) Photomicrographs of acellular microbes (viruses): HIV, TMV, Bacteriophage T2	04

ક્રમ	અભ્યાસક્રમ સમિતિના સભ્યનું નામ		સહી	ક્રમ	અભ્યાસક્રમ સમિતિના સભ્યનું નામ		સહી
1	ડો નીરજ શેઠ	ડીન અને અધ્યક્ષ		5	ડો. શ્રીનિવાસ મૂર્તિ	આંતરિક સભ્ય	
2	ડો રાકેશ પટેલ	બાહ્ય તજજ્ઞ		6	ડો નિખિલ ભટ્ટ	આંતરિક સભ્ય	
3	ડો એસ.આર.દવે	બાહ્ય તજજ્ઞ		7	શ્રીમતી પ્રિતીબહેન શુક્લ	આંતરિક સભ્ય	
4	ડો દેવ્યાનીબહેન ટીપરે	બાહ્ય તજજ્ઞ		8	શ્રી અરવિંદભાઈ ડુંગરચિયા	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=30, Credit=02)

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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).

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Board of Studies(Chemistry)

(1) Prof.(Dr.) Niraj Sheth

(3) Dr. Hitesh K. Kadiya

(2) Dr. Sanjay D. Patel

(4) Prof.(Dr.) Mayur C.Shah

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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=60, Credit= 02)

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 (28 Hours)

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

(B) Experiments of Physical chemistry (32 Hours)

- (1) To measure the density of a given liquid by R.D. bottle(4 hours)
- (2) To determine the relative surface tension of a liquid with respect to water at room temperature by Stalagmometer(4 hours)
- (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(8 hours)
- (4) To determine the relative viscosity of a liquid with respect to water at room temperature by Ostwald's viscometer(4 hours)
- (5) To determine the composition of a given mixture consisting of two miscible liquids, A and B by viscosity measurement(8 hours)
- (6) To determine the refractive index of a given liquid and find its specific and molar refractivities(4 hours)

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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)

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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, Sadra, Dist: Gandhinagar
Department of Biogas Research and Microbiology
B.Sc. Semester-I

GT-101 Gandhian Thought (ગાંધીવિચાર)
(Syllabus of theoretical portion) (In force from June, 2023)
(External Evaluation: 60% + Internal Evaluation: 40%)
Total Teaching Hours=45, Credit=3)

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 લંડનનું સમય (1888 થી 1891)

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

1.3 દક્ષિણ આફ્રિકાનું સમય (1893 થી 1914)

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

1.4 ભારતનું 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 મૂળતત્ત્વ

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

2.4 ગાંધીવિચારનું વૈશ્વિક પ્રભાવ

- માર્ટિન લ્યુથર કિંગ

- નેલ્સન મંડેલા
- આંગ સાન સૂકી
- દલાઈ લામા

એકમ - ૩ ઉર્જા અને તેના સ્ત્રોત

- ઉર્જા એટલે શું?
- ઉર્જાના સ્વરૂપ: યાંત્રિક ઉર્જા, ઉષ્મા ઉર્જા, રાસાયણિક ઉર્જા, ગુરુત્વાકર્ષણીય ઉર્જા, નાભીય ઉર્જા, સૌર ઉર્જા, વિદ્યુત ઉર્જા
- ઉર્જાના સ્ત્રોત: પુનઃપ્રાપ્ય અને પુનઃઅપ્રાપ્ય ઉર્જા સ્ત્રોત
- ઉર્જા બચત અને ગાંધીવિચાર
- બિનપરંપરાગત ઉર્જાના સાધનો: સૂર્યકુકર, સોલાર હીટર, સોલાર ડ્રાયર, પવનચક્કી, સૌર તળાવ, સૌરલાઈટ, બાયોગેસ, બાયોમાસ વગેરે
- ઉર્જા સંરક્ષણ

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) પ્રફૂલ્લ દવે, ગાંધીની ફૂંપળો, વિચારવલોણું પરિવાર, અમદાવાદ.
- (9) Prabhu R.R. and U.R. Rao. The Mind of Mahatma Gandhi (Elected -----) Navajivan Publishing House, Ahmedabad
- (10) પર્યાવરણ સાથી ,રમેશ સાવલિયા -CEE

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=75, Credit=2.5)

Basic Electrical, Electronics and Solar Equipment Repair and Maintenance

BASIC ELECTRICAL

(15 HOURS)

- 1) Sources of electricity (6)
- 2) Basic house wiring (9)

BASIC ELECTRONICS

(30 HOURS)

- 1) Introduction to electronic equipments (02)
- 2) Introduction to electronic components (02)
- 3) Identification and testing of electronic components (04)
- 4) Soldering and de-soldering (07)
- 5) Project eg. Preparation of automatic light; door bell; water level sensor, indicator, controller; smoke sensor etc. (15)

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.