

Programme Code:	BSc	Programme Title:	Bachelor of Science	
Course Code:	22UPS3N2	Title	Batch:	2022-2025
		Non-Major Elective I: Renewable Energy Sources-I	Semester:	III
Hrs/Week:	1		Credits:	2

Course Objective

- To develop the basic skills about various energy resources and its applications

Course outcomes

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

CO Number	CO Statement	Knowledge Level
CO1	Remember the fundamental concept of various energy resources	K1/ K2
CO2	Apply the physical principles of conventional and non-conventional sources to study the device and make measurements.	K3
CO3	Analyze the harvested energy from various available sources and utilize it based on the requirements	K4
CO4	Create solar related devices and make measurements	K5
CO5	Design and construct energy related devices and apply based on the available needs	K6


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Mapping

PO/PSO CO	PSO1	PSO2	PSO3	PSO4	PSO5	PO6	PSO1	PSO2
CO1	H	M	H	H	M	H	M	H
CO2	M	-	M	M	H	H	-	M
CO3	H	H	M	L	-	L	H	-
CO4	M	L	H	H	M	H	H	M
CO5	H	M	M	M	H	-	H	L

H- High; M- Medium; L- Low

Renewable Energy Sources-I

Unit	Content	Hrs
I	GEOLOGY Age of Fossil - Measurement of depth of ocean - Lava from Volcano - Monsoons – Seebergs - Radiation from Granites and Marbles - Earth's Magnetic properties	3
II	HYDROLOGY Coolness of mud pot water - Colour of Waterfall - Measurement of Quality of water in dams - Purity of Rain water - <i>Purity of mineral water in the Market</i>	3
III	SOLAR RADIATION AND ITS MEASUREMENTS Solar Constant - Solar Radiation at the earth's surface: Beam and diffuse solar radiation – Air mass – Attenuation of beam radiation – Solar radiation geometry: Latitude of location – Declination – Hour angle – Angstrom compensation Pyrheliometer	3



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IV	SOLAR ENERGY COLLECTORS Physical principles of the conversion of solar radiation into heat - Flat plate liquid collector - Solar concentrators and receiver geometries (Basic types) - <i>Advantages and disadvantages of concentrating collectors over flat plate type collectors</i>	2
V	SOLAR ENERGY STORAGE Types of energy storage – Thermal storage - High temperature latent heat storage - Electrical storage - Storage in the form of fuel – Storage in the form of potential hydrogen energy	2
Total contact hours		13

- *Italic font denotes self study*

Pedagogy and Assessment Methods:

Seminar, Assignment, Experience discussion, PPT

Text Books

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS /EDITION	YEAR OF PUBLICATION
1.	Rai G. D	Non Conventional Sources of Energy	Khanna Publishers, NewDelhi	2002

Reference Books

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS /EDITION	YEAR OF PUBLICATION
1	Rai G. D.	Solar Energy Utilization	Khanna Publishers NewDelhi	
2	Garg H.P. Prakash J	Solar Energy Fundamentals And Applications	Tata McGraw Hill Publications, New Delhi	


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Programme Code:	B.Sc. PHY			Programme Title:	Bachelor of Physics	
Course Code:	22UPS5E10			Title	Batch:	2022 – 2025
				Core Elective - I :	Semester:	V
Lecture Hrs./Week or Practical Hrs./Week	5	Tutorial Hrs./Sem.	-	Basic Electronics & Circuit System	Credits:	5

Course Objective

To provide fundamental skill to analyze electronic circuit systems and introduce basic semiconductor devices, their characteristics, operations and applications

Course Outcomes

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

CO Number	CO Statement	Knowledge Level
CO1	Understand the fundamental concepts of electronic circuits with semiconductor devices	K1 / K2
CO2	Apply the knowledge of circuits to investigate PN junctions in semiconductor devices under various conditions	K3
CO3	Demonstrate familiarity with basic electronic components and use them to design simple electronic circuits	K4
CO4	Recognize a variety of exciting high-tech products and systems enabled by electronics	K5
CO5	Design, develop and simulate the new electronic circuits for applications in various fields	K6


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Mapping

PO /PSO CO	PO1	PO2	PO3	PO4	PO5	PO6	PSO1	PSO2
CO1	H	M	-	-	M	-	H	-
CO2	M	H	-	-	H	-	M	M
CO3	L	M	H	M	M	L	M	H
CO4	-	L	M	H	L	M	-	H
CO5	-	-	-	M	-	M	-	H

H – High; M – Medium; L – Low

Basic Electronics & Circuit System

Units	Content	Hrs
Unit I	DC CIRCUITS AND ALTERNATING CURRENTS DC Circuits: Current, Voltage, Resistance, Ohm's Law, Joule's Law, Resistors and Batteries - Series and Parallel Circuits - Networks - Kirchoff Rules - Thevenin's Theorem - Norton's Theorem - Maximum power transfer theorem – Proportional Voltage and Current formula - Ammeter, Voltmeter, Ohmmeter and Multimeter (Basic ideas) - Alternating currents: Frequency, Amplitude and Phase - RMS value and Power - Capacitance and Inductance - <i>Transformer</i>	13
Unit II	SEMICONDUCTOR DEVICES AND CIRCUITS Semiconductor and Energy bands - Doped Semiconductor - PN Junction diode and Zener diode - Characteristics - Half wave, Full wave and Bridge rectifiers – Capacitance filter-Two pin regulated power supply - Voltage doublers - Clippers and Clampers - Transistor and action - Common base and Common emitter Configurations - Relations between α and β - Load line and Operating point - Stability - Voltage divider Self bias - JFET and its characteristics	13
Unit III	AMPLIFIERS & OSCILLATORS Principle of amplification - Classification of amplifiers - Common emitter single stage amplifier and frequency response - Multistage amplifiers (Basic ideas) - Concept of feedback and Effect of negative feedback (qualitative) - Barkhausen criterion - Basic Oscillatory circuit and Classification of oscillators - Hartley, Colpitts and Phase shift Oscillators (Circuit operations)	13


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Unit IV	OPERATIONAL AMPLIFIER Typical stages of an Op Amp - Ideal Op Amp and characteristics - Input offset voltage, Offset current, Bias current and Slew rate (Definitions) - Inverting Op Amp - Noninverting Op Amp - Differential Op Amp - Scale and Phase changers - Adder and Averager – Subtractor, Differentiator and Integrator	13
Unit V	OPTOELECTRONIC DEVICES Optical radiation - Flux and illumination - Structure, variation of resistance & speed response of a Photo detector - Photovoltaic cells - Photodiodes - Phototransistors - Light beam detector - Electronic slave flash control - Window detector - LED: Bar graph display, drivers and LED arrays - <i>Optically coupled isolator (Basic ideas)</i>	13
	Total Contact Hrs	65

- *Italic font denotes self-study*

Pedagogy and Assessment Methods:

Seminar, Power Point Presentation, Chalk and talk, Quiz, Assignments, Group Task.

Text Books

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS \ EDITION	YEAR OF PUBLICATION
1	James J.Brophy	Basic Electronics for Scientists	McGraw Hill Publishing Company, New York	1990
2	Sadasiva Biswal	Basic Electronics (Vol. I)	Atlantic Publishers and Distributors	2001
3	Swaminathan Mathu	Electronics: Circuits and Systems	Howard W.Sams & Co. Inc, New York	1985
4	Related online contents [MOOC, SWAYAM, NPTEL, Websites etc] https://nptel.ac.in/courses/122/106/122106025/ https://nptel.ac.in/courses/117/103/117103063/ https://nptel.ac.in/courses/108/101/108101091/			


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S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS \ EDITION	YEAR OF PUBLICATION
1	Narayana Rao B.V.	Principles of Electronics (Vol. I & II)	Wiley Eastern Limited & New Age International Limited, New York	1994
2	Norman Lurch	Fundamentals of Electronics	John Wiley & Sons	2010 (Reprint)
3	Ramakant A.Gayakwad	Op-Amps & Linear Integrated Circuits	PHI Learning Pvt. Ltd., New Delhi	1997


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