

SYLLABUS
BACHELOR OF VOCATION
RENEWABLE ENERGY TECHNOLOGY
OUTLINE OF PAPERS AND TESTS
FOR
B.Voc.(RENEWABLE ENERGY TECHNOLOGY)(Semester-V) PART –III
Continued for Session: 2021-22 & 2022-23

CODE	SUBJECTS	L	T	P	TOTAL CREDITS* *one credit =15 hrs./1 lecture of 1 hr.	External Marks	Internal Marks	Practical Marks	TOTAL MARKS
B.VRET-511	General English	3	1	0	4	74	26		100
B.VRET-512	Wind Energy-I	3	1	0	4	74	26		100
B.VRET-513	Hydro Energy-I	3	0	0	3	74	26		100
B.VRET-514	Wind Energy-II / Hydro Energy-II	3	0	0	3	74	26		100
B.VRET-515	Practical Paper I pertaining to (B.VRET-512)			3	3			45	45
B.VRET-516	Practical Paper I pertaining to (B.VRET-513)			3	3			45	45
B.VRET-517	Practical Paper III pertaining to (B.VRET-514)			3	3			45	45
B.VRET-518	Industrial visit			1	1				15
B.VRET-519	Seminar/ Project/ Workshop	2				50			50
	Total General Education Component				12				600
QP-	Qualification pack of level 7				18			Evaluation Shall be done by Sector skill Council	

**B.VRET-511
General English**

Time Allowed: 3hrs

MM: 74

Pass Percentage: 35 %

INSTRUCTIONS FOR THE PAPER-SETTER

The question paper will consist of three sections A, B and C. Section A and B will have four questions from the respective sections of the syllabus and carry 15 marks each. Section C will consist of 10 short answer type questions which will cover the entire syllabus uniformly and will carry 1.5 marks in all.

INSTRUCTIONS FOR THE CANDIDATES

Candidates are required to attempt two questions each from sections A and B of the question paper and the entire section C.

LEARNING OUTCOMES

1. Students will be able to increase their reading speed and comprehension of articles.
2. Students will improve their Vocabulary.
3. Students will strengthen their ability to write essays and summaries using the process approach.
4. Students will heighten their awareness of correct usage of English grammar in writing and speaking.

Section-A

Comprehension: One unseen passages of 250-300 words in length with a variety of comprehension questions including 05 marks for word-attack skills such as word formation and inferring meaning, finding opposites etc. The passage can be a factual passage (e.g., instruction, description, report etc.) or a literary passage (e.g., extract from fiction, drama, poetry, essay or biography), or a discursive passage involving opinion, (argumentative, persuasive or interpretative text).

Section-B

Vocabulary: Change the Number, Change the Gender Words commonly mis-spelt Antonyms Synonyms
Fill up using correct determinant

References:

1. W. Standard Allen: Living English Structure (Orient Longman)
2. Wilford D. Best: The Student's Companion (Rupa)

B.VRET-512

Wind Energy-I

Time Allowed: 3hrs

MM: 74

Pass Percentage: 35 %

INSTRUCTIONS FOR THE PAPER-SETTER

The question paper will consist of three sections A, B and C. Section A and B will have four questions from the respective sections of the syllabus and carry 11 marks each. Section C will consist of 15 short answer type questions which will cover the entire syllabus uniformly and will carry 30 marks in all.

INSTRUCTIONS FOR THE CANDIDATES

Candidates are required to attempt two questions each from sections A and B of the question paper and the entire section C.

LEARNING OUTCOMES

1. Students will be able to understand the various forms of conventional energy resources.
2. Students will be able to Learn the present energy scenario and the need for energy conservation
3. Students will be able to explain the concept of various forms of Wind energy
4. Students will be able to learn Outline division aspects and utilization of wind energy for both domestics and industrial application
5. Students will be able to analyze the environmental aspects of wind energy.

Section-A

Basics of Wind Energy Conversion: History of wind energy, Current status and future prospects, Wind Energy in India- Power available in the wind.

Wind Turbine power and torque characteristics-Types of rotors: Horizontal and Vertical axis wind turbine. Characteristics of wind rotor-Analysis of wind regimes- Local effects, wind shear, Turbulence and acceleration effects- Measurement of wind: Ecological indicator.

Section-B

Anemometers-wind direction-Wind speed statistics: Time and Frequency distribution, Mean wind speed and-distribution of wind velocity.

Aerodynamics of wind turbine: Airfoil, lift and drag characteristics- Aerodynamic theories- Axial momentum theory- Blade element theory- Strip theory- Power coefficient and tip speed ratio characteristics-Rotor design and Performance analysis

Reference:

1. Wind Energy: Fundamentals, Resource Analysis and Economics; Mathew Sathyajith; 2006; Springer.
2. Johnson GL. Wind Energy Systems, (Electronic Edition), Prentice Hall Inc, 2006
3. Burton T. Sharpe D. Jenkins N. Bossanyi E. Wind Energy Handbook. John Wiley, 2001.

Practical (B.VRET-512)

M.M. 45

1. Measurement of wind speed
2. Evaluation of cut-in speed and cut-off speed
3. I-V characteristics of wind turbine at different wind speed
4. Characteristics of wind turbine with electrolysis and water pump
5. P, V and F measurement of output of wind generator

B.VRET-313

Hydro Energy-I

Time Allowed: 3hrs

MM: 74

Pass Percentage: 35 %

INSTRUCTIONS FOR THE PAPER-SETTER

The question paper will consist of three sections A, B and C. Section A and B will have four questions from the respective sections of the syllabus and carry 11 marks each. Section C will consist of 15 short answer type questions which will cover the entire syllabus uniformly and will carry 30 marks in all.

INSTRUCTIONS FOR THE CANDIDATES

Candidates are required to attempt two questions each from sections A and B of the question paper and the entire section C.

Learning outcomes

1. Students will be able to list different reaction turbine types and describe their performance characteristics.
2. Students will be able to describe working, principle of hydro energy.
3. Students will be able to explain the role of dam/storage in operation of large – hydropower plants.
4. Students will be able to describe environmental and social impact of large-scale hydropower plants.

Section-A

Introduction to Hydro Power Energy: Introduction to non-conventional energy, types of energy what is hydropower energy? Need for hydropower energy and its power estimation.

Types of Hydro Power Plants: High, medium and low head plants, base load and peak load plants, run-or-river plant with pondage, run-of-river plant without pondage, storage type plant and pump storage plants, mini and microhydro plants, underground hydropower plants
Electric current, voltage, AC rectifier, DC rectifier, transformers, losses in transformer.

Section-B

Description of main parts of Hydropower Station: Block diagram of small hydro power station, dam, and details of desalting tank. Storage & balancing reservoir. pen stock, pipe line & tunnelling. Surge tank, valve house, turbines. synchronous generator. protection & control equipment.

Synchronous Generator & its construction, types of synchronous generator -self excited, separately excited, self-excited with carbon brush.

References:

1. Bisht Tara Datt, Electrical Machine II, Asian Publishers Muzaffarnagar.
2. Chakrabarti & Halder, Power System & Analysis - Operation & Research, PHI Pvt Ltd, New Delhi.
3. Gupta & Singhal, Electric Machines, New Age International (P) Ltd, Publishers New Delhi.
4. Kumar Murugesh K., Basic Electrical Science & Technology, Vikas Publishing House Pvt Ltd, New Delhi.
5. Nag, P. K., Power Plant Engineering, TMH Publication, New Delhi.

6. Ravindranath & Chander, Power System Protection & Switch Gear, New Age International (P) Ltd, Publishers New Delhi.

Practical (B.VRET-513)

M.M. 45

1. To study the flow through venture-meter
2. To study the flow of visualization using Reynolds apparatus
3. To study the flow through bend meter
4. To study the working of millimeter
5. To determine the working and constructional details of hydro power plant

BVRET-514

Wind Energy-II

Time Allowed: 3hrs

MM: 74

Pass Percentage: 35 %

INSTRUCTIONS FOR THE PAPER-SETTER

The question paper will consist of three sections A, B and C. Section A and B will have four questions from the respective sections of the syllabus and carry 11 marks each. Section C will consist of 15 short answer type questions which will cover the entire syllabus uniformly and will carry 30 marks in all.

INSTRUCTIONS FOR THE CANDIDATES

Candidates are required to attempt two questions each from sections A and B of the question paper and the entire section C.

LEARNING OUTCOMES:

1. Students will be able to learn about determine the theoretical amount of power available for a given wind flow velocity and swept area.
2. Students will able to explain the nature of lift and drag forces and define the lift and drag coefficients.
3. Students will able to apply the concepts of lift and drag, including use of velocity vectors, to analyze a wind turbine blade include propelling forces and bending forces, and compare and contrast their magnitudes along the length of the blade.
4. Students will be able characterize the two main types of grid connection and their effect on the turbine rotor performance.

Section - A

Wind energy conversion systems: Wind electric generators- Tower, Rotor, Gearbox, power regulation, safety mechanisms.

Generator: Induction and synchronous generator-Grid integration- Wind pumps- Wind driven piston pumps, limitations and performance analysis.

Section-B

Wind Energy and Environment: Environmental benefits and problems of wind energy Economics of wind energy.

Factors influencing the wind energy economics- Site specific parameters-machine parameters- Life cycle cost analysis.

References:

1. Wind Energy: Fundamentals, Resource Analysis and Economics; Mathew Sathyajith; 2006; Springer.
2. Jha AR. Wind Turbine Technology, CRC Press, Taylor & Francis, 2011
3. Jain P. Wind Energy Engineering. McGraw- Hill 2011

Practical (B.VRET-514)

M.M. 45

1. Demonstration of system with charge controller
2. Demonstration of system with charge controller and inverter
3. Power quality of AC output of system.
4. Impact of wind speed on power output and its quality
5. Impact of load on power output and its quality

BVRET-514

Hydro Energy-II

Time Allowed: 3hrs

MM: 74

Pass Percentage: 35 %

INSTRUCTIONS FOR THE PAPER-SETTER

The question paper will consist of three sections A, B and C. Section A and B will have four questions from the respective sections of the syllabus and carry 11 marks each. Section C will consist of 15 short answer type questions which will cover the entire syllabus uniformly and will carry 30 marks in all.

INSTRUCTIONS FOR THE CANDIDATES

Candidates are required to attempt two questions each from sections A and B of the question paper and the entire section C.

LEARNING OUTCOMES:

1. Students will increase their general knowledge by gaining a broad understanding of sciences jointly cooperate hydropower plant.
2. Students will be able to gain detailed knowledge of hydropower generation system.
3. To explain voltage and turbine regulation and how these affect the electrical grid and the mechanical system with turbine and generator.
4. To describe the water flow through a power station.

Section-A

Water resources planning—Water Resources in India, purpose & classification of water resources development, hydrologic cycle, precipitation, runoff, hydrograph analysis

Reservoir planning & dam planning: Investigation, site selection, zones of storage, storage capacity, sedimentation & control, single & multipurpose reservoir, flood routing, classification of dams, factors influencing selection of dam, site selection.

Section-B

Control of Hydraulic Power Plants: Hydraulic control-different types, machine control-starting and stopping of voltage control of generators and system, protection of machine against break down, automatic and Remote control of hydro plants.

Safety Measures in Hydro Power Plants: Surge tanks, screens, sand traps, jets dispersers, pressure regulators, Preventative maintenance, erosion of blades and prevention.

References:

1. Arakeri, H.R., Donahue, Roy, "Principles of Soil Conservation & Water Management.
2. Bower, H., "Ground Water Hydrology".
3. Central Water Commission, India, "Water Sources of India", Publication No.30/88,CWC, New Delhi, 1988.
4. Indian Institute of RETote Sensing, Publications on Water Resources.
5. Karanth, K.R., "Ground Water Assessment Development & Management".

6. Patra, K.C., "Hydrology & Water Resources Engineering".
7. Sharma, R.K., "A Text Book of Hydrology & Water Resources".

Practical (B.VRET-514)

M.M. 45

1. To calibrate a pressure gauge using a dead weight pressure gauge calibration
2. calibration of orifice meter
3. To calculation of the rate of flow using roto meter.
4. To study friction factor of given set of pipes.

SEMESTER-6

1. B.VOC (RET)-611 Industrial Training
2. B.VOC (RET)-612 Viva
3. B.VOC (RET)-613 Seminars
4. B.VOC (RET)-614 Evaluations by Trainer