

**BACHELOR OF ENGINEERING (MECHANICAL ENGINEERING)
THIRD YEAR SECOND SEMESTER EXAM 2025**

HYDRO, WIND AND WAVE POWER

Time: Three hours

Marks: 100

(Answer any **FIVE** questions)

***Different parts of the same question should be answered together.
All symbols carry their usual meanings unless otherwise mentioned.
Assume any relevant data if necessary.***

1. a) Discuss about hydrologic cycle with a neat schematic diagram. 6
b) What are the different water losses in calculating the runoff? 5
c) What is hydrographs and Flow duration curves? 6
d) What is water hammer? 3
2. a) What are the advantages and disadvantages of hydro power? 6
b) Draw a schematic diagram of a small hydroelectric power plant with its major components. 6
c) A Pelton wheel has a mean bucket speed of 15 m/s with a jet of water flowing at discharge of 800 litres/s, under the head of 120m. The buckets deflect the jet with an angle of 165° . Calculate power given to the wheel, power developed and hydraulic efficiency of the turbine. 8
3. a) What are the site selection criteria of a small hydro plant? 6
b) An inward flow reaction turbine operates at 400 rpm under a head of 120 m. Its diameter at inlet is 120 cm and flow area is 0.4m^2 . The angles made by absolute and relative velocity at inlet are 20° and 50° respectively with the tangential velocity. Assuming radially out, determine the discharge, power developed and hydraulic efficiency of the turbine. 9
c) Explain the governing mechanism of a Pelton Wheel. 5

[Turn over

4. a) What are the advantages and disadvantages of wind power? 6
- b) What are the site selection criteria of a wind farm? 6
- c) Explain the function of the different components of a wind turbine generator with a schematic diagram. 8
5. a) What is wave power? Discuss its merits and demerits 8
- b) Describe briefly any three types of wave energy conversion devices with neat sketch. 12
6. a) What is tidal power? Discuss its advantages and disadvantages. 6
- b) Discuss the operation of single-acting and double-acting in a single basin tidal power plant with neat schematic diagram. 8
- c) What are the different types of turbine used in tidal power plants? 6
7. Write short notes on: (any **FOUR**) 4 X 5 20
- a) Draft tube
- b) Surge Tank
- c) Pump storage power plant
- d) Classification of wind turbines
- e) Classification of water turbines