Department of Electrical and Electronics Engineering
Mar Athanasius College of Engineering, Kothamangalam

Second Sessional Examination - October 2026

B24EE3P12- RENEWABLE ENERGY SYSTEMS AND APPLICATIONS

S5 EA & EB

Time: 1.5 Hrs. Max Marks: 40

Answer all questions from Part A and Part B

Part A [4*3 =12 marks]

1. Differentiate between HAWT and VAWT. **(CO3)**
2. Explain the factors that influence the site selection for wind power plant. **(CO3)**
3. List out the main components of tidal plant. **(CO4)**
4. What are the advantages and disadvantages of Tidal power plants? **(CO4)**

Part B [2*14 = 28 marks]

5.a) Derive the expression for maximum power extracted by a wind turbine. [8 Marks] **(CO3)**

b) Determine the power in the wind if the wind speed is 8 m/s and the blade length is 50 m. Air density is 1.23 kg/m^3. What is the maximum theoretical value of the power that can be extracted from the wind using a turbine? If the power coefficient of a turbine is 0.30 at a wind velocity of 20m/s, what is the power output of the turbine? [6 Marks] **(CO3)**

6. (a) Classify single-basin tidal power generation systems based on their mode of operation. Describe each mode and its relevance in terms of power generation. [8 Marks] **(CO4)**

(b) Derive the expression for the average theoretical power generated from tidal scheme during one filling. [6 Marks] **(CO4)**

CO3: Student will be able to analyze the aerodynamic principles, performance characteristics and operational schemes of wind turbines and understand the basic concepts of small hydro systems.

CO4: Student will be able to explain the operating principles, components, and classification of tidal and OTEC systems and assess their performance, site suitability and practical constraints for sustainable ocean energy generation.