

**THE KAVERY ENGINEERING COLLEGE***(An Autonomous Institution)***UG/PG DEGREE END SEMESTER THEORY EXAMINATIONS, APRIL-MAY 2026****Second Semester****Power Systems Engineering****PPSE2408 – WIND AND SOLAR ENERGY SYSTEMS****Regulations - 2024****Duration : 3 Hrs****Maximum : 100 Marks****PART – A (ANSWER ALL QUESTIONS) (Marks 10\*2=20)**

| <b>Q.No</b> | <b>Questions</b>                                                                                                    | <b>BLT</b> | <b>CO</b> | <b>Marks</b> |
|-------------|---------------------------------------------------------------------------------------------------------------------|------------|-----------|--------------|
| 1.          | Classify the types of wind in the earth's atmosphere.                                                               | L2         | 1         | 2            |
| 2.          | Draw the power Vs wind speed characteristics.                                                                       | L1         | 1         | 2            |
| 3.          | Mention the reason for deploying induction generators in a wind turbine.                                            | L2         | 2         | 2            |
| 4.          | List out the factors to be considered for selection of site for wind generator.                                     | L1         | 2         | 2            |
| 5.          | Mention some of the devices used to measure Solar Irradiation and also draw the IV Characteristics of a Solar Cell. | L2         | 3         | 2            |
| 6.          | Write the principle of working of solar PV cell.                                                                    | L2         | 3         | 2            |
| 7.          | What are the different applications of solar PV system in rural area?                                               | L1         | 4         | 2            |
| 8.          | What is the importance of MPPT in a Solar PV system?                                                                | L1         | 4         | 2            |
| 9.          | List some of the Grid Integration Issues with Solar PV Systems.                                                     | L1         | 5         | 2            |
| 10.         | What are the advantages of using hybrid energy system?                                                              | L1         | 5         | 2            |

**PART – B (ANSWER ALL QUESTIONS) (Marks 5\*16 = 80)**

| <b>Q.No</b> | <b>Questions</b>                                                                                                                                                                | <b>BLT</b> | <b>CO</b> | <b>Marks</b> |
|-------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------|-----------|--------------|
| 11.         | a Describe the fundamental principles of wind energy conversion and discuss the major components of a wind energy conversion system in detail.                                  | L2         | 1         | 16           |
|             | <b>Or</b>                                                                                                                                                                       |            |           |              |
|             | b i Explain about the components of horizontal wind energy conversion systems with necessary diagrams.                                                                          | L2         | 1         | 8            |
|             | ii Comment on the relative feature of HAWT and VAWT systems.                                                                                                                    | L2         | 1         | 8            |
| 12.         | a Describe the grid connected operation of induction generators with required control schemes.                                                                                  | L2         | 2         | 16           |
|             | <b>Or</b>                                                                                                                                                                       |            |           |              |
|             | b i Explain the main considerations in selecting a site for Wind generators.                                                                                                    | L2         | 2         | 8            |
|             | ii Explain the scheme for variable speed permanent magnet synchronous generator-based wind turbines. Specify the advantages and disadvantages over fixed speed wind generators. | L2         | 2         | 8            |
| 13.         | a Explain in detail the electrical equivalent circuit model and current-voltage characteristics of solar cell.                                                                  | L2         | 3         | 16           |
|             | <b>Or</b>                                                                                                                                                                       |            |           |              |
|             | b i Define solar radiation and solar irradiance. How does the irradiance depend on the wavelength of the radiation?                                                             | L2         | 3         | 8            |
|             | ii Explain working principle of solar PV cells? What are the materials used for PV cells?                                                                                       | L2         | 3         | 8            |

|           |     |                                                                                                                                                                 |    |   |    |
|-----------|-----|-----------------------------------------------------------------------------------------------------------------------------------------------------------------|----|---|----|
| 14.       | a   | Design a standalone photovoltaic system by selecting appropriate components and justify your choices based on system requirements and environmental conditions. | L4 | 4 | 16 |
| <b>Or</b> |     |                                                                                                                                                                 |    |   |    |
|           | b i | Explain the various power conditioning schemes for Maximizing Solar PV output.                                                                                  | L4 | 4 | 8  |
|           | ii  | List the major advantages and disadvantages of solar PV systems.                                                                                                | L4 | 4 | 8  |
| 15.       | a i | What factors limit the grid's capacity to absorb wind energy, and how can these be addressed to increase wind power utilization?                                | L2 | 5 | 8  |
|           | ii  | What do you mean by a Solar Energy storage system and how is it broadly classified?                                                                             | L2 | 5 | 8  |
| <b>Or</b> |     |                                                                                                                                                                 |    |   |    |
|           | b i | Discuss in detail the factors to be considered for Hybrid Solar PV and WECS. Also draw the block diagram for the same.                                          | L2 | 5 | 8  |
|           | ii  | Describe the functioning of Grid Connected PV system with its operation.                                                                                        | L2 | 5 | 8  |