

Reg No.: _____

Name: _____

APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY

Fifth Semester B.Tech Degree (S,FE) Examination January 2022 (2015 Scheme)

Course Code: EE301**Course Name: POWER GENERATION, TRANSMISSION AND PROTECTION**

Max. Marks: 100

Duration: 3 Hours

PART A*Answer all questions, each carries 5 marks.*

Marks

- 1 Suppose a power station has to meet the following demands : (5)
- Group A : 200 kW between 10 AM and 8 PM
Group B : 100 kW between 6 AM and 10 AM
Group C : 50 kW between 7 AM and 11 AM
Group D : 100 kW between 8 AM and 4 PM and then between 6 PM
and 6 AM
- Plot the daily load curve and hence determine the number of units generated per day.
- 2 A two-conductor single phase transmission line operates at 50Hz. Diameter of each conductor is 20mm and the spacing between the conductors is 3m. Calculate loop inductance of line/km and inductive reactance/km. (5)
- 3 With the help of a diagram, explain what do you mean by an ACSR conductor. What are its advantages? (5)
- 4 Analyse any five advantages of HVDC systems over HVAC systems. (5)
- 5 Define RRRV. Derive an expression for it. (5)
- 6 With the help of a neat diagram, explain the working of a thermal relay. (5)
- 7 Discuss the different causes of over voltages. (5)
- 8 With the help of a neat diagram, illustrate how stator inter turn protection of an alternator is done. (5)

PART B*Answer any two full questions, each carries 10 marks.*

- 9 With the help of a block diagram, explain the working of a wind energy conversion system. Discuss about any four disadvantages of wind power. (10)

- 10 a) With the help of a vector diagram, derive an expression for capacitance required to improve the power factor from $\cos\phi_1$ to $\cos\phi_2$. (5)
- b) Discuss the need for transposition of conductors and explain how it is done. (5)
- 11 a) Derive ABCD Constants of a medium transmission lines using nominal π method. Also draw the phasor diagram. (7)
- b) With the help of a vector diagram, explain what do you mean by Ferranti effect. (3)

PART C

Answer any two full questions, each carries 10 marks.

- 12 a) What do you mean by sag template? Explain its necessity. (5)
- b) In a 33 kV overhead line, there are three units in the string of insulators. If the capacitance between each insulator pin and earth is 11% of self-capacitance of each insulator, find (i) voltage across the top, middle and bottom unit and (ii) string efficiency. (5)
- 13 a) Compare the volume of conductor material required in a 2 wire d.c system with a single phase 2 wire ac system. (5)
- b) The core diameter of a single-core cable is 2.5 cm and resistivity of insulation is $4.5 \times 10^{14} \Omega\text{-cm}$. If the insulation resistance is 495 M Ω per km, find the insulation thickness. (5)
- 14 a) Analyse the benefits of FACTS devices. (5)
- b) Illustrate the need for grading of underground cables. Explain any one method with the help of a diagram. (5)

PART D

Answer any two full questions, each carries 10 marks.

- 15 a) Explain the working of a vacuum circuit breaker with the help of a diagram. (6)
- b) Define the different ratings of a circuit breaker. (4)
- 16 a) With the help of a block diagram, explain the working of a microprocessor-based relay. (5)
- b) With necessary sketches, explain different types of AC distributors. (5)
- 17 a) What do you mean by insulation co-ordination? Why is it necessary? (4)
- b) With the help of a neat diagram, explain the working of a percentage differential protection of transformers. (6)
