Reg No.:_____ Name:_____

APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY

Fifth Semester B.Tech Degree Examination December 2021 (2019 scheme)

Course Code: EET 301

Course Name: POWER SYSTEMS I

Max. Marks: 100 Duration: 3 Hours

PART A

(Answer all questions; each question carries 3 marks) Marks

1		What is load factor and what is its importance?	3
2		Explain the functions of the following. (i) Super heater (ii) Economiser (iii) air pre heater	3
3		Explain the concept of self GMD and mutual GMD for overhead line.	3
4		The three conductors of a three phase lines are arranged at the corners of a triangle of sides 2m, 2.5m, and 4.5m. Calculate the inductance per km of the line when the conductors are regularly transposed. The diameter of each conductor is 1.24cm	3
5		What do you mean by Surge Impedance Loading?	3
6		Explain methods to reduce the corona in transmission lines	3
7		Define following terms (i) Arc voltage (ii) Restriking voltage (iii) recovery voltage	3
8		Differentiate between switching and lightning surges	3
9		Write notes on different types of distribution systems.	3
10		What is effect of power factor on the cost of generation?	3

PART B

(Answer one full question from each module, each question carries 14 marks)

Module -1

11	a)	With a neat schematic diagram explain the working of a nuclear power plant	10
	b)	A generating station has a connected load of 23MW and a maximum demand of 20MW, the unit generated being 61.5×10^6 per annum, calculate (a) demand factor (b) average demand (c) load factor	4
12	a)	With the help of a block diagram, explain the working of wind energy conversion system.	7
	b)	Explain the design steps of a ground mounted solar farm.	7

Module -2

13 Derive the expression for capacitance of a three phase transmission line with (i) Symmetrical spacing and (ii) Unsymmetrical spacing 14

14 a) What is meant by transposition of lines? What are its advantages 4

b) In a three phase transmission line with 132KV at the receiving end, the following are the transmission constants: A=D= $0.98\angle 3^\circ$, B=$110\angle 75^\circ$ Ω, C=$0.0005\angle 88^\circ$ S. If the load at the receiving end is 50MVA at 0.8 lagging power factor. Determine the voltage, current and power factor at the sending end. 5

c) Derive the expression for inductance of a single phase overhead transmission line 5

Module -3

15 a) What do you mean by sag? Derive the expression for sag when the supports are at same level. 7

b) What are FACTS devices? How are they classified? Explain the working of any one FACTS device with the help of a diagram. 7

16 a) A three phase transmission line is being supported by three disc insulators. The potential across top unit and middle unit are 8KV and 11KV respectively. Calculate (i) The ratio of capacitance between pin and earth to the self capacitance of each unit (ii)The line voltage (iii) String efficiency 6

b) With the help of diagrams, explain what do you mean by intersheath grading. 8

Module -4

17 a) What are the basic requirements of a protective relaying? 6

b) Explain the construction and working of SF_6 Circuit breaker 8

18 a) Explain the working of microprocessor based over current relay with the help of block diagram 6

b) Explain with the help of a diagram, the construction and working of any one type of surge diverter. 8

Module -5

19 a) Derive an expression for the most economical value of power factor which may be attained by a consumer 7

b) A single phase distributor 2 kilometres long supplies a load of 120 A at 0·8 p.f. lagging at its far end and a load of 80 A at 0·9 p.f. lagging at its mid-point. Both power factors are referred to the voltage at the far end. The resistance and reactance per km are 0·05 Ω and 0·1 Ω respectively. If the voltage at the far end 7

is maintained at 230 V, calculate: (i) voltage at the sending end (ii) phase angle between voltages at the two ends

20 a) Write short notes on the following 6

i Two-part tariff

ii Three part tariff

iii Power factor tariff

b) Write short notes on distribution automation system 4

c) What do you mean by an aerial bunched cable? Compare its advantages and disadvantages. 4

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