Q.P. Code: 18EE0210 **R18**

Reg. No: | | | | | | | | | | |

SIDDHARTH INSTITUTE OF ENGINEERING & TECHNOLOGY:: PUTTUR

(AUTONOMOUS)

B.Tech III Year I Semester Supplementary Examinations December-2021

POWER SYSTEMS-I

(Electrical and Electronics Engineering)

Time: 3 hours Max. Marks: 60

PART-A

(Answer all the Questions **5 x 2 = 10** Marks)

1	a	List the factors for selection of site for hydroelectric power plants.	L1	2M
	b	Sketch the V-I characteristics of solar panel.	L1	2M
	c	Define transmission efficiency.	L1	2M
	d	Define string efficiency.	L1	2M
	e	Classify the cables based on voltage and type of insulating materials used in them.	L1	2M

PART-B

(Answer all Five Units 5 x 10 = 50 Marks)

UNIT-I

2		Draw the schematic diagram of a modern steam power station and explain its operation in detail.	L3	10M

OR

3		Compare Thermal, Hydro and Nuclear power stations on the basis of technical, mechanical and economic aspects.	L2	10M

UNIT-II

4		Explain principle of operation and working of Wind Power Plant.	L2	10M

OR

5		Explain working and construction of Solar Photo Voltaic Power System.	L2	10M

UNIT-III

6		Derive equivalent mathematical expression for voltage regulation of a short transmission line with the help of phasor diagram.	L2	10M

OR

7		A 3-phase, 50Hz overhead transmission line 100km long has the following constant: Resistance/km/phase= 0.1 ohm Inductive reactance/km/phase= 0.2 ohm Capacitive susceptance/km/phase = 0.04 x 10^{-4} siemen Determine (i) sending end current (ii) sending end voltage (iii) sending end power factor (iv) transmission efficiency when supplying a balanced load of 10,000kW at 66kV, 0.8 power factor lagging. Use nominal-T method.	L3	10M

UNIT-IV

8	a	What are the factors affecting corona? And derive the expressions for critical disruptive and visual critical voltage.	L2	4M
	b	Determine the corona characteristics of a 3-phase line 160km long, conductor diameter 1.036cm, 2.44m delta spacing, air temperature 26.67oC, altitude 2440m, corresponding to an approximate barometric pressure of 73.15cm of Mercury, operating voltage 110kv at 50Hz. Assume data if required. (Irregularity factor etc.).	L3	6M

OR

9	a	What do you understand by grading of insulators? Explain.	L1	5M
	b	Each line of a three phase system is suspended by a string of three identical insulators of self capacitance of C farad. The shunt capacitance of connecting metal work of each insulator is 0.2C to earth and 0.1C to line. Calculate the string efficiency of the system and also calculate string efficiency if a guard –ring increases the capacitance to the line of metal work of the lowest insulator to 0.3C.	L2	5M

UNIT-V

10		Derive the following (i) Insulation resistance of a cable (ii) Capacitance of a single core cable.	L3	10M

OR

11	a	Derive a relation between the conductor radius and inside sheath radius of a single core cable so that the electric stress of the conductor surface may be minimum.	L2	5M
	b	A cable has been insulated with two insulating materials having permittivity of 6 and 4 respectively. The inner and outer diameter of a cable is 3cms and 7cms. If the dielectric stress is 50kV/cm and 30kV/cm, calculate the radial thickness of each insulating layer and the safe working voltage of the cable.	L3	5M

END