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Sudan University of Science & Technology

College of Graduate Studies

**Capacity Enhancement of Gas Turbine Power Plant Using Inlet
Air Cooling by Thermal Energy Storage**

أقدم هذا البحث كجزء من متطلبات الحصول على درجة الماجستير في الهندسة الميكانيكية (الطاقة) من كلية الدراسات العليا، جامعة السودان للعلوم والتكنولوجيا.

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اللَّهُ نُورُ السَّمَاوَاتِ وَالْأَرْضِ مِثْلُ نُورِهِ كَمِثْلِهَا فِيهَا. مِصْحَاحُ الْمِصْحَاحِ فِي- رُجَاةٍ-)
الرُّجَاةُ كَأَنَّهَا كَوْكَبٌ دُرِّيٌّ يُوقَدُ مِنْ شَجَرَةٍ مُبَارَكَةٍ- رَبُّونِي لَأَسْئَلَنَّكَ وَلَا عَزِيَّةَ يَكَادُ
رَبُّنَهَا يُضِيءُ وَلَوْ لَمْ تَمْسَسْهُ تَارٌ نُورٌ عَلَى نُورٍ يَهْدِي اللَّهُ لِنُورِهِ مَنْ يَشَاءُ وَبَصُرْتُ اللَّهُ
(الْأَمْثَالَ لِلنَّاسِ وَاللَّهُ بِكُلِّ شَيْءٍ عَلِيمٌ)

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(سورة النور 35)

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Element	Relative Humidity			Cloud Amount			Rainfall (30 years)					Wind (10 years)		
	06:00	12:00	18:00	06:00	12:00	18:00	Total	No. of Days	Maximum in One Day	Prevailing Direction	Mean Scalar Speed			
Month	%			(0-8)			mm	mm	mm	mm	mm	Date	Km/h	
	(30 years)			(30 years)										
January	35	21	27	1.8	2.0	1.6	tr	0	0	0	tr	30-66	N	16
February	28	17	22	1.8	1.6	1.4	tr	0	0	0	tr	23-69	N	16
March	23	13	18	2.5	2.3	1.9	tr	0	0	0	tr	SEV	N	14.4
April	21	13	18	2.2	2.1	1.6	tr	0	0	0	11.8	SEV	N	16
May	26	15	22	2.8	2.8	2.3	5	1.4	1.2	0	20.3	27-67	N	14.4
June	39	18	25	3.6	3.4	3.0	5	1.3	1.2	0.2	23.7	24-66	S	14.4
July	59	31	41	4.9	5.0	4.0	55	6.3	5.6	1.7	79.5	19-62	S	16
August	68	40	52	5.3	5.1	4.7	72	7.2	6.6	2.3	100.0	8-61	S	14.4
September	54	29	40	4.8	4.3	3.9	25	3.1	2.6	0.7	66.2	27-55	S	11.2
October	37	21	25	2.3	2.9	2.1	5	1.2	1.1	0.1	19.1	16-54	N	12.8
November	34	21	28	1.6	1.7	1.4	tr	0	0	0	tr	10-42	N	14.4
December	30	22	29	1.6	1.6	1.2	tr	0	0	0	tr	SEV	N	14.4
Year	39	22	29	2.9	2.9	2.5	167	20.5	18.3	5.1	100.0	27-8-55		
Maximum Recorded	99													
Minimum Recorded	02													

Element	Atmospheric Pressure			Air Temperature °C				Vapour Pressure mBar			Bright Sunshine Daily Duration (30 years)						
	mBar station level (30 years)			Dry Bulb (30 years)	Daily Maximum (30 years)	Daily Minimum (30 years)	(30 years)										
Month	06:00	12:00	18:00	06:00	12:00	18:00	Mean n	High st	Date	Mean n	Low't	Date	06:00	12:00	18:00	Hours	%
January	969.0	966.0	967.2	18.5	30.4	24.9	31.7	40.1	17-41	16.0	7.0	22-59	7.8	9.1	8.6	10.5	93
February	968.1	965.3	966.2	19.7	31.8	26.3	33.2	43.3	25-41	16.7	7.6	2-57	6.6	7.8	7.6	10.7	93
March	966.4	963.5	964.0	23.9	35.6	30.0	37.0	44.9	21-41	19.9	11.6	2-59	7.0	7.9	8.0	10.4	87
April	965.1	962.1	962.5	28.3	38.7	32.7	40.1	47.2	20-41	23.0	12.7	1-68	8.2	8.9	9.2	10.7	85
May	964.5	961.9	961.8	31.3	40.5	35.0	41.9	46.7	SEV	26.3	18.5	1-67	12.1	11.0	11.7	10.1	78
June	965.0	962.4	962.1	31.1	39.9	35.5	41.6	47.2	11-42	27.1	20.2	29-68	17.1	13.1	13.9	9.9	76
July	965.6	963.3	963.1	28.6	36.4	32.6	38.1	46.3	3-44	25.7	20.0	6-42	22.2	17.8	19.1	8.7	67
August	966.0	963.8	963.8	27.5	34.6	31.2	36.2	43.3	4-48	24.8	18.8	28-55	24.6	21.3	22.7	8.7	69
September	965.8	963.0	963.4	28.8	37.1	32.8	38.4	44.7	21-41	25.6	19.4	SEV	21.3	17.7	19.6	9.3	76
October	965.9	962.8	963.9	29.2	37.9	32.7	39.3	43.0	SEV	25.2	18.7	3-65	15.2	13.4	14.2	10.2	87
November	967.4	964.3	965.7	25.0	34.5	28.8	35.8	42.0	1-41	21.2	12.8	31-59	10.8	11.3	11.1	10.7	94
December	968.9	965.9	967.2	20.2	31.0	25.3	32.3	39.0	27-60	16.9	6.0	24-51	9.3	9.9	9.5	10.5	94
Year	966.5	963.7	964.2	26.0	35.7	30.7	37.1	47.2	20-4-44	22.4	6.0	24-51	13.5	12.4	12.9	10.0	83
Max Recorded	976.2																
Min Recorded	951.1																