Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

BE - SEMESTER–V(New) • EXAMINATION – WINTER 2016

Subject Code:2153504 **Date:24/11/2016**

Subject Name:Air Pollution Control

Time:10:30 AM to 01:00 PM **Total Marks: 70**

Instructions:

1. **Attempt all questions.**
2. **Make suitable assumptions wherever necessary.**
3. **Figures to the right indicate full marks.**

			MARKS
Q.1		**Short Questions**	**14**
	1	Define Cutile	
	2	Define Necrosis	
	3	Cavity in aerodynamic structure	
	4	Inversion	
	5	Air quality index	
	6	Define Smog	
	7	Chronic air pollutant effect	
	8	% COHb in blood= ……*(ppm CO) + (0.5)	
	9	SALR stands for…….	
	10	PAN stands for ……	
	11	In cyclone, separation factor S= ……	
	12	CFC stands for……	
	13	NAAQS stands for……	
	14	The representative stack sampling can be achieved by …….flow pattern in stack.	
Q.2	**(a)**	What is a difference between atmospheric laps rate and dry adiabatic laps rate? Derive equation for both.	**03**
	(b)	What were the outcomes of Kyoto Protocol and Montreal Protocol?	**04**
	(c)	A chimney with a design stack height of 250 meter is emitting sulphur dioxide at a rate of 500 g/s on a sunny day of June with moderate wind speed (5-7 m/s) at the stack altitude of 10 meter. (A=0.295 , B=0.119 and p for σ_y =0.903 and p for σ_z = 0.986, α=0.25) Find estimation of concentration of sulphur dioxide downwind for <ρ_{SO2} > (1000, 50, 20, 250).	**07**
		OR	
	(c)	Write a short note on extraction of sulphur from fuel for control of sulphur dioxide emission.	**07**
Q.3	**(a)**	Narrate one incident each of Acid rain, Global warming and Ozone layer depletion.	**03**
	(b)	Explain Inertial impaction and particle capture mechanism for fabric filter.	**04**
	(c)	The traffic density for a highway is 1200 vehicle/hr and the average vehicle speed is 80 km/hr. The average carbon monoxide concentration 100m, 250m, 500m, and 1000m downwind of the highway if the wind speed normal to the highway is 2m/s. Calculate ground level concentration of carbon monoxide.(assume neutral condition)	**07**

OR

Q.3 **(a)** If class 3 and 4 both are producing 83 db and 83 db of sound during lunch time. What is the total sound produced by class 3 and 4 during lunch? **03**

(b) How terrain and structure change plum behavior? **04**

(c) Write precise effect of following pollutants on man material and environment. **07**

a) PM_{10} & $PM_{2.5}$ **b)** Lead **c)** Cadmium **d)** Nickel **e)** Mercury **f)** CO **g)** SO_2

Q.4 **(a)** Explain Air Quality Index and Comprehensive Environmental Pollution Index. **03**

(b) What is ventilation coefficient? How significant it is **04**

(c) Estimate the cut diameter and overall collection efficiency of a cyclone given the particle size distribution of dust from cement kiln. Particle size distribution and other. **07**

Avg particle size in range dp, μm	1	5	10	20	30	40	50
wt percent	3	20	15	20	16	10	6

Gas viscosity = 0.02 CP, Specific gravity of particle = 3
Inlet velocity of gas = 48 ft/sec, (1feet = 0.3048m)
Effective number of turns = 5, Cyclone dia= 8 ft and cyclone inlet width= 2 ft

OR

Q.4 **(a)** Enlist pollutant belongs to GHG groups and explain their adverse impact on environment. **03**

(b) Write a note on design and working of different scrubbing system. **04**

(c) Write a working and construction of different types of scrubbers with design steps in sequence. **07**

Q.5 **(a)** Write major pollutant emitted by following industrial sources. **03**

a) Coal base power plant **b)** Petroleum Refining **c)** Organic chemical industries

(b) Write a short note on Electrostatic Precipitator. **04**

(c) Write a short note on standard sampling procedure for SOx, NOx and $PM_{2.5}$ in stack. (It should inclusive of Traverse points, Height of sampling, absorbent and time of sampling, analysis etc) **07**

OR

Q.5 **(a)** Explain adverse impact of air pollutants on man , material and environment. **03**

(b) Write a note on Air (Prevention &Control of pollution) act, 1981. **04**

(c) Explain concept of effective stack height and enlist different equations for estimation of plum rise. (It should inclusive of Holland, Turner, Briggs and ASME committee) **07**

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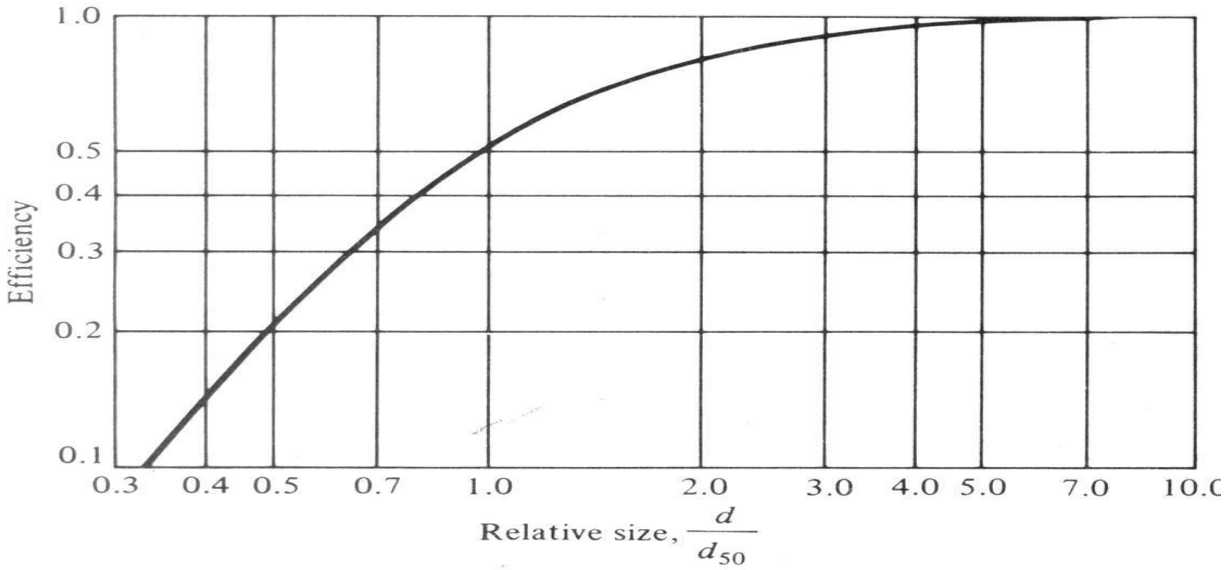
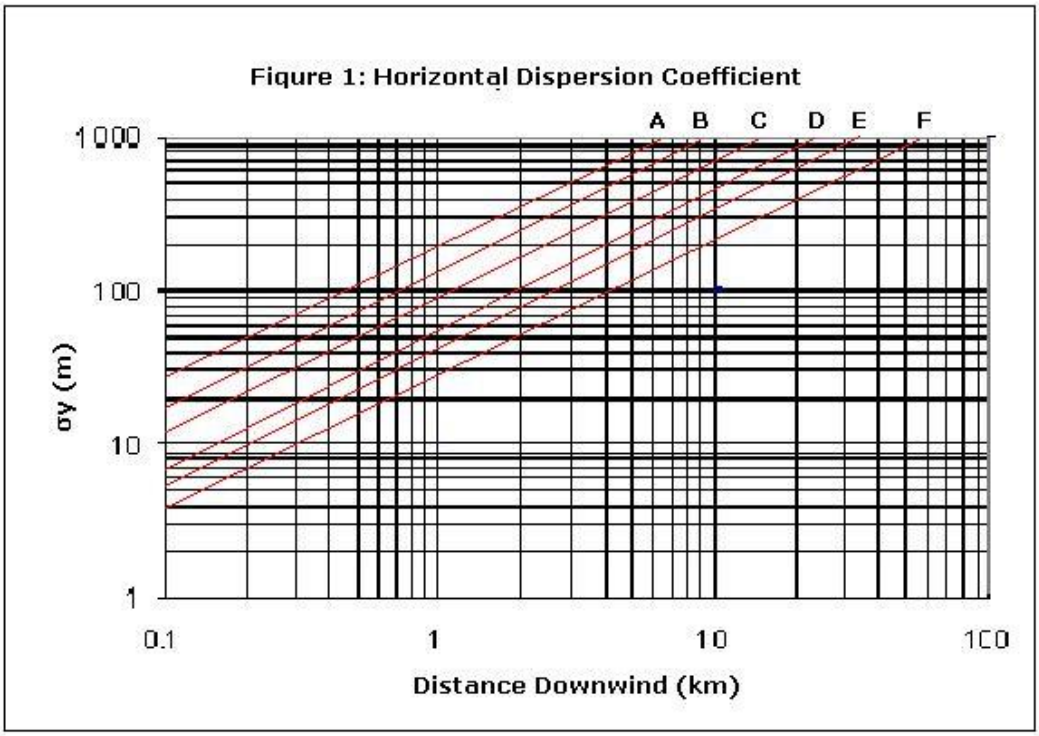
Standard efficiency curve for a cyclone separator





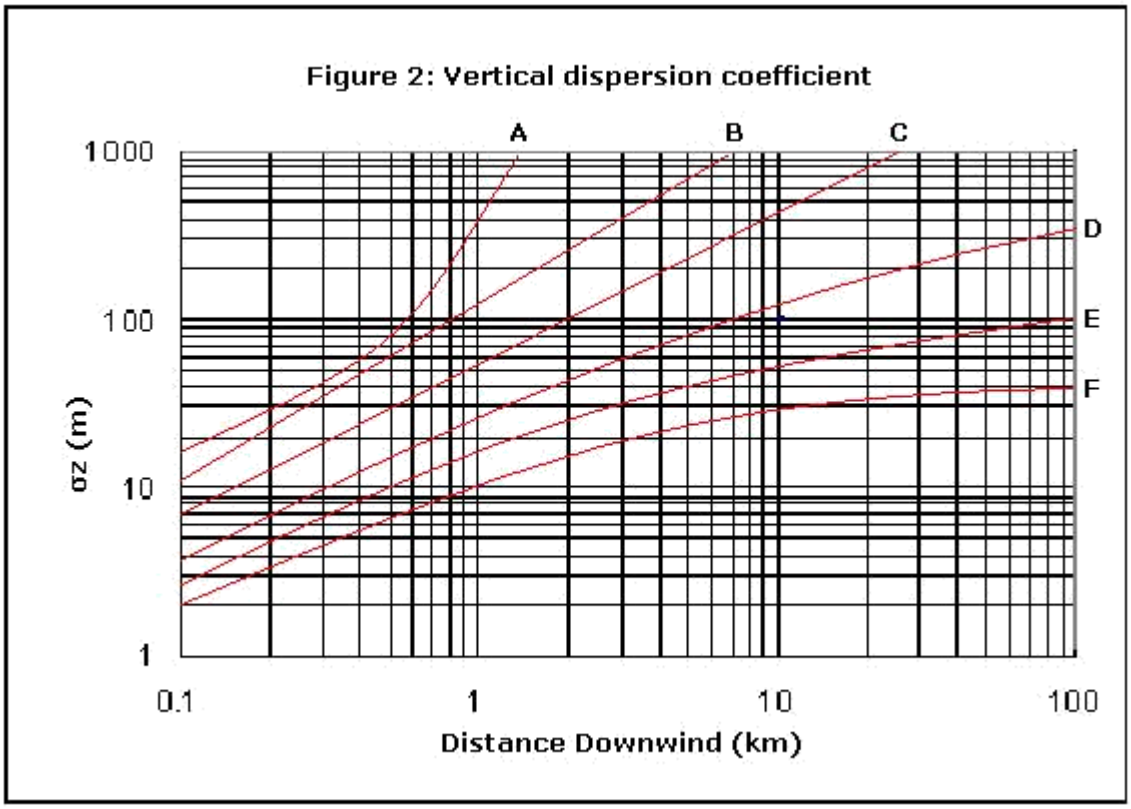


Figure 2: Vertical dispersion coefficient
A
B
C
D
E
F
1000
100
10
1
σz (m)
0.1
1
10
100
Distance Downwind (km)