

PUNE INSTITUTE OF COMPUTER TECHNOLOGY 27, DHANKAWADI, PUNE 411 043.

DEPT. SUBJECT	CLASS	DIV	ROLL NO.	DATE
Questions	1 2 3	5 5	8 7 8	Total
Merka obtained				Examiner
1. Cal	culate th	e tor	ight da	or & volume dair
requir	ad for co	andous	tron of	3 kg of carbon
Soln Corr	+ 0, ->		*	
12	a 32.a			
Lot of	to 02 grady	to bu	TD 121	g C = 32 kg
tos	of 05 redy	to lou	TD 3 K	C = 32 × 3 = 8ke
Asa	ir contains	23	1 02 ly +	ra 98
the state of the s	- kpm r	8 ×	100 0=	34.783 69
1	1 1	767	23 ,	347839
Vol	of air rega	d or	14 008	A NTP occupies 22.
1.10	1 occupied		molegia	= 28.94 gal = 22.
		36	1	d 2
Va)	min occ	upied	by 347	Radian -
	- 22	4 × 3	4783	
	2.8	29	2 .	
	= 26-6	2 ×	103 1:4	007.8
100 5 10	e 26-9	2 103		1 14 = 10 mg
2. Calcu	late the	nase	a rinh	ectived for combus
		ontain	ing c.	ROJ H157. 0.
	+ 14+	1 kg	coal corr	tain 0.8 kgC
0,	TSyH &	0, 0	05 kg	A 7
wt d	allo On reg	= [32 C +	8H+8-0]
- 10	7	- 3	0.8 +	8 x0:15 - 0:05
			L	



	- 9:1323 ± 1	
	2:1333 + 1:2 - 0:05	-
	3-2833 159	14
	W/ of 02 regd = 3.2833 kg	1
		1
	w dair red = 100 x 3.2833	1
	23	
	= 14.275 kg.	
	7.	50
	wit of air read for combustion of	_
	5 th of coal - 5x14.275	-
	= 71.3767 bg	-
-25		-
1	A sample of coal was found to have	_
	C= 75" bestion by ut	_
	N- 6 1 1 5.2 0 0 12.1	
	Calculate	_
	1) Michigam and & O & all necessar	
	Complete company dia die	-
	(5) on fair redg of not excern win.	Signif
Soln		1/
	Basis: 1 to coal contain	
	0.75 kg C 0.052 kg H 0.121 kg O	
	Minimum and of negd for complete am	Man
	1 coal = 52 / c2 + 8H + 5-0	
	1 2	1
	= (82 × 0.75) + (8×0.052)+0-0	12)
_	12	
	9 + 0.416 -0.121	77
	= 9 + 0.416 -0.121	- 4
	= 9 + 0.416 -0.121 - butth 2.295 kg	
	= butth 2.295 kg	
	= 20174 2.295 kg Min. wt of air regd = 100 x 2.295	
	= butth 2.295 kg	



	4. A fuel is found to contain c. 901 H-6/
ka	arrount of air regd for complete combustion
	1 1 1 1 1 1 1 1
833	To street air is used for combust
1	tallulate / composition of dry products
7	sal Basis 1 1 2 2 contain
mbustien of	Sol Basis: 1 by full contains CE 0:9 kg H= 0:06 kg S= 0:025 kg 0:00
4:275	
767 19	It with air regul for complete combustion of fact
	V V
nd to have	= 32 c + 8H + 5 - 0 x 160
12.17	(32 - 0.9) + (8 x 0.06) + 0.025 - 0.01 3/
211	1(12)
	The state of the s
all necessary	= 12.4+ 0.48 +0.025-0.01 7 x 1.09
Ika d coal	2 12 58(0.1
excess dirla apple	= 12.5869 to
P	25 / excess air is supplied
0.121 100	Excess air = 12.587 x 25 = 3.147 kg
1.1 1.16	The second secon
implete ambustly	Actual aix supplied = 125 x 12.587=15.734
'0	C 12.5 87 + 3.147
(m) 1 m = 101	D. 0 1 1 1 1
52)+0-0-12)	Dry Troducts in flue gas: Flue gases constair
	12 1 2 , of som excess and & No four
1	Dry Products in flue gas: Flue gases contains CO2, SO2, O2 from excess and & N2 from actual air supplied
	wt of co. = 44 x 0.9 = 3.3 kg
75	302 = 64 x 0.025 = 0.05kg
	32
COL	wt of B = 3.147 × 23 = 0.724 kg
= 13.9691 19	wtd N = 15.734 x 77 - 12.115 kg
- 13 1- 114	wtd N2 = 15.734 x 77 - 12.115 kg



	Total wit of flue gases = 3.3 +0.05+0.724 1111		
	= 16.189 120		-
	Percentage of dry the goes		
	1 1 11 1		
	1 co2 - 601 dco2 x100 - 33 x100 - 2038/		-
	1 co - 01 dco2 ×100 - 3.3 ×100 · 2038)	27	٨
	150 00 min 100 00 11	1	
	1502 0.05 x100 , 0.309).		r
	1. 02 - 0.724 ×100 - 4.47)	Soln	1
	16.189	-	
	1 No 12:115 x 100 = 74835/	-	
	16.184	-	T
	10.084	1	
	Problems	-	1
	Problems based on Volume Calculation	-	1
1_	A 90.		
	by and used in I CE had the foll come		1
	45/ CH4:36/ CO:151		
	Do at the Find the volume of dir read		
Solo.	for the combustion of 1 mg of the sas		
	A gas used in ICE had the following by to! H: 451 CH4: 361 CO: 15's for the combustion of 1 mi of the gas.		4
	Basis: 1 m3 of gas compoins H = 0.45 m3 of gas compoins CO = 0.15 m3 N2 = 0.04 m3		
	H = 0.45 m3 1 4; CH = 0.24 m3		
	CO = 0.15 m Na = 0.04 m3	1	-
	No does not combust;	1	-
	+ + + 0 -> HO	_	
		-	-
	1 6.5		- 9
	Vol. of Ob regd = 0.45 x 0.5-0.2	2.0	_30
	0 forte	-	
	CH + 2 A -> CD + 2 H .		
	CH4 + 202 -> CO2 + 2160		
	1 2 2 20		S
	: Vol of Do for CH, = 0 36 x 2= 0.72	\$ V	_
		2	
	co + - 02 -> co2	-	
	1:05		
	: Vol. of 02 for CD = 0.15x0-5=0.6	25	
	100	13	_
	Total Val & D2 regal = 0.225 to \$2 +0.075		
	10101 131 1 25 1 40 1 2 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1		_
	= 1.020 m		



	Total 02 repd = 0.4+0:05+0:15+04	,	-
	The second secon		+
	Oz present in fuel - 0:020 m		-
	Not 02 roud - 1-0.020 = 0.98m		_
_			C
	- 'Vo) of air regd for the combustion	_	è
	of 1 m of Just = 0.98 × 100 = 4.67 m	_	3
	21 =	-	7
	Calculation of dry flue great	+	
	Coz = 0.2 +0.1+0.05+0.1+024=0.69m3	-	3
			1
	No = No (fuel) + No (tromain)		O
	6.5 + (74 × 4.67) = 4.19m	-	
	= 600 and	-	-
			2
	Total Vol. of dry products = 0.69+4.19		t
	= 4.88 m3		1
	· 1-10 = 0.69 x1m= 14.139/	-	
	1-co2 = 0.69 × 100 = 14.139/	-	-
		0	1
	1. N2 = 4.19 x100 = 85.861)		1
	14.88		
	- TO		
47	A gaseous feel has the fall composition	-	
	co= 10/ H= 10/ N= 00 21/20/	1	H
	CO = 10 / 10 = 10 / N = 00 / 14 20 /		Ľ
	of air supplied conception of		H
	dry flus goes	1	Н
	any The gases	1	
	(1) % to Volume conversion	1	H
	CH4 -> 53 % -> 0.53 m3		-
		-	-
	c0 → 26 % → 0.26 m³	Total	1



	A.C.	+ 1.00.	Volde e	89 ×100 = 13 ·20/
	Janes II	5 3.3	Val fluegas - 0	70 = 0.25-100=3.71)
74	1.	H - > 10 0/	2 - 10 - 00	7.0 = 6.74
	13	H ₂ → 10 % -	70.1010	1 No 5 6 NOT 83,08
	1	7 - 10	50.01 10	6.74
- 8	-	Con	mbustion Re	actions
ms	1			1.00.00
	1-15	DCH4 +200	CO	+ 2H20
ation	(2	CO + 1 0.	3 00	
+· 67m3	3	H + 100	H ₂	
-		2 2 2		XX /
9207	-15	otal volume	of on requir	red for combustion
= 7	1 =	= (0.53 x 2)	+ (0.26 × 0.	5) + (0.10 × 0.5)
19.3	7.5	- 06 4	0.05	
269 m3	E	1.24 03.	- M M	The second second
- 5	· O	Amount of a	ir required :	= 1.24 × 100 = 5.90 F
m	Cs	without exce	ss air)	21
	No.	and the second second		
	(2) A	chial air su	ppried = 1.24	X120 = 7.08 m3
	1	-	2	
19		10 M 10 M		
	(3)E	xess air = 7	1.08 - S.30 c	- 1.19 m ³
	1	, H		17 10 117
	100	Flu	ie Gas Comp	- ities
		1	daz (ele)b	541/100
	(I)	lue nen	1.	C4
		E ALL CI	Mains Co,	SO2 102 (from excessale
	10	102 Clean	actual ale s	upplied)
	Ala			
position	Vol	d co= (c	O Joon CHy	H(co from cottlestor
and address	_	The second secon		1 - State
Systima)		= 0.89	1 m³	
25(184)		_ 0 0		
	Vol	. d so -	NII	
ro J:	Vol	· d so2 -	NII	c 0.25m3
zot:	(oV	d so2 -	N11 21 x 1.18	c 0.25m3
ro J:		d so2 -	N11 21 x 1.18	= 0.25m3
zot:	(oV	d so2 -	NI 21 x 1-18 100 Vol- & N2 Tor	n fuel + from Actual
zot:	(oV	d so ₂ =	N1) 21 x 1.18 100 Vol. 4 N2 Ter	n fuel + from Actual
zot:	(oV	d so ₂ =	N1) 21 x 1.18 100 Vol. 4 N2 Ter	n fuel + from Actual
zot:	(oV	d so ₂ =	N1 21 x 1.18	n fuel + from Actual
of solume	(oV	$\begin{array}{cccccccccccccccccccccccccccccccccccc$	$\frac{21}{100} \times 1.18$ $\frac{21}{100} \times 1.18$ $\sqrt{79} \times 7.08$	n fuel + from Actual