

All Civil Engineering Subjects To The Point By Dhyan Pal in Single PDF-

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ESE-2017 AIR-179 (AEE-BRO) and Appeared in Personality Test in 2016,18
GATE AIR-93(2018),AIR-145(2016),AIR-531(2020),AIR-1038(2015)
SSC-JE 2015(PRE-108.75/200 ,MAINS-210/300)
Selected in IOCL,ONGC,RITES,NBCC in year 2016 through GATE-16 Score and PT.
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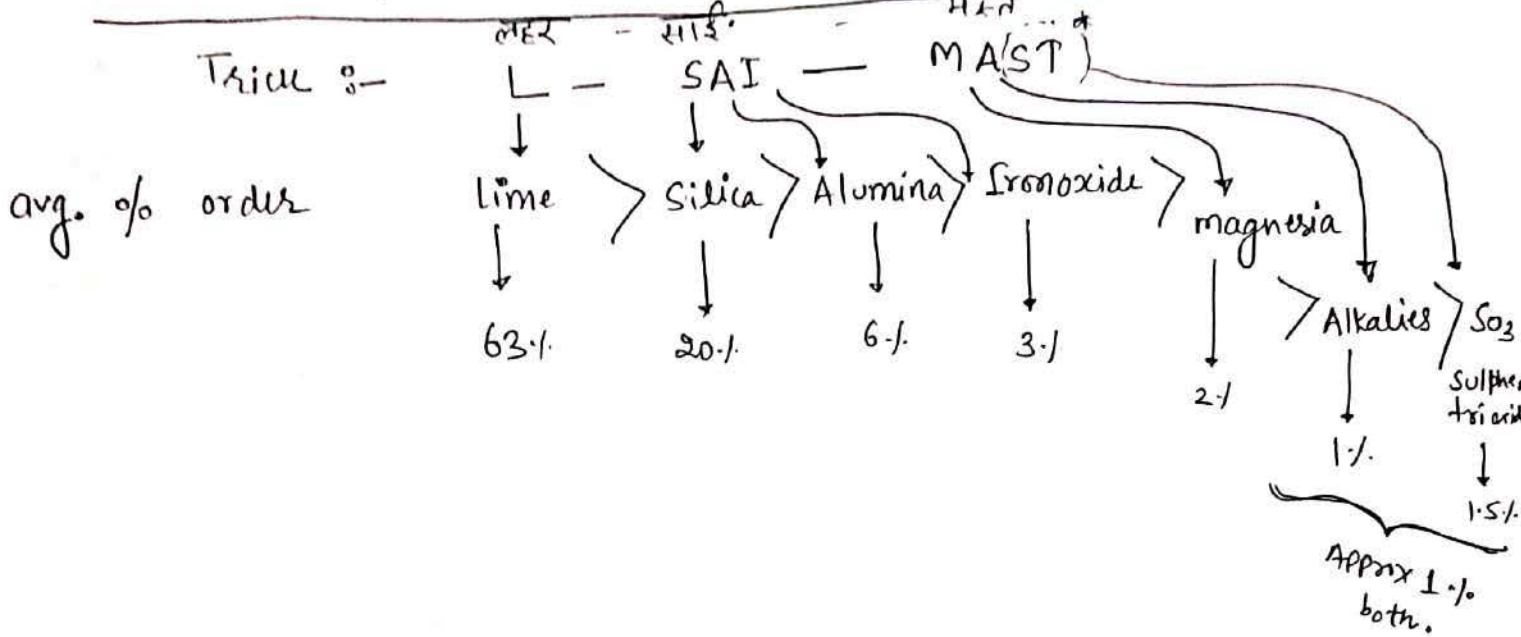
Self
confidence

Achieve
Daily Target

Multiple
revision

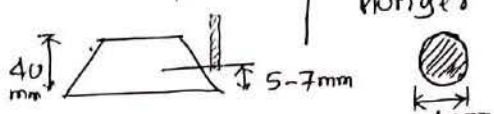


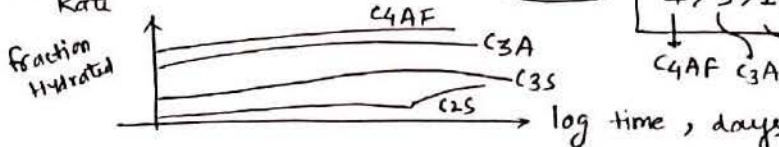


Constituent of Portland Cement (Raw material) :-



Oxide	Composit (o/o)	Avg (o/o)	function	if Excess quantity then?
lime (CaO)	60-65	63	Controll ↙ ↘ Strength Soundness ↙ ↘ To The Point By DhyanPal Deficiency ↙ ↘ Strength ↓ Setting time ↓	unsoundness
Silica (SiO ₂)	17-25	20.1	Strength	Cause slow setting
Alumina (Al ₂ O ₃)	3-8	6.1	quick setting	lowers strength
Ironoxide (Fe ₂ O ₃)	0.5-6	3.1	color + fusion of different ingredients • acts as flux	← Same →
magnesia (MgO)	0.5-4	2.1	color + Hardness	cracks in mortar, makes unSound. cement
Alkalies (Na ₂ O + H ₂ O)	0.5-1	1.1	residues	efflorescence & cracks.
Sulphurtrioxide (SO ₃)	1-2	1.5.1	—	makes cement unSound.
conclusion	(i) strength Responsibility ← lime silica (ii) Quick setting → Alumina (iv) (iii) hardness → magnesia Iron oxide		(iii) Soundness ← Sulpher lime magnesia initial setting time ← Zypsum silica	My S 19/2/2020

14/12/2020

Cement Test name	Purpose	Imp. points																																
Fineness Test	measure mean size of grains	sieve method → use (90μ) Sieve → find % residue Air permeability method → Nurse & Blane's method Sedimentation method → Wanger turbidity method * In Air permeability method fineness measured in $\frac{cm^2}{kg}$ % Residue by weight SSA cm^2/gm <table border="1" data-bbox="718 358 1212 504"> <tr> <td>OPC</td> <td>10</td> <td>2250</td> </tr> <tr> <td>PPC</td> <td>5</td> <td>3000</td> </tr> <tr> <td>RHC</td> <td>5</td> <td>3250</td> </tr> </table> Specific surface area (SSA)	OPC	10	2250	PPC	5	3000	RHC	5	3250																							
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RHC	5	3250																																
Consistent Test (P%)	to find quantity of water to form a paste of normal consistency	Vicat apparatus 10 mm dia. Plunger 50 mm length 																																
Initial setting time (0.85 P%)	to get IST	Vicat apparatus Square needle (1x1) mm  note:- OPC IST min = 30 min																																
Final setting time (0.85 P%)	to get FST	Vicat apparatus 5mm dia annular ring  OPC FST max = 10 hr.																																
Soundness Test (0.78 P%)	to check soundness of cement means volume change after setting of cement	Lechatelier Test → for lime only free → $\neq 10mm$ Autoclave Test → for lime & magnesia free → $\neq 0.8\%$ * no Test for 'sulphur'																																
Compressive strength Test (P/4 + 3) %	to check comp. strength (OPC) Mpa	• cube of 50cm ² surface area & all side = $\sqrt{50}$ cm • take cement & sand ⇒ 1:3 • min 3 cube • 27 ± 2 °C • cube cast in 2 layers in leakproof method <table border="1" data-bbox="351 1321 670 1433"> <tr> <th>grade</th> <th>3 day ± 1hr</th> <th>7 day ± 2hr</th> <th>28d ± 4hr</th> </tr> <tr> <td>33</td> <td>16</td> <td>23</td> <td>33</td> </tr> <tr> <td>43</td> <td>24</td> <td>33</td> <td>43</td> </tr> <tr> <td>53</td> <td>27</td> <td>37</td> <td>53</td> </tr> </table>	grade	3 day ± 1hr	7 day ± 2hr	28d ± 4hr	33	16	23	33	43	24	33	43	53	27	37	53																
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53	27	37	53																															
Tensile strength Test 'or' Briquette Test (P/5 + 2.5) %	to get tensile strength	min 6 Briquette (OPC) <table border="1" data-bbox="1117 1422 1468 1534"> <tr> <td>3 days</td> <td>$\neq 2$ Mpa</td> </tr> <tr> <td>7 days -</td> <td>$\neq 2.5$ Mpa</td> </tr> </table>	3 days	$\neq 2$ Mpa	7 days -	$\neq 2.5$ Mpa																												
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Heat of hydration Test → =		Calorimeter method ① Rate of Hydration :- Trick (4-3=1) <table border="1" data-bbox="1324 1612 1532 1713"> <tr> <td>4</td> <td>3</td> <td>1</td> </tr> <tr> <td>4</td> <td>3</td> <td>1</td> </tr> <tr> <td>4</td> <td>3</td> <td>1</td> </tr> <tr> <td>4</td> <td>3</td> <td>1</td> </tr> </table>  ② Ratio of heat evaluation :- (if equal amount of all taken) Trick 3+1=4 <table border="1" data-bbox="1117 1836 1436 2038"> <tr> <td>3</td> <td>1</td> <td>4</td> <td>2</td> </tr> <tr> <td>↓</td> <td>↓</td> <td>↓</td> <td>↓</td> </tr> <tr> <td>C3A</td> <td>C3S</td> <td>C4AF</td> <td>C2S</td> </tr> <tr> <td>↓</td> <td>↓</td> <td>↓</td> <td>↓</td> </tr> <tr> <td>865</td> <td>500</td> <td>420</td> <td>260</td> </tr> </table> Jule gram	4	3	1	4	3	1	4	3	1	4	3	1	3	1	4	2	↓	↓	↓	↓	C3A	C3S	C4AF	C2S	↓	↓	↓	↓	865	500	420	260
4	3	1																																
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Specific gravity Test → "		Lechatelier flask OPC Specific gravity around = 3.15																																