

Government Engineering College, Jhalawar

B. Tech VI Semester First Mid Term-2018

6CE6.3A- Repair and Rehabilitation of Structures

Maximum Marks : 10

Duration : 1;00 Hours

Que. 1 What do you Understand by Non-Destructive Test ?

(3)

OR

Que. 2 What is Corrosion ? Write a short note on Rusting of Steel and the corrosion Reaction.

(3)

Que. 3 What are the causes of Deterioration in Structures and How They can Prevent ?

(3)

OR

Que. 4 What is the use of Half-Cell Potential Meter Test and what are the factors influence the Potential data?

(3)

Que. 5 What is the principle of Rebound Hammer Test Briefly Describe with Its Advantages and Limitations?

(4)

Q-1-

Ans-1-

Non-Destructive test

The non-destructive test as the name suggest the test is conducted to the sample without destructing or partially destructing the sample. The test is generally used to find hardness, modulus of elasticity, corrosion, location of steel reinforcement below the surface of concrete etc.

The non-destructive test are easy to perform and give the efficient results.

Sometimes we need to find the quality of structure which may be new or old we can use NDT to find its different properties.

Some methods to perform NDT-

- ① Rebound hammer test, to find the hardness of concrete surface
- ② Pulse velocity test
- ③ Half cell potentiometer test, to find corrosion in steel beneath the concrete.

④ Penetration test, to find permeability of flow of water

uses -

- ① To determine the hardness of in-cast concrete
- ② To check the quality control during batching, mixing and other processes

③

Q-4-

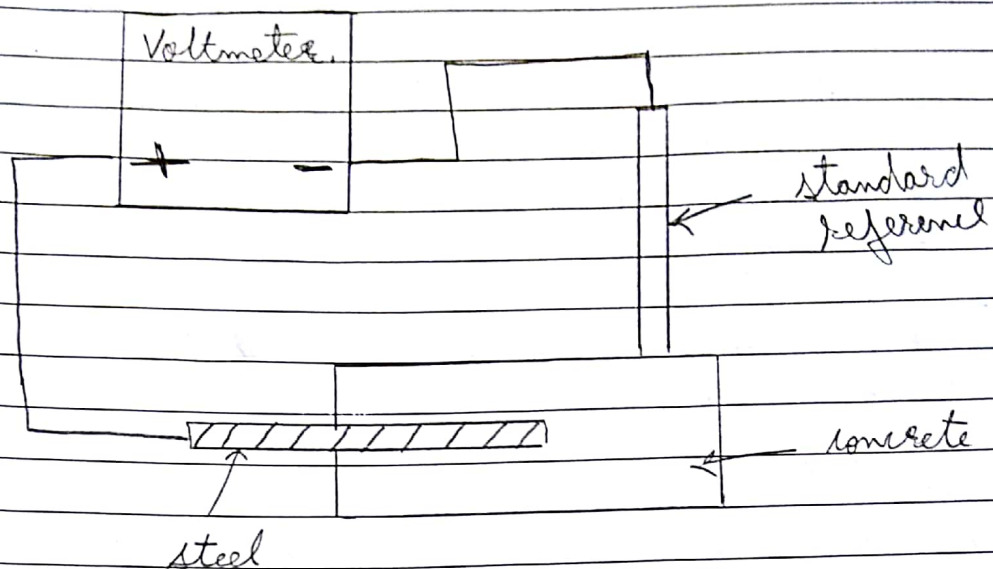
Ans-4-

Half-cell Potential Meter test

The half cell potential meter is a electrical technique to determine the the corrosion in steel of a concrete sample.

Half cell Potential meter works on the principle of potential difference b/w the standard reference (Cu/CuSO_4) and the sample which is going to be tested. The negative end is connected to the standard reference and the positive end to the sample.

The method is easier, simple to perform and gives efficient results. The structures such as buildings, roads have causes corrosion which effect the the life of the structures. So we must need to find that our structures have corrosion or not.



Result of the sample V/c Cu/CuSO_4	Corrosion
less than -0.200 V	no corrosion
between $-0.200 - -0.350 \text{ V}$	probability of corrosion
greater than -0.350 V	90% probability of corrosion

Factors Influence the potential data -

- a) Oxygen ion
- b) Moisture content
- c) Chlorine ions
- d) Core Inhibitors
- e) Carbonation.

(3)

Q-5-

Ans-5-

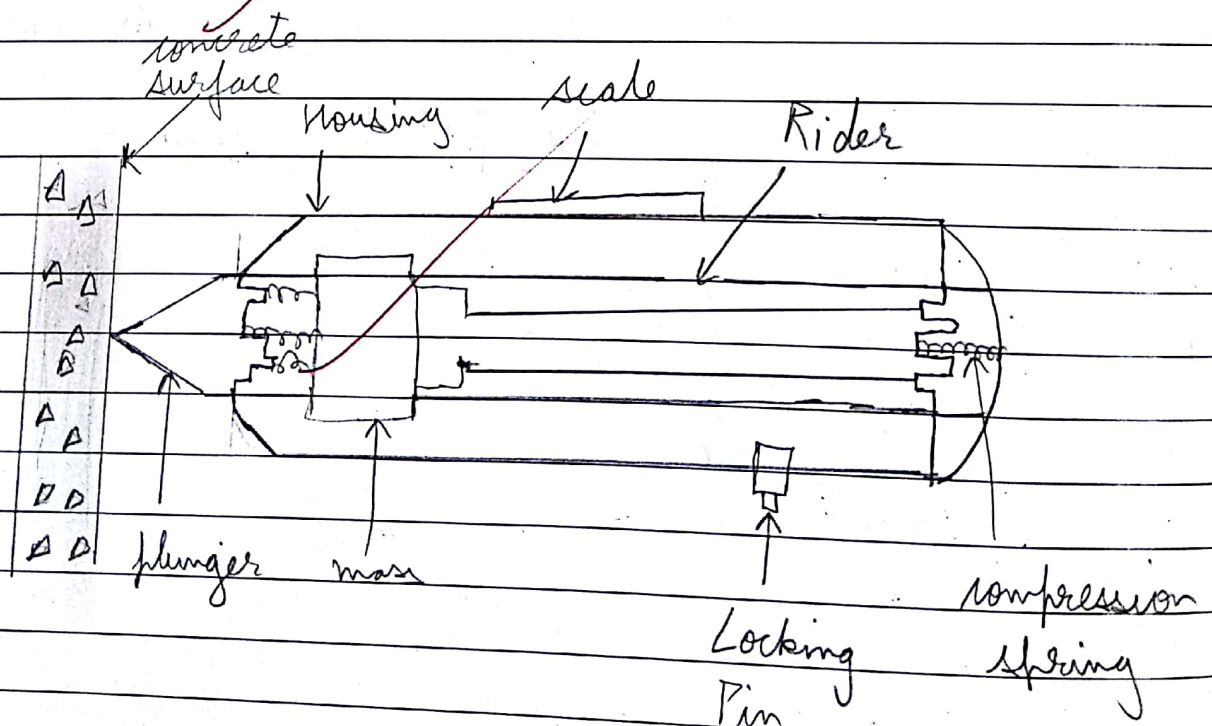
Rebound Hammer Test

The Rebound hammer test or schmid hammer test is use to determine the hardness of the sample. By using the parameter of hardness we can find the compressive strength of concrete.

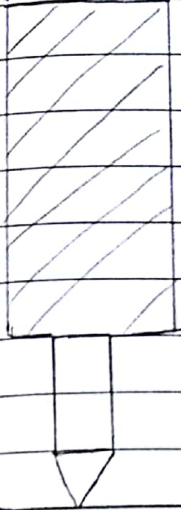
The Rebound hammer is an NDT which is most widely use.

The test work on the principle of rebound theory, in this a mass is used to derive to extent the spring and apply the load on the sample until it reaching to it end and the spring compresses and then rebound back.

The machine consist of hammer of 1.8 Kg weight and the spring, plunger and the ~~at~~ arbitrary tabular scale from 10 to 100.

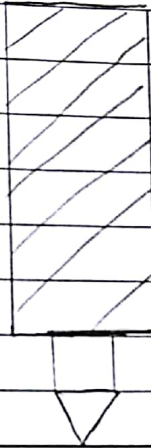


Initial adjustment
for test



(a)

Body is
pushed



(b)

Hammer
Rebound



(c)

Test completed



(d)

Advantages -

- i) It is easier to perform
- ii) Gives the value of compressive strength of concrete
- iii) With help of compressive strength we can find Modulus of Elasticity
- iv) Test does not demolished the structure

Limitation

- i) Effected by aggregate used
- ii) Type of cement used
- iii) Age of concrete
- iv) Moisture content

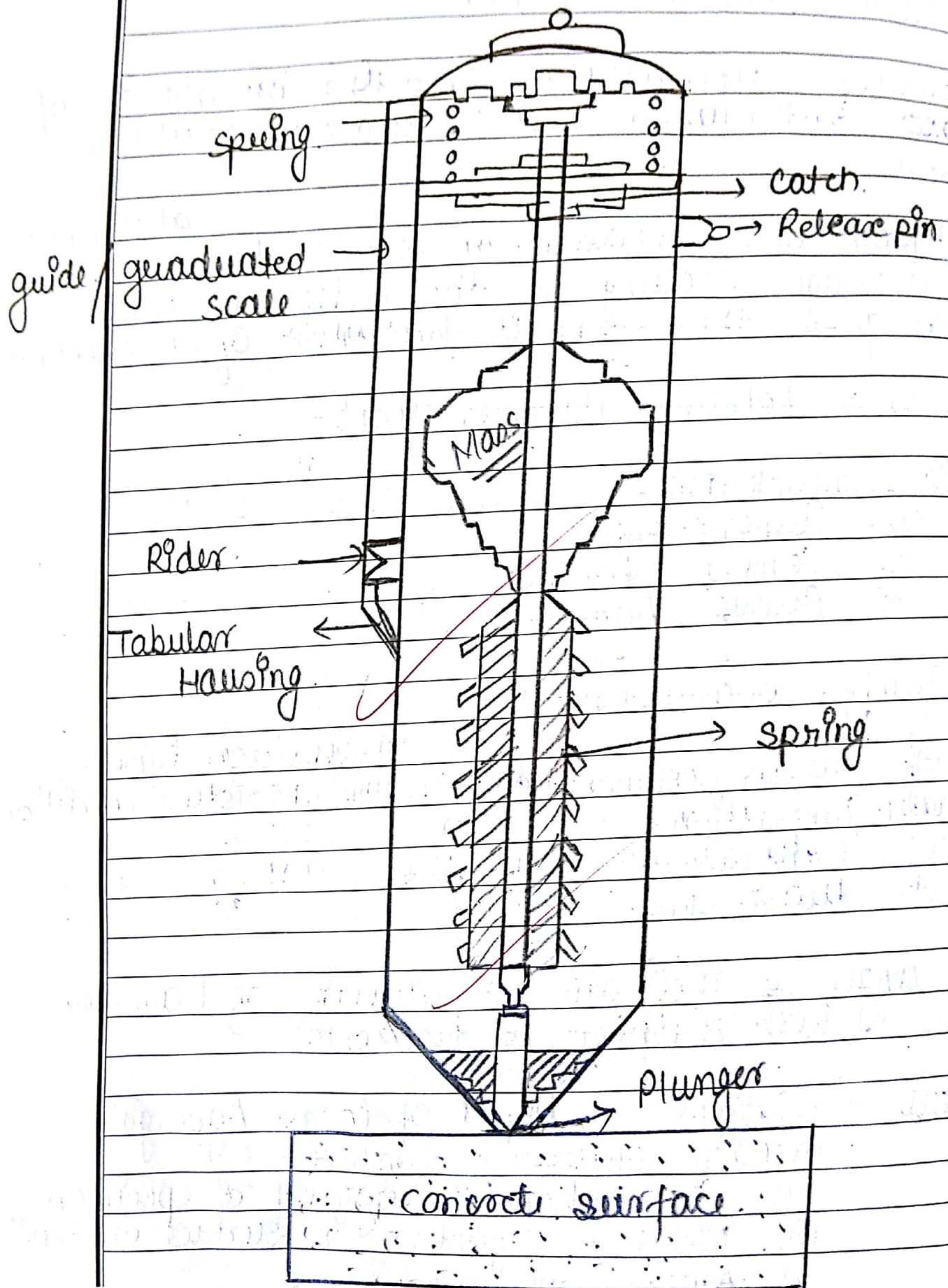


fig:- Rebound Hammer.

Ans 03

How can potential water & air movement

When the building or any other structure is not constructed properly, then there is the deterioration in the structure in future.

The causes of deterioration.

- i) Grade of Cement is not used properly.
- (ii) Types of aggregate use is of low strength.
- (iii) Cracks developed in the structure which expands due to temperature effect & causes destruction of building or any other structure.
- (iv) The Mortar $\rightarrow$ Cement + sand + water should not mix properly & lump all there in the structure.
- (v) The structure is constructed on a water-bound area where water quantity is greater in the soil, the load carrying capacity is low. & the bearing strength is also low. This causes deterioration in structure.

Prevention Methods -

- i) Epoxy Injection.
- ii) Grouting & sealing.
- iii) Cracking
- iv) Sticking

3

- v). Adding Reinforcement
- vi). Deep Packing.
- vii). Overlay & surface treatment.

(i) Epoxy Injection :- Epoxy injection is used to bound the cracked section.

(ii) For Epoxy Injection required preparing & planning

(iii) The cracks are jointed or sealed by injecting a liquid into it.

(ii) Grooving & sealing :- In grooving & sealing, the cracks are enlarged ~~for~~ or the grooves are enlarged & then the paste is joint or sealed the cracks is filled.

(iii) Grouting :- In grouting, the cracks are developed. In the region where repairing is not conducted, so grouting is done by inserting a pipe into the cracks & filled the grout into it.

(iv) Stitching :- Stitching includes ~~the~~ by inserting the metal ring at the either portion of cracks & then it is sealed by filler or paste.

(V) Adding Reinforcement - In this the beam is drilled & holes are drilled in beams & then epoxy is done & then it is sealed by paste.

(VI) Grout Packing - In this, ^{low} water cement amount of water, fine sand & cement are mixed to prepare a paste & this paste is then filled to the cracks to repair it.

(VII) Overlay & Surface Treatment - For rough surface, the prepared paste is overlaid manually by the help of spatula & makes it smooth & treat it by filling the cracks & smoothing the surface.

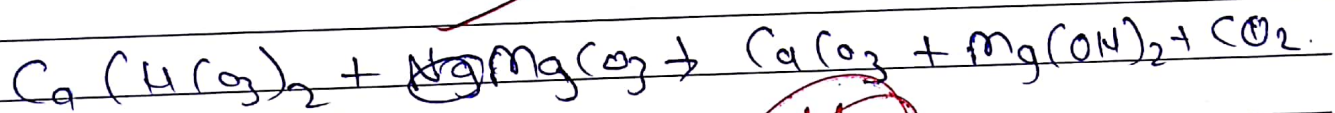
(3)

Answer-1-

Corrosion :- In the deterioration of concrete is the corrosion is contact to be defined as the carbon and oxide is mixed and prepared to carbon dioxide.

Carbon dioxide present in atmosphere is more to react the many gas and effect the concrete.

The portland cement is react to air or carbon dioxide to affect the concrete, it is called Corrosion.





Govt. Engineering College Jhalawar

III Yr. B.Tech VI Sem. 2017-18

Mid Term Award list

Civil Engineering

Subject with code: RRB, GCE6.3A (Repair)

Date of Exam 07.02.2018

S. No	Roll No.	Name of Student	Max. Marks : 10		
			I Mid Term Marks	II Mid Term Marks	Total Marks
1	2015UCE001	ABHISHEK BAIRWA	AB		
2	2015UCE002	ABHISHEK SINGH	10		
3	2015UCE003	ADI RAJ JAIN	AB		
4	2015UCE004	AJAY KUMAR CHOUDHARY	9		
5	2015UCE005	AJAY KUMAR MEENA	9		
6	2015UCE006	AMAR SINGH MEENA	9		
7	2015UCE007	ANKIT KUMAR MAHALA	8		
8	2015UCE008	ANKIT RAJ SHARMA	8		
9	2015UCE009	ANKIT YADAV	7		
10	2015UCE010	ANOOP KUMAR VERMA	9		
11	2015UCE011	ASHISH NAGAR	AB		
12	2015UCE013	BHAGYASHREE SONI	10		
13	2015UCE014	BHAWANI SHANKAR REGAR	9		
14	2015UCE015	BRIJESH SHARMA	8		
15	2015UCE016	CHANDRA PRAKASH	8		
16	2015UCE017	DEEPAK KUMAR GOYAL	9		
17	2015UCE018	DHEERAJ GARG	9		
18	2015UCE019	DHIRENDRA SINGH PANWAR	9		
19	2015UCE020	DILKHUSH SAINI	8		
20	2015UCE021	DOULAT RAM YADAV	8		
21	2015UCE022	HEMENDRA GOSWAMI	9		
22	2015UCE023	JAI KUMAR GAUTAM (TFWS)	AB		
23	2015UCE024	KARAN YADAV	9		
24	2015UCE025	KARINA PANWAR	9		
25	2015UCE026	KHUSHBOO MEWARA	9		
26	2015UCE027	KIRTIKA GUNJAL	9		
27	2015UCE028	LOKESH AMROLIYA	8		
28	2015UCE029	LOVE KUMAR NAGAR	9		
29	2015UCE030	MANISH KUMAR	7		

30	2015UCE031	MAYANK PANDEY	9		
31	2015UCE032	MOOLCHAND TOGASIA	9		
32	2015UCE033	NARENDRA KUMAR MEENA	8		
33	2015UCE034	NITESH KUMAR	8		
34	2015UCE037	PIYUSH GOCHER	9		
35	2015UCE038	POOJA MEENA	8		
36	2015UCE039	PRAVEEN KUMAR MEHRA	9		
37	2015UCE040	RAHUL CHOUDHARY	9		
38	2015UCE041	RAHUL KUMAR RATHOR	10		
39	2015UCE042	RAVI SHANKAR RATHOR	9		
40	2015UCE043	RAVINDRA KUMAR SAINI	10		
41	2015UCE044	ROHIT SINGH	9		
42	2015UCE045	SACHIN CHHIPA	10		
43	2015UCE046	SACHIN KALYAN	9		
44	2015UCE047	SHREYA RATHORE	10		
45	2015UCE048	SHUBHAM PANDAY	7		
46	2015UCE049	SHYAM SINGH GURJAR	7		
47	2015UCE050	SUMAN MEENA	8		
48	2015UCE051	SUMIT YADAV	6		
49	2015UCE052	SUNIL SAINI (TFWS)	9		
50	2015UCE053	SURAJ NAGAR	9		
51	2015UCE054	VARUN RATHORE	AB		
52	2015UCE055	VIJAY KUMAR RATHOR (TFWS)	AB		
53	2015UCE056	VIJENDRA SINGH PANWAR	9		
54	2015UCE057	VIJESH MENARIA	10		
55	2015UCE058	VIKRANT GUJAR	8		
56	2015UCE059	VISHAL SHARMA			
57	2015UCE060	YOGENDRA SINGH PANWAR	8		
58	2015UCE061	YUNJESHVARI JETI	9		
59	2015UCE300 (Branch Change)	HIMANK PANCHAL	9		
60	2015UCE301 (Branch Change)	UMESH KUMAR MEENA	7		
61	2016UCE400 (College)	PALKANSH BHATT	6		

Signature of Examiner



