



MANIPAL INSTITUTE OF TECHNOLOGY

VII SEMESTER B. TECH (CIVIL ENGINEERING)

END SEMESTER EXAMINATION, NOV 2022

NON-DESTRUCTIVE TESTING OF CONCRETE STRUCTURES (CIE 4080)





(-11 - 2022)

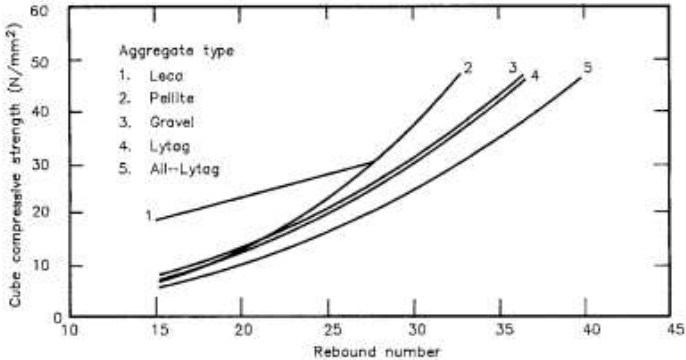
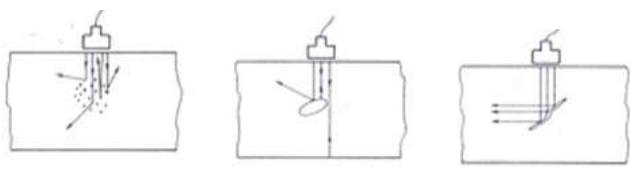
TIME: 3 HRS.

MAX. MARKS: 50

Note: 1. Answer all questions.

2. Any missing data may be suitably assumed.

Q. NO	QUESTION	MARKS	CO
1A	Explain the importance of Visual Inspection Technique (VIT) in assuring the quality of concrete structures.	2	1
1B	What does a Magnetic Particle Inspection (MPI) kit consists? Describe.	3	2
1C	Identify the defects indicated in the pictures 1C [a, b, c, & d] below and describe the causes, its effects on concrete structure and suggest remedial measures.  1 C. (a)  1 C. (b)  1 C. (c)  1 C. (d)	5	5
2A	Describe the reasons for inability (limitations) of Liquid Penetrant Inspection (LPI) method to detect cracks that are not open to the surface.	2	1
2B	Discuss the ranges of Half-cell Potential values in millivolts and their application in describing the probability of corrosion.	3	4
2C	Describe the working principle of rebound hammer with a neat sketch of it.	5	2
3A	Describe the procedure of conducting dry MPI with a neat sketch.	2	3
3B	Describe the ranges of velocity of Ultrasound wave propagating through the concrete and explain how it is useful in establishing the quality of concrete.	3	4

3C	<p>The concrete specimens comprising different aggregate types were tested using rebound hammer. The result of the test is presented as figure 3C below. Infer the effect of light weight aggregate types on rebound number and strength of the concrete.</p>  <p style="text-align: center;">Fig. 3C</p>	5	5
4A	Describe the issues concerning to the safety of inspector during inspection of structure using Radiographic method.	2	1
4B	Describe the effects of 'age' and 'carbonation' of concrete on Rebound hammer method used in testing of concrete.	3	5
4C	<p>A section of girder of a steel bridge was inspected using reflection probe Ultrasound technique. The defects of types as depicted in the figure 4C [a, b & c] below were recognized. Identify defects and describe them with the help of neat sketch of A scan display for each defect types.</p>  <p style="text-align: center;">(4C. a) (4C. b) (4C. c)</p>	5	5
5A	Describe the applications Ground Penetrating Radar (GPR) in context with quality of concrete.	2	1
5B	With a neat sketch describe the working of Wenner four probe used in electrical resistivity measurement of in situ concrete.	3	2

5C

Describe the features of the radargram, fig. 5C, of RCC member given below obtained from GPR inspection.

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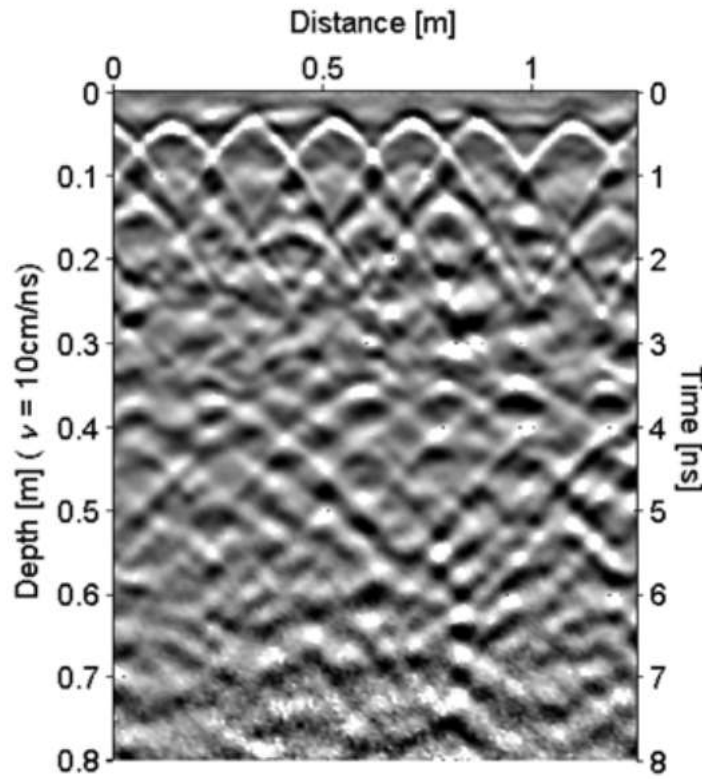


Fig. 5C