Ref. No. Ex./PG/CT/T/121/2019

M. Const. Engg. EXAMINATION, 2019

2nd Semester/

SUBJECT Condition Assessment & Health Monitoring of Structures - I

(Name in full)

PAPER_____

Time : Three hours

Full Marks ~~30~~/100
(~~15~~/ 50 Marks for this part)

No of Questions	Part I / ~~Part II~~	Marks
	Answer any Four Questions	
Q1.	Describe briefly the process of corrosion and its effect in concrete structures.	12.5
Q2.	Describe the non-destructive test technique based on Impact echo method.	12.5
Q3.	Write a short note on Alkali Aggregate reactions in concrete.	12.5
Q4.	Describe the effect of abrasion and erosion in concrete Structures.	12.5
Q5. a)	Describe the non-destructive test technique based on cross hole sonic logging method.	08
Q5. b)	Mention the uses of cross hole sonic logging method and compare it with low strain pile integrity test.	4.5

M.E. Construction Engineering - First Year - Second Semester, 2019

Condition Assessment and Health Monitoring of Structures-I

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Answer Q3 & ONE from the rest. **15+ 10 =25**

1. What is NDT in a structure? What are the types of NDT normally adopted for condition assessment of a structure? Why is Destructive Testing(DT) not preferred?
2. What are the reasons for which NDT is carried in a structure? A concrete wall of 2.5Mx4.5M has developed some distresses .Some test with Schmidt hammer/ UPV are required to be done. How will you select the test grid/points -Justify your decision.
3. Describe the limitations of NDT. Elaborate basic principles of Schmidt hammer and UPV test. Prepare a chart of Core cutting test results .

Master of Construction Engineering 2nd Semester Examination 2019

CONDITION ASSESSMENT & HEALTH MONITORING OF STRUCTURES – I

Part – III **Full Marks: 25**

Assume any relevant data not provided, Answer any One Questions

1. a) What are the principle and objective of Ultrasonic pulse velocity test in concrete **5**

b) Discuss the **Equi-distant method of UPV test** for estimation of Crack depth. The following UPV readings were observed at a TG foundation by this method.

Grid No.	Grid Length (mm)	Time T_1 for X_1 (Micro-sec)	Time T_1 for X_1 (Micro-Sec)
P	50	31.7	62.5
Q	100	61.4	118.6
R	75	67.2	115.8
S	50	25.3	42.6
T	75	58.5	96.5

Calculate the **Crack Depth** and comment on it. **8**

c) Discuss the effect of surface condition & moisture content, stress level and close presence of reinforcement and concrete grade on the test result of UPV. **7**

d) Write down the expression of Ultrasonic pulse Velocity (UPV) in Concrete and Calculate the Dynamic modulus of Elasticity of concrete assuming UPV as 3.75 km/Sec and Poisson Ration of Concrete as 0.22. **5**

2. a) What are the **advantage and disadvantage** of **Non-destructive** testing? **5**

b) Discuss the objective & **principle of Schmidt Hammer Test** in concrete. 5

c) Discuss the effect of **carbonation & moisture content** on the test result **5**

d) The hammer readings at different locations of a column are given below. Calculate the **average, standard deviation and most probable least value** of the **estimated strength of concrete**. Discuss on the result of the estimated strength of concrete. The estimated strength $S = 0.006X^2+1.154\ X - 14.2$ **10**

Location	H(m)	Hammer Reading (Horizontal) X									
Bottom	0.5	28	26	27	28	29	32	23	29	26	28
Middle	1.5	32	34	34	37	32	32	36	38	31	30
Top	2.5	22	25	24	27	25	27	28	25	36	30