UTHM
Universiti Tun Hussein Onn Malaysia

UNIVERSITI TUN HUSSEIN ONN MALAYSIA

FINAL EXAMINATION
SEMESTER I
SESSION 2019/2020

COURSE NAME	:	STRUCTURAL MAINTENANCE
COURSE CODE	:	BNC 41103
PROGRAMME CODE	:	BNC
EXAMINATION DATE	:	DECEMBER 2019 / JANUARY 2020
DURATION	:	3 HOURS
INSTRUCTION	:	ANSWER **ALL** QUESTIONS

TERBUKA

THIS QUESTION PAPER CONSISTS OF **THREE (3)** PAGES

Q1   (a)   Define the meaning of structural defects in civil engineering perspective.

(3 marks)

(b)   "Service life" is a complex and indistinct concept, it is generally difficult to determine in detail. Function, safety, aesthetics, economics and environment issues are amongst the range of factors that may in combination dictate the final service life.

Define;

(i)   Required service life
(ii)   Design service life
(iii) Technical service life
(iv) Functional service life
(v)   Economic service life

(10 marks)

(c)   Maintenance is the process of ensuring that buildings and other assets retain a good appearance and operate at optimum efficiency. Classify the planned maintenance and contingencies maintenance based on BS 3811.

(6 marks)

(d)   Sketch **THREE (3)** types of settlement.

(6 marks)

Q2   (a)   Differentiate the destructive and non-destructive test to the concrete.

(4 marks)

(b)   Visual inspection is a common and basic method of inspection. Explain **THREE (3)** reasons of the need to do visual inspection before some further action carried out.

(6 marks)

(c)   Structural movement, environmental effect and loading is are parts of the major causes of structural failure. As a maintenance team expert, recommend **THREE (3)** methods of NDT to check the integrity of that structure.

(12 marks)

(d)   In Malaysia, defects in new building are too many unabated and the impacts of defects are high maintenance costs, poor user satisfactions, dangerous to the tenants and the buildings cannot function properly. Classify the general problem and defects in new building.

(3 marks)

Q3 (a) Point out **THREE (3)** NDT methods for corrosion monitoring.

(3 marks)

(b) Choose **TWO (2)** answer from **Q3 (a)** and differentiate the methods.

(4 marks)

(c) In your opinion, why do we need to monitor the structures even though after being repaired? Explain **FOUR (4)** reasons to support your answer.

(8 marks)

(d) Differentiate the direct method in terms of monitoring items, techniques and their measurement principle for diagnostic on pre-stresses concrete structure.

(10 marks)

Q4 (a) Cracks problem in building structure may develop due to several causes. Explain **THREE (3)** causes for this problem.

(3 marks)

(b) In order to repair the building structure, several method can be used. Differentiate the repairing cracks method between bonding with epoxies, grouting, stitching, external stressing, blanketing, routing or sealing and use of overlays method.

(14 marks)

(c) By referring the cracks method in **Q4 (b)**, propose **ONE (1)** method that suitable for active cracks problem.

(2 marks)

(d) Monitoring crack by using Ultrasonic Pulse-Velocity (UPV) can give us significant data in which higher velocity indicate good condition, while slower velocity shows the concrete have some cracks or voids. Sketch **THREE (3)** types in getting the UPV data throughout direct transmission method, semi-direct transmission method and indirect transmission method while conducting UPV.

(6 marks)

- END OF QUESTIONS -

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