UNIVERSITI TUN HUSSEIN ONN MALAYSIA

FINAL EXAMINATION
SEMESTER II
SESSION 2012/2013

COURSE NAME	:	STRUCTURE REPAIR & REHABILITATION
COURSE CODE	:	BFP 4043 / BFP 40403
PROGRAMME	:	BFF
EXAMINATION DATE	:	JUN 2013
DURATION	:	3 HOURS
INSTRUCTION	:	ANSWER **FOUR (4)** QUESTIONS ONLY

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

Q1 (a) One of the important major components of building that needed attention is building defect. Define structural defects according to Home Building Regulation (2004).

(4 marks)

(b) Discuss **three (3)** processes of investigation of the structural defects before any repair technique is implemented.

(9 marks)

(c) With the aid of a sketch, provide explanation on the possible outcome that could happen to structural elements if there is a structured movement, such as;

(i) Weather Effects
(ii) Earthquake
(iii) Settlement of Foundations

(12 marks)

Q2 (a) The purpose of visual inspection is to get an overview of the concrete structure. List **five (5)** items that should be addressed during the visual inspection.

(5 marks)

(b) Non-destructive test is the inspection or analysis of existing materials, structure and involving the process of manufacturing without destroying the integrity of materials and structures. With the aid of sketches, explain the process of the following tests:

(i) Schmidt Hammer
(ii) Ultrasonic pulse velocity testing.

(12 marks)

(c) The table below shows the result of strength which was correlated rebound numbers using Schmidt Hammer. Discuss the factors affecting the value of strength.

Table Q2(c): Average rebound numbers at different location of a building

Location	**Rebound Average**	**Compressive Strength (MPa)**
Beam	48	48-49
Staircase	58	65
Corridor	30	28-29

(8 marks)

Q3 (a) Temporary works are considered as one of the repair techniques. Compare the application of temporary works as below;

(i) Shoring
(ii) Underpinning

(10 marks)

(b) Describe **five (5)** possible requirements of temporary work on site.

(5 marks)

(c) Propose and explain **two (2)** methods of repairing in construction foundation stabilization.

(10 marks)

Q4 (a) The method of strengthening concrete structures with fiber reinforced polymer (FRP) composites has existed for over a decade. Explain **three (3)** different types of FRP for strengthening concrete structures.

(12 marks)

(b) A single beam requires additional shear strength to prevent it from a shear failure. Explain briefly method of strengthening to be used for that beam as bellow;

(i) External Post-Tensioning

(6 marks)

(ii) Bonded Steel Elements

(4 marks)

(c) Sketch a diagram on how strengthening works in reinforced concrete beam are done.

(3 marks)

Q5 (a) It is important to understand the different types of cracks before applying the proper remedy. If the cracks exist due to continuing foundation settlement, repair will not be useful until the settlement problem is corrected. Discuss the type and causes of concrete cracks.

(7 marks)

(b) There are many methods to repair the crack in structural defect. Illustrate the process and of technique of repair for cracks by the epoxy injection method.

(9 marks)

(b) Gunite shotcrete or pneumatically applied mortar as a repair method for restoring surfaces spoiled due to corrosion of reinforcement in the concrete. Discuss the process to illustrate the technique used.

(9 marks)

END OF QUESTIONS