

Course No: CON 5317  
Course Title: Buildings Restoration  
& Rehabilitation  
Date: 14 / 04 /2018  
No. of Questions: (3)  
Time: 1 hours  
Using Calculator (No)

University of Palestine



Second Mid Exam  
Second Semester  
2017/2018  
Total Grade: 30

Instructor Name: Dr.Mohammed Ahmed  
Student No.: \_\_\_\_\_  
Student Name: \_\_\_\_\_  
College Name: Engineering  
Dep. / Specialist: Civil Engineering  
Using Dictionary (No)

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**Please Answer All Questions**

**First Question**

**10 Points**

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***Choose only the correct answer***

1. The critical structural members can be repaired or strengthened for resisting excess shear and flexure by providing
  - a) increasing w/c ratio
  - b) additional steel reinforcement and/or carbon fiber wraps/mesh
  - c) higher stresses so as to impair its stability
2. Insufficient reinforcement at corners and openings is considered one of the poor design details and would cause
  - a) stress concentrations that may cause cracking
  - b) spalled cover concrete of RCC elements
  - c) ponding of water due to poor drainage
3. Differential settlement between the surface and the interior volume of the concrete will cause
  - a) the concrete becomes rigid and gains enough strength
  - b) vibrations induced damages
  - c) surface cracks
4. Symptoms of reinforcement corrosion as one of the deterioration causes will arise as
  - a) cracking and spalling in an early age of appearance
  - b) cracking and spalling in a long term age of appearance
  - c) cracking and spalling appears through construction stage
5. Based on the preliminary data collected and site visit, the rehabilitation engineer should subdivide and classify the repairs gradually as
  - a) cosmetic repair , superficial repair, patch repair, principal repair and major repair
  - b) cosmetic repair , principal repair, superficial repair, patch repair and major repair
  - c) cosmetic repair , superficial repair, principal repair, patch repair and major repair

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6. Cracks at right angle to the main reinforcement are generally associated with
    - a) drying shrinkage
    - b) alkali-aggregate reaction
    - c) structural deficiency
  7. The field/laboratory testing is to be undertaken through rehabilitation process basically for
    - a) preparation of work sheets required for BOQs.
    - b) validating the findings of visual inspection
    - c) safety measures to prevent any immediate major mishap during execution of repair jobs
  8. To repair the damage caused by carbonation
    - a) ingress of carbon dioxide with water will decrease the depth of carbonated concrete
    - b) treat the concrete surface with a 1% phenolphthalein solution in ethanol
    - c) the entire thickness of material penetrated by carbon dioxide around the reinforcement rods must be eliminated
  9. Plastic shrinkage occurs and micro-cracks may form on the surface in the presence of
    - a) high temperature, very high external humidity
    - b) low temperature, very high external humidity
    - c) high temperature, very low external humidity
  10. Damage due to freeze-thaw cycles only occurs when there is a combination of the following conditions
    - a) low temperatures and presence of macro-porosity
    - b) low temperatures and absence of macro-porosity
    - c) low temperature and low capillary micro porosity

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**Second Question**

**14 Points**

A) Explain in brief steps of fire damage

**(3 Points)**

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B) List three cases required to evaluate a strength of an existing structure or its portion . Name the main three non/semi-destructive methods commonly used

**(3 Points)**

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C) Explain in brief the symptoms and prevention measures for the following design mistakes/errors .

**(6 Points)**

1. Inadequate structural design

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2. Poor design & details

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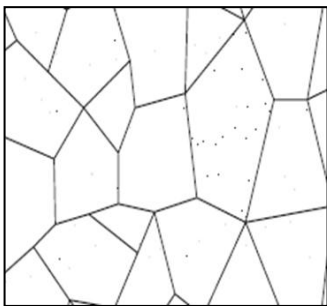


D) What are the main stages of condition survey followed in the repair and rehabilitation process. (2 Points)

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**Third Question** (6 Points)

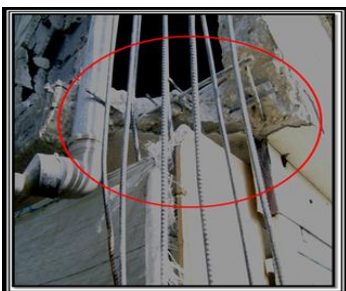
Consider and explain in brief the defects shown below



1).....



2).....



3).....

*End of Questions & Good luck*