



### Please Answer All Questions

#### First Question

*20 Marks*

Choose a **technical term** in column B that best matches the sentence in column A, and write the corresponding letter in the answer sheet.

Column A	Column B
1. A technique used to pre-stress reinforced concrete providing the structural member with an immediate and active load-carrying capability	A. Underpinning
2. A technique involves drilling holes on both sides of the crack and grouting in U-shaped metal units with short legs that span the crack.	B. Stitching
3. A highly efficient and environment friendly method is used to remove concrete cover where metal pieces are projected at the concrete surface at a high velocity.	C. Post-Tensioning
4. It is the process of strengthening and stabilizing the foundation of an existing building or other structure	D. Dry pack
5. . It is a process of projecting mortar or concrete at high speed onto a surface pneumatically.	E. Patching
6. A method involves enlarging the crack along its exposed face and filling it with a sealant.	F. Shot blasting
7. It is a combination of Portland cement and sand passing a No. 16 sieve mixed with just enough water to hydrate the cement	G. Routing and sealing
8. It consists of restoring or increasing the section of an existing member, principally a compression member, by encasement in new concrete.	H. Abrasion
9. The wearing away of material by friction where surface particles become detached/separated by a combined action of shearing & tearing	I. Shotcrete
10. A repair technique for concrete structures which consists of replacing the lost, unsound or contaminated concrete with a material that can be new concrete, a repair mortar, a grout, etc.	J. Jacketing



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## Second Question

20 Marks

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*Mark each of the following sentences True (T) or False (F)*

1. Cracking and spalling of concrete due to chemical attack arise in a long term age appearance. ( )
2. The patch repair is a non-structural or minor structural repair limited to crack sealing, restoring the lost concrete cover, if any, due to corrosion of reinforcement. ( )
3. Rust staining in a freshly laid concrete is not considered indicative of honeycombed concrete. ( )
4. Efflorescence occurs as a crystalline deposit on surfaces of masonry, stucco or concrete and in absence of moisture movement. ( )
5. The colour of the concrete damaged by a fire is an indication of maximum temperature level to which the surface had been subjected. ( )
6. To strengthen and make the concrete more resistant to impact, steel fibers are used so that impact energy is distributed less evenly throughout the entire structure. ( )
7. In Windsor probe, the lower the depth of probe penetration, the higher compressive strength of concrete. ( )
8. Flexural cracks in beams may occur in negative moment region between two supports and maximum width at a top face converging towards top. ( )
9. In Ultra Pulse Velocity Test, the higher pulse velocity is the worst concrete quality. ( )
10. In Correct preparation of delamination damage, a perimeter is to be saw cut to a minimum depth of 1 inch, and concrete has to be removed to at least the same depth beneath exposed reinforcing steel. ( )

Course No: CON 5317

Course Title:

**BUILDING REHABILITATION**

Date: 20 / 05 / 2018

No. of Questions: (5)

Time: 2 hours

Using Calculator (No)

University of Palestine



Final Exam

Second Semester

2017/2018

Total Grade: 100

Instructor Name: Dr.Mohammed Ahmed

Student No.: \_\_\_\_\_

Student Name: \_\_\_\_\_

College Name: Engineering

Dep. / Specialist: Civil Engineering

Using Dictionary (No)

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### Third Question

*20 Marks*

- A. Explain in details how the structural system analysis and its validation can be done and evaluated for rehabilitation and repair of deteriorated buildings.
- B. In old dams, consider where essential damages/deterioration could mainly arise. How can you classify and prioritize them for repair requirements.
- C. Discuss shotcrete techniques and its applications.
- D. Explain any five various causes of cracks and list the proper techniques required for repairing such cracks.

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### Fourth Question

*20 Marks*

- A. List main reasons for selecting epoxy resins and polymer impregnating concrete as repair or restoration materials
- B. What is overlay and list three advantages of the thin polymer overlays?
- C. Define grouting. What do you mean by blanketing?
- D. why do concrete surfaces scale ? Explain how the resistance to abrasion can be improved.
- E. Explain and sketch two methods of span shortening

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### Fifth Question

*20Marks*

- A. What is meant by shoring? Discuss and sketch repair and strengthening of columns by jacketing.
- B. Explain and sketch how beams are repaired without increasing the section or reinforcement.
- C. Discuss and sketch Curling of RCC slabs and how it is repaired in efficient ways. List three causes lead to splitting cracks in columns.
- D. List the steps in repair aspect? What are the important properties considered in a concrete repair material.

*Good Luck*