



University of Technology
Building and Construction Engineering Department
Subject: Principles of Building and Construction Engineering
Time: 3 hrs.
Examiner: Committee



1st class
Date: 11/6/2016

Attempt Four questions only

Q1: A- Compare between the following:

- Spillway and sluiceway
- Reservoir and lake
- Evaporation and evapotranspiration
- Dead storage and useful storage in dams
- Arch and buttress dams

15 mark

B- Choose the correct answer: (Answer five only).

- 1) Trusses are usually subjected to:
a) flexural force b) axial force c) uniform force d) all of the above
- 2) Engineering structures can be classified according to their uses into civil and:
a) military b) compound c) residence d) none of the above
- 3) Arches achieve their strength in:
a) bending b) compression c) tension d) all of the above
- 4) Frames are divided into two categories according to the type of connections between beams and columns, rigid and:
a) braced b) portal c) fixed d) none of the above
- 5) A one-way slab needs moment resisting reinforcement only in its:
a) long direction b) short direction c) diagonal d) none of the above
- 6) The roof is considered as a:
a) dead load b) live load c) wind load d) none of the above

10 mark

Q2: A- The population for a city was estimated to be 25000 in the year 2000, where it was 15000 in the year 1990. By using the arithmetic method determine the duration that population reach 35000.

15 mark

B- Correct the words under lines:

- 1- According to Materials, Bridges are classified into: Pedestrian., Highway, and Railroad.
- 2- Analysis of the cable forces in a suspension bridge must consider linear geometry due to large deflections.
- 3- Pipelines are the major channel of transportation for carrying goods and passengers.
- 4- Flexible pavements are those which are surfaced with concrete materials.
- 5- Rigid pavements generally require some sort of maintenance or rehabilitation every 10 to 15 years

10 mark

Q3: A- The distance between point A and contour line 135, is 15cm on a map of 1:50,000 scale, the elevation of point B is 142m 12m higher than point A. What is the distance between B and the contour line?

15 mark

B- Place your appropriate answer in the following blanks:

- 1- Transportation Systems consists of Highways, Rail transport, -----, -----, and -----
- 2- According to AASHTO classification, the -----highway provide Full control of access, High level of service, and High design speed for Long trips.
- 3- A bridge is a key element in a transportation system for controls the ----- of the system.
- 4- ----- and ----- bridges are main structure above the Deck Line.
- 5- A flexible pavement structure is generally composed of ----- layers of materials which can accommodate this -----
- 6- Rigid pavements have -----in terms of functionality

10 mark

Q4: A- State the types and sources of water pollution and explain two of them.

10 mark

B- What are the classification of the highway according to AASHTO? 5 mark

C- Topography is a combination of methods and instruments to comprehensively measure and represent details of the Earth's surface. List these instruments and methods.

10 mark

Q5:A- Write "T" if the statement is true and "F" if the statement is false.

1. The amount of annual precipitation in Iraq is 1200 mm.
2. The length of Tigris river in Iraq is 1418 km.
3. Ground water storage is defined as overland flow occurs after rainfall event.
4. The function of Tharthar lake in Iraq is to control flood and regulation.
5. Hawizah, Hammar, and Qurne are the tributaries of Tigris river.
6. The percentage of global fresh water amount 25% from the global water.
7. Lake, rivers and soil moisture constitute only 0.4% from the global fresh water.
8. Precipitation occurs when atmospheric moisture is too small in clouds.
9. The weight of dam is the force which try to destabilize concrete dams.
10. Inertia force of water due to earthquake is one of vertical forces acting on dams.

10 mark

B- List five of the fundamental core subjects for structural engineering in BSc Level.

10 mark

C- Answer two of the following:

- 1) Classify the structural slabs on the basis of spanning directions; support your answer with drawings.
- 2) List five of the basic types of structural elements.
- 3) Explain the purposes of using the following in constructing concrete: i) admixtures and ii) steel reinforcement.

5 mark

Good luck



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Principles of Building and Construction Engineering

Typical solutions of the final exam 1st attempt 2015-2016

Q1: A-

Spillway	Sluiceway
Is part from the dam and it is used to control released flows from a dam into a downstream area.	a sliding gate or tunnel for controlling the flow of water to the turbines or downstream.
Located at crest usually	Located near the bottom of dam

Reservoir	Lake
Artificial water storage	Natural water storage

Evaporation	Evapotranspiration
Water evaporated from open bodies like reservoir, lake etc.	Water evaporated from plants and soil and water bodies

Dead storage	Useful storage
water in a reservoir that cannot be drained by gravity through a dam's outlet works, spillway or power plant intake and can only be pumped out.	storage available for the intended purpose between minimum pool level and normal pool level.

Arch dam	Buttress dam
Have considerable upstream curvature	Consist of continuous upstream face supported by buttress
Depends on its curvature to stay stabile	Depends on the support from the buttress

Q1: B-

- 1) Trusses are usually subjected to axial forces only.
 - 2) Engineering structures can be classified according to their uses into civil and military structures.
 - 3) Arches achieve their strength in compression.
 - 4) Frames are divided into two categories according to the type of connections between beams and columns, rigid and braced frames.
 - 5) A one-way slab needs moment resisting reinforcement only in its short direction.
 - 6) The roof is considered as a dead load.
-

Q2: A-

$$k_a = (p_2 - p_1) / (t_2 - t_1) = (25000 - 15000) / (10) = 1000$$

$$P_t = P_o + k_a t$$

$$35000 = 25000 + 1000 t$$

$$t = 10 \text{ year}$$

at 2010 the population reach 35000

Q2: B-

1- Usage

2-nonlinear

3-Roads

4-bituminous (or asphalt)

5- 20-40

Q3: A- distance = $15 \times 50,000 / 100 = 7,500 \text{ m}$

$$B_e l = 142$$

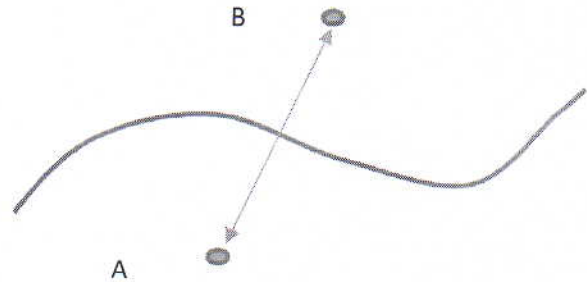
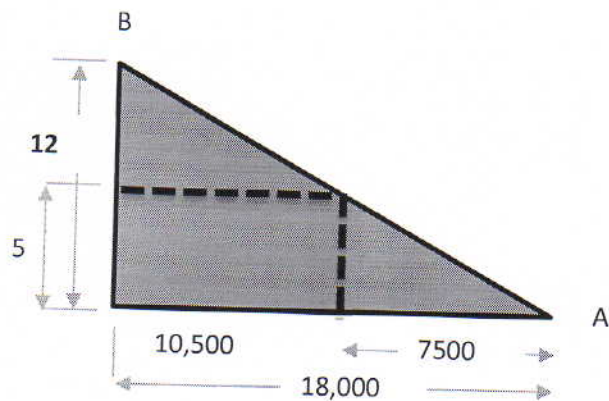
$$\text{Line} = 135$$

$$A_{e l} = 142 - 12 = 130$$

The line between A and B

$$(135 - 130) / 7500 = (142 - 135) / D$$

$$D = 7 \times 7500 / 5 = 10,500 \text{ m}$$



Q3: B-

- 1- Air transport , Water transport, Continuous flow systems
- 2- Principal arterials.(Expressways or Freeways).
- 3- capacity
- 4- Suspension, cable-stayed
- 5- Several, flexing
- 6- High efficiency

Q4:A-

- 1) domestic sewage
- 2) disease causing agents
- 3) inorganic chemicals and minerals
- 4) synthetic organic chemical and oil
- 5) nutrients
- 6) radio active substance
- 7) heat from industrial and power plants

B-

- 1) principles arterials
- 2) transition
- 3) minor arterials
- 4) collectors
- 5) access (local) roads
- 6) terminal

C-

- *planimetry*: to determine the relative positions of the representation of points on the Earth's surface with respect to the same reference surface;
 - *altimetry*: to determine the height of the points on the Earth's surface with respect to the geoid surface;
 - *tachymetry*: for the planimetric and altimetric survey of the Earth's surface zones;
 - *land surveying*: to measure areas, moving and rectify borders, levelling zones of the Earth physical surface.
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Q5: A-

- 1- F
- 2- T
- 3- F
- 4- T
- 5- F
- 6- F
- 7- T
- 8- F
- 9- F
- 10- F


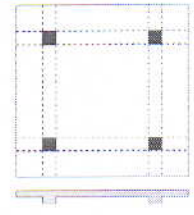
B-

- 1) Strength of Materials or Solid Mechanics.
- 2) Structural Analysis: - Static & Dynamic, theories of structural failure.
- 3) Material Science: Concrete Technology.
- 4) Engineering and Numerical Analysis.
- 5) Reinforced Concrete and Prestressed Concrete.
General structural design courses that includes, Composite Structure, Timber, Masonry and Structural Steel Designs.

C-

1-

Slabs are classified based on spanning directions into:

– One-way slab, Spanning in one direction	
– Two-way slab, Spanning in two direction	

- 2- Beams, Trusses, Columns, Slabs, Arches, Cables, Frames, Shells
- 3- Admixtures are used to enhance the properties of concrete such as strength, setting time or durability etc. steel reinforcement used to support the concrete against tension.