

سوالات زبان تخصصی مهندسی

# عمران

سراسری ۱۳۷۲

## *IN THE NAME OF GOD*

*With reference to the number in the passage, choose (1), (2), (3) or (4) which best completes each blank.*

**Then mark box appropriately.**

An important class of cofferdams are those built on land. They are probably more (1) ..... than those located in (2) ..... Of water. A few of the structures (3) ..... often require land cofferdams (4) ..... buildings, subways, sewers, pump wells, upper (5) ..... Of mine shafts, pits, (6) ..... large machine foundations, and approach piers for bridges. With such a (7) ..... of applications, cofferdam (8) ..... and sizes very tremendously, as (9) ..... the problems involved in (10) ..... design and installation.

In most cases, on of the (11) ..... Problems is that of carrying on the work (12) ..... Neighboring structures buildings, street, pipe lines, sewer, and other (13) ..... are not disturbed or damaged. (14) ..... this problem were not (15) ..... it might often be much simple to (16)..... the cofferdam by digging (17) ..... hole in the ground sloping back the sides so that (18) ..... sheeting piling, or bracing would be (19) ..... At all. However, the problem of drainage must still be dealt (20) ..... in2 many cases it is possible to compromise (21)..... making a preliminary (22) ..... for the first 10 or 20 ft. or so of (23) ..... sloping the banks for this top “cut”, the (24) ..... of the excavation requiring sheeting and bracing.

The (25) ..... of protecting adjoining structures (26) ..... execution of land cofferdams generally (27) ..... careful work and pains taking (28) ..... To detail.

However, as small movements and loss of ground are (29) ..... to prevent, when adjoining foundation come with in an influence line (30) ..... sloping upward from the bottom of the excavation it is usually prudent to provide positive support in the from of underpinning.

	(1)	(2)	(3)	(4)
1)	Plenty	abundant	numerous	efficient
2)	Areas	Spaces	Reservoirs	bodies
3)	That	Where	Would	they
4)	Are	refer to	Indicate	utilize
5)	Ends	Portions	Regions	extremes
6)	In	On	As	For
7)	Scarcity	Variety	Simplicity	Creativity
8)	Sides	Dimensions	Shapes	Angles
9)	Does	Doing	Do	To do
10)	Their	Such	Its	This
11)	Minor	Subordinate	Negligible	Chief
12)	Therefore	So that	However	Until
13)	Utilities	Facilities	Instruments	Mechanisms
14)	Unless	Although	If	Because
15)	Missing	Available	Supported	Present
16)	Eliminate	Construct	Reinforce	Accumulate
17)	The	A	One	Several
18)	Some	No	Few	Any

19)	Sufficient	Appropriate	Estimated	Required
20)	To	Over	With	On
21)	By	With	In	after
22)	Surveying	Designing	Excavation	Drill
23)	Land	Areas	Depth	Locations
24)	Proportion	Remainder	Extent	Method
25)	Purpose	Cause	Probability	Necessity
26)	Within	During	Before	Till
27)	Calls for	Tends to	Agrees with	Looks up
28)	Summation	Enumeration	Attention	Reception
29)	Essential	Meager	Likely	Difficult
30)	Drawn	Which drawing	That draws	Which drawn

پاسخنامه کلیدی سوالات زبان تخصصی - مهندسی عمران (سراسری ۱۳۷۲)

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سوالات زبان تخصصی مهندسی

# عمران

سراسری ۱۳۷۳

***Read the following passage carefully; then mark the correct choices on your answer sheet.***

## **THE MEASUREMENT OF EARTHQUAKES**

Earthquakes are natural vibration within the earth's crust. They show that crustal movements are still taking place today. When rocks move or fracture, great pressures are produced and shock waves are transmitted through the earth.

The waves are recorded on a seismograph and the intensity can be determined by using a scale which ranges from 1 to 10.

Three kinds of waves can be identified on a seismograph, p, or primary waves; s, or secondary waves and L, or long waves; p and s waves arrive at the seismograph station first because they travel directly through the Earth. The L. waves travel along the surface of the Earth and make the biggest impression.

**1. the long waves produce the most outstanding ..... ..**

- |              |               |
|--------------|---------------|
| 1) intensity | 2) pressure   |
| 3) vibration | 4) impression |

**2- a seismograph is an instrument concerned with .... ..**

- |                 |                    |
|-----------------|--------------------|
| 1) transmission | 2) great pressures |
| 3) earthquakes  | 4) station         |

**3- the word "crust" means ..... ..**

- |                      |                    |
|----------------------|--------------------|
| 1) a liquid layer    | 2) a solid layer   |
| 3) a non solid layer | 4) a gaseous layer |

**4- the synonym of word “fracture” is ..... ..**

- 1) cleavage
- 2) splash
- 3) sprinkle
- 4) misplacement

**5- the ..... arrive at the seismograph station first.**

- 1) primary waves
- 2) secondary waves
- 3) long waves
- 4) both a and b

**Select the proper answer to the following items. Then mark the correct choices on your answer sheet.**

**6-light weight aggregate for concrete can be obtained from ....**

- 1) sand and grave
- 2) volcanism material
- 3) granite
- 4) crushed granite

**7- if the depth of a beam is increased, it’s moment capacity will .....**

- 1) decrease
- 2) increase
- 3) decrease slightly
- 4) not change

**8- for what purpose does a topographical surveyor use a tachometer?**

- 1) to find out the estimated slope between the instrument and a point.
- 2) to find the distance from the instrument to a particular point.
- 3) to save the cost of buying and using a theodolite.
- 4) to save multiplying a measured distance by 100.

**9- the beam shown is a ..... ..**

- 1) propped cantilever beam
- 2) continuous three span beam

- 3) continuous beam with overhang
- 4) simply supported beam with overhang.

**10- to slow the rate of setting of concrete, we add ... . . .**

- 1) a retarder
- 2) a plasticizer
- 3) an accelerator
- 4) an inhibitor

**11- Portland cement is foremost among construction ..... Used in civil engineering projects.**

- 1) goods
- 2) substances
- 3) stuffs
- 4) materials

**12- the basic distinction between the linked professions of science and engineering lies in their goals. The scientist aims to discover new knowledge whether useful or not, while the engineer strives to put knowledge, old or new, to work efficiently for the needs of mankind. You can guess from the context that "....."**

- 1) puts forward
- 2) concludes
- 3) makes great efforts
- 4) co – operates

**13- a state in which the properties of a system do not change with time' unless the system is influenced by the surroundings is called .....**

- 1) buoyancy
- 2) equilibrium
- 3) balance
- 4) stability

**14- an applied science which deals with the properties and principles of liquid and gases is called .....**

- 1) soil mechanics
- 2) hydraulics
- 3) fluid mechanics
- 4) thermodynamics

**15- a mass formed by coalescence or concentration of particles**

**of matter such as artificial stone like material used for foundations called .....**

- 1) aggregate
- 2) concrete
- 3) foundation basin
- 4) sandstone.

**16- if the load a layer of saturated clay is increased the excess water drains out of the soil. This process is know as ....**

- 1) consolidation
- 2) cavitation
- 3) swelling
- 4) uplift.

**17- a slab is a structural member which can be defined as a .....**

- 1) horizontal plate under vertical loads
- 2) vertical member under compressive loads
- 3) slender diagonal member under tensile loads.
- 4) long narrow horizontal member under axial loads.

**18- the cement has to be ..... Under very dry condition as otherwise it deteriorates rapidly.**

- 1) used
- 2) packed
- 3) stored
- 4) mixed

**19- in the case of air entrained concrete, a mixing time of less than 2 or 3 minutes may cause ..... entrainment of air.**

- 1) harmless
- 2) prolonged
- 3)desired
- 4) inadequate

**20- generally, the higher the temperature of the concrete at placement the greater the ..... Rate of strength development, but the lower the long term strength.**

- 1) initial
- 3) first

- 2) heat
- 4) economic

پاسخنامه کلیدی سوالات زبان تخصصی - مهندسی عمران (سراسری ۱۳۷۳)

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سوالات زبان تخصصی مهندسی

# عمران

سراسری ۱۳۷۴

*Read the following passage carefully, and then answer the questions in your answer sheet.*

### **ROAD SURFACING**

The choice of type and thickness of the road surface is an important part of design. The type chosen depends on the maximum load expected, the frequency of these loads, and other factors. On some routes, because the traffic flow is very low, no surfacing is necessary; and soil serves as the finished roadway. As traffic increases, a surface of sandy clay, crushed slag, crushed stone, or a mixture of these is applied. When correctly applied, this provides a satisfactory surface for a small traffic flow. Gravel, if used for these surfaces, usually contains sufficient clay or fine material to stabilize the surface. Then further stabilized by the application of calcium chloride, a gravel surface also creates less dust. Another surface is composed of Portland cement and water. When mixed into the upper few inches of the subgrade and compacted with a roller, this forms a soil/ cement base which can be surfaced with bituminous materials. On the other hand, highways which have to carry large volumes of heavy vehicles must be carefully designed and must have considerable thickness.

Pavements are either flexible or rigid. Flexible pavements have less resistance to bending than rigid pavements, but both types can be designed to withstand heavy traffic. Flexible paving mixtures are composed of aggregate and bituminous. The latter though sometimes obtained from petroleum products, are more usually

**obtained from asphalt products.**

**1- flexible paving mixtures are composed of .....**

- 1) aggregate materials only
- 2) bituminous and clay materials
- 3) aggregate and bituminous materials
- 4) bituminous materials only

**2- both flexible and rigid pavements can be designed to withstand .....**

- 1) light traffic
- 2) heavy traffic
- 3) delicate cars
- 4) unheavy vehicles

**3-flexible pavements have ..... To bending than rigid pavements.**

- 1) more strength
- 2) more withstanding
- 3) more resistance
- 4) less resistance

**4- gravel helps in ..... if it used for surface construction.**

- 1) stabilization
- 2) standardization
- 3) incapability
- 4) less resistance

**5- the important part of a road design is the choice of type and thickness of the .....**

- 1) subgrade
- 2) road surface
- 3) road aggregate
- 4) traffic flow

**6- when some Portland cement and water are mixed together and compacted with a roller, they form a .....**

- 1) finished roadway
- 2) gravel surface
- 3) bituminous material
- 4) soil/ cement base

**7- highways with large volumes of heavy must have .....**

- 1) considerable thickness
- 2) a maximum load clay
- 3) sufficient crushed clay
- 4) a mixture of clay and a crushed stone

**8-as traffic increases, a surface of sandy clay, crushed stone, and crushed slag is .....**

- 1) appraised
- 2) applauded
- 3) applied
- 4) apprehended

**9-in some roads no surface is necessary because .....**

- 1) the traffic flow is very low
- 2) soil cannot serve as the finished roadway
- 3) there is no traffic flow at all
- 4) the traffic flow is very high

**10- bituminous materials are more usually obtained from .....**

- 1) paving mixtures
- 2) sufficient clay
- 3) composed aggregates
- 4) asphaltic products

**Select the appropriate choice for the blanks and mark the correct on your answer sheet.**

**11- members and their connections in a highway bridge truss may be ..... Loaded and unloaded millions of times during the life of the bridge.**

- 1) simultaneously
- 2) directly

3) repeatedly

4) commonly

**12- a force applied to a member before it carried its working load is called .....**

1) wind force

2) a runway

3) impact force

4) earthquake force

**13- a paved stripe on which aircrafts land or take off at an airport is called .....**

1) a sleeper

2) a runway

3) an overpass

4) a retaining wall

**14- a bridge supported by cables usually hung from towers is called.....**

1) a masonry arch bridge

2) a concrete arch bridge

3) a multi- arch bridge

4) a suspension bridge

**15- quicksand is produced when the intergranular pressure of sand is ..... By upward drag of water.**

1) neutralized

2) decreased

3) doubled

4) prevented

**16-block shear rupture is a ..... failure mode that can occur along the perimeter of welds.**

1) exploding

2) ongoing

3) extending

4) tearing

**17- the word “fluctuation” means .....**

1) burn with a bright flame

2) drifting movement

- 3) up and down movement
- 4) process of casting

**18- slow movement of water or another fluid through porous material like earth or some types of rock such as limestone is called .....**

- 1) upstream
- 2) seepage
- 3) effluent
- 4) sewage

**19- a duct or pipe for carrying off the waste material or excess water is called..... .**

- 1) drainage
- 2) spillway
- 3) sewage
- 4) sewer

**20- supporting a building with temporary timber or steel elements during repair or construction is called .....**

- 1) studge
- 2) shoring
- 3) shift
- 4) slurry

پاسخنامه کلیدی سوالات زبان تخصصی - مهندسی عمران (سراسری ۱۳۷۴)

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سوالات زبان تخصصی مهندسی

# عمران

سراسری ۱۳۷۵

**1-The stresses that are caused by cold bending and straightening, cooling after rolling, or by welding are .....**

- |                          |                       |
|--------------------------|-----------------------|
| 1) residual stresses     | 2) ultimates stresses |
| 3) working load stresses | 4) Yield Stresses     |

**2- lateral deflection of a building due to wind is called: .....**

- |                          |                         |
|--------------------------|-------------------------|
| 1) foundation settlement | 2) drift                |
| 3) buckling shape        | 4) allowable deflection |

**3- a fracture phenomenon associated with a cyclic stress condition is known as:.....**

- |                       |                  |
|-----------------------|------------------|
| 1) strain – hardening | 2) plastic hinge |
| 3) ductile failure    | 4) fatigue       |

در سوال ۴ تا ۶ مناسب ترین کلمه را برای جای خالی متون داده شده انتخاب نمایید.

**4- after compaction using one of the three standard methods, the bulk density and water content of the soil are determined and the dry density calculated. For a given soil the ..... is repeated at least five times, the water content of the sample increased each time.**

- |              |           |
|--------------|-----------|
| 1) condition | 2)limit   |
| 3)method     | 4)process |

**5- the construction material which is most likely to ve abundantly present in a masonry structure is .....**

- |                        |          |
|------------------------|----------|
| 1) aluminum            | 2)bricks |
| 3) reinforced concrete | 4)steel  |

**6- creep is the property of concreete by which it continues to deform with time under ..... Loads.**

- 1)substantial
- 3) sustained

- 2)suitable
- 4)suspended

۷- با توجه به متن زیر، گزینه مناسب را انتخاب کنید.

**The observation of earthquake motion by instruments has provided basic data for studies of the natural phenomena of earthquake . resistant design of structures and has contributed much to the progress of earth science and earthquake engineering. In particular, the development of the strong motion seismograph and the accumulation of strong motion seismograms have played a very important part in the rational design of structures.**

- 1)Rational Desing of structures are indebted to the accumulation of strong motion records.
- 2) strong motion seismograms do not play role in the studies of earthquake resistant design of structures.
- 3) studies of the phenomena of earthquake provide date for instruments.
- 4) all of the above.

در سوالات ۸ و ۹ مناسبترین کلمه را برای جای خالی متون داده شده انتخاب کنید.

**8- one can ..... between gravel and sand by visual inspection.**

- 1) determine
- 2) resolve
- 3)differentiate
- 4)tolerate

**9- a (n) ..... sees a glass half full, and a (n) ..... sees a glass half empty.**

- a) Hydrologist
- b)pessimist

c) businessman

d) optimist

1) c,d

2) d,b

3) a,c

4) b,d

۱۰- با توجه به مطلب زیر گزینه مناسب را انتخاب کنید.

**Many automobile manufactures are planning to offer GPS in its 1989 models. A GPS receiver will be connected to a computer and digitized map system and will display in a small screen a continuous, detailed, map of the location of the automobile. This will be a very useful tool for traveler to a new location, and to those individuals who have difficulty finding their way. The system will allow a delivery firm to prepare a route map for the driver, increasing the efficiency of the driver and vehicle, and eliminating the, "I got lost", excuse. (how many more distractions can the human driver master?)**

- 1) A GPS receiver combined with a digital mapping system would be a necessary tool for automobile manufactures.
- 2) automobile manufactures also would be involved with GPS and digital mapping.
- 3) in future a GPS receiver, a digital map and a computer will be used as a route map.
- 4) in near future GPS receiver and digital mapping system would be used as an automobile accessory.

پاسخنامه کلیدی سوالات زبان تخصصی - مهندسی عمران (سراسری ۱۳۷۵)

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3-	□	□	□	■
5-	□	■	□	□
7-	■	□	□	□
9-	□	■	□	□

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4-	□	□	□	■
6-	□	□	■	□
8-	□	□	■	□
10-	□	□	■	□

سوالات زبان تخصصی مهندسی

# عمران

سراسری ۱۳۷۶

## **Reading – DESIGN OF BUILDINGS TO RESIST EARTHQUAKES.**

In seismic zone, buildings are designed to resist the earthquake forces that are specified by the building code, the magnitudes of these forces depend on the mass of the building, upon the proportion of the building, upon the type of construction, and upon the functions of the building. These specified forces are intended to provide a strength commensurate with the vibration forces the building will experience during a moderately strong earthquake. In the event of very strong earthquake, it is expected that the building will be overstressed and will be somewhat damaged, but there should be no injury or loss of life. To design a building so as to sustain damage in the event of strong ground shaking is justified by economic considerations. The very strong ground shaking occurs so infrequently than the cost of repairing damage is less than the investment required to provide more earthquake resistance.

For very important structures, the consequences of severe damage or failure may be so great that special precautions are required. Nuclear reactor power plants, large dams, long suspension bridges, and exceptionally tall buildings are examples of such special structures. Such structures are not designed according to ordinary building code requirements but are given special consideration. Their potential earthquake vibrations are analyzed, and the maximum stress and displacements produced by earthquake ground motions are

determined by means of digital computers. They accordingly are given more earthquake resistance than ordinary buildings. For example, in the world, nuclear reactor power plants are designed to resist the strongest expected ground shaking without being overstressed.

Buildings are sometimes damaged during earthquakes because of failure of the ground upon which the building is founded. The passage of seismic waves causes the ground upon which the building is founded. The passage of seismic waves causes the ground to vibrate, and the associated stresses and strains may produce a failure of the ground itself. In Alaska in 1964, this took the form of large landslides that destroyed many buildings.

In the city of Niigata in Japan, a different type of soil failure was produced by the earthquake of June, 1964. This seacoast city was built on an alluvial plane of saturated sandy soil. During the earthquake, the stresses produced by the seismic waves caused the sand grains to shift slightly relative to each other and to become more closely packed. When this happened, the weight of the superposed soil and buildings was temporarily supported by the water that filled the spaces between the sand grains and, in effect, for a few minutes the ground. Some of the buildings sank as much as one meter, and many buildings tilted like the Leaning Tower of Pisa and one six-story building rolled over completely without being otherwise damaged.

In I.R. of Iran, it is now common to build large dams of earth; for

example in Khuzestan, the new KARKHEH dam has a height of 127 meters. An earth structure such as this must be analyzed with great care and must be designed to withstand the vibratory stresses and strains produced by earthquakes. At present, there is a great interest in the world, in studying the earthquake behavior of soils and earth structures.

**A) According to the reading, determine the best choice in the following sentences.**

**1- in seismic zone, buildings are designed to .....**

- 1) have mass and proportions which will not be affected by earthquakes.
- 2) meet certain economic criteria only.
- 3) provide a strength commensurate with any forces they will experience.
- 4) suffer damage during a very strong earthquake.

**2- certain special structures are .....**

- 1) analyzed during earthquakes to discover their vibration.
- 2) built to higher specifications than those of the normal building code.
- 3) determined by the use of digital computers.
- 4) designed to resist all possible ground shaking.

**3- in the niigata earthquake of 1964 damage was caused by .....**

- 1) failure of construction techniques.
- 2) changes in the soil: water ration.
- 3) building rolling over
- 4) the weigh of superposed soil and buildings.

**4- soil failure may take the form of.....**

- 1) underground collapse
- 2) landslides
- 3) both of these (1&2)
- 4) neither of these (1&2)

**5- in designing structures like the karkheh dam, the most important factor is .....**

- 1) height
- 2) mass
- 3) seismic influences on soil structures.
- 4) vibratory stresses produced by earthquakes.

**B) replace the underlined parts with synonymous expressions from the reading:**

**6- during strong earthquakes, buildings may be damaged to some extent.**

- |               |               |
|---------------|---------------|
| 1) some what  | 2) some times |
| 3) other wise | 4) investment |

**7- for certain structures, the results of earthquake damage may be very serious.**

- |                 |            |
|-----------------|------------|
| 1) consequences | 2)failures |
| 3) requirements | 4) strong  |

**8- some building are designed to withstand very strong earthquakes.**

- |            |           |
|------------|-----------|
| 1) produce | 2)resist  |
| 3) shift   | 4)support |

**9- different types of soil failure can be caused by earthquakes.**

- 1) specified
- 3) produced

- 2) required
- 4) expected

**10- it is now usual for large dams to be built of earth.**

- 1) common
- 3) ordinary

- 2) event
- 4) sustain

پاسخنامه کلیدی سوالات زبان تخصصی - مهندسی عمران (سراسری ۱۳۷۶)

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سوالات زبان تخصصی مهندسی

# عمران

سراسری ۱۳۷۷

The movement of water in a cycle, from the oceans to the atmosphere, to the land, and then back to the sea is called the hydrologic cycle. They interact with the atmosphere to maintain an almost constant average value of water vapor in the atmosphere. Without the balancing effect of the oceans, whole continents could be totally dry at sometimes and completely flooded at others.

**1- the atmospheres maintains an almost constant average value of water vapor because of .....**

- 1) the winter and summer temperature difference.
- 2) the heat it receives from the oceans.
- 3) its interaction with the oceans
- 4) its balancing effect

**2-in line 3, “they” refers to .....**

- |             |                         |
|-------------|-------------------------|
| 1)cycles    | 2)oceans                |
| 3)balancing | 4)atmosphere and oceans |

**3- the hydrologic cycle is basically the movement of .....**

- 1)atmosphere from the sea to the land
- 2) atmosphere from the continents to the oceans
- 3)water from the continents to the sea
- 4)water from the sea to the atmosphere, to the land, and back to the sea.

**4- in line 4, “value” means.**

- |         |          |         |          |
|---------|----------|---------|----------|
| 1) cost | 2)amount | 3)worth | 4)weight |
|---------|----------|---------|----------|

**5- in line 6 “others” refers to: .....**

- 1)times
- 3)oceans

- 2)continents
- 4)effects

۶. برای محل خالی متن انگلیسی زیر، مناسب ترین کلمه از چهار گزینه داده شده در زیر را انتخاب کنید.

**In B.S. 882: 1965 the division into zones is based primarily on the percentage passing the 600 m(no. 25) B.S sieve, as shown by the values in table 3.23 the main reason for this is that a large ..... of sands divide themselves naturally at just that size, the grading above and below being approximately uniform. Furthermore, the content of particles finer than the 600 m (no.25) sieve has a considerable influence on the workability of the mix, and provides a fairly reliable index of the overall specific surface of the sand.**

- 1) value
- 3)specimen

- 2)particle
- 4)number

**7- if a rectangular plate is simply supported on all edges, which one of the following descriptions most closely depicts the condition of the edges of the plate.**

- 1) the edges of the plate are built into walls.
- 2) the edges of the plate are sitting on four columns.
- 3) the edges of the plate are sitting on walls.
- 4) the edges of the plate are not supported in a complicated way.

**8-for a homogeneous anisotropic ally elastic solid, which one of the following statements is true?**

- 1) the material properties are the same at every point, but different in each direction at a point.

- 2) the material properties are the same at every point and in every direction a point.
- 3) the material properties are different at every point, but the same in every direction at a point.
- 4) the material properties are different at every point and in every direction at a point.

**9- a property of a soil which decides the angle at which its free slope will stand in cut of fill and which therefore decides its stability is called:**

- |                      |                 |
|----------------------|-----------------|
| 1) internal friction | 2) irrigation   |
| 3) insulation        | 4) infiltration |

**10- a block to which a tension member is tied and is of any size, from a few cm square in a prestressed concrete beam to several meters for the cables of a suspension bridge is called:**

- |                          |                 |
|--------------------------|-----------------|
| 1) aggregates            | 2) an anchorage |
| 3) an articulated dumper | 4) an abrasion  |

پاسخنامه کلیدی سوالات زبان تخصصی - مهندسی عمران (سراسری ۱۳۷۷)

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سوالات زبان تخصصی مهندسی

# عمران

سراسری ۱۳۷۸

## **READING A: THE MEASUREMENT OF EARTHQUAKES**

It is of great engineering importance to know just how the ground moves during an earthquake. For this reason, there is a network of strong motion seismographs in the western Japan whose function is to record potentially destructive ground motion. Approximately 200 instruments are in the network and they provide information used by engineers to develop earthquake resistant design. There are also seismographs operated by seismologists, but these instruments are so sensitive that they go off scale if the ground shaking is strong enough to be felt. Hence, they are not of practical use. The engineering seismograph will record the true acceleration of the ground and is capable of recording from 1 to 100 percent of the acceleration of gravity. As it is usually a long time between earthquakes the instrument is inoperative until the ground moves with an acceleration of 1 percent of gravity and then the instrument begins to record.

When the ground shaking stops the instrument shuts off and is ready for the next earthquake. The instruments are stationed near faults where large earthquakes are expected, and they also are stationed in cities that are likely to be shaken. Some of the instruments are located on the ground to record its motion, and others are located in the upper parts of buildings to record how they vibrate during the earthquake. In the city of Tokyo all new building code to have three accelerographs, one in the basement to record the ground shaking one at the top and one at mid height to record building motions. The information provided by these instruments will enable the safety and

economy of construction to be evaluated and will provide valuable data for designing building to resist earthquakes with minimal damage. Similar instruments have also been installed on important dams, bridges and nuclear reactors.

ccA ground acceleration record obtained during a strong earthquake has a very characteristic appearance. The acceleration curve oscillates back and forth 5 to 20 times per second. During very strong shaking the maximum ground acceleration will be in the range of 25 to 50 percent of gravity and the duration of strong shaking may be from 20 to 40 seconds. The largest acceleration ever recorded was 50 percent of gravity.

Special analyses are made of earthquake records to study the effect that such ground motion would have on buildings. So called response spectra and fourier spectra are calculated from the accelerograms to determine the strength of the various frequency components in the ground motion. It is found that over the range of  $1/5$  to 3 cycles per second the strength of the frequency components is approximately constant. Above and below this range the strength diminishes. This means that a building whose natural frequency of vibration by an earthquake. In the upper parts of buildings, the vibratory motion may be severe that persons have difficulty standing and bookcases and filing cabinets may fall over. The amplitude of the

building vibration depends upon the height of the building. Tall structures will vibrate with a greater amplitude than will low structures. For example the top of a 50. story building will vibrate back and forth approximately one meter during strong shaking. Although this displacement is large, the natural period of vibration is long and therefore the motion is very slow. For example in the japan a 10 storey building will have a period of vibration of about 5 seconds. There fore persons on the top of a 50. story building will be in more danger of becoming seasick than of being injured by the violence of the motion.

**1- with reference to the reading A choose the true statement.**

- 1) some seismographs are not useful to engineers because they are not sensitive enough.
- 2)high buildings in all major cities are required to have three accelerographs.
- 3) the acceleration and duration of shaking became greater at increasing distance from the epicenter.
- 4) not all instruments are used to measure ground movement.

**2- with reference to the reading a choose the false statement.**

- 1) seismologists are interested in measuring ground movements which begin at 1 % of the acceleration of gravity.
- 2)Earthquakes whose origin is deep in the earth have a longer duration than those originating at a shallow depth.
- 3) a building with a frequency of vibration of 2 cycles per second will

probably be more affected by an earthquake than buildings with frequencies of 5 cycles per second

4) a seismograph used by engineer does not work at accelerations below 1 percent of gravity.

*in the 2 following question replace the underlined words with synonymous expressions from the reading A:*

**3- acceleration is lessened as the distance from the epicenter increases.**

1) attenuated

2) inkured

3) evaluated

4) originated

**4- above 3 cycles per second the strength of the frequency components grows less.**

1) determines

2) shuts off

3) diminishes

4) originated

**5-complete the following paragraph by choosing one word in the blank:**

**Because a knowledge of how the ground moves in an earthquake is important for engineers a network of about 200 instruments has been set up in earthquake areas. These instruments are designed to record the true acceleration of the ground and operate on a scale from one to one hundred percent of the acceleration of the ground and operate on a scale from one to one hundred percent of the acceleration of gravity. The instruments are located not only at ground level but also at mid height and at the top of building.**

1) epicenter

2) range

3) scale

4) amplitude

## **READING B: AIRPORT DESIGN**

**Passenger terminal building concept** . The passenger terminal building is a point in the terminal area . it has a key function around which all the other supporting functions must be planned.

Terminal buildings vary in size and arrangement , depending principally on the volume of traffic to be handled. The following text describes briefly the different arrangements and the factors to be considered in making a choice.

**Centralized and unit terminal. basically** , There are two possible approaches to the arrangement of the terminal buildings. In a one building. Where traffic volumes are very high (as at Tokyo international airport), each airline may have its own separate terminal building. Where traffic volumes are very high (as at Tokyo international airport) each airline may have its own separate terminal building, this is referred to as the unit terminal concept. These two concepts can be combined in various degrees, thus at Tokyo international airport there is a centralized terminal combining the activities of all foreign carriers but the domestic carriers have their own terminal building.

A single centralized terminal building has many advantages it represents a reasonably compact operation without the problems of transferring passengers and baggage from one terminal building to another thus it is important to plan a terminal building so that it can be readily expanded as traffic grows.

**Number of Levels of Operation in a terminal building.**

The Decision as to whether the design of the terminal building should incorporate one two or three levels for processing passengers and baggage is influenced primarily by the volume of traffic.

For small volumes of traffic, the one level operation is normally much more economical than the other. The processing of passengers and baggage takes place at the level of the apron and the entire layout is quite simple.

**In the 5 following questions choose the item in each question which according to the reading B, is not true.**

- 1) the design of the passenger terminal building is the most important factor in planning the terminal area
- 2) airport design depends on the fact that the passenger terminal has a key function.
- 3) Support functions cannot be planned without taking the passenger terminal into account.
- 4) The number of passengers affects the type of terminal building chosen.

**7-**

- 1) centralized and unti terminals are basically incompatible.
- 2)with a low volume of traffic, more than one terminal is necessary.
- 3)the reading does not state that all international flights at Tokyo airport are processed at the same terminal building.

**8- two level operations**

- 1)are more expensive to run than one level operations.
- 2) have access fingers at ground level.
- 3) ensure a smooth flow of passengers and baggage.
- 4) are important for airports with a high volume of traffic.

**9-**

- 1) centralized terminals do not spread their activities over a wide area.
- 2) unit terminals may involve moving passengers from one terminal to another.
- 3) the reading does not give many of the advantages of centralized terminals.
- 4) terminal buildings must be designed to a fixed plan.

### **10- the design of terminal buildings**

- 1) is influenced only by the number of passengers.
- 2) may include up to three floors.
- 3) is determined partly by economic considerations.
- 4) takes the volume of traffic and cost factors into consideration.

### **READING C: LIFTING CAPACITY**

Every crane has a certain lifting capacity, ranging from a few tons to many hundred of tons, depending on the type of crane and the purpose for which it is intended. In jib cranes the capacity usually varies with the radius which depends on the slope of the jib. When the latter is raised to a steep slope the radius. The distance from the load to the center of the king pin. Is small and the crane can then carry an heavier load than when the jib is lowered to its farthest extent and the radius is large. This difference in lifting capacity different radii is determined by the stability of the crane i.e. its safety against overturning. The weight of the load (suspended from the jib) multiplied by the radius constitutes the overturning moment. The latter is counterbalanced by a heavy counterweight which is located a certain distance rearward from the king pin and develops a counterbalancing moment. This counterweight may be mounted on

the substructure or on a special secondary jib projecting to the rear and is sometimes movable so that the counterbalancing moment can be varied within certain limits. The overturning moment must always be smaller than the counterbalancing moment, and for this reason only certain maximum load is permissible at a certain radius.

Besides hooks a variety of lofting and handling devices can attached to cranes. An important device for picking up bulk materials such as coal or etc. is the grab. It consists of two shells which can open and close to pick up the load and subsequently discharge it these movement are produced by the actuation of the holding rope and the closing rope.

***With referring to the reading C in the 5 in the 5 flowing questions choose the best choice:***

**11. the lifting capacity of a bridge crane depends on:**

- 1)the radius
- 2)the weight of the load
- 3)the distance to the center of the king pin
- 4)none of these

**12- the higher the angle of the jip above horizontal,**

- 1)the greater the distance
- 2)the longer the jib
- 3)the heavier the load
- 4)the longer the redius

**13-the counterweight is always:**

- 1-adjustable
- 2)determined by weight x resius
- 3) in excess of the overturning moment
- 4) mounted on the substructure

**14- maximum loads at a certain radius are:**

- 1) fixed
- 2) variable
- 3) equal to the counterweight
- 4) greater than the overturning moment

**15-the reading implies that grabs would be used for unloading:**

- |                |                  |
|----------------|------------------|
| 1) metal bars  | 2) sand          |
| 3) automobiles | 4) packing cases |

پاسخنامه کلیدی سوالات زبان تخصصی - مهندسی عمران (سراسری ۱۳۷۸)

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سوالات زبان تخصصی مهندسی

# عمران

سراسری ۱۳۷۹

## **Reading A :**

Over the past twenty years, several hundred articles on analysis and behavior of semi rigid steel frames have appeared in the technical literature . this body of knowledge indicates that semi rigid or partially restrained frames (PR) possess many economical , construction , and technical advantages over rigid frames and frame shear wall systems.

However , it is safe to say that only a some percentage of the literature on this subject addresses design issues directly . the result is that even though semi rigid or partial restraint (PR) connection behavior is recognized and allowed by most specifications very few structure engineers have made explicit use of them in design. In general these few designers possess what are considered advanced analysis and design tools, consisting mostly of computer programs developed in house. This situation is beginning to change , however because advanced analysis techniques are beginning to be widely discussed and disseminated and public domain and commercial programs incorporation them will soon be available.

This paper describes the development of a particular type of semi rigid construction which the author and his co workers have developed over the past 10 years . the paper is divided into three main parts. The first part presents some important considerations on semi rigid behavior , which apply irrespective of the connection type being used. They are included here to illustrate the differences between simple, fully rigid, and partially rigid structure and to highlight

their impact on limit states. The second part of the paper deals with the design of semi rigid structures utilizing the composite action of the floor system. Traditionally the additional strength and stiffness provided by the floor system is ignored in the analysis of steel buildings , except to idealized it as the rigid diaphragm for lateral loads. This part of the paper intends to show why it is economical, structurally efficient , and safe to utilize the additional strength and stiffness of the floor slab in design . the last part of the paper deals with detailing issues related to the seismic performance of semi rigid composite systems.

**Based on above passage , choose the best answer for following questions:**

**1 – according to the article, the general behavior of semi rigid connections**

- 1) is discussed in the first part of paper
- 2) is used in design offices
- 3) depends on the floor system
- 4) has not been discussed in the literature , as should be.

**2 – the above article**

- 1) is introduction of a book on composite semi – rigid construction.
- 2) recommends to utilize the effect of the floor slab in design.
- 3) is part of the paper on seismic performance of semi – rigid connections .
- 4) is part of a paper on advanced analysis & design tools.

**3 – the floor slab system**

- 1) is part of every semi – rigid connections.
- 2) acts as a rigid diaphragm against earthquake load.

- 3) has negligible effect on safety and strength of steel buildings.
- 4) is a marginal issue in the paper.

#### **4 – the article intends to describe**

- 1) the limits of specification on semi – rigid connection applications.
- 2) the last 20 years of research on the subject.
- 3) a special semi – rigid construction developed by the authors.
- 4) the advances over the last 10 years on particular type of PR connection.

#### **5 – the best synonym for to disseminate is:**

- 1) to separate
- 2) to examine
- 3) to simulate
- 4) to spread widely

### **Reading B: END BEARINGS FOR BRIDGES**

In general bearings are classified as being either of the expansion or the fixed types, as the names imply, expansion bearings are those which supposedly allow the bridge to expand or contract freely, and fixed bearings are those which are fixed against longitudinal movement. The term “fixed Bearing” is rather misleading because it does not necessarily mean that the bearing is fixed against rotation, as commonly intended in structural analysis. It means instead that the position of bearing is fixed. Expansion bearing (1) allow the bridge ends to move back and forth with expansion and contraction caused by changes in temperature: (2) allow the bridge move freely at its ends with changes in the length of the bridge caused by the live loads and (3) keep horizontal loads from being applied to

some of the bridge supports where such forces may be undesirable. Expansion bearings may be of the sliding type or of the roller or rocker types depending on the spans and loads.

For short spans, a simple bearing plate can be used such as the one shown in ffg.1 to the right for steel stringer. In this arrangement the beam end is allowed to slide on a smooth metal plate.

The expansion plates may be made from bronze with the sliding surfaces planed and polished, or from some copper alloy with smooth, true surfaces.

These kinds of bearing plates are not satisfactory for long spans where a large part of the reaction is caused by the live load. Downward deflections of the beam or truss cause the inside pressure on the plate to become excessive, with the result that the masonry support may be injured. For spans greater than approximately 50 80 ft. it is necessary to use some type of support involving sliding plates rockers or segmental rollers. A sliding plate type of expansion bearing wich can be used for spans of up to 100 ft. is shown in fig 2 at the right.

Among the types of fixed bearings that may be used are hinges curved bearing plates or some type of pin arrangement. A hinge type of connection should allow end rotation.

Of the members, such as is provided by the pin in Fig.3 when heavy loads are involved, it may be necessary to provide the hinge with some type of lubrication system which will permit it to rotate freely and not wear quickly. Actually fixed bearings need to be designed for vertical and longitudinal forces: but practically the vertical forces are so much larger than the longitudinal ones that if the bearings are designed for the vertical forces they will surely be strong enough to take the others.

**6- according to the reading B which expression is true?**

- 1) fixed bearings prevent all longitudinal movement.
- 2) changes in the length of bridges are caused only by temperature variations.
- 3) bridges with long spans have weak masonry supports.
- 4) bearing plates are planed to reduce friction.

**7- according to the reading B, which expression is false?**

- 1) the type of expansion bearing used depends on the length of the bridge.
- 2) expansion bearings do not need to be designed with consideration for both longitudinal and vertical forces.
- 3) sliding plate type bearings are not suitable for all bridge lengths.
- 4) bearing plates are not suitable for bridges with live loads.

**8- based on the reading B, suggest bearing type for a 150 ft span road bridge used regular by heavy traffic.**

- |           |                  |
|-----------|------------------|
| 1) rocker | 2) Sliding plate |
| 3) hinge  | 4) Fixed         |

***Please read the Reading C and answer the 4 following question.***

**Reading C:**

The profession of engineering takes the knowledge of mathematics and natural sciences gained through study, experience and practice and applies this knowledge with judgment to develop ways to utilize the materials and forces of nature for the benefit of all humans.

Process is similar to the scientific method with respect to a step. By . step routine, but it differs in goals and end results the design process encompasses the following activities, all of which must be completed.

1. Identification of a need
2. problem definition
3. search
4. constraints
5. criteria
6. alternative solutions
7. analysis
8. decision
9. specification
10. communication

in the majority of cases, designs are not accomplished by an engineer simply completing the 10 steps shown in the order given. As the designer proceeds through each step new information may be discovered and new objectives may be specified for the design.

**9- what does “possess” mean in the 2nd paragraph?**

- |             |             |
|-------------|-------------|
| 1) Have     | 2) Play     |
| 3) postpone | 4) practice |

**10- what does “encompass” mean in the 3rd paragraph?**

- 1)remind
- 2)protect
- 3)Explain
- 4)cover

**11- the ..... of an engineering effort or design is usually a device or a structure which satisfies a need.**

- 1)Application
- 2)Objective
- 3)Process
- 4)Routine

**12- under what circumstances the designer should possibly modify and reduce some aspects of the problem?**

- 1)when it is difficult to justify the project within the budget limits.
- 2)when it is difficult to define the problem.
- 3)when it is difficult to analyze the problem.
- 4)when it is difficult to communicate with other designers.

**In the 3 following questions choose the correct answer.**

**13- by ..... a member its load carrying capacity increases.**

- 1)stiffing
- 2)stiffnering
- 3)stiffnessing
- 4)sriffening

**14-a structure with redundant members is .....**

- 1) stable
- 2)stable and indeterminate
- 3)indeterminate
- 4)determinate

**15- ..... of concrete is obtained using a slump test.**

- 1) Durability
- 2)humidity
- 3)workability
- 4)rigidity

پاسخنامه کلیدی سوالات زبان تخصصی - مهندسی عمران (سراسری ۱۳۷۹)

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سوالات زبان تخصصی مهندسی

# عمران

سراسری ۱۳۸۰

**Read the reading A and answer the 4 following questions .**  
**Reading A :**

The principal aims of earthquake-resistant design should be :

(a) *To prevent total collapse of structures* . In every major earthquake there have been examples of lives lost because of collapse of buildings that lacked alternative load paths after failure of principal members . Brittle forms of construction are particularly ..... for sudden and total collapse . It should be possible to design buildings with sufficient ductility and redundancy so that people may be evacuated without loss of life gross distortions of buildings necessitate total reconstruction eventually.

(b) *To control damage to a repairable extent* .The economic consequences of an earthquake are usually very severe and therefore there is a strong incentive to implement methods of design that enable a structure to absorb the energy of an earthquake with minimal costs of subsequent repair . Furthermore, buildings and structure of strategic importance , such as hospitals , power generating facilities , telecommunications buildings , dams and bridges , should be capable of surviving a large earthquake and still keep .....

**1-The best synonym for redundancy in the first paragraph is :**

- |                |                     |
|----------------|---------------------|
| 1) brutality   | 2) superfluity      |
| 3) perspicuity | 4) impermissibility |

**2- Choose the best word for the blank in the first paragraph.**

- |               |                 |
|---------------|-----------------|
| 1) patulous   | 2) notorious    |
| 3) fastidious | 4) rambunctious |

**3-The best synonym for incentive in the second paragraph is :**

- 1) motive
- 3) mechanism

**4- choose the best word for the blank in the second paragraph .**

- 1) function
- 3)functional

**Read the reading B and answer the 4 following reading B: SOIL STABILIZATION**

Motorways are usually made of reinforced concrete about 20 to 25 cm thick , placed on a granular sub base or base course , which in turn is placed on a well compacted earth sub grade . sometimes rock which has been excavated can be crushed and used for the base course ; at other times ,a lean concrete base course is used . The base course can be created by soil stabilization ,i.e. increasing the bearing strength of the existing subsoil , rather than by replacing with another material . This process consists of mixing a percentage of stabilizing agent which may be cement , bitumen or other substances into the soil .

The engineer has classified soils into four principal groups according to particle size : gravel , comprising particles from 60 mm down to 2mm ; sand , comprising particles from 2 mm to 0.06 mm; silt , comprising particles from 0.06 mm to 0.002 mm in size ; and clay , having particles less than 0.002 mm in size . soils rarely consist of just one of these groups ; usually there is a mixture resulting in compound soils , such as sandy silt or sandy clay. The engineer is more concerned with the grading . A soil may be well graded ,

uniformly graded or poorly graded . A well graded soil has a particle size distribution which includes a wide range of sizes without an excess or deficiency of any size. A uniformly graded soil is one having a high percentage of one certain size of particle and a low percentage of other sizes. A poorly graded soil is one containing an excess of some and a deficiency in other . It is a poorly graded soil that exhibits weakness . This is because the voids between the particles existing in excess are not filled by the next smaller size particles . the result is a soil containing more water and air than is desirable and which will not compact . the stabilizing agent has little effect on a poorly graded soil unless material having the missing particle sizes is added and the whole mixture thoroughly compacted.

5- According to the reading B and with reference to the table below, which soil is well graded ?

**Particle size in millimetres**

	<b>60-2</b>	<b>2-0.06</b>	<b>0.06-0.002</b>	<b>Less than 0.002</b>
<b>Soil A</b>	<b>%6</b>	<b>%7</b>	<b>%8</b>	<b>%79</b>
<b>Soil B</b>	<b>%25</b>	<b>%28</b>	<b>%23</b>	<b>%24</b>
<b>Soil C</b>	<b>%10</b>	<b>%45</b>	<b>%5</b>	<b>%40</b>

1) soil A

2) soil B

3) soil C

4) soil A,B

**6- According to the reading B, the four following statements are all true . But choose the one which you consider to be most important ?**

- 1) Crushed rock can be used for the base course.
- 2) Cement and bitumen can act as stabilizing agents.
- 3) A well –graded soil does not have an excess of any particular particle size .
- 4) Stabilizing agents have little effect on poorly graded soil unless material having the missing particle sizes is added

**7-According to the reading B, which expression is true ?**

- 1) Soils usually consist of one principal soil group.
- 2) Stabilizing agents have considerable effect on a poorly graded soil .
- 3) Base courses can be created by increasing the bearing strength of the existing subsoil.
- 4) The engineer is less concerned with the grading than with the soil group .

**8- According to the reading B, which expression is false ?**

- 1) Soils rarely consist of only one size group.
- 2) The base course can be created by soil stabilizing .
- 3) The grading of a soil is more important to an engineer than particle size .
- 4) A poorly graded soil includes a wide range of particle sizes without an excess or deficiency of any one size.

**Read the Reading C and answer the 3 following questions.**

## Reading C :

**Surge tanks :** it is uneconomical to design long pipelines for pressures created by water hammer or to operate a valve slowly enough to reduce these pressures. Usually a surge tank is installed close to valves at the end of long conduits . A surge tank is tank containing water connected to the conduit ; the water column , in effect , floats on the line

when a valve is suddenly closed , the water column in the line rushes into the surge tank .The water level in the tank rises until the increased pressure in the surge tank overcomes the momentum of the water .when a valve is suddenly closed , the water column in the line rushes into the surge tank . the water level in the tank rises until the increased pressure in the surge tank overcomes the momentum of the water . when a valve is suddenly opened , the surge tank supplies water to the line when the pressure drops . the section of the pipe between the surge tank and the valve must still be designed for the water hammer ; however , the closure time to reduce the pressures for this section will be only a fraction of the time required without the surge tank.

Although a surge tank is one of the most commonly used devices to prevent water hammer , it is by no means the only device . various types of relief valves and air chambers are widely used on small diameter lines , where the pressure of water hammer may be relieved by the release of a relative small quantity of water .

**Based on Reading C** , choose the one which best completes each sentence in the 3 following questions.

### **9- the objective for usage of surge tank is . ....**

- 1) to optimize the cost and design of pipeline
- 2) to increase the water pressure in the pipeline
- 3) to reduce the pressure quickly in long pipeline
- 4) to supply water when the water pressure is not enough

### **10 – To prohibit water hammer ...**

- 1) small quantity of water has to be released
- 2) the surge tank is the only recommended device
- 3) besides surge tank , special types of valves and air chambers are used
- 4) depending on pipeline diameter , various types of relief valves and air chambers are introduced

### **11- water hammer .....**

- 1) needs strong pipeline
- 2) may hit the surge tank and damage it
- 3) helps to increase pressure and supply water easily
- 4) is the result of momentum of water and should be considered the long pipeline design .

**Read the Reading D and answer the 3 following question .**

**Reading D :**

**Storage dams . The dams discussed here are normally used to store water for supplementary irrigation , domestic water supply , recreational purposes , stock ponds , or auxiliary flood control in tributaries of main streams . their operation will rarely require**

continuous attention , except at seasonal . if warranted , there should be an operator`s house with telephone service , at or near the control works of dams.

The stimulation and protection of growth of vegetative cover to retard erosion on the slopes of earth. Fill dams not otherwise protected is an important item of maintenance to which careful attention should be given . this cover is an essential item of banks,as well as beautification of the structure, and may have an important influence on the costof repairs.

Expert advice on suppression of alagae growth in reservoirs should be obtained and followed , and no chemicals should be introduced into a reservoir without competent advice.

Based on reading D , choose the one which best completes each sentences in the 3 flawwing questions:

**12- chemicals . . . . . used in a reservoir . . . . . the algae growth.**

- 1) can be , to stop
- 2) can be,to speed up
- 3) should not be , except for
- 4) should not be,as it damages

**13- the stimulation and protection of growth vegetative cover. . .**

- 1)need careful attention
- 2) may increase the cost of repars

- 3) is an important item of maintenance and cost reduction
- 4) is only desired on the slopes of earth-fill dams not otherwise protected.

**14- what is meant by recreational in the reading:**

- 1)artificial
- 2)Agricultural
- 3) entertainment
- 4)to creat again

**15- in the flawwing paragraph , choose the best word for the blank .**

**Newmark and hall (1973) . they averaged  
The response spectra of a large number  
Of earthquake record,all scaled to a  
Common peak ground acceleration , and,  
Aftersome . . . . . of the curves , produced  
the simplified normalized spectra shown  
in fig. a.THE curves are all drawn for a  
maximum ground accelertation of 1.0 g,  
velocity of 122 cm/s , and displacement  
of 91cm.**

- 1) smoothing
- 2) smoothy
- 3) smooth
- 4) smoothed

پاسخنامه کلیدی سوالات زبان تخصصی - مهندسی عمران (سراسری ۱۳۸۰)

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سوالات زبان تخصصی مهندسی

# عمران

سراسری ۱۳۸۱

**Read the passage I and answer the 6 following questions.**  
**Passage I :**

The effect of earthquake ground shaking is to make buildings vibrate. Low, stiff buildings vibrate with relatively high frequencies of 5 to 10 cycles per second, and tall buildings vibrate with low frequencies of 5 to 10 cycles per second and tall buildings vibrate with low low frequencies. The earthquake induced forces, that a building experiences, depend especially upon the mass of the mass of the building and upon the frequency of vibration. Although a 20 story building may have twice the mass of a 10 story building, its natural frequency will be smaller and, hence, the earthquake forces will be less than twice of those of a 10 story building. This is quite different from the forces by wind storms which will be twice as great for the 20 story building as for a 10 story building of the same width. In other words, for sufficiently tall buildings the wind forces will be greater than the earthquake forces. This leads to the interesting consequence that very tall buildings that have been designed to resist wind forces will also be able to withstand a strong earthquake. Although New York City does not have earthquake design requirements, its skyscrapers will be relatively safe in the event of an earthquake because they have been designed to resist wind forces; however, buildings of 10 stories or less will not be safe.

The most hazardous buildings during an earthquake are those constructed of brittle materials such as brick or stone masonry. These brittle materials are weak in tension and when overstressed during an earthquake will break and collapse. Such brittle materials

of construction were the cause of the high death toll in Agadir, Morocco. In California such buildings are not permitted, but are made of beams and columns, or reinforced concrete. Such properly designed buildings, even when overstressed during earthquake, will not fail and will not be hazardous to the occupants.

**Based on above passage, choose the best answer for the 6 following questions:**

**1-The most dangerous during an earthquake are those made of . . . . .**

- 1) reinforced concrete
- 2) stone and concrete
- 3) brick or stone masonry
- 4) steel beams and columns

**2- the skyscrapers of New York City are relatively safe in the event of an earthquake since they . . . .**

- 1) fail to withstand wind storms
- 2) have earthquake design requirements
- 3) have been designed to resist vibration
- 4) have been designed to resist wind forces

**3. the effect of earthquake ground shaking makes tall buildings vibrate with . . . . .**

- 1) frequencies less than 5 cycles per second
- 2) high frequencies of 10-15 cycles per second
- 3) high frequencies of 5 to 10 cycles per second
- 4) the same frequencies as that of low, stiff buildings

**4- paragraph 2 mainly discusses . . . . .**

- 1) hazardous buildings seen in agadir , morocco
- 2) safety of buildings in relation to the design and material of construction
- 3) desting of occupants when buildings are overstressed during an earthquake
- 4) buildings in California which are made of steel beams or reinforced concrete

**5) the best synonym for // hazard //is . . . . .**

- 1)toll                      2)weak                      3)venture                      4)brittle

**6)the word toll is closest in meating to wich of the following?**

- 1)cost in life                      2)grievous price
- 3) charge for health                      4)death of the bishop

Passage II :

Brazilian tower could become the world`s tallest building

A new skyscraper in sao Paulo , brazil , that could be the tallest and largest building in the world when it is completed within planners hope three years . has been designed by minoru yamasaky associates of Rochester hills Michigan . the pyramid . shaped structure would stand approximately 494 m tall and occupy 1.3 million sq m of space .each side of the towers squary base will measure 244 m.

Henry j. Guthard the senior vice president of minoru yamasaky says the maharishi tower will rely on four composity magacolumns for the main vertical support . the magacolumns square, high strength

steel shells filled with concrete . will tilt toward the center as the building rises about two thirds of the way up , they will be tied together with a series of horizontal framing diaphragms and floor slabs . similar connections will be made at other points as the building rises. The columns will meet at the top.

Where the magacolumns join together, it become a unified structure guthard says. This system will transfer horizontal loads to the columns and impart stability so the building can withstand winds and seismic loads, he says. Guthard could not say how many stories the building will have or how tall the stories will be.

The structure will house a hotel, a convention center, retail establishments , high tech businesses, and apartments and condominiums. Guthard estimates 50.000 people will live or work in the building , and the conection center and business could pull in as many as 30.000 visitors a day . an extensive people mover system will transfer people between parking facilities and mass transit outside and the buildings interior, as move people around within the city to support a structure that can take advantage of the city and country`s economic recovery, guthard says.

The approximately \$1.6 billion that will be needed to fund the multiuse facility is being raised by the brasilinvest group, of sao Paulo, and the maharishi global development fund, of new york city.

Minoru Yamasaki has designed a similar tower the India tower Planned got jabalpur , India that at 677 m would be taller than the maharishi tower . but guthard says the brazilian structure is " on the fast track " and is likely to be completed first .

**Based on above passage , choose the best answer for the 5 following questions:**

**7- the megacolumns are . . . . .**

- 1) high strength hollow steel columns filled concrete
- 2) high strength concrete with steel shields
- 3) square concrete columns
- 4) tilted columns

**8) the horizontal framing diaphragms are used to.....**

- 1) support floor slabs
- 2) tilt the columns toward the center of the building
- 3) provide a working platform for the people mover
- 4) brace the columns together for additional stability against horizontal loading.

**9) the people mover system will.....**

- 1) have the same function as the elevator
- 2) transfer people between parking and the main transit system
- 3) transfer people horizontally on the horizontal diaphragm system
- 4) handle movement of people within the structure and provides a connection to the main transit system.

**10 – when it is completed , the maharishi tower will .....**

- 1) be locate in brazil's third – largest city
- 2) accommodate at least 80,000 people a day
- 3) be the tallest and largest building in the world
- 4) be the most earth quake – resistant building in the world

**11- designers believe that the maharishi tower will be completed before the India tower because.....**

- 1) its investors plan to proceed more rapidly with construction than do the India tower investors
- 2) it is located on a high – speed rail line that will facilitate movement of construction material
- 3) there is a higher demand for the residential and commercial space in sao paulo than there is in jabalpur
- 4) the people movers system will transport construction workers between the work site and site and their homes more rapidly

**Read the passage III and answer the 4 following questions**

**Passage III:**

**Pedestrian bridge commemorates town's sailing heritage**

Modeled after the hull, rigging and masts of a sailing ship, the turkey creek pedestrian bridge in la sale, Ontario , was designed to honor the town's eponym, the French explorer Robert la sale (1643 . 87) the cable stayed footbridge, which is 40 m long and has a span of 30 m , was a community supported project

Designed and built with donated materials by volunteers from local high schools , colleges and engineering firms in response to the increasing number of pedestrian roadway accidents.

After meeting periodically for several months, volunteers came up with the final design; a wooden structure with a deck consisting of 2 m wide by 2.4 m long sections and two 9.8 m masts with a bearing capacity of 45.360 kg each . the masts are each supported by 18.140 kg of concrete and employ about 1km of galvanized steel cables . in accordance with an old shipbuilding tradition the volunteers placed pennies under each mast for good luck .

Because a crane was not used in the construction the designers built each half of the deck on opposite sides of the creek parallel to the shore .they then rotated the halves over the creek and a 5m center span was set in place using a system of ropes and pulleys in the months since its completion this past spring the \$130.000(us\$88.000) footbridge has quickly become a recognizable and will .used structure in the community . " it "s become something of a land mark " notes norm becker an engineer who played a major role in the planning and development of the project

## **12) the footbridge.....**

- 1) has a span of 40 m .
- 2) is located in a small town in turkey .
- 3) was developed and constructed by members of the local community
- 4) was built of materials salvaged from an old sailing ship

## **13) the masts of a bridge are.....**

- 1) made of concrete
- 2) the beams that span the valley
- 3) capable of carrying at least 18,140kg
- 4) the vertical poles at each end of the bridge

**14) the deck was primarily constructed .....**

- 1) in one section in place over the bridge
- 2) in sections on the shore and then turned
- 3) separately and put in place using a crane
- 4) from 9.8m long wooden planks from the original sailing ship

**15) the word " eponym " means.....**

- 1) " turkey creek " in French
- 2) a person for whom a place is named
- 3) the wealthiest member of a community
- 4) the person who contributes the most to a project

پاسخنامه کلیدی سوالات زبان تخصصی - مهندسی عمران (سراسری ۱۳۸۱)

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سوالات زبان تخصصی مهندسی

# عمران

سراسری ۱۳۸۲

## Civil Engineering Technical English Exam

### PASSAGE A:

For large or complex structures static methods of seismic analysis are not accurate enough and many authorities demand dynamic analyses for certain types and size of structure. Various methods of differing complexity have been developed for the dynamic seismic analyses for certain types and size of structure with more than three degrees of freedom such analyses are carried out by matrix methods on computers.

The three main techniques currently out by matrix methods on computers.

The three main techniques currently used for dynamic analysis are;

- (i) direct integration of the equations of motion by step – by-step procedures;
- (ii) normal mode analysis;
- (iii) response spectrum techniques.

Direct integration provides the most powerful and informative analysis for any given earthquake motion. A time dependent forcing function ( earthquake accelerogram) is applied and the corresponding response – history of the structure during the earthquake is computed.

That is the moment and force diagrams at each of a series of prescribed intervals throughout the applied motion can be found. Computer programs have been written for both linear elastic and nonlinear inelastic material behaviour, using step-by-step integration procedures. Linear behaviour is seldom analysed by direct integration,

unless mode coupling is involved, as normal mode techniques are easier, cheaper, and nearly as accurate. Three-dimensional non-linear analyses have been devised which can take the three orthogonal accelerogram components from a given earthquake, and apply them simultaneously to the structure. In principle, this is the most complete dynamic analysis technique so far devised and is unfortunately correspondingly expensive to carry out.

Normal mode analysis is a more limited technique than direct integration, as it depends on artificially separating the normal modes of vibration and combining the forces and displacements associated with a chosen number of them by superposition. As with direct integration techniques, actual earth quake accelerograms can be applied to the structure and a stress history determined, but because of the use of super position the techniques is limited to liner material behaviour. although model analysis can provide any desired order of accuracy for linear behaviour by incorporating all the model responses, same approximation is usually made be using only the first few modes on order to save computation time. Problems are encountered in dialing with systems where the modes cannot be validly separated, i.e. where mode coupling occurs.

The most serious shortcoming of linear analyses is that they do not accurately indicate all the members requiring maximum ductility. in other words the pattern of highest elastic stresses is not necessarily the same as the pattern of plastic deformation in an earthquake structure. for important structure in zones of high seismic risk. Non – linear dynamic analysis is sometimes called for.

The response spectrum technique is really a simplified special case of modal analyses. The modes of vibration are determined in period and shape in the usual way and the maximum response magnitudes corresponding to each mode are found by reference to a response spectrum. An arbitrary rule is then used for superposition of the responses in the various modes. The resultant moments and forces in the structure correspond to the envelopes of maximum values, rather than a set of simultaneously existing values. The response spectrum method has the great virtues of speed and cheapness.

Although this technique is strictly limited to linear analysis because of the use of superposition, simulation of non-linear behaviour has been made using pairs of response spectra, one for deflection and one for accelerations. The expected ductility factor is chosen in advance and the appropriate spectra are used. This is clearly a fairly arbitrary procedure, and is unlikely to be more realistic than the linear response spectrum method.

Another attempt to study non-linear behaviour by spectral techniques is described by Shepherd and McConnell. They conclude that non-linear response spectrum techniques may be best applied only to structures behaving like a single degree of freedom system, such as bridge piers, as the pattern of hinge points in other systems would be too complicated for prediction by this approximate method.

**Read the passage A and answer the 7 following questions.**

**1 – which of the following would be the best title for this passage?**

- 1 ) combination of model responses.
- 2) stochastic response of linear system.
- 3) critique of dynamic methods of seismic analysis.
- 4) response to general dynamic loading : super position methods.

**2 – the passage supports which of the following conclusions?**

- 1) direct integration method is the cheapest method
- 2) the force discrepancy will be taken up by plastic behaviour .
- 3) the response analysis procedures can be formulated in the frequency domain .
- 4) using pairs of response for simulations of non-linear behavior is not more realistic than linear response spectrum method.

**3 – according to the passage what is the main defect in the linear analyses?**

- 1) the linear methods have the great virtues of speed and cheapness.
- 2) some approximation is usually made by using only the first few modes.
- 3) the pattern of highest elastic stresses is
- 4) the linear methods provide the most powerful and informative analysis for any given earthquake motion.

**4 – Which of the following situations prevent us from using Normal mode method?**

- 1) We want to save computation time.
- 2) We have a system with coupling modes.
- 3) We have a large and complex system.

4) We have a structure with more than three degrees of freedom.

**5 – According to the passage, when we use direct integration for linear behaviour?**

- 1) When the structure has coupling modes.
- 2) For any structure with more than three degrees of freedom.
- 3) When the pattern of hinge points is too complicated for predictions.
- 4) It's not necessary to use direct integration method for linear systems.

**6 – What can we do for making simulations of non-linear behaviour?**

- 1) Using coupling modes.
- 2) Using pairs of response spectra.
- 3) Using all modes of the system.
- 4) Using moments and forces correspond to the envelopes of maximum values.

**7 – Non- linear response spectrum techniques may be best applied to:**

- 1) A chimney
- 2) An arch dam
- 3) A suspension bridge
- 4) A tall building with coupling modes.

**PASSAGE B:**

The sloping face and graceful parabolic arch of the Espirito Santo Plaza, a mixed use high rise are likely to make it a well-known feature of the local skyline. But the building is also notable for the strategy its designers employed to cope with floods.

The 35-story tower stands close to the edge of Biscayne Bay. The 70,000 m<sup>2</sup> post-tensioned concrete structure is divided into office, hotel, and residential levels, respectively, from bottom to top, each with a different column layout, says Elias Matar, the project manager for structural engineers L.E.R Associates.

Many high-rises in similar locations are built so that the walls of the ground floor will break away during a flood. The Espirito Santo Plaza, however, is designed to keep floodwaters out, even during a 100-year flood, when the water would be 4.3m above sea level, or 2.3m above the building's ground floor elevation. The curtain wall is reinforced to withstand water pressure on the exterior, much like an aquarium in reverse, says Jae Chang, an architect with K.P.F.

Associates, which designed the building. The window assembly is 50mm thick, or about twice the typical thickness, including a nearly 25mm inner layer comprising two glass panels joined by a clear polycarbonate interlayer for added strength. In addition, the window mullions are reinforced with carbon steel.

The ground floor slab is reinforced and attached to the pile caps to resist upward hydrostatic pressures of up to 25,000 Pa, says Matar. In addition, a concrete wave triple wall about 450mm high will be constructed on the eastern edge of the property to dissipate wave energy during a flood. In this way, Matar says, the owners obtained a flood classification for the building that allowed them to use the ground floor for habitable space.

Flat-plate construction was used for the hotel and residential floors, but slab-and-beam construction was used on the office level to achieve spans of up to 15m. Column transfers occur at the 16<sup>th</sup> and

25<sup>th</sup> floors. On the 23<sup>th</sup> and 24<sup>th</sup> floors, two concrete outrigger walls about 9m high and 700mm thick extend from the building core to the perimeter to provide additional stiffness. Now under construction, the \$ 160-million project is scheduled for completion in the summer of 2003.

**Read the passage B and answer the 4 following questions.**

**8 – A major difference between this building and others built in flood-prone areas is:**

- 1) other high-rises employ break-away walls on the ground floors.
- 2) high-rises are not usually built near bays because of the high risk of flooding.
- 3) post-tensioned concrete structures have not previously been considered suitable for flood areas.
- 4) most such high rises designate the ground floor as living space because it can be more easily repaired after a flood.

**9 – Uplift forces on the building due to flooding are resisted by**

- 1) two concrete outrigger walls.
- 2) a curtain wall reinforced with carbon steel.
- 3) alternating flat-plate with slab-and-beam construction.
- 4) a reinforced ground floor slab attached to the pile caps.

**10 – The article states:**

- 1) more stiffness is obtained through the use of concrete outrigger walls.
- 2) the ground floor of such buildings are not usually considered habitable spaces.

3) column transfer is an effective means of improving the flood resistance of buildings.

4) that the building enjoys sufficient rigidity since it has employed flat-plate construction for upper floors.

**11 – The first line of defense against flooding is:**

1) break-away walls on the ground floor.

2) a concrete wall at edge of the property.

3) flat-plate construction on the hotel and residential floors.

4) windows made of extra glass reinforced with polycarbonate interlayer.

**PASSAGE C**

In essence, construction is combination of organizations, engineering science, studied guesses and calculated risks. From their very nature, construction operations must be performed at the site of the project. Construction is a dynamic, restless, compelling business.

Two basic factors, however, help to stabilize the construction business. In prosperous times, there is immediate and widespread increase in demand for constructor's services from both government and private industry; during periods of recession, Federal and state governments tend to accelerate public-works program to "offset" economic downswings. Another inherent element of stability is the industry's mobility, making it less subject to regional economic slumps.

Construction is essentially a service industry. The construction of a project involves thousands of details and complex, interwoven

relationship among owners, architects, engineers, general governmental bodies and agencies, labor, and others.

Technological advances are resulting in more complex facilities.

Hence, there is increasing necessity for skillful coordination of all construction operations to attain maximum efficiency, speed, and economy. Thus, the professional function of managing and coordinating construction operations and performing the work with his own experienced organization makes the constructor a key figure in the economy.

**Read the passage C and answer the 4 following questions.**

**12 – The best for above passage is .....**

- 1) Stability of industry
- 2) Role of constructors
- 3) Construction Management
- 4) Construction and Economy

**13 – Complex facilities .....**

- 1) are more efficient, economical and speedy
- 2) require skilled project operation management
- 3) are resulting in more technological advances
- 4) stabilize the regional economy and Federal governments.

**14 – The word “offset” in above passage means .....**

- |            |                   |
|------------|-------------------|
| 1) offend  | 3) demolish       |
| 2) grow up | 4) counterbalance |

**15 – During periods of recession .....**

- 1) industry's mobility is more effective
- 2) the constructors are key figures in the economy
- 3) government should stabilize construction project
- 4) public-works programs should be further supported by governments.

پاسخنامه کلیدی سوالات زبان تخصصی - مهندسی عمران (سراسری ۱۳۸۲)

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سوالات زبان تخصصی مهندسی

# عمران

سراسری ۱۳۸۳

**Civil Engineering Technical English Exam**  
**Read the two following passages and answer the corresponding questions.**

**PASSAGE A:**

### **EARTH QUAKE DAMAGE REPORT**

On February 28, 2001, a magnitude 6.8 earthquake struck western Washington state. The epicenter was approximately 18km northeast of Olympia, the state capital, and approximately 58kmsouthwest of Seattle. It is estimated that the maximum energy release occurred at a depth of 60km, which is very deep. Fortunately, the ground shaking intensity throughout the region was moderate. There was only one death (a heart attack) and approximately 400 injuries resulting from the earthquake. Even so, inancial losses are expected to range between \$1 billion and \$2 billion.

Within minutes of the earthquake, EQE international mobilized its Seattle-based staff to investigate and research the damage. Within hours, engineers from other EQE offices joined the investigation and response effort to support clients and to find out what could be learned to prevent losses in future earthquakes. By March 3 the engineers had inspected hundreds of buildings, bridges, and lifeline facilities.

This was the largest earthquake to affect western Washington in the past 50 years. Recent quakes include one near Sea-Tac in 1965 of

magnitude 6.5 and one near Olympia in 1949 of magnitude 7.1. In January of 1700 an earthquake with an estimated magnitude of 9.0 struck the region. A preliminary study of the February event, known as the Nisqually earthquake after the shifting tectonic plate beneath the region, indicates that it consisted of normal faulting within the subducting Juan de Fuca plate.

A portion of the subducting plate moved down and to the northeast. This movement is exactly the opposite of what occurred in the Northridge earthquake, which struck California in 1994. The Juan de Fuca plate can subduct beneath the North America Plate off the coasts of northern California, Oregon; Washington, and British Columbia along what is known as the Cascadia Subduction Zone. As it bends during its descent, the Juan de Fuca plate cracks and breaks, causing earthquakes to occur along an area known as the Benioff zone.

Ground shaking from the earthquake was captured by an array of strong-motion instruments located throughout the greater Puget Sound region. The largest accelerations were recorded on the southwest shore of Lake Washington. These exhibited peak ground accelerations of 0.31g and durations of strong shaking of less than 10 seconds. However, there were few other recordings of motion exceeding a peak acceleration of 0.10g. However, no recordings are available within about 20km of the epicenter, where the largest intensities were observed. Estimates of intensity indicate most of the

region experienced shaking, as measured by the modified Mercalli intensity (MMI), of 7 or less. South Seattle experienced MMI intensities of 6 to 7, while north Seattle saw intensities of 5 to 6.

The recorded ground motions were low for earthquake of this magnitude. For example, some of the accelerations produced by the Northridge earthquake were more than three times higher. This difference may be attributed to the great depth of the fault rupture for this earthquake. Because of this, the seismic waves generated had a greater opportunity to attenuate before reaching the ground surface. Rather than a high level of concentrated damage, the Nisqually quake produced damage that was more moderate but covered a wider area.

The earthquake caused liquefaction as far west and south as Shelton and Tumwater, and as far north as Green Lake and Lake Sammamish. There were numerous sand boils in south Seattle. Liquefaction in this area caused some minor pipeline damage. The earthquake caused a landslide that partially blocked the Cedar River. Another one knocked a house in Salmon Beach into the Tacoma Narrows and damaged other homes to such an extent that they had to be evacuated. There were other, larger, slides in rural areas and soil slumping that resulted in highway closures.

Because of the relatively moderate ground motions, damage to modern structures was very light, consisting primarily of damage to

nonstructural components. Where structural damage did occur, it was generally at sites with soft soils or outdated construction with known seismic vulnerabilities.

Unreinforced brick masonry buildings with unbraced parapets and without wall anchors were particularly vulnerable, and there were several collapses. Numerous facilities experienced significant nonstructural damage, for example, ceiling failures, damage to partition walls, fallen light fixtures, sprinkler piping breaks, toppled furniture, computer damage, and shifting of equipment.

The region to the south of Seattle includes low-lying areas with saturated soils vulnerable to liquefaction. They are home to manufacturing facilities, office parks, and commercial hubs and the buildings typically are of older construction. In addition to URMS, there are precast-concrete, concrete frame, and reinforced masonry structures.

Lifeline system including bridges, water and wastewater systems, electric power plants, and telecommunications facilities performed very well. These system are vulnerable to liquefaction and lateral spreading to landslides and to strong ground skaking. Only limited liquefaction and lateral spreading occurred, and this was in the ports of Olympia and Seattle and in the southern part of Duwamish River valley. Only one major landslide occurred, and that was near the Tacoma Narrows Bridge. Other areas subject to ground

instability, such as the tidal flats in Tacoma, were barely damaged because of the low levels of ground shaking. Excessive liquefaction did occur around Capital Lake, resulting in gross slumping and instability of the banks, but there was little damage to the built environment.

Sea-Tac International Airport, about 40km northeast of the epicenter, was closed immediately after the earthquake because of extensive damage to the control tower. The tower was constructed in about 1970 atop a terminal building that dates from the 1940 s .

Amplification of motion through the terminal and tower structures was sufficient to damage welded connections at the base of tubular steel columns supporting the tower roof, severing these connections.

Extensive nonstructural damage accompanied these failures, including the loss of glass in the tower and the failure of ceiling systems. This vulnerability had been brought to light by EQE in a risk assessment conducted in the mid-1990s. rather than upgrade the tower, the airport elected at that time to build a replacement that would provide better visibility as part of an overall airport expansion program. This new tower is currently under construction.

Based on EQE'S proprietary modeling software and industry database, the estimated insured loss for this earthquake will be \$500 million to \$800 million, excluding government facilities. If the event had occurred on the recently discovered Seattle fault or had not been as deep, it easily could have been among the largest insured losses for the U.S insurance industry in the past decade. For comparison, the insured losses for the Northridge and Loma Prieta

**earthquake were \$14 billion and \$1.4 billion, respectively.**

**1 – The 2001 Nisqually earthquake:**

- 1) was the largest known quake in the area.
- 2) had an epicenter 11 miles northeast of Seattle.
- 3) was considered an aftershock of the Northridge earthquake.
- 4) was a result of normal faulting within the Juan de Fuca plate.

**2 – Which statement is correct?**

- 1) Sand boils occurred as a result of landslides in some areas.
- 2) There was no generated ground acceleration within about 20km of the epicenter.
- 3) The ground motion was moderate because the fault rupture took place at a depth of 60km.
- 4) Modern structures sustained less damage because they were not built on sites with soft soils.

**3 – To design an earthquake resistant building, the designer must assure that:**

- 1) the structure has enough ductility to absorb the quake energy.
- 2) the construction site not located near an earthquake epicenter.
- 3) the structural elements are stiff enough to remain intact during and after the jolt.
- 4) the non-structural elements are positioned to remain intact during and after the quake.

**4 – Nonstructural damage includes:**

- 1) damage that takes place under the structure.
- 2) damage such as fallen lights and ceiling fixtures.

- 3) damage to partition walls, load bearing walls and facades.
- 4) fallen parapets, toppled furniture and cracked foundations.

**5 – which sentence is correct?**

- 1) liquefaction may cause landslides.
- 2) life-line facilities are generally located underground.
- 3) in general, low-lying areas are more susceptible to liquefaction if saturated.
- 4) in general, low-lying areas with gravelly soil are more vulnerable to liquefaction when the ground is saturated.

**6 – There was structural damage to the Sea Tac International Airport control tower because:**

- 1) it was located close to the epicenter of the earthquake.
- 2) the building was being replaced, so it had not been upgraded.
- 3) shards of broken glass from control tower windows severed welded connections.
- 4) it was built in the 1940s before earthquake damage was considered during design.

**7 – It can be inferred from the article that EQE international is:**

- 1) a company specializing in earthquake rescue and recovery.
- 2) the engineering company that designed the Sea-Tac international Airport.
- 3) a company that provides earthquake insurance to the government and corporations.
- 4) an engineering firm that researches and assesses earthquake vulnerability and damage.

**8 – The main reason that Seattle quake caused less damage to the built environment is that:**

- 1) damage was limited to a smaller area in Seattle because of the depth of the fault rupture.
- 2) the California quakes occurred in area where structures are older, in general, than in Seattle area.
- 3) the depth of fault rupture in Seattle allowed the seismic waves to ease before reaching the surface.
- 4) there was much more soil liquefaction in the California quakes, causing more damage to lifeline systems.

**PASSAGE B:**

As noteworthy as the stadium is from a structural point of view, it might not have been built without the benefit of a comprehensive water supply and reuse system. From the beginning it was clear that meeting the new facility's increased demand for water would be a formidable task. The town of Foxborough's existing water supply system was capable of providing the stadium with approximately 380 m<sup>3</sup>/min; the new facility would require 13,250 m<sup>3</sup>/min. Obtaining that water required close cooperation between Foxborough and the project team. The town designed and built an on site booster station to create a high-pressure water district that would serve not only the stadium but also other areas of the town, says Frank Dougherty, who was Rizzo Associates lead technical manager for the water and wastewater

components of the project. An elevated 3,800 m<sup>3</sup> on-site storage tank reinforces the water district by providing enough additional potable water to meet the stadium's needs without disrupting the town's supply. To further reduce the strain on the town's supply system, an abandoned on-site well was reactivated to satisfy all the irrigation needs of the site.

Increasing the supply of potable water to the site was an important step, but to further reduce demands on the town's resources and again to reduce any harmful effects to the environment the stadium designers included an innovative water reuse system that is projected to conserve 42,000m<sup>3</sup> per year.

During a stadium event, wastewater will be directed to underground holding tanks, from which it will then be pumped into an on-site wastewater treatment plant. Designed by Applied Water Management, of Bellmead, New Jersey, the 950m<sup>3</sup>/day plant will treat the effluent to a high standard of quality using a membrane bioreactor filtration system with ozone treatment and ultraviolet light disinfection. After the water is treated, it will be pumped off-site to a 1,900m<sup>3</sup> reuse tank financed and built by the town of Foxborough. Treated water from the reuse tank will then go back into the stadium through a separate piping system to be used for toilet flushing. Excess reclaimed water will be direct to a 1 ha Leach field for groundwater recharge. About 60 percent of all water the stadium uses during an event will come from the reuse tank, says Boiteau. Because of the potential for future growth in the region, the wastewater treatment plant was designed to accommodate expansion to 4,900m<sup>3</sup>/day.

Making the public/private partnership work was essential to the success of the water system improvements. Because the town's share of the system was subject to a public bidding process, says Dougherty, it needed a longer procurement schedule. Yet the components for which the town was responsible were critical to the completion of the rest of the project.

Commissioning the interconnected water system on time coordination with the town and the various contractors has been one of the most challenging and rewarding part of the project, Dougherty says.

Another example of a successful public/private partnership on the project was the cooperation between the consulting engineers and the Massachusetts Highway Department (MassHighway) on the design and construction of related transportation improvements, says Chris Calnan, a senior project manager for Rizzo Associates who led the transportation infrastructure design. On the site itself, the transportation plan mitigated the conflicts between vehicular and pedestrian traffic by creating large pedestrian walkways, including four underpasses below roadway, to separate the two traffic types.

Rising above the north entrance to the stadium, which is scheduled for substantial completion this spring, a pair of architectural features reminds visitors that they are indeed in New England: a 24m Steel arch bridge and a steel framed beacon, reminiscent of a coastal lighthouse. With its unique combination of structural and environmental components, including the water reuse system and the daylighting of the Neponset River, CMGI Field itself serves as a reminder that a major stadium can be designed not only to function effectively but

**also to be environmentally friendly.**

**9 – A major issue affecting the success of the stadium project was:**

- 1) How to provide the huge amount of water that the facility would use.
- 2) The number of people from the surrounding community who would actually use the facility.
- 3) How to discharge sewage from the facility into Boston Harbor without adverse environmental impact.
- 4) How to provide adequate public transportation to the facility so that the volume of automobile traffic would be minimized.

**10 – What two features of the facility does the author feel reminds people of the New England area?**

- 1) A bridge and a beacon.
- 2) Steel spans and a lighthouse.
- 3) A water reuse system and the daylighting of the river.
- 4) A major stadium and an environmentally friendly design.

**11 – Changes made in the transportation infrastructure off-site primarily:**

- 1) Were made on the nearby interstate freeway system.
- 2) Are funded by the corporation that is constructing the stadium itself.
- 3) Provided safe pedestrian walkways that did not cross vehicular traffic.
- 4) Improved access to the stadium site while minimizing delays to though traffic.

**12 – From this portion of the article we can understand that:**

- 1) The stadium facility will put a major strain on the water supply for the area.
- 2) The city of Foxborough is responsible for treating all waste water coming from the facility.
- 3) The major portion of the water used by the stadium during an events is used for flushing toilets.
- 4) Competition between the public and private sector with regard to the method of treating waste water significantly slowed construction.

**13 – Which of the following is not a way that the stadium will use to meet its water needs:**

- 1) Recycling treated waste water.
- 2) The use of on-site well water to water the grounds.
- 3) Building a large water storage tank specifically for stadium use.
- 4) Expansion of the area's storage reservoir to increase its capacity.

**In the 6 following questions choose the answer which best completes technically each individual item:**

**14 – A material is said to be ductile if it can undergo large, ..... deformations before fracture.**

- |              |              |
|--------------|--------------|
| 1) residual  | 2) temporary |
| 3) dynamical | 4) permanent |

**15 – Properly done for a long period, ..... produces stronger, more watertight concrete.**

- |              |                  |
|--------------|------------------|
| 1) curing    | 2) vibration     |
| 3) admixture | 4) reinforcement |

**16 – For concrete without ..... air, the duration of protection against freezing should be twice as long for maximum durability.**

- 1) enclosed
- 2) entrained
- 3) entranced
- 4) entertained

**17 – An aggregate is physically ..... if it retains dimensional stability under temperature or moisture change and resists weathering without decomposition.**

- 1) hard
- 2) sound
- 3) strong
- 4) resistant

**18 – The direction in which the normal stresses become maximum or minimum are called .....**

- 1) Mohr's directions
- 2) principal directions
- 3) orthogonal directions
- 4) major and minor directions

**19 – The soil for foundations can be altered to conform to desired characteristic by ....., consolidation and or its replacement with select material.**

- 1) vibration
- 2) mixtures
- 3) saturation
- 4) compaction

پاسخنامه کلیدی سوالات زبان تخصصی - مهندسی عمران (سراسری ۱۳۸۳)

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9 -	■	□	□	□	10 -	■	□	□	□
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13 -	□	□	□	■	14 -	□	□	□	■
15 -	■	□	□	□	16 -	□	■	□	□
17 -	□	□	□	■	18 -	□	■	□	□
19 -	□	□	□	■					

سوالات زبان تخصصی مهندسی

# عمران

سراسری ۱۳۸۴

***Read the following passage (A) carefully and answer the 7 questions.***

**Passage A:**

### **SEISMIC BEHAVIOUR OF SOIL-STRUCTURE SYSTEM**

The importance of the nature of the sub-soil for the seismic response of structures has been demonstrated in many earthquakes, but a reasonable understanding of the factors involved has only recently begun to emerge.

For example it seems clear from studies of recent earthquakes that the relationship between the periods of vibration of structures and the period of the supporting soil is profoundly important regarding the seismic response of the structure. In case of the 1970 earthquake at Gediz, Turkey, part of a factory was demolished in a town 135km from the epicenter while no other buildings in the town were damaged.

Subsequent investigations revealed that the fundamental period of vibration of the factory was approximately equal to that of the underlying soil. Further evidence of the importance of periods of vibration was derived from the medium sized earthquake of Caracas in 1967 which completely destroyed four buildings and caused extensive damage to many others. The pattern of structural damage has been directly related to the depth of soft alluvium overlying the bedrock. Extensive damage to medium rise buildings (5-9 storeys) was reported in areas where depth to bedrock was less than 100m while in areas where the alluvium thickness exceeded 150m the damage was greater in taller buildings (over 14 storeys). The depth

of alluvium is course directly related to the periods of vibration of the soil. Considering shear waves traveling vertically through a soil layer of depth H, the periods of horizontal vibration of the soil are given by

$$T_n = \frac{\gamma H}{(2n-1)v_s}$$

Where n is an integer, 1,2,3,..., and  $V_s$  is the velocity of the shear wave.

In order to evaluate the seismic response of a structure at a given site, the dynamic properties of the combined soil structure system must be understood. The nature of the sub-soil may influence the response of the structure in three ways.

- (i) The phenomenon of soil amplification may occur, in which the seismic excitation at bedrock is modified during transmission through the overlying soils to the foundation. This may cause attenuation or amplification effects.
- (ii) The fixed base dynamic properties of the structure may be significantly modified by presence of soils overlying bedrock. This will include change in the mode shapes and periods of vibration.
- (iii) A significant part of the vibrational energy of the flexibly supported structure may be dissipated by material damping and radiation damping in the supporting medium.

Items (ii) and (iii) above are investigated under the general title of

soil structure interaction which may be defined as the interdependent response relationship between a structure and its supporting soil. The behaviour of structure is dependent in part upon the nature of the supporting soil and similarly the behaviour of the stratum is modified by the presence of the structure.

It follows that soil amplification (item (i) above) will also be influenced by the presence of the structure, as the effect of soil structure interaction is to produce a difference between the motion at the base of the structure and the free field motion which would have occurred at the same point in the absence of the structure. In practice however, this refinement in determining the soil amplification is seldom taken into account, the free field motion generally being that which is applied to the soil structure model as discussed in the following section. Because of the difficulties involved in making dynamic analytical models of soil systems, it has been common practice to ignore soil structure interaction effects simply treating structures as if rigidly based regardless of the soil conditions.

However intensive study in recent years has produced considerable advances in our knowledge of soil structure interaction effects and also in the analytical techniques available, as discussed below.

**1 – During the Gediz earthquake, part of a factory was demolished because of:**

- |                         |                         |
|-------------------------|-------------------------|
| 1) soft alluvium        | 2) vertical vibration   |
| 3) horizontal vibration | 4) resonance phenomenon |

**2 – What is the predominate period (in second) of a clay soil layer at**

**20m depth with a velocity of the shear wave equal 200 m/s?**

- 1) 0.1
- 2) 0.2
- 3) 0.4
- 4) 0.6

**3 – What is the opposite of amplification?**

- 1) vibration
- 2) excitation
- 3) attenuation
- 4) signification

**4 – The word refinement means: the act of:**

- 1) beating
- 2) washing
- 3) purifying
- 4) amplifying

**5 – The word damping means:**

- 1) سختی
- 2) غالب
- 3) استهلاک
- 4) بزرگنمایی

According to the passage A, in the 2 following sentences choose the appropriate word for the blanks.

**6 – Ideally the earthquake motion should be applied at .....  
To the complete soil structure system.**

- 1) bedrock
- 2) surface
- 3) top of building
- 4) soil layer

**7 – There are great uncertainties in defining a design ground motion which not only represents the nature of ..... shaking appropriate for the site, but also represents a suitable level of risk.**

- 1) soil
- 2) building
- 3) vibration
- 4) earthquake

**Read the following passage (B) and answer the 8 questions.**

**Passage B:**

### **REACHING FOR THE SKY**

The world's tallest building is scheduled to open soon and has a profile unlike that of any previous skyscraper a tapered base topped by a series of flared segments. The great height 508m and unique shape of the building posed a series of challenges for the engineers who developed its structural scheme and had to devise a way to found the skyscraper on weak geologic formations in an area known for extreme typhoons and earthquakes.

The height of the structure presented one of the greatest challenges for engineers. Each level added to a skyscraper comes at an ever increasing cost; in effect the new story is added at the bottom of the building since it must include sufficient structure to carry the floors above it and include enough space to house elevator and stair extensions, plus utility risers for mechanical, electrical, plumbing and fire protection systems. An economic limit on the height of a building occurs when the cost of adding a level exceeds the revenue it will generate.

The tower was conceived as structure encompassing 200,000m<sup>2</sup> and surrounded at the base by an area called "the podium". An additional 200,000m<sup>2</sup> of retail space and basement parking. With the floor plate sizes following general office building standards, the office space requirement led to 101 levels.

Soft bedrock beneath the site is located about 40 to 60m below clay and stiff colluvial soil layers. Building such a tall structure on this soil required extensive geotechnical sampling and investigation. The groundwater level is normally 2m below the surface, but engineers designed the building substructure, which is five levels deep, as if the water table were at grade.

Shallow foundations could have led excessive settlement or soil bearing failure, so the engineers designed a deep foundation to transfer the building's weight directly to bedrock. Greater loads require larger or more numerous deep foundation elements, so the engineers sought to minimize the building's dead load. A steel frame design helped to achieve this goal.

While based on concepts of culture and beauty, the design of the building also reflects the practical requirements of high rise construction. Below the repetitive modules that flare upward, the tower has a 25 story base shaped as a truncated pyramid that offers structural benefits. A wide base provides better overturning resistance and lateral stiffness than a straight shaft, if the structural system engages the perimeter columns. The transition between the pyramidal base and its inverted pyramidal modules above gives the building a waistline of sorts.

## **8 – From the article it can be understood that:**

- 1) the profile of the building is straight from bottom to top.
- 2) the profile of the building grows narrower at one point and then widens again.

3) the profile of the building grows narrower at one point and then rises straight up.

4) the sides of the building are straight up to the 62<sup>nd</sup> level and then taper to ward the center.

### **9 – The cost of adding levels to a skyscraper:**

1) decreases as the number of levels increases.

2) may be more than the revenue than an additional level would earn.

3) includes jacking up the base of the building to add levels from the bottom.

4) includes adequate structure to support the building, but not the cost of utility risers.

### **10 – The podium of the structure:**

1) extends above the base of the building.

2) is equal in area to that of the skyscraper itself.

3) includes shopping areas but not parking facilities.

4) consists of parking areas and the bedrock foundation.

### **11 – The main reason that a steel frame design was chosen is:**

1) it would minimize the dead load of the skyscraper

2) it offers the most resistance to typhoon damage

3) it would allow the designers to use a shallow foundation

4) it would decrease the overall cost and time of construction

### **12 – A challenge for engineers was to design the building:**

1) based on concepts of culture and beauty.

2) taking into consideration the extremely deep water table of the area.

3) to stand in an area with no bedrock and withstand earthquake and typhoons.

4) to withstand earthquakes and typhoons despite the weak geology of the area.

**13 – The structural benefits of the shape of the building's base:**

1) are only realized if the building has a waistline.

2) include resistance to overturning and lateral stiffness.

3) were lessened because it does not engage the perimeter columns.

4) were a major consideration when the shape of the building was chosen.

**14 – The foundation of the skyscraper is:**

1) a shallow mat foundation.

2) steel piles driven deep into the ground.

3) a series of cast – in – place concrete piles.

4) a deep one that transfer the load to the bedrock.

**15 – The building was designed as if the water table were:**

1) at ground level.

2) two meters below the surface.

3) 40 to 60 meters below the surface.

4) level with the bottom of the five – story substructure.

**In the 5 following sentences choose the appropriate word for the blanks.**

**16 – Local waves with in the harbor make ..... difficult, if not**

**possible.**

- |             |              |
|-------------|--------------|
| 1) sailing  | 2) anchoring |
| 3) berthing | 4) anchorage |

**17 – The rate of ..... of pavements is function of the traffic using the road.**

- |                  |                  |
|------------------|------------------|
| 1) corrosion     | 2) deterioration |
| 3) wear and tear | 4) displacements |

**18 – The increase in carbon content of steel .....**

- |                          |                              |
|--------------------------|------------------------------|
| 1) reduces its ductility | 2) reduces its strength      |
| 3) increases its density | 4) increases its weldability |

**19 – By ..... the plate girder web, its resistance to buckling will be increased.**

- |               |               |
|---------------|---------------|
| 1) stiffening | 2) widening   |
| 3) hardening  | 4) stiffening |

**20 – In finite element formulation, the displacements of two elements at their juncture line must be .....**

- |               |               |
|---------------|---------------|
| 1) identical  | 2) equivalent |
| 3) comparable | 4) compatible |

پاسخنامه کلیدی سوالات زبان تخصصی - مهندسی عمران (سراسری ۱۳۸۴)

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