جمهوری اسلامی ایران
وزارت علوم تحقیقات و فناوری

۱۳۵۰

جزوه درس زبان تخصصی

مدرس: دکتر علیرضا آذربخت

فصل اول

سؤالهای آزمون ورودی کارشناسی ارشد عمران
سال ۱۳۷۲

آزمون ۱۳۷۲
سؤالهای زبان تخصصی

IN THE NAME OF GOD

With reference to the numbers in the passage, choose A, B, C, or D 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 vary tremendously, as (9) ..... the problemes involved in (10) .....design and installation.

In most cases, one of the (11) ..... problems is that of carrying on the work (12) ..... neighboring structures buildings, streets, pipe lines, sewers, 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) ..... In 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 foundations come with in an influenece line (30) ..... sloping upward from the bottom of the excavation, it is usually prudent to provide positive support in the form of underppining.

	(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	angels
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

آزمون ۱۳۷۲

سؤالهای ریاضیات

۳۱- در معادله $y = \beta \cos(wx + \alpha)$ در صورت حذف ثابتهای β و α چه رابطه‌ای بدست می‌آید؟

۱) $y = xy' + y'^2 + 1$ ۲) $y'' - 3y'w = 0$ ۳) $y'' + w^2 y = 0$ ۴) $y' - 3wy = -12$

۳۲- حل معادلهٔ دیفرانسیل مقابل چیست؟ $(D^2 - 1)y = 8xe^x$

۱) $y = c_1 e^X + c_2 e^{-X} + \cos x$
۲) $y = c_1 \cos x + c_2 \sin x + \frac{1}{2} x \sin x$
۳) $y = e^{2x}(c_1 + c_2 x + \frac{1}{2}x^2)$
۴) $y = c_1 e^{-x} + e^x (c_2 - 2x + 2x^2)$

۳۳) کارانجام شده‌توسط‌نیروی $F = \vec{xi} + \vec{yj} + \vec{zk}$ درطول‌مارپیچ $\lambda(t) = \text{Cost}\ \vec{i} + \text{Sint}\ \vec{j} + 3t\vec{K}$ برابراست با:

۱) π ۲) 7π ۳) ۰ ۴) 2π

۳۴) تبدیل معکوس لاپلاس تابع $F(s) = \text{Arc Cot } s$ برابر است با:

۱) $t \sin t$ ۲) $t \cos t$ ۳) $\frac{\sin t}{t}$ ۴) $\frac{\cos t}{t}$

۳۵- جواب حاصل به روش تکرار نقطه ثابت در حل معادله $x^3 + x - 1 = 0$ که به صورت $x = g(x) = 1 - x^3$ نوشته می‌شود به سمت ریشه معادله، همگرا نیست به جهت آنکه:

۱) $|g'(x)|$ در نزدیکی ریشه از واحد کوچکتر است.
۲) $|g'(x)|$ در نزدیکی ریشه به سمت صفر میل می‌کند.
۳) $|g'(x)|$ همواره از $\frac{1}{2}$ کوچکتر است.
۴) $|g'(x)|$ در نزدیکی ریشه با مقدار بزرگتر از واحد است.

۳۶- هرگاه x و y دو متغیر تصادفی مستقل باشند آنگاه:

۱) $E(xy) = E(x)\,E(y)$ و $\delta_{xy} = E_x E_y$
۲) $E(xy) = E(x)\,E(y)$ و $\delta_{xy} = 0$
۳) $E(xy) = 0$ و $\delta_{xy} = \delta_x \delta_y$
۴) $E(xy) = 0$ و $\delta_{xy} = 0$

۳۷- کدام یک از ماتریس‌های زیرماتریس معکوس $M = \begin{bmatrix} \cos\theta & \sin\theta \\ -\sin\theta & \cos\theta \end{bmatrix}$ است؟

۱) $A = \begin{bmatrix} -\sin\theta & \cos\theta \\ \cos\theta & \sin\theta \end{bmatrix}$
۲) $A = \begin{bmatrix} \cos\theta & \sin\theta \\ \sin\theta & \cos\theta \end{bmatrix}$
۳) $A = \begin{bmatrix} \cos\theta & -\sin\theta \\ \sin\theta & \cos\theta \end{bmatrix}$
۴) $A = \begin{bmatrix} \cos\theta & \sin\theta \\ \sin\theta & -\cos\theta \end{bmatrix}$

۷- مقدار انتگرال سه‌گانه $\iiint (x^2+y^2+z^2)\,dxdydz$ بر روی حجم کره $x^2+y^2+z^2=9$ برابر است با:

۱) 360π ۲) صفر ۳) 194π ۴) 180π

۸- مقدار حد $\lim_{(x,y)\to(0,0)} \frac{xy}{\sqrt{x^2+y^2}}$ برابر است با:

۱) ∞ ۲) دارای حد نیست ۳) ۱ ۴) صفر

۹- انتگرال $\int_0^2 \int_{y/2}^1 ye^{x^3}\,dx\,dy$ برابر است با:

۱) $e-1$ ۲) $\frac{1}{3}(e-1)$ ۳) $\frac{2}{3}(e-1)$ ۴) e

۱۰- جواب عمومی معادله دیفرانسیل $y''+3y'+4y=0$ عبارت است از:

۱) $y=c_1e^{-4x}+c_2e^{x}$ ۲) $y=c_1e^{-\frac{3}{2}x}+c_2xe^{-\frac{3}{2}x}$

۳) $y=c_1e^{x}\cos\frac{\sqrt{7}}{2}x+c_2e^{-x}$ ۴) $y=e^{-\frac{3}{2}x}(c_1\cos\frac{\sqrt{7}}{2}x+c_2\sin\frac{\sqrt{7}}{2}x)$

۱۱- جواب عمومی معادله $y''-4y'=-4$ برابر است با:

۱) $y=c_1+c_2e^{-4x}-x$ ۲) $y=c_1+c_2e^{4x}+x$

۳) $y=c_1\cos 2x+c_2\sin 2x$ ۴) $y=c_1xe^{-4x}+x^2$

۱۲- معادله دیفرانسیل $(y\cos x+\sin y+y)\,dx+(\sin x+x\cos y+x)\,dy=0$

۱) کامل است.

۲) دارای عامل انتگرال‌ساز x است.

۳) دارای عامل انتگرال‌ساز y است.

۴) دارای عامل انتگرال‌ساز نیست.

۱۳- هرگاه $y(0)=0$ و $y'(0)=0$ و $y''-y'+y=t$ و آنگاه $L(y)$ برابر است با:

۱) $\frac{s-1}{s^2(s^2-s+1)}$ ۲) $\frac{s+1}{s^2(s^2-s+1)}$

۳) $\frac{1}{s^2(s-1)}$ ۴) $\frac{1}{s^2(s^2-s+1)}$

۱۴- جواب معادله دیفرانسیل $y'-\frac{1}{x}y=x^2$ عبارت است از:

۱) $y=(-\frac{x^2}{3}+c)\,x$ ۲) $y=(x^2+c)\,x$

۳) $y=(\frac{x^2}{2}+c)\,x$ ۴) $y=(\frac{x^3}{3}+c)\,x$

۱۵- معادله شاخص معادله دیفرانسیل $x(x-1)y''+(3x-1)y'+y=0$ دارای:

۱) ریشه مضاعف صفر است.

۲) ریشه‌های ۱ و ۱- است.

۳) ریشه‌های ۰ و $\frac{1}{2}$ است.

۴) ریشه‌های ۱- و $\frac{3}{5}$ است.

آزمون ۱۳۷۳

سؤالهای زبان تخصصی

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

THE MEASUREMENT OF EARTHQUAKES

Earthquakes are natural vibrations within the Earth's crust. They show that crustal movemens 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 deter mined 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.

16 - The long waves produce the most outstanding ..... .

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

17 - A seismograph is an instrument concerned with ..... .

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

18 - The word "crust" means ..... .

1) a liquid layer 2) a solid layer 3) a non solid layer 4) a gaseous layer.

19 - The synonym of word "fracture" is ..... .

1) cleavage 2) splash 3) sprinkle 4) misplacment

20 - 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.

21 - Light weight aggregate for concrete can be obtained from ..... .

1) sand and gravel 2) volcanic material 3) granite 4) crushed granite

22 - If the depth of a beam is increased, its moment capacity will ..... .

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

23 - For what purpose does a topographical surveyor use a tacheometer?

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.

24 - 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

25 - To slow down the rate of setting of concerte, we add ..... .
1) a retarder 2) a plasticizer 3) an accelerator 4) an inhibitor

26 - portland cement is foremost among construction ..... used in civil engineering projects.
1) goods 2) substances 3) stuffs 4) materials

27 - The basic distinction between the linked professions of secience 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

28 - A state in which the properties of a system do not change with time, unless the system is influenced by the surroundings is calld ..... .
1) buoyancy 2) equilibrium 3) balance 4) stability

29 - 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

30 - A mass formed by coalescence or concentration of particles of matter such as artificial stonelike material used for foundations called ..... .
1) aggregate 2) concrete 3) foundation basin 4) sandstone

31 - If the load on a layer of saturated clay is increased, the excess water drains out of the soil. This process is known as ..... .
1) consolidation 2) cavitation 3) swelling 4) uplift

32 - 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

33 - The cement has to be ..... under very dry conditions as otherwise it deteriorates rapidly.
1) used 2) packed 3) stored 4) mixed

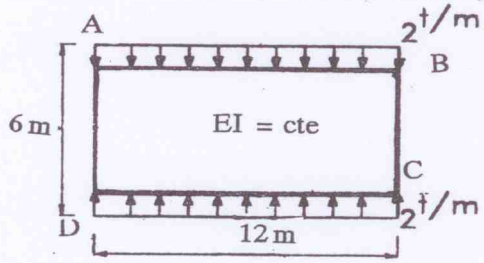
34 - In the case of air entrained concrete, a mixing time of less than 2 or 3 minutes may cause ..... entrainment of air.

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

35 - 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 2) heat 3) first 4) economic

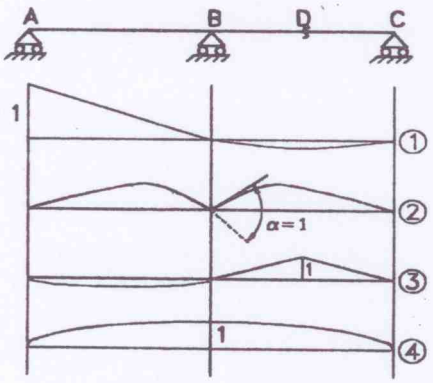
سؤالهای مقاومت مصالح و تحلیل سازه‌ها — آزمون ۱۳۷۳



۳۶- M_{BA} را پیدا کنید.

۱) -۱۲ t.m ۲) -۱۶ t.m

۳) -۸ t.m ۴) $+۱۲$ t.m



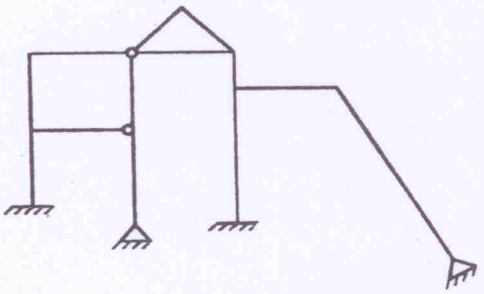
۳۷- در مورد تیر نامعین روبرو کدامیک از خط تأثیرها غلط می‌باشند؟

۱) عکس‌العمل تکیه‌گاه A

۲) ممان منفی روی تکیه‌گاه B

۳) برش در D

۴) عکس‌العمل تکیه‌گاه B



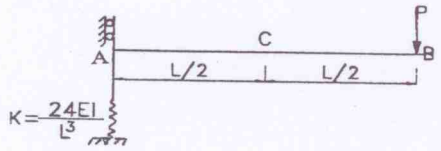
۳۸- قاب نشان داده شده در شکل، چند درجه نامعین است؟

۱) ۶

۲) ۸

۳) ۹

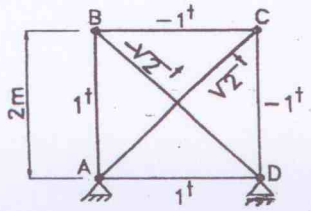
۴) ۷



۳۹- در صورتی که تکیه‌گاه قائم در نقطهٔ A الاستیک باشد مطلوبست تعیین تغییرمکان قائم‌نقطه C دراثرنیروی P (EI درطول‌تیرثابت است)

۱) $PL^۳/۱۲EI$ ۲) $۵PL^۳/۴۸EI$

۳) $PL^۳/۸EI$ ۴) $PL^۳/۶EI$



۴۰- خرپای مربع شکل نامعین زیر دارای تکیه‌گاه مفصلی در A و تکیه‌گاه‌غلطکی‌در D تحت اثر نوعی بارگذاری، دارای نیروهای داخلی:

$F_{AC} = -F_{BD} = \sqrt{۲}t$ و $F_{AB} = F_{AD} = -F_{BC} = -F_{DC} = ۱t$

فصل سوم

سؤالهای آزمون ورودی کارشناسی ارشد عمران
سال ۱۳۷۴

سؤالهای زبان انگلیسی — آزمون 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 loads 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. when further stabilized by the application of calcium chloride, a gravel surface also creates less dust. Anthor 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 dending 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) fragileness

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

1) subgrad
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 vehicles must have ..... .

1) considerable thickness
2) a maximum load
3) sufficient crushed clay
4) a mixiture of clay an a crushed stone

8 - As traffic increases, a surface of sandy clay, crushed stone, and crushed slage is ..... .

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

9 - On 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 - Bituminuos 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 carries its working load is called ..... .

1) wind force
2) prestressing force
3) impact force
4) earthquake force

13 - A paved strip 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 drage 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 falme
2) drifting movement
3) up and down movement
4) process of casting

18 - Slow movement of water or another fluid through porous material like eath 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

آزمون ۱۳۷۴

سؤالهای ریاضیات

۲۱- تبدیل لاپلاس معکوس تابع $\frac{S+1}{S^3+S}$ برابر است با:

۱) $1+\cos t+\sin t$
۲) $1+\cos t-\sin t$
۳) $1-\cos t+\sin t$
۴) $-1+\cos t+\sin t$

۲۲- حجم محصور بین سطوح $Z=1-X^2-Y^2$ و $Z=0$ برابر است با:

۱) $\frac{\pi}{2}$
۲) π
۳) 2π
۴) ۱

۲۳- مساحت ناحیه مشترک بین دلوارهای $r=a(1+\cos\theta)$ و $r=a(1-\cos\theta)$ برابر است با:

۱) $\frac{a^2}{4}(\frac{3\pi}{2}-4)$
۲) $a^2(\frac{3\pi}{2}-4)$
۳) $\frac{a^2}{2}(\frac{3\pi}{2}-4)$
۴) $a^2(3\pi-8)$

۲۴- جواب معادلهٔ دیفرانسیل $x^2y''+4\alpha xy'+y=0$ به ازای چه مقدار حقیقی پارامتر α در نقطه $x=0$ دارای حد متناهی غیر صفر است؟

۱) $\alpha>1$
۲) $\alpha<1$
۳) هیچ مقدار حقیقی α
۴) $\alpha=1$

۶- معادله دیفرانسیل با مشتقات جزئی $\frac{\partial^2 z}{\partial x \partial y} - \frac{\partial z}{\partial x} - \frac{\partial z}{\partial y} + z = 0$ با تغییر متغیر تابع $z = u(x, y)\, e^{x+y}$ تبدیل می‌شود به:

۱) $\frac{\partial^2 u}{\partial x \partial y} = 0$ ۲) $\frac{\partial^2 u}{\partial x \partial y} - \frac{\partial u}{\partial x} - \frac{\partial u}{\partial y} + u = 0$ ۳) $\frac{\partial^2 u}{\partial x \partial y} + u = 0$ ۴) $\frac{\partial^2 u}{\partial x \partial y} - \frac{\partial u}{\partial x} - \frac{\partial u}{\partial y} = 0$

۷- تابع $f(x, y)$ با دامنه تعریف D مربع $0 \le x, y \le 1$ بصورت

$$f(x, y) = \begin{cases} x(1-y) & \text{و } 0 \le x \le y \\ y(1-x) & \text{و } y < x \le 1 \end{cases}$$

تعریف شده است. مقدار انتگرال $\iint_D f(x,y)\, dx\, dy$ برابر است با:

۱) $\frac{1}{6}$ ۲) $\frac{1}{8}$ ۳) $\frac{1}{12}$ ۴) $\frac{1}{24}$

۸- مقدار انتگرال $\int_0^\infty xe^{-sx}\cos\beta x\, dx$ برابر است با: (از تبدیل لاپلاس $\cos\beta x$ استفاده کنید.)

۱) $\frac{\beta^2 - s^2}{(s^2 + \beta^2)^2}$ ۲) $\frac{s^2 - \beta^2}{(s^2 + \beta^2)^2}$ ۳) $\frac{\beta^2 - s^2}{\beta^2 + s^2}$ ۴) $\frac{s^2 - \beta^2}{s^2 + \beta^2}$

۹- یک جواب خصوصی معادله دیفرانسیل خطی ناهمگن $\frac{d^4y}{dx^4} - 2\frac{d^2y}{dx^2} + y = x\cosh x$

در حالت کلی به صورت زیر پیشنهاد می‌شود:

۱) $y_p(x) = x^2(A_0 x + A_1)e^x + x^2(B_0 x + B_1)e^{-x}$

۲) $y_p(x) = (A_0 x + A_1)\cosh x + (B_0 x + B_1)\sinh x$

۳) $y_p(x) = A_0 x^3 e^x + B_0 x^3 e^{-x}$

۴) $y_p(x) = (A_0 x + A_1)e^x + (B_0 x + B_1)e^{-x}$

۱۰- منحنی‌های جواب معادله دیفرانسیل $yy'' + y'^2 - 1 = 0$ عبارتند از:

۱) یک خانواده سهمی‌ها ۲) یک خانواده دوایر ۳) یک خانواده بیضی‌ها ۴) یک خانواده هذلولیها

آزمون ۱۳۷۷

سؤالهای زبان تخصصی

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 atomosphere 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 some times and completely flooded at others.

11- The atmosphere 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

12 - In line 2, "they" refers to ..... .

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

13 - 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

14 - In line 2, "value" means.

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

15 - In line 4, "others" refers to:

1) times 2) continents 3) oceans 4) effects

۱۶- برای محلّ خالی متن انگلیسی زیر مناسب‌ترین 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 μm (No. 25) B.S. sieve, as shown by the values in Table 3.23 . The main resason for this is that a large ..... of sands divide themselves naturally at just that size, the gradings above and below being approximately uniform. Furthermore, the content of particles finer than the 600 μm (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 2) particle 3) specimen 4) number

17 - 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.

18 - For a homogeneous anisotropically 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 at a point.

3) The material properies 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.

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

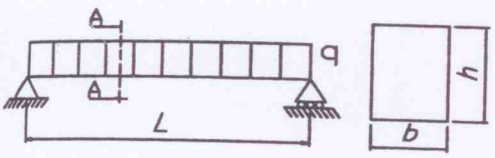
1) internal friction 2) irrigation 3) insulation 4) infiltration

20 - 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 supension bridge is called:

1) Aggregates 2) An anchorage 3) An articulated dumper 4) An abrasion

سؤالهای مقاومت مصالح و تحلیل سازه‌ها — آزمون ۱۳۷۷

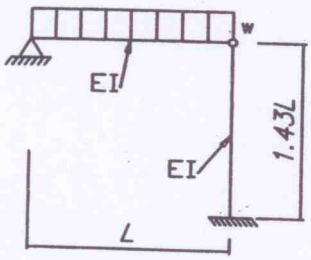
۲۱- تیر ساده‌ای به دهانهٔ L زیر اثر بار یکنواخت به شدت q قرار گرفته است، اگر تنش مجاز برشی و خمشی برای مصالح تیر به ترتیب τ_w و σ_w فرض شوند و مقطع تیر مربع مستطیلی به ابعاد b و h باشد، طول l را چنان تعیین کنید که تنشهای برشی و خمشی با هم به مقدار مجاز خود برسند؟



۱) $\frac{\sigma_w}{\tau_w} \cdot \frac{1}{h}$ ۲) $\frac{\tau_w}{\sigma_w} \cdot \frac{1}{h}$

۳) $\frac{\tau_w}{\sigma_w} \cdot h$ ۴) $\frac{\sigma_w}{\tau_w} \cdot h$

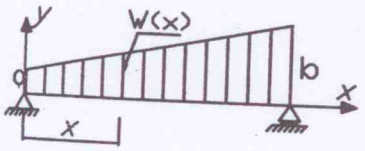
۲۲- بار بحرانی سیستم نشان داده شده چقدر است؟

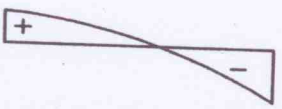


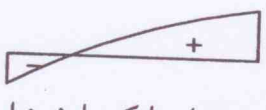
۱) $۲\frac{\pi^۲EI}{L^۳}$ ۲) $\frac{\pi^۲EI}{L^۳}$

۳) $۰/۲۴\frac{\pi^۲EI}{L^۳}$ ۴) $۰/۵\frac{\pi^۲EI}{L^۳}$

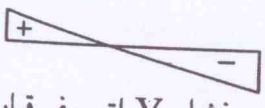
۲۳- کدام نمودار تغییرات نیروی برشی در تیر شکل مقابل را نشان می‌دهد؟



۱) 

۲) 

۳) 

۴) 

۲۴- اگر قطر یک مخزن استوانه‌ای جدار نازک با ضخامت ثابت و رفتار خطی که تحت فشار V اتسمفر قرار گرفته است دو برابر شود تنش کششی در جدار آن ...

۱) بوجود نمی‌آید. ۲) تفاوتی نمی‌کند. ۳) دو برابر می‌شود. ۴) نصف می‌شود.

۲۵- میله‌ای با سطح مقطع نشان داده شده تحت تأثیر لنگر پیچشی T قرار دارد. شعاع متوسط دایرهٔ R و ضخامت آن t می‌باشد. ضخامت هر یک از ورقهای اتصالی به دایره جدار نازک t و طول آن $۲\pi R$ می‌باشد. چنانچه‌نسبت $\frac{R}{t} = ۱۰$ باشد، چنددرصد لنگر پیچشی T توسط جدارهٔ نازک دایره‌ای شکل تحمل خواهد شد؟

فصل هفتم

سؤالهای آزمون ورودی کارشناسی ارشد عمران سال ۱۳۷۸

آزمون ۱۳۷۸

سؤالهای زبان تخصصی (عمران)

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 motions. 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 perecent of gravity, and then the instrument begins to rcord.

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 buildings more than 10 storyes in height are required by the 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.

A 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. At increasing distance from the epicenter, the acceleration is attenuated and the duration of shaking is lengthened. Also, an earthquake originating at a shallow depth (5 km) beneath the ground surface will have larger accelerations and shorter durations than if it originated at a greater depth (30 km). The largest acceleration ever recorded was 50 percent of gravity.

Special analyses are made of earthquake records to study the effect that such ground motions 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 is in this range will tend to be relatively strongly excited into vibration by an earthquake. In the upper parts of buildings, the vibratory motion may be so 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-storey 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 2 seconds, and a 50-stroey building will have a period of

about 5 seconds. Therefore, persons on the top of a 50-storey 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 become greater at increasing distances 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 engineers dose not work at accelerations below 1 percent of gravity.

In the 2 following questions, replace the underlined words with synonymous expressions from the reading A:

3- Acceleration is lessened as the distance from epicenter increases.

1) attenuated 2) injured 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) stops

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 instrument has been set up in earthquake areas. These instruments are designed to record the true acceleration of the ground and operate on a ..... 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 buildings.

1) epicenter 2) range 3) scale 4) amplitude

READING B: AIRPORT DESIGN

Passenger Terminal Building Concept. The passenger terminal building is a focal 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 Terminals. Basically, there are two possible approaches to the arrangement of the terminal buildings. In a centralized terminal, all passengers and baggage are processed in one 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 with out 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 (floors) 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 baggagge takes Place at the level of the apron, and the entire layout is quite simple.

A two - level operation can be economically justified only at a high - traffic - volume airport. In this type of operation, arriving and departing passengers are separated. The

departing passengers are usually processed on the upper level, and the arriving passengers, on the lower level. The fingers leading to the aircraft are also above the level of the apron. The Principal advantage of this system is that congestion in the flow of passengers and baggage can be reduced considerably. The disadvantage is the high cost.

If an airport is to handle large volumes of international and domestic passengers, a three - level operation might be justified. One leverl could be used solely for international passengers, one level for domestic passengers, and the ground level for baggage and service facilities. Regardless of the scheme selected, the importance of complete flexibility in planning to permit expanasion, both horizontally and vertically, causing as little interference with the original facilities cannot be overemphasized.

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

6-

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 unit terminals are basically incompatible.

2) With a low volume of traffic, more than one terminal is necessary.

3) It is not essential for each airline to have its own terminal.

4) The reading dose 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 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 hundreds 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 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 a heavier load than when the jib is lowered to its farthest extent and the radius is large. This difference in lifting capacity at different 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 a certain maximum load is permissible at a certain radius.

Besides hooks, a variety of lifting and handling devices can be 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 movements are produced by the actuation of the holding rope and the closing rope.

With referring to the reading C, in the 5 following 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 jib above horizontal,

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

13- The counterweight is always:

1) adjustable
2) determined by weight × radius
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 overturning moment

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

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

سؤالهای زبان تخصصی (محیط زیست) آزمون ۱۳۷۸

Read the 3 followings paragraphs and answer the 5 questions after each.

Reading A:

The objective of the study to formulate an integrated master plan for environmental pollution control based on the research, survey and analysis on socio-economic activities and water pollution from cities, industries and etc. In the state of Mishigan. The specific objectives of the study are: Development of a master plan and a strategy to control and reduce the water pollution and to improve water quality of the Lake; Measurement and monitoring of various pollutants including BOD5, COD, SS, DO, pH, Cl, temperature, and visibility; Detemination of the contribution of each pollutants; Praparation of dispersion map of pollutants;

Determination of the contribution of various sources of pollution including domestic, industrial and business offices; Establishmant of a warning communication system; Establishment of the standards that can be achieved with in the next five and ten years; Establishment of marine pollution control reseaarch center; Development of an educational program for awareeness of the general public, technicians, and engineers to cope with the problrms of water pollution; and Development and transfer of technologies required reducing water polution from industrial sources including physical, chemical and biological treatment processes.

1- The objective of this study could be mostly achieved by:

1) research
2) survey
3) analysis of the data
4) all of the above

2- It seems that the specific objectives of the study are:

1) can not be counted
2) less than five items
3) 10 items
4) over 20 items

3- From the objectives, the most suitable time required to achieve the goals could be estimated to be:

1) two to three years
2) one to three months
3) two to five weeks
4) up to six months

4- The BOD5, COD and DO parameters are mainly considered as:

1) physical, chemical & biological parameters
2) physical & biological parameters
3) chemical & biological parameters
4) non of the above

5- According to the objective of the study, the data will be collected from:

1) discharges of water pollution from the cities
2) discharges of water pollution from industries
3) discharges of water pollution from the cities & discharges of water pollution from industries
4) the water quality of the lakes

Reading B:

Quantity of Domestic Wastewaler

In accordance with accepted engineering practice, separate domestic sewers should be designed for conveying the spent water supply from a community, the industrial wastewaters and the unavoidable amounts of groundwater and stormwater infiltration to a wastewater treatment plant and hence to a point of ultimate discharge. All waters that do not contain objectionable or potentially objectionalble impurities should be excluded from the domestic sewer system. In addition to stormwater runoff and commercial and industrial cooling waters, this would include building roof, yard and foundation drains which should be excluded from the domestic sewer system by (rigidly enforced) local ordinances.

Since the domestic water supply is also used for watering lawns and washing cars and streets, the quantity of domestic wastewater is less than the water consumed by the community. Conversely under conditions reflecting excessive infiltration into the sewer system owing to high groundwater levels and poor sewer construction, the quantity of wastewater may be greater than the amount of water consumed. Owing to these influences, the quantity of wastewater flow may vary in different communities from 70 to 130 percent of the water consumed. If more exacting data are not available, it is frequently assumed that the average rate of domestic wastewater flow, including some allowance for infiltration, is equivalent to the average rate of water utilization.

The quanlity of community wastewater flow will be significantly influenced by seasonal conditions, daily times and day of the week. A typical pattern of hourly flow variation would begin at midnight with a gradual decrease in flow to a minimum between 5 A.M. and 7 A.M., followed by marked increase in flow as the daily activities of the community begin to maximum flow between noon and 1 P.M. This is

followed by a gradual decrcase in flowrate through the remaining portion of the day. Positioned approximately halfway between the maximum and minimum hourly levels are the average rates of wastewater flow. This characteristic wastewater flow variation is very similar to that for community water consumption, but the peaks are commonly flatter than and lag in time over those for water usage. This is mainly due to the storage capacity available in the sewers.

For each question or statements there are four answers, select your best choice and mark it, please:

6- The origin of domestic sewage running in sewers is:

1) used water only
2) used water and rain water
3) used water and infiltration from all sources
4) used water and ground water

7- Domestic sewage collection system is designed:

1) For spent water and storm water
2) It depends on conditions and cost justification
3) For spent water and industrial wastes
4) For spent water supply by community

8- The variation of sewage flow in sewers depends on:

1) cost of water and water consumption
2) seasonal and days of the year
3) population dencity
4) temperature and humidity

9- The quantity of waste water is usually:

1) Equal to quantity of water used
2) Less than 70 percent of water consumed
3) More than 130 percent of water consumption.
4) More tnan 70 and less than 130 percent of water consumption.

10- Infiltration of ground water to sewer system depends on:

1) High ground water and poor sewer construction
2) High ground water level
3) Type and diameter of sewer
4) Poor sewer construction

Reading C:

Microscreening

Microscreening has been applied in domestic water treatment, sewage waste water filtration and in filtering industrial effluents.

Microscreening ulitizes a special woven metallic or plastic filter fabric, which is mounted on the periphery of a revolving drum provided with continuous backwashing. The drum operates submerged in the flowing waste water to approximately two - thirds of its depth. Wastewater enters through the open upstream end of the drum and flows radially outward through the microfabric leaving behind the suspended solids. The deposited solids are carried upward on the inside of the fabric beneath a row of wash water jets. From there they are flushed into a waste hopper mounted on a hollow axle of the drum (Fig. B.2c).

Water for backflushing is drawn from the filtered water effluent and is pumped through the jets spanning the full width of the screen fabric. Depending on the speed of rotation and on the size of screen openings, only about one-half of the applied wash water actually penetrates the screen.

Drum rotation and backwash are continuous and adjustable. Either manual or automatic control based on the differential pressure can be provided. The pressure head develops due to the intercepted solids, which build up on the inside of the microfabric and create a filtration mat capable of removing particles that are smaller than the aperture size of the mesh. Microscreen opening sizes vary between 23 and 60 μ which corresponds to 165,000 to 60,000 openings per sq. Inch of surface area. The stainless steel wire cloth used in microstrainers has generally been more successful than the plastic type.

The flow capacity of a given size of microscreen depends on the rate of fabric clogging, drum speed, area of submergence and head

loss.[3,10] The rate of screen blockage[11] under standard head and flow conditions is called the filterability index, which can be determined experimentally as described in Section 5.19. Figure 6.2e shows a microstrainer installed in a concrete tank. The amount of backwash water used ranges from 2 to 5 percent of the total hydraulic loading which is in the range of 5 to 30 gpm per sq. Foot. Table 6.2f provides performance data for such units[9].

11- Microscreening has been used for:

1) sewage treatment first
2) water filtration only
3) water filtration first
4) water, sewage and industrial waste treatment

12- Microscreen utilizes a special filter fabric mounted on a drum which needs.

1) to be washed continuously
2) to be washed as needed
3) to be moved by flowing water
4) to be installed in a stable conditions

13- Water for washing the microscreen should be supplied from:

1) From any sources avilable
2) Effluent water from the microscreen unit
3) Influent of the microscreen unit
4) clean drinking sources

14- Microscreening process, due to development of mat on its surfaces, works as:

1) It removes particle smaller than its mesh size
2) Particles smaller than mesh size cannot be removed
3) A physical - chemical process
4) A physical process

15- The capacity of a microscreen depends on:

1) Rate of clogging
2) Area of submergence
3) Head loss developed and drum speed
4) All the four factors

آزمون ۱۳۷۸

سؤالهای ریاضیات

$\int_{0}^{x} [t]^{2} dt = 2(x - 1)$

۱۶- به‌ازای چه مقدار $x \in [2 ، 3]$، تساوی

که در آن [ ] علامت جزء صحیح است، برقرار است؟

۱) $x = \frac{5}{2}$
۲) $x = \frac{7}{3}$
۳) $x = \frac{8}{3}$
۴) $x = 3$

۱۷- اگر $\varepsilon(x)$ با رابطه $\lim_{x \to 0} \varepsilon(x) = 0$ تعریف شده باشد، کدامیک از روابط زیر برقرار است؟

فصل هشتم

سؤالهای آزمون ورودی کارشناسی ارشد عمران
سال ۱۳۷۹

آزمون ۱۳۷۹
سؤالهای زبان تخصصی

Reading A

Over the past twenty years, several hundred articles on analysis and behavior of semi-rigid steel frames have appeared in the technical. This body of knowledge indicates that semi-rigid or partially restrained frames (PR) possess many economical, constructional and technical advantages over rigid frames and frame-shear wall systems. However, it is safe to say that only a small percentage of the literature on this subject addresses design issues directly. The result is that even though semi-rigid of partial - restraint (PR) connection behavior is recognized and allowed by most specifications. very few structural engineers have made explicit use of them in desing. 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 incorporating 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 structures 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 idealize it as a 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 mainly 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 desing 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 utilizd the effect of the floor slab in design
3) is part of a paper on seismic performance of semi-rigid connections
4) is part of paper on advanced analysis & design tools

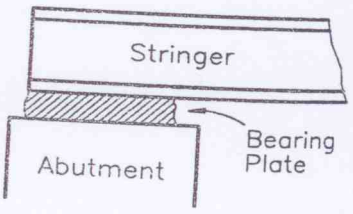
3- The floor slab system
1) is part of every semi-rigid connections
2) acts as a rigid diaphragm against earthquake load
3) has negligible effect on safety and strength of steel buildings
4) is a marginal issue in the paper

4- The article intends to describe
1) the limits of specifications 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

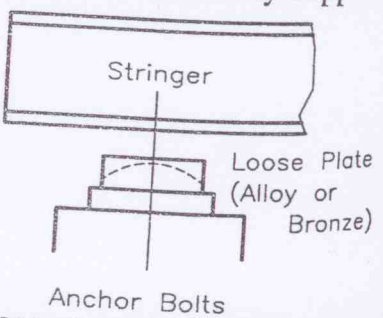
5- The best synonym for "to disseminate" is.
1) to separate 2) to examine 3) to simulate 4) to spread widely

Reading B: END BEARINGS FOR BRIDGES

In general, bearing are classified as being either of the expansion or the fixed type. 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 positon of bearing is fixed. Expansion bearings (1) allow the bridge euds to move back and forth with expansion and contraction caused by changes in temperature; (2) alow the bridge to 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 fig.1 to the right, for a steeel stringer. In this arrangement, the beam end is allowed to slide on a smooth metal plate-The expansion plates maybe made from bronze, with the sliding surfaces planed and polished, or from some copper alloy with smooth, true surfaces.

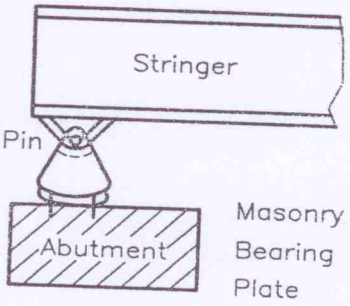


These kinds of bearing plates are not satisfactory for long spans where a large part of the reaction is caused by the live load. Downward deflections of the beam or truss cause the inside pressure on the plate to become excessive, with the result that the masonry support may be injured. For spans greater 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 support expansion bearing which 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 longitudinol ones that if the bearings are desinged 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 regularly 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.

An engineer is a person who possesses this knowledge of mathematics and natural sciences, and through the principles of analysis and design, applies this knowledge to the solution of problems and the development of devices, processes, structures, and systems for the benefit of all humans.

The end result of an engineering effort, generally referred to as design, is a device, structure, system, or process which satisfies a need. A successful desing is achieved when a

logical procedure is followed to meet a specific need. The procedure, called the design 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 activites, 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. If so, the designer must backtrack and repeat steps. For example, if none of the alternatives appear to be economically feasible when the final solution is to be selected, the designer must redefine the problem or possibly relax some of the criteria to admit less expensive alternatives. Thus, because decisions must frequently be made at each step as a result of new developments or unexpected outcomes, the design process becomes iterative.

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 of desing is usually a device, or a structure which satisfies a need.

1) Application 2) Object 3) Process 4) Routine

12- Under what circumstances the designer should possibly modify and reduse some aspects of the problem.

1) When it is difficult to justly 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 desingers.

In the 3 following questions, choose the correct answer.

13- By ... a member, its load carrying capacity increases.

1) stiffing 2) stiffinering 3) stiffinessing 4) stiffening

14- A structure with redundant members is ... .

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

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

1) Durability
2) Humidity
3) Workability
4) Rigidity

سؤالهای ریاضیات — آزمون ۱۳۷۹

۱۶- شعاع همگرائی سری $\sum_{n=1}^{\infty} \left(\frac{n}{n+1}\right)^{n^2} z^n$ چقدر است؟

۱) ۱
۲) e
۳) $\frac{1}{e}$
۴) $\sqrt{e}$

۱۷- مقدار انتگرال $\int_s \int \vec{F}.\vec{n}ds$ کدام است در صورتی که در آن $F(x,y,z) = (x,y,z)$ و s سطح بیضی‌گون $\frac{x^2}{a^2} + \frac{y^2}{b^2} + \frac{z^2}{c^2} = 1$ و $\vec{n}$ بردار قائم یکه خارجی s است؟

۱) $\frac{2}{3}\pi abc$
۲) $\frac{4}{3}\pi abc$
۳) $2\pi abc$
۴) $4\pi abc$

۱۸- مقادیر ماکزیمم و می‌نیمم تابع $f(x,y) = 3x + 4y$ بر دایره $x^2 + y^2 = 1$ کدام است؟

۱) ماکزیمم ۱ و می‌نیمم ۱-
۲) ماکزیمم ۵ و می‌نیمم ۵-
۳) ماکزیمم ۵ و می‌نیمم ۳-
۴) ماکزیمم ۳ و می‌نیمم ۵-

۱۹- حجم محدود به صفحه $z = 0$ از پایین، مخروط $z = \sqrt{x^2 + y^2}$ از بالا و استوانه $x^2 + y^2 - 2ax = 0$ از اطراف، با کدام رابطه برابر است؟

۱) $\frac{3}{2}\pi a^3$
۲) $\frac{8}{3}a^3$
۳) $\frac{32}{9}a^3$
۴) $\frac{16}{3}\pi a^3$

۲۰- مقدار مساحت عرقچینی که از نیم‌کره $x^2 + y^2 + z^2 = 2 \cdot z \geq 0$ توسط استوانه $x^2 + y^2 = 1$ بریده می‌شود چقدر است؟

۱) $\sqrt{2}\pi$
۲) $\pi(2 - \sqrt{2})$
۳) $\pi(2\sqrt{2} - 1)$
۴) $2\pi(2 - \sqrt{2})$

۲۱- می‌دانیم که تبدیل لاپلاس $f(t) = \sin t$ برابر با $F(s) = \frac{1}{s^2 + 1}$ است. تبدیل لاپلاس $g(t) = t^2 \sin t$ کدام است؟

۱) $\frac{-2s}{(s^2 + 1)^2}$
۲) $\frac{6s^2 - 2}{(s^2 + 1)^3}$
۳) $\frac{4s^2 + 2}{(s^2 + 1)^3}$
۴) $\frac{2s^2 + 1}{(s^2 + 1)^2}$

۲۲- اگر $\lambda = 1$ مقدار ویژه مکرر مرتبه سوم ماتریس $\begin{pmatrix} 5 & -3 & -2 \\ 8 & -5 & -4 \\ -4 & 3 & a \end{pmatrix}$ باشد، مقدار a کدام است؟

۱) ۱
۲) ۱-
۳) ۳
۴) ۳-

فصل نهم

سؤالهای آزمون ورودی کارشناسی ارشد عمران
سال ۱۳۸۰

آزمون ۱۳۸۰

سؤالهای زبان تخصصی

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 continuity or 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 even if 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 wiht minimal costs of subsequent repair. Furthermore, bulidings and structures 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 2) motion 3) mechanism 4) manoeuvre

4- Choose the best word for the blank in the second paragraph

1) function 2) functioned 3) functional 4) functioning

Read the Reading B and answer the 4 following questions.

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 it 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 2 mm; 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 wellgraded, uniformly graded or poorly graded. A well- graded soil has a particle size distribution which includes a wide range of sizees 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 sizes and a deficiency in others. It is a poorly graded soil that exhibits weakness. This is because the voids bteween the particles existing in excess are bit 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 agant has little effect on a poorly graded soil unless material having the missing particle sizes is added and whe whole mixture thoroughly compacted.

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

			Particle size in	millimeters	
	60-2	2-0.06	0.06-0.002	less+han 0.002	
Soil A	6%	7%	8%	79%	
Soil B	25%	28%	23%	24%	
Soil C	10%	45%	5%	40%	

1) soil A 2) soil B 3) soil C 4) soils 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 and 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 size 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 stabilization.

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 valves 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 a 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 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 water hammer; however, the closure time to reduce the pressures for this section will be only a fration 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 os water hammer may be relieved by the release of a relatively small quantity of water.

Based on Reading C, choose the one which best completes each sentences 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 pipelines
4) to supply water when the water pressure in 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 in the long pipeline design

Read the Reading D and answer the 3 following questions.

Reading D

Storage Dams. The dams discussed here are normally used to store water for supplenentary irrigation, domestic water supply, recreational puirposes, stock ponds, or auxiliary flood control in tributaries of main streams. Their operation will rarely require continuous attention, except at seasonal intervals. 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 the reservoir, on the borrow pits used in construction, and on the slopes of earth-fill dams not otherwise protected is an important item of maintenace to which careful attention should be given. This cover is an essential item of protection against erosion and sloughing of banks, as well as beautification of the structure, and may have an importand influence on the cost of repairs. Expert advice on suppression of algae 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 following 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 of vegetative cover ... .

1) needs careful attention
2) nay increase the cost of repairs
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:

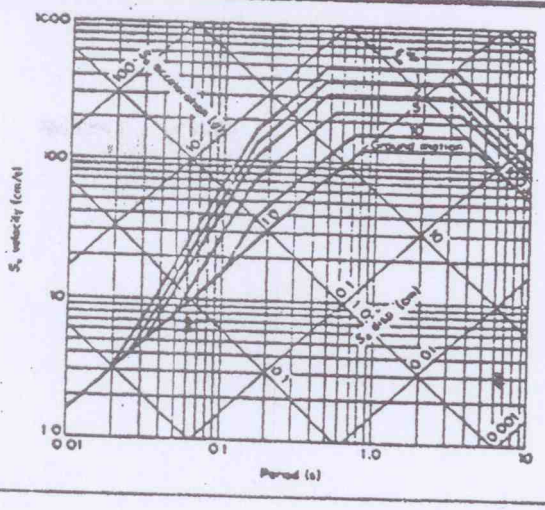
1) Artificial
2) Agricultural
3) entertainment
4) To creat again

15- In the following paragraph, choose the best word for the blank.

Newmark and Hall (1973). They averaged the response spectra of a large number of earthquake records, all scaled to a common peak ground acceleration, and, after some .... of the curves, produced the simplified normalized spectra shown in Fig A. The curves are all drawn for a maximum ground acceleration of 1.0 g, velocity of 122 cm/s, and displacement

of 91 cm.

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



سؤالهای ریاضیات — آزمون ۱۳۸۰

۱۶- به ازای کدام مقادیر a و b انتگرال $\int_A^B (۲axz + y^۲)\,dx + y\,(bx + az) + dy + (ax^۲ + y^۲)\,dz$ مستقل از مسیر است؟

۱) $a = b = ۱$ ۲) $a = b = ۲$ ۳) $a = ۱ , b = ۲$ ۴) $a = ۲ , b = ۱$

۱۷- مقدار انتگرال $\oint_C (۶y + x)\,dx + (y + ۲x)\,dy$ که در آن C، دایره $(x - ۲)^۲ + (y - ۳)^۲ = ۴$ پیموده شده (یک‌بار) در جهت خلاف عقربه‌های ساعت می‌باشد، کدام است؟

۱) -۱۶π ۲) -۴π ۳) صفر ۴) ۳۲π

۱۸- دو جواب مستقل معادله دیفرانسیل زیر به کدام صورت است؟

$$x^۲y'' + ۳xy' + (۱ + x)\,y = ۰ \quad , \quad x > ۰$$

۱) $y_۱(x) = \frac{۱}{x}\sum_{n=۰}^{\infty} a_n x^n$, $y_۲(x) = \frac{۱}{x}\sum_{n=۰}^{\infty} b_n x^n$

۲) $y_۱(x) = \sum_{n=۰}^{\infty} a_n x^n$, $y_۲(x) = \frac{۱}{x}\sum_{n=۰}^{\infty} b_n x^n$

۳) $y_۱(x) = \sum_{n=۰}^{\infty} a_n x^n$, $y_۲(x) = y_۱(x)\ln x + \sum_{n=۰}^{\infty} b_n x^n$

۴) $y_۱(x) = \frac{۱}{x}\sum_{n=۰}^{\infty} a_n x^n$, $y_۲(x) = y_۱(x)\ln x + \frac{۱}{x}\sum_{n=۱}^{\infty} b_n x^n$

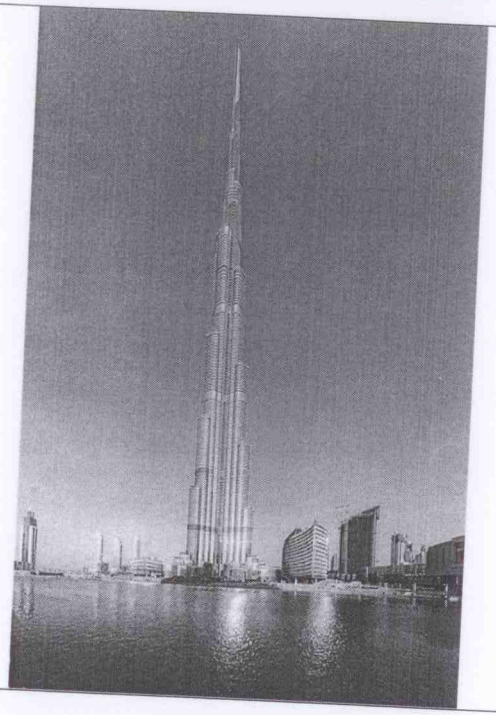
۱۹- مسئله مقدار اولیه زیر را در نظر می‌گیریم:

$$\begin{cases} ۴\dfrac{d^۲y}{dt^۲} - y = ۰ \\ y(۰) = ۲ \ , \ y'(۰) = \beta \end{cases}$$

به ازای چه مقدار β، وقتی $t \longrightarrow +\infty$، جواب مسئله به طرف صفر میل می‌کند؟

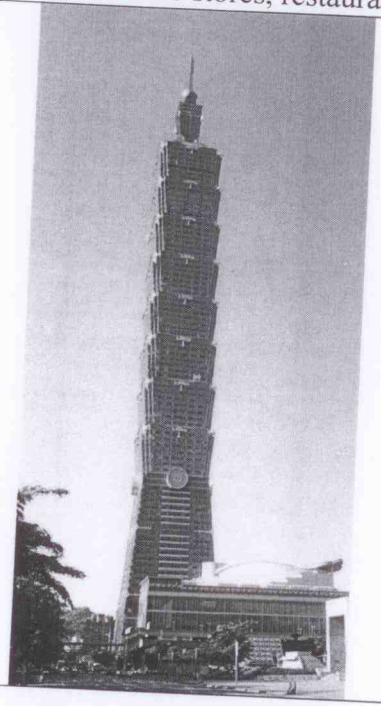
(Burj Khalifa – Dubai, United Arab Emirates – 828 m (2,717 ft

Burj Khalifa, known as Burj Dubai prior to its inauguration, is a skyscraper in Dubai, United Arab Emirates, and the tallest man-made structure ever built, at 828 m (2,717 ft). Construction began on 21 September 2004, with the exterior of the structure completed on 1 October 2009. The building officially opened on 4 January 2010, and is part of the new 2 km2 (490-acre) flagship development called Downtown Dubai at the 'First Interchange' along Sheikh Zayed Road, near .Dubai's main business district



(Taipei 101 – Taipei, Taiwan – 508 m (1,667 ft

Taipei 101, formerly known as the Taipei World Financial Center, is a landmark skyscraper located in Xinyi District, Taipei, Taiwan. The building ranked officially as the world's tallest from 2004 until the opening of the Burj Khalifa in Dubai in 2010. Taipei 101 comprises 101 floors above ground and 5 floors underground. The name of the tower reflects its floor count. The tower is designed to withstand typhoons and earthquakes. A multi-level shopping mall adjoins the tower houses to .hundreds of fashionable stores, restaurants and clubs



فصل دهم

سؤالهای آزمون ورودی کارشناسی ارشد عمران
سال ۱۳۸۱

آزمون ۱۳۸۱

سؤالهای زبان تخصصی

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. The earthquake - induced forces, that a building experiences, depend especially upon the mass of the building and upen 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 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 hight death toll in Agadir, Morocco. In California such buildings are not permitted, but are made of steel beams and columns, or reinforced concrete. Such properly - designed buildings, even when overstressed during a strong 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 structures 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 desigend 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 to 15 cycles per second
   3) high frequencies of 5 to 10 cycles per second
   4) the same frequencies as that of low, stiff building

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 meaning to which of the following?
   1) Cost in life
   2) Grievous price → having very serious effect or causing great pain
   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 Yamasaki 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 square base will measure 244 m.

Henry J.Guthard, the senior vice president of Minoru Yamasaki, says the Maharishi Tower will rely on four composite megacolumns for the main vertical support. The megacolumns-square,high-strength steel shells filled with concrete-will tilt toward the center as the building rises. About two-thrids 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 four columns will meet at the top.

"where the megacolumns 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 convention 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 building's interior, as well as move people around within the structure.

With a population of 18 milion, Sao Paulo is the third-largest city in the world". The building represents the belief that there is sufficient capital in Brazil and faith in 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-taht 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 with concrete

2) high strength concrete columns with steel shields

3) square concrete

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 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 earthquake-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 Paolo than there is in Jabalpur

4) the people movers system will transport construction workers between the work site

Read the passage III and answer the 4 following questions

Rassage 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 Salle, Ontario, was designed to honor the town's eponym, the French explorer Robert La Salle(1643 - 87). The cable - stayed footbridge, which is 40m 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 structrue with a deck consisting of 2 m wide by 2.4 m long sections and two 9.8m masts with a bearing capacity of 45,360 kg each. The masts are each supported by 18,140 kg of concrete and employ about 1 km 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 5 m 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 well - used structure in the community. "It's become something of a landmark" 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, 140 kg

4) the vertical poles at each end of the bridge

14. The deck was primarily construcred .... .

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 9.8 m long wooden planks from the original sailing ship

15. The word "eponym" meams .... .

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

سؤالهای ریاضیات — آزمون ۱۳۸۱

۱۶- با توجه به آنکه تبدیل لاپلاس تابع sint برابر است با $\frac{۱}{s^۲+۱}$، تبدیل لاپلاس تابع $f(t)=\frac{sint}{t}$ کدام است؟

(یادآوری می‌شود که تبدیل لاپلاس تابع f با رابطه $F(s)=\int_{۰}^{\infty} f(t)e^{-st}dt$ تعریف می‌شود.)

۱) $F(s)=-arc\ tgs$

۲) $F(s)=\frac{\pi}{۲}-arc\ tgs$

۳) $F(s)=\frac{\pi}{۲}+arc\ tgs$

۴) $F(s)=arctgs-\frac{\pi}{۲}$

۱۷- جواب مسأله مقدار اولیه $\begin{cases} x''+x=f(t) & , \quad t\geq ۰ \\ x(۰)=۰ & , \quad x'(۰)=۰ \end{cases}$ کدام است؟

۱) $x(t)=\int_{۰}^{t} f(u)cos(t-u)du$

۲) $x(t)=\int_{۰}^{t} f(u)sin(t+u)du$

۳) $x(t)=\int_{۰}^{t} f(u)sin(t-u)du$

۴) $x(t)=\int_{۰}^{t} f(u)cos(t+u)du$

۱۸- یک جواب معادله دیفرانسیل $X^۲Y''+۸X^۲Y'+(۴X^۲+۱)Y=۰\ ،\ X>۰$ کدام است؟

۱) $Y=\sum_{n=۰}^{\infty} a_nX^n$

۲) $Y=X^۲\sum_{n=۰}^{\infty} a_nX^n$

۳) $Y=X^{-۱/۲}\sum_{n=۰}^{\infty} a_nX^n$

۴) $Y=X^{۱/۲}\sum_{n=۰}^{\infty} a_nX^n$

۱۹- جواب عمومی معادله دیفرانسیل $y''+y=۲sinx$ کدام است؟

۱) $y=c_۱cosx+c_۲sinx-xcosx$

۲) $y=c_۱coshx+c_۲sinhx+۲sinx$

فصل یازدهم

سؤالهای آزمون ورودی کارشناسی ارشد عمران
سال ۱۳۸۲

آزمون ۱۳۸۲

سؤالهای زبان تخصصی

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 type and size of structure. Various methods of differing complexity have been developed for the dynamic seismic analysis of structures. They all have in comrnon the solution of the equations of motion as well as the usual statical relationships of equilibrium and stiffness. For any structure with more than three degrees of freedom such analyses are carried 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 pro-cedures;

(II) normal mode analysis;

(II) response spectrum techniques;

Italic 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 durig the earthquake is computed. That is, the moment and force diagrams 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 integ-ration 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. [16]

In principle, this is the most complete dynamic analysis technique so far devised, and is unfortunately correspondingly expensive to carry out.

Italic 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 superposition the technique is limited to linear material behaviour. Although modal analysis can provide any desired order of accuracy for linear behaviour by incorporating all the modal responses, some approximation is usually made by using only the first few modes in order to save computation time. Problems are encountered in dealing 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. [17] For important structures in zones of high seismic risk, non-linear dynamic analysis is sometimes called for.

Italic [18,19,20] is really a simplified special case of modal analysis. The modes of vibration are determinnd 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, simulations of non-linear behaviour have been made using pairs of response spectra, one for deflections and one for accelerations. [21,22] 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-liear behavior by spectral techniques is described by shepherd ad McConnel. [23] They conclude that non-linear response spectrum techniques may be best applied only to structures beaving 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 predictions 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 modal responses.

2) Stochastic response of linear systems.

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 spectra for simulations of non-linear behaviour 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 not the same as the pattern of plastic deformation

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^2 posttensioned concrete structure is divided into office, hotel, and residential levels, respectively, form 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 4.3 m above sea level, or 2.3 m above the buildings ground floor elevation. The curtain wall is reinforced to withstand water pressure on the exterior, much like an aquarium in revers'e. 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 25 mm 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 trip wall about 450 mm 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^{th} and 25^{th} floors. On the 23^{rd} and 24^{th} floors, two concrete outrigger walls about 9m

Espirito Santo Plaza

From Wikipedia, the free encyclopedia

Espirito Santo Plaza is an office skyscraper in Brickell in Downtown Miami, Florida, United States. It was designed by the renowned architectural firm of Kohn Pedersen Fox Associates PC (KPF). The 505-foot (168 meter), 36-story building is located on the southern end of Brickell Avenue in the Financial District.

The architecture is based loosely on the Saint Louis Arch, of which its front façade loosely mimics. One of Miami's common nicknames is "The Gateway to Latin America," which also closely resembles Saint Louis' nickname, "The Gateway to the West." It is said to welcome people to the United States as the arch welcomes people to the west.[1]

The building is the North American headquarters for the Espírito Santo Bank and contains some Class A office space. A Conrad Hotel as well as some residential units occupy the remaining space. The building opened July 1, 2004, and is located at 1395 Brickell Avenue, less than a block from the Financial District Metromover Station.

The building has been featured twice in *Burn Notice*, once as headquarters for an architectural company, and again in a skyline shot.

Espirito Santo Plaza

Espirito Santo Plaza on Brickell Avenue

Type	Office
Location	1395 Brickell Avenue, Miami, Florida, United States
Started	2001
Completed	2004
Opening	2004
Roof	505 ft (154 m)
Floor count	36
Architect	Kohn Pedersen Fox Associates PC (KPF), Bermello Ajamil and Partners DJMJ (B&A)
Structural engineer	Leslie E. Robertson Associates RLLP

Contents

- 1 Tenants
- 2 Gallery
- 3 See also
- 4 References
- 5 External links

Tenants

- French Consulate General, Miami (Suite 1050)[2]

Espirito Santo Bank (http://www.esbf.com) Suite 400

Gallery

View of the backside of the tower from the pool deck of the Four Seasons hotel in May 2008

high and 700 mm 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 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 rise 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 the edge of the property.
3) flat-plate construction on the hotel and residential floors.
4) windows made of extra glass reinforced with a 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 contractor's services from both government and private industry; during periods of recession, Federal and state governments tend to accelerate public-works programs 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 relationships among owners, architects, engineers, general governmental bodies and agencies, labor, and others.

Technological advances are resulting ~~in more complex facilities~~ 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 contractor a key figure in the economy.

Read the passage c and answer the 4 following questions.

12- The best title for above passage is .....

1) stability of industry
2) Role of Contractors
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
2) grow up
3) demolish
4) counterbalance

15- During periods of recession .....

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

فصل دوازدهم

سؤالهای آزمون ورودی کارشناسی ارشد عمران
سال ۱۳۸۳

آزمون ۱۳۸۳

سؤالهای زبان تخصصی

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

Passage A:

Earthquake Damage Report

On February 28,2001,a magnitude 6.8 earthquake struck western Washington state. The epicenter was approximately 18 km northeast of Olympia, the state capital, and approximately 58 km southwest of Seattle. It is estimated that the maximum energy release occurred at a depth of 60 km, 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 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 teamed 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 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 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 decent, 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 0.10 g. However, no recordings are available within about 20 km 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 an 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 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, 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 to manufacturing office parks, and commercial hubs and the buildings

typical!y are of older In addition to URMS, there are precast-concrete, concrete frame, and reinforced masonry structures.

Lifeline systems--including bridges, water and wastewater systems, electric power plants, and telecommunications facilities--performed verv we!!. These systems are vulnerable to liquefaction and lateral spreading, to and to ground shaking. Only limited liquefaction and lateral spreading occurred, and this was in the ports of Olympia and Seattle and in the southern part'of the Duwamish River valley. Only one maior 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 40 km northeast of the epicenter, was closed immediately after the earthquake because of extensive to the control tower. The tower was constructed in about 1970 atop a terminal building that the 1940 s. Amplification of motion through the terminal and tower structures was sufficient to 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 in the tower the failure of ceiling systems. This vulnerability had been brought to light by EQE in a 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.

Interstate 5 is the major north-south thoroughfare the Seattle area. Several other highways provide east-west access across the region, with a number of bridges at the many river, lake, and bay crossings. State Route 99 skirts the western edge of downtown Seattle on a viaduct which is similar in age and construction to the Cypress Freeway/I-880 viaduct collapsed in Oakland, California,in1989 during the Loma Prieta earthquake. Fortunately, the Nisqually temblor caused only relatively minor damage and disruption to the transportation network.

The failure of two modern bridges on 1-5 is of interest. The Holgate overpass, an early 1980s design, experienced a short-column failure. The 4th Avenue on-ramp, which is less than five years old, was closed as the result of a bearing failure.

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 earthquakes 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 20 km of the epicenter.

3) The ground motion was moderate because the fault rupture took place at a depth of 60 km.

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 is 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 is 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 the 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 areas where structures are older, in general, than in the 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 /min; the new facility would require 13,250 m /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[1] lead technical manager for the water and wastewater components of the project. An elevated 3,800 m^3 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 42,000 m 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 950 m /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 1,900 m 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 directed 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 4,900 m^3 /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 in coordination with the town and the various contractors has been one of the most challenging and rewarding parts 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 ransportation plan mitigated the conflicts between vehicular and pedestrian traffic by creating large pedestrian walkways, including four underpasses below roadways, to separate the two traffic types. Off-site, the major transportation improvements, funded by MassHighway, consisted of two grade-separated interchanges on Route 1, ramp improvements at the interchanges between.

Route 1 and the interstate system; and reconstruction of Route 1 in the vicinity of the stadium. The two main paths into the stadium grounds--Route 1 southbound and northbound--were separated at grade so that southbound traffic crosses under a bridge carrying the northbound traffic, eliminating the potential left-turn conflict. To provide access to the back entrance of the stadium, a concrete arch bridge having two llm spans crosses the Neponset River.

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 24 m 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 through 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 event 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.

14- MassHighway funded:
1) Reconstruction of the interstate and pedestrian bridges on the stadium site.
2) A bridge crossing thr Neponset River and pedestrian bridges on the stadium site.
3) Reconstruction of a portion of Route 1 and a bridge crossing the Neponset River.
4) An overpass for northbound Route 1 traffic and an exit ramp the interstate to the stadium grounds.

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

15- A material is said to be ductile if it can undergo large,..... deformations before fracture.
1) residual 2) temporary 3) dynamical 4) permanent

16- Properly done for a long period,..... produces stronger, more watertight concrete.
1) curing 2) vibration 3) admixture 4) reinforcement

17- 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

18- 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 (OK) 4) resistant

19- The directions 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

20- The soil for foundations can be altered to conform to desired characteristics by..... consolidation and or its replacement with select material.
1) vibration 2) mixtures 3) saturation 4) compaction

فصل سیزدهم

سؤالهای آزمون ورودی کارشناسی ارشد عمران
سال ۱۳۸۴

آزمون ۱۳۸۴

سؤالهای زبان تخصصی

Read the following pussage (A) carefnlly Ilnd answer the 7 questions.

Passage A:

Seismic behaviour of.soil-structure systems

The importance of the nature of the sub-soil for the seismic response of structures has been demonstrated in many earthquake, understanding of the factors involved has only recently begun to emergo for example it seems clear from stuches of recent earthquakes mar the rela tionship 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 the case of the 1970 earthquake at Gediz, Turkey, part of a factory was demolished in a town 135 km from the epicentre 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 uedrock.46 Extensive damage to mediumrise buildings (5-9 storeys) was reported in areas where depth to bedrock was less than 100 m while in areas where the alluvium thickness exceeded 150 In the damage was greater in taller buildings (over 14 storeys). The depth of alluvium is of course directly related to the periods of vibration of the soil. Considering shear waves travelling vertically through a soil layer of depth H, the periods of horizontal vibration of the soil are given by

$$T_n = \frac{4H}{(2n-1)v_s}$$

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 throup;h the overlying soils to the foundation. This may cause attenuation or amplification effects.

(ii) The fixed base dynamic properties of the structure may he significanny modified by the prescncc of soils overlying bedrock. This will include changes 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 m.aterial damping and radiaiion damping in the supporting medium.

Items (ii) and (iii) above are. investigated under the general title :of *soi/structure interaction* which may be defined as the interdependent response relationship between a structure and its supporting soil. The behaviour of the 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 petermining 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 baseo regardless of the soil conditions. However intensive study in reccnt years has produced considerable advances in our knowlcdge of soil-structmc interaction effects and also in the analytical tcchniques available, as discussed below.

1- During the Gediz earthquake, part of a factory was demolished. because of :
1) soH alluvium 2) vertical vibration
3) horizontal vibralion 4) resonance phenomenon

2- What is the predominate pcriod (in second) of a clay soil layer at 20 m depth with a velocity 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 menns: The act of
1) beating 2) washing 3) purifying 4) amplifying

5- The word damping means:

۱) منحنی ۲) غالب ۳) استهلاک ۴) بزرگنمایی

According to the passugc A, in the 2 following sentcnces choost: the approprinte wonl for blanks.

6- Ideally the earthquake motion should be applied at ..... to the complete soil-Struct 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 repress the nature of ..... shaking appropriate for the site, but also represents a suitable leve risk.

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

Read the following passage (B) and answer the 8 following 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— 508 m— and unique shape of the buildıng posed a series of challenges for the engineers who developed its structural scheme and had to devise a way fo found the skyscraper of weak geologic formations in an area known for extreme typhoons and calhquahoo.

The height of the structure presented one of the greatest challenges for engineers. Fach level added to a sky scraper comes at an ever increasing cost, in effect the vonw stony is added at the bottom of the building sivee it must include suffieient strnture to cory the floor above it and include enough space to house elevator and stair extensions, plus utility risers for mechanical, electrical, plumbing and fire proteetion systems. An economic limit on the height of a building oceurs when the cost of adding a level exceeds the revenue it will generate.

The tower was conceived as a structure encompassing 200,000 m^2 and snrrounded at the base by an cnlled "the podium" an additional 200,000 m^2 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 soil required extensive geotechnical sampling and investigation. The groundwater level is normally 2 m 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 to excessive settlement or soil bearing fililure, so the engineers designed a deep foundati~n to transfer the building's weight directly to bedrock. Greater loads require larger or more numerous deep foundalion 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 requiremcnts or high-rise collstlllctioll. I klow the repetitive modules that Hare upward,

thc tower has a 25-story basc shaped as a truncated pyramid that offers struetural benefits. A wide base provides better overturning resistanee and lateral stiffness than a straight shaft, if the structural system engages the perimerer 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 or Ihe buildillg is straight from bottom to top.
2) the profile of the building grows narrower at one point and then widens again.
3) the proflle of the building grows narrower at one point and thcn rises straight up.
4) the sides of the building are straight up to the 62nd level and then taper toward the ecnter.

9- The cost of adding levels to a skyseraper:
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 or the building to add levels form the bottom.
4) includes adequate structures 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 thc building:
1) based on concepts of culture and beauty.
2) tnking in to considemtion 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) includc resistance to overturning and lateral stiffness.
3) were lesscncd because it does not engage the perimeter colwnns.
4) were a major consideration when the shape of the building was chosen.

14- The foundation of the skyscrnpcr 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 transfers the the bedrock.

to

15- The building was designcd as if thc watcr table were:
1) at ground level
2) two meters below the surface.
3) 40 to 60 mcters below the surfacc.
4) level with thc bottolll of the five-slory 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) bcrthing 4) anchorage

17- The rate of ..... of pavemcnts is u function of the traffic using the roud.
1) corrosion 2) dctcrioration 3) wear and tcar 4) displaccments

18- The increase in carboll contcnt of stecl .....
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) stiffenering

20- In finite element formulation, the displacements of two elemcnts at their juncture line must.
1) identical 2) equivalent 3) comparable 4) compatible

آزمون ۱۳۸۴

سؤالهای ریاضیات

۲۱- کار انجام شده توسط نیروی $\vec{F} = (xy, yz, xz)$ در طول منحنی $\vec{R} = (t, t^2, t^3)$ با فرض $0 \le t \le 1$ برابر است با:

۱) ۷ ۲) $\frac{۳۲}{۱۱}$ ۳) ۱۱ ۴) $\frac{۲۷}{۲۸}$

۲۲- جواب معادله $x^2y'' + 5xy' + 4y = 0$ وقتی که $x \to \infty$ برابر است با:

۱) صفر ۲) ۱ ۳) e ۴) ∞

۲۳- انتگرال $\int_0^{\infty} \frac{e^{-x}}{\sqrt{x}} dx$ برابر است با:

۱) $-\pi$ ۲) صفر ۳) $\sqrt{\pi}$ ۴) 2π

۲۴- معادله شاخص معادله دیفرانسیل $4xy'' + 2y' + y = 0$ که به روش فروبینیوس حل می‌شود دارای ریشه‌هایی به صورت زیر هستند؟

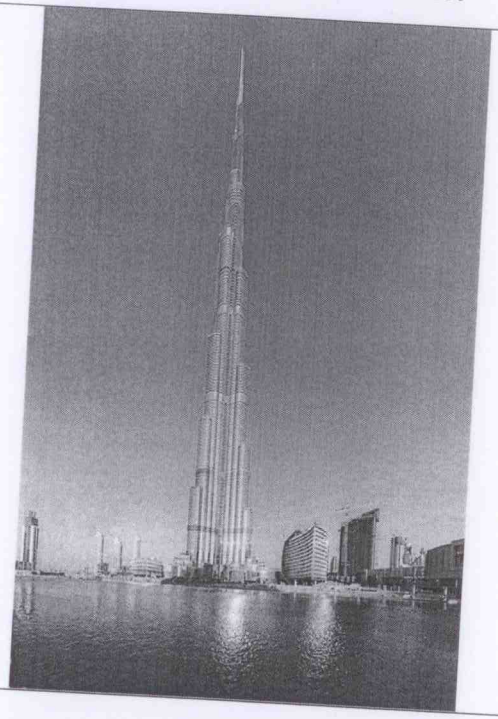
۱) ۱- و ۱ ۲) $\frac{1}{2}$ و ۰ ۳) $\frac{1}{2}$ و ۱ ۴) ۱- و ۰

۲۵- اگر y جواب مسأله زیر باشد:

$$y'' + 4y = \begin{cases} 1 & , \ 0 \le t < \pi \\ 0 & , \ \pi \le t < \infty \end{cases}$$

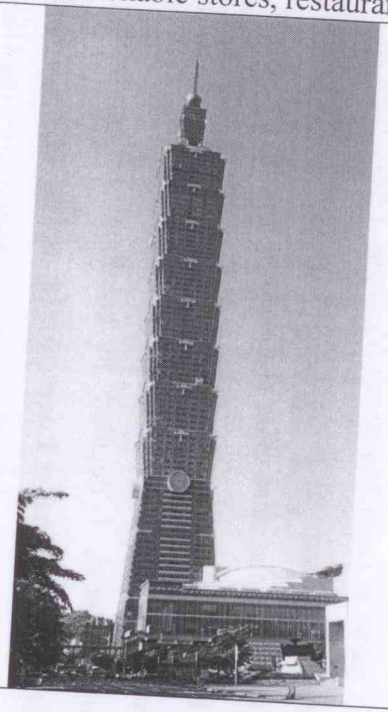
(Burj Khalifa – Dubai, United Arab Emirates – 828 m (2,717 ft

Burj Khalifa, known as Burj Dubai prior to its inauguration, is a skyscraper in Dubai, United Arab Emirates, and the tallest man-made structure ever built, at 828 m (2,717 ft). Construction began on 21 September 2004, with the exterior of the structure completed on 1 October 2009. The building officially opened on 4 January 2010, and is part of the new 2 km2 (490-acre) flagship development called Downtown Dubai at the 'First Interchange' along Sheikh Zayed Road, near .Dubai's main business district



(Taipei 101 – Taipei, Taiwan – 508 m (1,667 ft

Taipei 101, formerly known as the Taipei World Financial Center, is a landmark skyscraper located in Xinyi District, Taipei, Taiwan. The building ranked officially as the world's tallest from 2004 until the opening of the Burj Khalifa in Dubai in 2010. Taipei 101 comprises 101 floors above ground and 5 floors underground. The name of the tower reflects its floor count. The tower is designed to withstand typhoons and earthquakes. A multi-level shopping mall adjoins the tower houses to .hundreds of fashionable stores, restaurants and clubs



فصل چهاردهم

سؤالهای آزمون ورودی کارشناسی ارشد عمران
سال ۱۳۸۵

آزمون ۱۳۸۵

سؤالهای زبان تخصصی

Technical English for Civil Engineers

Section A: Comprehension

Passage A1. Effect of Design on Behavior

A structure which is designed for very much larger horizontal earthquake forces than are ordinary will have a shorter period of vibration because of its greater stiffness. The shorter period results in higher spectral accelerations, so that the stiffer structure may attract more horizontal force. Thus, a structure designed for too large force will not necessarily be safer than a similar structure based on smaller forces. On the other hand, a design based on too small force makes the structure more flexible and will increase the relative deflections of the floor.

In general, yielding occurs first in the story that is weakest compared with the magnitudes of the shearing forces to be transmitted. In many cases this will be near the base of the structure. In the system is essentially elastoplastic, the forces transmitted through the yielded story cannot exceed the yield shear of that story. Thus, the shears, accelerations, and relative deflections of the portion of the structure above the yield floor are reduced compared with those of an elastic structure subject to the same base motion. Consequently, if a structure is designed for a base shear which is less than the maximum value computed for an elastic system, the lower story will yield and the shears in the upper stories will be reduced. This maens that, with proper provision of energy absorption in the lower stories, a structure will, in general, have adequate strength provided the design shearing forces for the upper stories are consistent with the design base shear.

A significant inelastic deformation in structure *inhibits* the higher modes of oscillation.

readily understood design models that provide reliability, economy of use, as well as some economical tradeoff from a valueengineering point of view.

balancing two opposing situations or qualities.

Based on the passage A2, choose (1), (2), (3), or (4) which best completes each item:

5- Design of semi-rigid connections ..... .
1) requires additional modeling and analysis
2) is the only reliable and economical option
3) will be allowed within next 10 years
4) is still not practical

6- In frameworks, connections ..... .
1) contribute to global performance and member sizing
2) are classified to be flexible or semi-rigid
3) are selected based on value engineering
4) are either pinned or rigid

7- What is the best equivalent to the word "imminent".
1) safe 2) enforcing 3) impossible 4) about to happen

8- The most desirable perception in the framework connections ..... .
belief
1) to achieve economical solution
2) to advance the analytical techniques
3) to incorporate various choices with assurance
4) to elaborate further modeling and classification a spects.

Section B:

Choose (1), (2), (3), or (4) which best completes technically each individual item

9- A material is said to be ductile if it can undergo large .....deformations before fracture.
1) residual 2) temporary 3) permanent 4) dynamical

10- Properly done for a long period, ... produces stronger, more watertight concrete.
1) vibration 2) curing 3) admixture 4) reinforcement

make well

11- For concrete without ..... air, the duration of protection against freezing should be twice as long for maximum durability.
1) enclosed 2) entranced 3) entrained 4) entertained

12- The directions in which the normal stresses become maximum or minimum are called .....
1) principal directions 2) Mohr's directions
3) orthogonal directions 4) major and minor directions

13- The soil for foundations can be altered to conform to desired characteristics by ....., consolidation and or its replacement with select material.
1) mixtures 2) compaction 3) vibration 4) saturation

فصل چهاردهم

سؤالهای آزمون ورودی کارشناسی ارشد عمران
سال ۱۳۸۵

آزمون ۱۳۸۵

سؤالهای زبان تخصصی

Technical English for Civil Engineers

Section A: Comprehension

Passage A1. Effect of Design on Behavior

A structure which is designed for very much larger horizontal earthquake forces than are ordinary will have a shorter period of vibration because of its greater stiffness. The shorter period results in higher spectral accelerations, so that the stiffer structure may attract more horizontal force. Thus, a structure designed for too large force will not necessarily be safer than a similar structure based on smaller forces. On the other hand, a design based on too small force makes the structure more flexible and will increase the relative deflections of the floor.

In general, yielding occurs first in the story that is weakest compared with the magnitudes of the shearing forces to be transmitted. In many cases this will be near the base of the structure. In the system is essentially elastoplastic, the forces transmitted through the yielded story cannot exceed the yield shear of that story. Thus, the shears, accelerations, and relative deflections of the portion of the structure above the yield floor are reduced compared with those of an elastic structure subject to the same base motion. Consequently, if a structure is designed for a base shear which is less than the maximum value computed for an elastic system, the lower story will yield and the shears in the upper stories will be reduced. This maens that, with proper provision of energy absorption in the lower stories, a structure will, in general, have adequate strength provided the design shearing forces for the upper stories are consistent with the design base shear.

A significant inelastic deformation in structure *inhibits* the higher modes of oscillation.

Therefore, the major deformation is in the mode in which the inelastic deformation predominates, which is usually the fundamental mode.

Based on passage A1, choose (1), (2), (3), or (4) which best completes each item:

1- The main message of above passage is ..... .
1) to design the structure for small horizontal force.
2) to design the structure for greater horizontal force
3) to design for consistent shearing forces and ductility
4) to design the structure for small horizontal force

2- The structure failure against earthquake will primarily occur in the ..... .
1) first floor 2) foundation 3) lowest floor 4) weakest floor

3- The fundamental mode of vibration ..... .
1) governs the primary behavior of structure
2) posses greater period than higher modes
3) is most representative of major deformation of structure
4) all above

4- What is the synonym for the word "inhibit" in above passage ..... .
1) exhibits 2) restrain 3) increase 4) represent

Passage A2. Semi-Rigid Connections in Steel

Semi rigid connections in steel structures have been in various phases of development for over 50 years and appear to be at the genesis of utilization as the twentiesth century has drawn to an end. It is believed that within 10 years there will be an international explosion of new uses and innovative applications of the semi-rigid approach.

After a century of utilization of structural steel as a practical framing material, designers are finally looking at the role of connections in frameworks with a more critical eye. In buildings, connections were expected to act as either pinned or rigid joints. In between, semi-rigid performance was too unpredictable and also not worth unraveling the additional analyses, despite obvious benefits of some weight or size reduction in the connected member. Today the onrush of technological development is removing those historical barriers and more versatility in connection design appears *imminet*. The reason is the pervasive development of information on a global basis which continues to shed light and provide behavior models that offer predictability, reliability, and economical options.

Perhaps the most important need today in the field of steel connection technology is a better way of classifying and labeling the different connection types in terms of the range of their practical performance. There still remains some confusion as to what is meant by "partially restrained", "flexible", or "semi-rigid" connections. It would seem that before structural designers begin utilizing such connections as part of the steel design process, they need to be reassured that they understand the effect the conection has on the structure's performance as a whole. This includes

readily understood design models that provide reliability, economy of use, as well as some economical tradeoff from a valueengineering point of view.

Based on the passage A2, choose (1), (2), (3), or (4) which best completes each item:

5- Design of semi-rigid connections ..... .
1) requires additional modeling and analysis
2) is the only reliable and economical option
3) will be allowed within next 10 years
4) is still not practical

6- In frameworks, connections ..... .
1) contribute to global performance and member sizing
2) are classified to be flexible or semi-rigid
3) are selected based on value engineering
4) are either pinned or rigid

7- What is the best equivalent to the word "imminent".
1) safe 2) enforcing 3) impossible 4) about to happen

8- The most desirable perception in the framework connections ..... .
1) to achieve economical solution
2) to advance the analytical techniques
3) to incorporate various choices with assurance
4) to elaborate further modeling and classification a spects.

Section B:

Choose (1), (2), (3), or (4) which best completes technically each individual item

9- A material is said to be ductile if it can undergo large .....deformations before fracture.
1) residual 2) temporary 3) permanent 4) dynamical

10- Properly done for a long period, ... produces stronger, more watertight concrete.
1) vibration 2) curing 3) admixture 4) reinforcement

11- For concrete without ..... air, the duration of protection against freezing should be twice as long for maximum durability.
1) enclosed 2) entranced 3) entrained 4) entertained

12- The directions in which the normal stresses become maximum or minimum are called .....
1) principal directions 2) Mohr's directions
3) orthogonal directions 4) major and minor directions

13- The soil for foundations can be altered to conform to desired characteristics by ....., consolidation and or its replacement with select material.
1) mixtures 2) compaction 3) vibration 4) saturation

14- Local waves within the harbor make ..... difficult, if not possible.

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

15- The rate of ..... of pavements is a function of the traffic using the road.

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

16- The increase in carbon content of steel ..... .

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

17- By ..... the plate-grider web, its resistance to buckling will be increased.

1) widening 2) stiffening 3) hardening 4) stiffenring

18- In finite element formulation, the displacements of two elements at their juncture line must be ..... .

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

19- ..... systems are generally subject to time-dependent constraints.

1) Stable 2) Unstable 3) Unreliable 4) nonconservative

20- The theory of wave motion in elastic solids receives a very important application in ..... .

1) sounding 2) seismology 3) morphology 4) marine experiments

آزمون ۱۳۸۵

سؤالهای ریاضیات

۲۱- اگر $\vec{F}(x,y,z) = x\vec{i} - ۲y\vec{j} + ۴z\vec{k} = (x,-۲y,۴z)$ و S کره $x^۲ + y^۲ + z^۲ = a^۲$، $a > ۰$ باشد، مقدار انتگرال $\iint_S \vec{F}.\vec{n}dS$ که در آن $\vec{n}$ بردار قائم یکه خارجی S است، برابر با چیست؟

۱) $\frac{۴}{۳}\pi a^۳$ ۲) $۲\pi a^۳$ ۳) $۳\pi a^۳$ ۴) $۴\pi a^۳$

۲۲- مقدار انتگرال $I = \oint_C (x\sin(y^۲) - y^۲)dx + (x^۲ y\cos(y^۲) + ۳x)dy$ که در آن C مرز ذوزنقه به رئوس $(۲-,۰)$ و $(۱-,۱)$، $(۱,۱)$ و $(۰,۲)$ می‌باشد و در جهت مثبت (خلاف عقربه‌های ساعت) پیموده شده است، برابر با چیست؟

۱) ۵ ۲) ۶ ۳) ۸ ۴) ۹

۲۳- مقدار انتگرال $\int_۰^۲ [t^۲]dt$ که در آن $[t^۲]$ جزء صحیح $t^۲$ می‌باشد برابر با چیست؟

۱) $۵ - \sqrt{۲} - \sqrt{۳}$ ۲) $۴ - \sqrt{۲} - \sqrt{۳}$ ۳) $۵ - ۲\sqrt{۲} - \sqrt{۳}$ ۴) $۴ - ۲\sqrt{۲} - \sqrt{۳}$

1- From this article, it can be understood:

1) that this robot is still in the development stage.

2) that this robot is currently in use in some places.

3) that this robot is being produced in significant numbers.

4) that this robot will not be ready for testing for several years.

2- The main purpose in the creation of such a robot is to:

1) reduce construction time on roads in unstable areas.

2) save money in the construction of roads in unstable areas.

3) reduce the need for workers to work in dangerous positions.

4) increase understanding of the role of satellites in stabilizing roads.

3- The legs are designed to:

1) insert 1,500 mm rods into the soil.

2) position the robot parallel to the surface.

3) support and balance the robot while it drills into the soil.

4) carry up to 3,000 kg of weight in addition to the weight of the robot.

4- Stabilizing the soil by inserting rods into it:

1) helps prevent landslides.

2) prepares the soil to support a road.

3) eliminates the need for construction workers.

4) is a technique used mainly on the walls of stream beds.

5- In this article, what is "the contraption"?

1) the robot itself. 2) The legs of the robot.

3) The drilling tool of the robot. 4) The Cartesian architecture of the robot.

6- It can be inferred from the article that:

1) the robot will require scaffolding for support.

2) the robot must be heavy in order to be stable.

3) the robot will be satellite controlled.

4) the robot is computer operated.

Directions: Read the following two passages and answer the 6 following questions from each:

Robot Will Stabilize Steep Slopes

A large remote controlled may soon be able to stabilize slopes that are prone to landslides, thereby sparing construction employees the need to expose themselves to danger on steep or unstable terrain.

Robatic technologies that were first developed to move satellites into their correct orbits are being adapted by engineers interested in preventing even small landslides, which threaten thousands of homes and lives each year. the 2 m tall robot can perform a common slope–stabilizing function–drilling rods into soil.

The robot features an adjustable, rotating tool that can drill 20 m deep holes in the earth from any angle and has a separate arm with the ability to insert a series of steel rods 1,500mm long and 73mm in diameter into the holes. The contraption's four legs can rotate up to 110 degrees, enabling the robot to "walk", and remain stable, on very steep slopes.

Every leg has a Cartesian architecture so that one limb may extend parallel to the surface, while a second limb may go back and forth over the surface. The hydraulically powered legs can withstand vertical and lateral forces of up to 20 kN, enabling them to sustain the 3,000 kg weight of the contraption at nearly any angle.

Current plans call for the use of stability analysis software so that the robot can monitor the locations of its legs and its overall equilibrium and, if necessary, take corrective action. It will spare people the need to rappel down steep slopes or work on scaffolds at great heights. By eliminating or at least reducing the need for people to work under such conditions, the robot will contribute to increasing safety of the workers.

The designers expect to test the robot's hole–drilling capabilities this spring, with a test of its ability to make its way along unstable slopes to follow soon after.

Remediated Dredge Material Used to Create Cement

Every year millions of cubic meters of contaminated materials are dredged from bays and ports to maintain the water's depth. This hazardous material generally ends up in land fills. In an effort to decontaminate and reuse the material, as well as conserve land fill space, experts are testing turning dredged matter into an ingredient of portland cement.

The test uses a process called cement lock, which treats contamination in two ways. First the dredged material is inserted into a rotary kiln that reaches temperatures of 1,315°C to 1,426°C. The heat breaks down such contaminants as polychlorinated biphenyls (PCBs) into their benign constituent parts. The resulting material is then passed through a carbon filter to remove such toxins as mercury and allowed to cool. The process creates a glasslike product called Ecomelt, which is then ground into a fine powdered and added to cement to give it weight and volume. When it is blended into cement, it takes part in the curing of concrete. It is similar to granulated glass furnace slag and is very uniform and consistent.

In November and December last year, some 305 m^3 of material dredged from a harbor was treated this way and the resulting 136 Mg of Ecomelt was destined to replace shale in a concrete roadway. Shale has to be mined, and that creates its own environmental problems. Using Ecomelt not only saves landfill space, but also prevents the creation of more waste by using an already existing material as a component of cement.

The kiln used in the pilot test captured the contaminants from the treatment process rather than releasing them into the air. The emissions control aspects and the monitoring protocols all led to a good environmental outcome.

Ecomelt has also been tested against ASTM International's standards for compressive strength with a favorable result, and, although no long term tests have been conducted on its life cycle, the material is expected to be as durable and reliable an ingredient as furnace slag.

A commercial-scale rotary kiln that can treat up to 382,400 m^3 of dredged material a year is being developed. Other ways of treating and reusing contaminated dredged

material are also being investigated. The goal is to establish a self-sustaining new industry that regularly uses dredged material as building material.

7- The main reason that material is dredged from waterways is:

1) to be used in landfills.
2) to reduce contamination.
3) to be used as an ingredient in Portland cement.
4) to keep the water from becoming too shallow.

8- In the cement lock process:

1) PCBs are produced.
2) the contaminated material is first heated and then filtered.
3) the dredged material is "locked" into the concrete as it dries.
4) the contaminated material is ground into powder and then filtered.

9- Ecomelt:

1) is also a name for furnace slag.
2) has been tested for long term durability.
3) is the scientific term used for the product created by cement lock.
4) is the commercial name for the product of the cement lock process.

10- Ecomelt is better than shale because:

1) it doesn't have to be mined.
2) it can be used in concrete roadways.
3) it does not require the used of furnace slag.
4) shale's contaminants are released into the air.

11- It is clear from the article that the rotary kiln being developed:

1) will also filter the material.
2) will not meet the demand of the industry Ecomelt.
3) will meet environmental standards similar to those of the test kiln.
4) will also be used for other ways of disposing of contaminated material.

12- The overall goal of the designers developing Ecomelt is:

1) to reduce environmental contamination created in the production of Portland cement.

2) to dispose of dredged material in a profitable and environmentally friendly way.

3) to find a cheaper way of producing Portland cement.

4) to find a better substitute for furnace slag and shale.

In the 8 following questions choose the answer which best completes technically each individual item:

13- Earthquakes provide architects and engineers with a number of important design ..... foreign to the normal design process.

1) chart 2) criteria 3) factor 4) crucial

14- In some countries the greater importance to the community of some types of structure is recognized by ..... requirements, such as in IRAN where all public buildings are designed for higher earthquake forces than other buildings.

1) hospital 2) structure 3) earthquake 4) statutory

15- As some reference to seismological data may be necessary, some basic definitions are given prior to discussing the ..... studies themselves.

1) manual 2) seismic 3) seismicity 4) insufficiently

16- By indicating the type of fault movement prevalent on a given fault, some of the characteristics of the ground motions in the fault ..... may be anticipated.

1) slightly 2) vicinity 3) distance 4) activity

17- The basic assumptions used in analytical models are themselves models of the behaviour and should not attempt ..... without a good appreciation of them.

1) good representation 2) structural analysis

3) design requirements 4) mathematical ability

18- The Winkler model may be more suitable for cohesionless soils but gives a poor representation of the ..... with cohesive soils.

1) rigid base 2) shear force

3) edges of the foundation 4) pressure distribution

19- The traditional method of calculating the plastic collapse load of a steel structure is the limit analysis approach where possible collapse modes are searched to find the one that give the ..... collapse load.

1) minimum 2) maximum 3) vertical 4) horizontal

20- A parallel chord truss has a structural action analogous to that of a beam and the top and bottom chords are equivalent to the ..... while the posts and diagonals are equivalent to the web.

1) depth 2) flanges 3) centroid 4) neutral axis

9- A thorough understanding of mathematics is sufficient to explain a wide variety of natural .....

1) criteria *2) principles* *3) phenomena* *4) components*

10- For centuries housework and shopping have been identified as female .....

1) targets *2) domains* *3) sectors* *4) contexts*

Part B : Grammar

Directions : Read the following passage and decide which choice (1), (2), (3), or (4) best fits each blank. Then mark your answer on your answer sheet.

There are many methods of mining, ...(11)... is based upon where a mineral deposit ...(12)... in the earth. While some mineral deposits are far ...(13)..., others lie at or ...(14)... the earth's surface. Several different mining methods ...(15)... deposits occur close to the earth's surface.

11- 1) that *2) each of which* *3) every method* *4) while any of them*

12- 1) is found *2) found* *3) finding* *4) being found*

13- 1) away *2) deep* *3) from* *4) underground*

14- 1) in *2) near* *3) within* *4) above*

15- 1) are used when *2) which used*
3) when used *4) which are used*

Part C : Reading Comprehension

Directions : Read the following three passages and choose the best choice (1), (2), (3), or (4). Then mark it on your answer sheet.

PASSAGE 1 :

Laser-Based Sensing Technique Applied to Bridge Construction

In constructing cable-stayed, suspension, and arch bridges that use hanger cables,

تست‌های کنکور کارشناسی ارشد سراسری ۱۳۸۷

Part A : Vocabulary

Directions : Choose the number of the answer (1), (2), (3), and (4) that best completes the sentence. Then mark your answer on the answer sheet.

1- Even as a young man he had been ..... as a future chief executive.

1) equipped *2) perceived* *3) submitted* *4) maintained*

2- In exceptional ..... students may arrange to take examinations at other times.

1) alternatives *2) implications*
3) circumstances *4) distributions*

3- There was a noticeboard ..... job vacancies and information on how to apply for them.

1) imposing *2) monitoring* *3) displaying* *4) transferring*

4- After a full ..... lasting over 2 years, very little new evidence had come to light.

1) approach *2) exploitation* *3) investment* *4) investigation*

5- The measures taken should considerably ..... the residents' quality of life.

1) insert *2) trigger* *3) advocate* *4) enhance*

6- Technological advances could ..... lead to even more job losses.

1) randomly *2) inherently* *3) ultimately* *4) empirically*

7- By completing a task on schedule you may ..... a feeling of pride in your work.

1) devote *2) derive* *3) undergo* *4) glance*

8- Roman coins that she showed me were ..... to the one I had found in the garden.

1) crucial *2) specific* *3) adjacent* *4) indentical*

maintaining the forces in the tension elements is crucial. However, measuring and verifying those forces can be a costly and time-consuming process. To facilitate matters, a laser-based technique has been developed that can calculate and verify the tension loads without the need to come into contact with the cable.

The technique employs a laser vibrometer that emits a laser beam whose reflection is used to measure the frequency of the cable's vibration. Once captured, the frequency is used in a formula that includes the cable's specifiations and other data to calculate the tension. The results can then be compared with the tension loads specified by the designer. This technique has been used to inspect existing bridges for several years, but only recently has it been used to verify forces in the tensioned elemetns during consturction.

16- The section implies that the inspection of existing bridges:

1) needs to be done every few years.

2) is done by visual survey of the structural elements only.

3) is done by estimating the tensile force in the cables from their measured frequencies.

4) is done by checking the tensile forces in the cables and comparing them against the design values.

17- The tension varies with:

1) the individual using the vibrometer.

2) the specifications of the cable used.

3) the distance at which the laser is used.

4) whether or not the bridge is designed with hanger cables.

18- From the section, it is evident that the vibrometer:

1) has been previously used to test bridges.

2) has been specified by the designer of the bridge.

3) is easier to use, but is not cost effective for small projects.

4) was designed specifically for use on bridges with hanger cables.

PASSAGE 2 :

Several methods can be employed to measure tension forces in cable elements. One measures the tension directly using a hydraulic ram through a process called liftoff. But hydraulic rams can be large, difficult to use, and inaccurate. Another method involves placing a frame on the cable and pushing against the cable laterally at its midpoint. This process involves a great deal of approximation, can be invasive, and cannot be applied to cables with larger diameters.

Vibration-based force measurement methods, however, use the frequency of the cable's vibration to calculate its tension. Many engineers use accelerometers or other sensors that must be attached to the cable to measure the frequency of its vibration. They also use a century-old formula that calculates the vibration of taut strings. This formula is effective in many applications, but when it comes to structural cables, there are parameters that this formula cannot address. In contrast, the formula used with the vibrometer includes characteristics that are unique to bridge cables, for example, bending stiffness, sag, and conditions at the ends of the cables.

19- To measure the tensile forces in the cable:

1) superpostion principles should be used.

2) in-situ measurement of tensile forces needs to be made.

3) a well-known formula has been combined with new laser equipment.

4) one should test the cable under a testing machine to failure to measure its strenght.

20- The existing formula to calibrate the vibration of cables is:

1) inadequate because it is 100 years old.

2) good for taut strings only and therefore cannot be applied to structural cables.

3) difficult to use because it requires the use of accelerometers and hydraulic rams.

4) not applicable to bridge cables since it does not take into account their pertinent characteristics.

21- The testing method that uses a frame placed against the cable:

1) is actually the basis of the newer vibrometer method.

2) is appropriate because it can be use on cables of all sizes.

3) contains many variables that may cause inaccurate results.

4) is the most accurate testing method other than the vibrometer method.

PASSAGE 3 :

In addition to the specialized formula and the ability to apply the technique remotely, the laser-based method offers other advantages. For example, a bridge may require verification of its stay cables before the bridge deck can be constructed. Typically, an engineer would need to go through days of safety training and then be suspended from the bridge to place sensors on the cables. But the laser-based technique makes it possible for the engineer to stand on a surface, such as another bridge, adjacent to the new structure and accurately measure the cables' vibrations from a distance.

The beam can impact the cable at any point along its length and at any angle, but the results are best if the laser beam is oriented perpendicularly to the cable and is aimed at a point between one-third the cable's length and its midpoint. The cable usually does not need to be impacted to create a vibration that can be measured by the device because such ambient distrubances as wind and traffic are usually sufficient to create vibrations. This technique requires only a small space on or off the bridge for the operator and the equipment and causes little, if any, disturbance to construction operations or traffic.

22- The laser-based technique can reduce the time needed for testing because:

1) the equipment used is compact.

2) the testing can be done earlier in the bridge building process.

3) it does not require specialized safety training for the tester before use.

4) the formula needed to interpret the laser results is alredy installed in the computer used.

23- In the second paragraph, the word "impact" means:

1) cut 2) cause to move

3) take a swing at 4) come into contact with

24- In order to measure the vibrations with the laser vibrometer, it is necessary to:

1) verify the stay cables.

2) cause the cables to vibrate.

3) swing from the bridge to palce sensors on it.

4) aim the laser so that the beam hits the cable.

25- Which of the following is not a benefit of the laser technique?

1) It can be done from a nearby location.

2) It can detect vibrations from normal bridge movements.

3) It can predict the cable tension before construction begins.

4) It doesn't interfere with traffic or construction work on the bridge.

In the five following questions, choose the answer which best completes technically each individual item:

26- In contrast to the simple linear elastic response model, the pattern of inelastic stress-strain behaviour is not constant, varying with the ..... size and shape, the materials used, and the nature of the loading.

1) stiffness 2) member 3) energy 4) earthquake

27- Multi-story buildings, are better represented as multi-degree of freedom structures, with one degree of freedom for each story, and one natural mode and period of ..... for each storey.

1) vibration 2) property 3) level 4) dynamic

28- The choice of an acceptable level of seismic risk is a complex problem, involving consideration of the consequences of earthquake damage, both social and financial, as

well as the probable degree of physical risk, i.e. the ..... of the site.

1) seismicity *2) protection* *3) destruction* *4) vital structures*

29- Magnitude is a quantitative measure of the size of an earthquake, which is independent of the place of observation, but Intensity is a ..... measure of the effects of an earthquake.

1) necessary *2) preliminary* *3) official* *4) subjective*

30- Seismology may be defined as the science and study of earthquakes, and their causes, effects and related phenomena, and ..... is most strictly defined as the frequency per unit area of earthquakes in a given region.

1) magnitude *2) seismicity* *3) scarcely* *4) seismically*

پاسخ تست‌های کنکور کارشناسی ارشد سراسری ۱۳۸۷

قسمت A: لغت و گرامر

۱ـ گزینه (۲) صحیح است.

با وجود جوان بودن او به عنوان مدیر اجرایی آینده .....

۱) تجهیز شد ۲) درک کرده شد ۳) پذیرفته شد ۴) باقی ماند

۲ـ گزینه (۳) صحیح است.

در ..... استثنایی، دانش‌آموزان می‌توانند در زمان‌های دیگری امتحان بدهند.

۱) گزینه دیگر ۲) مفهوم ۳) شرایط ۴) تقسیمات

۳ـ گزینه (۳) صحیح است.

در آنجا یک تخته اعلانات بود که شغل‌های موجود و اطلاعات چگونگی درخواست کار را .....

۱) تحمیل کننده ۲) نشان دادن (مانیتور کردن)

۳) نشان می‌داد ۴) انتقال دادن

۴ـ گزینه (۴) صحیح است.

بعد از ..... کامل که به مدت ۲ ساعت طول کشید، شواهد بسیار کمی معلوم شد.

۱) نزدیک شدن ۲) استخراج ۳) سرمایه‌گذاری ۴) تحقیقات

۵ـ گزینه (۴) صحیح است.

اندازه‌های گرفته شده باید به طرز قابل توجهی کیفیت زندگی ساکنین را .....

۱) قرار دادن ۲) هدف قرار دادن ۳) اختصاص دادن ۴) بالا بردن، ارتقاء دادن

۶ـ گزینه (۳) صحیح است.

پیشرفت‌های تکنولوژیکی می‌تواند ..... منجر به از دست دادن شغل‌های بیشتری شود.

۱) به صورت تصادفی ۲) نشانه‌گیری کردن ۳) سرانجام ۴) از روی تجربه

۷ـ گزینه (۴) صحیح است.

با به پایان رساندن کاری سر وقت و برنامه، ممکن است شما ..... احساس غرور در کارتان کنید.

۱) وقف کردن ۲) متنع شدن ۳) تحمل کردن ۴) خیره شدن

بخش ۳: سؤالات این قسمت مربوط به نامه ذیل می‌باشد. شما یکی را به عنوان بهترین گزینه انتخاب کنید.

شرکت کامپیوتر بین‌المللی
تایلند، بانکوک، خیابان *olive*

۲۵ ژانویه ۲۰۰۶

آقای *XX* عزیز:

شرکت کامپیوتر بین‌المللی *(NCC)* علاقه‌مند است تا بازار کامپیوتر در بازارهای کوچک اندونزی را ارزیابی کند. مطالعه‌ای موردنظر است تا نشان دهد که آیا بازار مطلوب است یا خیر و اینکه رقبای شرکت در اندونزی کدامند. بسته به نتیجهٔ مطالعه، سپس بر روی یک شروع شراکت با شریک تجاری اندونزیایی برای مونتاژ سخت‌افزار کامپیوتر تصمیم‌گیری می‌کنیم.

در کاتالوگ پیوست شده خواهید دید که فروش متوسط ماهیانه ما تا ۲۰٪ در ۵ سال گذشته افزایش یافته است. من برای یک کار تجارتی تا ۲ ماه دیگر در جاکارتا هستم و علاقمندم تا طی یک ملاقات، در مورد امکان تحقیقات در مورد بازار گفتگو و مصاحبه کنیم. در آینده نزدیک با شما در مورد ترتیب دادن یک ملاقات تماس می‌گیرم.

۱۹ـ گزینه (۴) صحیح است.

معنی: شرکت *(WCC)* چه چیزی را در مورد شرکت‌های اندونزیایی می‌خواست یاد بگیرد؟

۱) آیا آنها در طول ۵ سال گذشته درآمدشان افزایش یافته است.

۲) آیا آنها شعبه‌ای در تایلند دارند.

۳) آیا کاتالوگ‌های *MRA* را دریافت کرده‌اند.

۴) آیا آنها تمایل به خرید کامپیوتر دارند.

۲۰ـ گزینه (۱) صحیح است.

معنی: چرا آقای *Y* پیشنهاد ملاقات با آقای *X* داد؟

۱) آیا شرکت *MRA* مطالعه در مورد بازار را متعهد می‌شود یا خیر؟

۲) با رقبای شرکت *NCC* در تایلند را مشخص کند.

۳) آیا شرکت *MRA*، سخت‌افزار کامپیوتر را برای شرکت *NCC* نصب می‌کند؟

۴) تا یک شریک تجاری برای شرکت خودش پیدا کند.

تست‌های کنکور کارشناسی ارشد سراسری ۱۳۸۸

Part A : Vocabulary

Directions: Choose the word or phrase (1), (2), (3), or (4) that best completes each sentence. Then mark the correct choice on your answer sheet.

1- There was once a big difference between the two theoreticians, but now there is some ..... of opinions between them.

1) conviction *2) partnership* *3) presumption* *4) convergence*

2- The treatment that used to be given for this illness is now out of ..... .

1) vogue *2) impact* *3) prospect* *4) dimension*

3- Talks are being held about who should have ..... over the island.

1) sovereignty *2) sustainability* *3) establishment* *4) implementation*

4- The new law allows the members to make decisions by majority vote, rather than by ..... .

1) enormity *2) unanimity* *3) proponent* *4) constitution*

5- Now that English is used as the main language, the country's native language has been ..... .

1) contradicted *2) violated* *3) marginalized* *4) differentiated*

6- The responsibilities of the different people working in this department are clearly ..... .

1) attributed *2) interacted* *3) orientated* *4) demarcated*

7- The museum is planning to increase the amount of space ..... to modern art.

1) endorsed 2) promoted 3) allotted 4) displayed

8- Women's employment opportunities are often severely ..... by family commitments.

1) embraced 2) conflicted 3) reprimanded 4) constrained

9- Although these research topic are all related to linguistics, they can be divided into four ..... categories.

1) integral 2) discrete 3) adjacent 4) ultimate

10- A new treatment causes the disease to enter a(n) ..... phase, but the sufferer will never be fully cured.

1) latent 2) focal 3) erosive 4) underlying

Part B: Grammar

Directions: Read the following passage and decide which choice (1), (2), (3), or (4) best fits each blank. Then mark the correct choice on your answer sheet.

Jupiter is the largest of the nine planets that travel around the Sun. Its orbit lies beyond those of Mars and the asteroid belt, at (11) ..... from the Sun of 778 million kilometers. It takes 11.86 Earth years (12) ..... one orbit around the Sun and rotates on its axis every 9 hours 55 minutes 29 seconds.

From Earth, Jupiter appears to the naked eye as a bright star-like second (13) ..... Venus in brilliance. Astronomers of ancient times named Jupiter in honour of the ruler of the gods worshipped in the Greco-Roman world, though they had no idea (14) ..... the name actually was. In fact, Jupiter is larger than all the other planis put together. Its diameter is 11 times (15) ..... the Earth, and it could contain more than 1500 Earths within its volume. Its mass is 318 times that of the Earth, but because it is so large, Jupiter is remarkably light, its density being only slightly greater than that of water.

11- 1) an average distance 2) a distant average
3) an average distant 4) a distance average

12- 1) completing 2) to complete
3) when it completes 4) as long as it completes

13- 1) to only 2) only of 3) only to 4) of only

14- 1) if suitable 2) of suitability 3) how suitable 4) about suitability

---

15- 1) than 2) that of 3) those of 4) much more than

Part C : Reading Comprehension

Directions: Read the following passages choose the best choice (1), (2), (3), or (4). Then mark it on your answer sheet.

Dredged Material Cell Will experience Extraordinary Settlement

A dredged material containment cell is currently being designed to about the east side of the Craney Island Dredged Material Management Area (CIDMMA), which is located along the settlements of as much as 6.1 m. A new marine terminal will be built on the dredged material cell once the ground level has been stabilized.

Japan's Kansai International Airport was constructed in 1994 atop a man-made island that was expected to settle up to 12 m over the course of 60 years; by 2001 it had already settled by an average of 11.5 m. Seeking to avoid the same kinds of issues, the engineers working on the Craney Island project are proceeding carefully, counting on traditional surcharging to facilitate settlement before construction begins.

Three dikes will be added to the CIDMMA to create the new cell. The east side of the cell will measure about 2,591 m long and will form the north and south sides. A 18.3 m deep navigation channel will run along the east side of the new cell, enabling ships to unload their goods directly onto a wharf that will form part of the marine

terminal. The terminal will be accessible by road and rail, and the rail yard there will have the capacity to transport 1 million containers per year.

The new cell will cover 243 ha and be filled with dredged material from the surrounding waterways. The engineers are obtaining information about dredging projects in the less critical areas. Engineering the fill from the beginning will help the engineers control future settlement.

Once the cell has been filled with dredged material, the site will probably be surcharged with up to 9 m of earth. When the maximum settlements has been reached, the excess earth will be removed and the site paved over. The method is simple, but is usually the least expensive option. The surcharge layer could remain in place for up to a year.

Initially a concrete weir system with gatehouses will act as an outlet structure for overflow water as the dredged material settles into the cell; gravity will push the water out of the weir, and the quality of the water will be monitored and kept in compliance with environmental quality standards. Once the cell is full of dredged material, the remaining excess water will probably be removed using wick drains, often called strip drains. The dredged material will be placed atop 30.5 m of subsurface clay saturated with water. The engineers plan to place the drains, which act like large corrugated straws, anywhere from 2 to 3.5 m apart. The drains will offer a path by which the water can rise to the surface, where a sand drainage blanket will collect the water and allow it to evaporate. River currents and the 0.8 m tide will not impede these drainage efforts.

Because of the scope of the project and the extent of the settlement that has to take place before the concentrated loads of the shipping containers can be imposed on the marine terminal, internal dikes will separate phases of the construction. Current design plans stipulate that the cell be constructed in two to four phases; sections of the wharf will be constructed alongside the completed phases.

The rock and sand dikes of the addition will be constructed after the first deep cut is made for the navigation channel alongside the eastern side of the cell. The navigation channel will be dredged to a depth of 27.5 m, and the dredged material placed in the CIDMMA. The east dike will then be built at adepth of 27.5 m and backfilled so that

the 18.3 m deep navigation channel can run alongside it. The engineers expect that local sand will be used for the dikes and that the 305 nml diameter rock for the project will be shipped in. The CIDMMA currently covers 5.2 km^2 and holds more than 172m^3 of dredged material. The 243 ha cell will cost $2.2 billion and take 25 years to construct.

16- It can understood from the context of the article that author wants to use the Kansai Airport design:

1) as a blueprint for constructing the new containment cell.

2) to demonstrate how the rate of settlement can be underestimated.

3) To create an international standard for landfill settlement.

4) because it approximates the dredging requirements of the new terminal.

17- The new containment cell is predicted to be completed in:

1) 1 year *2) 5 years* *3) 25 years* *4) 50 years*

18- Fill for the new cell will be primarily composed of:

1) reinforced concrete.

2) damaged shipping containers

3) material dredged from nearby waterways.

4) excess earth from regional construction sites.

19- In order to allow construction of the wharf before the project is completed:

1) the cell will be constructed in stages

2) a concrete weir system will be built to support the wharf

3) it will be constructed on pylons running alongside the cell

4) it will be built upon the rock and sand dikes used to contain the cell

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20- One way the engineers hope to control settlement is:

1) pouring a concrete foundation at the base of the cell.

2) to place a surcharge of earth over the dredged material.

3) by draining water quickly using the navigation channel to be built alongside the cell.

4) to use coarse material or sand in critical areas and sitly material in less critical areas.

21- From the context of the article, it is understood that the purpose of the surcharge layer is:

1) to use as a base for the wick drains.

2) to provide a strong surface over which to pave.

3) to have an inexpensive temporary surface on which to build.

4) to weigh down the dredged material and speed up settlement.

22- What will be the main function of the project to be built on the newly created land?

1) To provide a terminal for container ships to unload.

2) To provide a terminal for freight trains to bring goods to ships.

3) To provide a base of operations for expansion of the CIDMMA.

4) To provide a passenger terminal for cruise ships and passenger trains.

23- The strip drains:

1) direct water out of the gates of the concrete weir.

2) allow the dredged material to be placed atop a saturated clay subsurface.

3) draw water to a sandy layer at the top of the dredged material so that it can evaporate.

4) divide the cell into stages so that construction can begin before the project is complete.

24- Which component of the development do we know will probably NOT be found locally?

1) Sand that forms part of the dikes.

2) Large rocks that from part of the dikes.

3) Material recovered in dredgining operations.

4) Surcharge earth that will cover the dredged material.

25- Why is it important for settlement to stabilize before the terminal is built?

1) Because the dikes will also destabilize if the fill is not stable.

2) Because there will be a deep navigation channel running alongside the cell.

3) Because the river and tides in the area may undermine the newly created land and cause it to collapse.

4) Because the shipping containers on the site will be heavy and may themselves cause settlement.

Part D:

In the 5 following questions, choose the answer which best completes technically each individual item:

26- Other formulae for calculating the fundamental periods of chimneys have been proposed, such as that by Housner for tapered cantilevers. This work also presents formulae for the second and third ..... periods.

1) suitable 2) cylindrical 3) useful 4) mode

27- A description of the response spectrum analysis of eight reinforced concrete chimneys up to 250m in height has been given by Rumman who used seven earthquake inputs and a structural ..... of 5 percent of critical.

1) equivalent 2) force 3) damping 4) moment

28- One of the main preoccupations is the ensure that seismic ..... will form in the chosen places of bridges, i.e. generally in visible portions of the piers in order to facilitate post-earthquake repairs.

1) forces 2) hinges 3) ductility 4) hardening

29- For important bridges, dynamic analysis is most desirable, and where foundations are constructed in, or driven through, ... soils a dynamic response analysis of the site may be considered essential.

1) softer *2) differential* *3) critical* *4) affected*

30- The horizontal interaction stresses between the soil and the foundation are arguably problematical than the vertical stresses, as comparatively little is known about ..... seismic passive pressures and the effect of seismic active pressure in different foundation situations. .

1) suitable *2) allowable* *3) guidance* *4) design*

پاسخ تست‌های کنکور کارشناسی ارشد سراسری ۱۳۸۸

۱ـ گزینه (۴) صحیح است.

معنی: زمانی اختلاف‌های زیادی بین دو تئوریسین (صاحبان عقیده و ...) بود ولی اکنون کمی ...(۴)... عقیده بین آن‌ها هست.

۱) محکومیت، عقیده کم ۲) مشارکت

۳) فرض، تصور ۴) همگرایی

۲ـ گزینه (۱) صحیح است.

معنی: راه علاجی که برای این بیماری استفاده می‌شده است، اکنون غیرقابل ...(۱)... .

۱) متداول، عادی ۲) برخورد، ضربه

۳) چشم انداز، پیش بینی ۴) اندازه

۳ـ گزینه (۱) صحیح است.

معنی: صحبت‌ها را در مورد اینکه چه کسی باید بر سرزمین ...(۱)... کند در حال انجام شدن است.

۱) پادشاهی، حق حاکمیت ۲) قابلیت تحمل

۳) مؤسسه، استقرار، محل کار، بنگاه ۴) پیاده سازی

۴ـ گزینه (۲) صحیح است.

معنی: قانون جدید، به اعضا اجازه می‌دهد تا براساس رأی اکثریت تصمیم‌گیری کنند تا اینکه براساس ...(؟)...

۱) عظمت، غیرعادی ۲) اتفاق آراء، یکدلی

۳) توضیح دهنده، طرفدار ۴) نظام نامه

۵ـ گزینه (۳) صحیح است.

معنی: اکنون که انگلیسی به عنوان اصلی‌ترین زبان استفاده شده است، زبان محلی کشورها ...(۳)...

۱) تناقض داشتن، مخالف بودن، رد کردن، تکذیب کردن

۲) تخلف کردن، تجاوز کردن به

PART A: Vocabulary

Directions: *Choose the word or phrase (1), (2), (3), or (4) that best completes each sentence. Then mark the correct choice on your answer sheet.*

1-Doctors should ---------- a while on the wisdom of separating babies from their mothers.
1) ponder 2) recover 3) resolve 4) proceed

2-Is the job of the police to enforce ---------- with the regulations?
1) authority 2) resolution 3) compliance 4) compensation

3-He was found guilty of ---------- of justice.
1) deviation 2) implication 3) obstruction 4) submission

4-The lawyer claimed that the company had shown a(n) ---------- disregard for its employees' safety.
1) reckless 2) illegible 3) engrossed 4) tentative

5-The book explains the ---------- of the English language from old to modern English.
1) initiation 2) reverence 3) incidence 4) evolution

6-The party is promising low inflation and ---------- economic growth.
1) mature 2) sustainable 3) haphazard 4) preliminary

7-We have ---------- many new features into the design of the building.
1) displaced 2) enhanced 3) assigned 4) incorporated

8-Global warming might ---------- dramatic changes in our climate.
1) induce 2) conceive 3) compile 4) penetrate

9-Some teachers welcomed the change in the educational system; but for the majority, the ------ was true.
1) revival 2) endeavor 3) converse 4) contradiction

10-The problem had been ---------- to in earlier discussions.
1) alluded 2) coincided 3) assumed 4) overlapped

PART B: Grammar

Directions: *Read the following passage and decide which choice (1), (2), (3), or (4) best fits each space. Then mark the correct choice on your answer sheet.*

Mass communication is the sending of messages through the mass media of television, radio, newspapers, and the cinema. Mass communication (11) ---------- a mass of people, that is, a large number of "receivers." It is an expensive business (12) ---------- can usually only be undertaken by large companies with large amounts of money (13) ----------, such as television and radio companies, publishing houses, and film studios. The technology used is costly and complex, and can rapidly become (14) ---------- date. Mass communication has arisen mainly in the 20th century. It depends upon (15) ---------- a certain degree of education. This century has seen the invention of radio and television, and the growth of newspaper and magazine circulations.

11-1) aims to	2) is aimed at	3) has aim at	4) has aim to
12-1) so	2) that it	3) and	4) which it
13-1) spends	2) to spend	3) spending it	4) for spending
14-1) to	2) for the	3) out for a	4) out of
15-1) public having	2) the public to have	3) public to have	4) the public having

PART C: Reading Comprehension

***Directions:** Read the following passage and answer the 11 questions by choosing the best choice (1), (2), (3), or (4). Then mark the correct choice on your answer sheet.*

A 27- story apartment building, known as the Solaire, is set to be the first residential high-rise certified by the Blue Building Council. Among the tower's numerous design elements in keeping with the principles of sustainable development is an independent wastewater system under its basement. After flowing into a feed tank below the building , as much as 94.6 m^3 of the building's sewage will be treated each day, and the resulting filtered water will be pumped into its toilets and cooling tower. Any excess sewage in the feed tank will then be routed to the city's sewer line.

A senior process engineer for firm that designed the system says Solaire residents will probably require only about half of the system's water. A second "blue" apartment complex being developed in an adjacent lot—one of several planned for the neighborhood—is expected to used the remainder of the treated water, he says. In addition, almost 90 percent of the waste from construction has been recycled.

The treatment system is located in sealed concrete chambers below the basement and is based on a common membrane bioreactor. The final separation of liquid from solids is achieved with ultra filtration membranes immersed in the final process tank. "So we positively remove all suspended solids and generate an effluent of very high quality," he says.

Several dozen independent treatment systems have been installed in and around commercial structures—including one in a new football stadium capable of treating up to 946 m^3 of wastewater per day. But, the engineer says, this is the first time one has been installed in a residential high-rise. While the Solaire's treatment system is more expensive than the cost of municipal sewer service, the concept could catch on in dense urban areas because of the long-term environmental advantages of redacting the demand for potable water.

Given its internal treatment system, along with water-saving mechanisms installed in plumbing fixtures and washing machines, the Solaire, is expected to use about 50 percent less potable water than a conventional residential high-rise of similar size.

The Solaire is also equipped with a photovoltaic solar array on its west façade that is expected to generated 5 percent of the electricity used by the building. To meet the requirements for "blue" certification, at least 50 percent of the material used to construct the Solaire was manufactured locally, and another 20 percent was manufactured within 805 km of the city.

Recycled construction material was used wherever possible. Steel pipes originally manufactured for oil drilling were used to fabricated the 26 m deep piles on which the building rests. The 300 mm diameter pipes were filled with steel reinforcement and concrete. In this case as well as in many other facets of the project, fly ash was substituted for cement in the concrete mix—another practice valued because it uses an industrial by-product.

"I would say that, with a little effort, everything in this building is very doable. This is an economically feasible building," says the executive vice president of the group which designed the Solaire's structural system. For instance, he says, the alternative fly ash concrete mixture was only about 10 percent more costly than conventional concrete.

According to Marcus, the most challenging aspect of constructing the Solaire had nothing to do with its "blue" rating,; rather, it concerned the layout of the interior. To accommodate a more marketable floor plan, the Solaire's developers divided the structure into four distinct floor plans that change at the 2^{nd}, 14^{th}, 18^{th}, and 25^{th} levels. That meant transferring gravity loads from one segment to the next without relying on enormous beams that would have disrupted the interior of the building.

Ultimately, the loads between the disparate column grids were redirected with a series of 355 mm thick reinforced-concrete walls—the same thickness as the structure's columns. At the transition floors, the walls span the offset columns and transfer the gravity load. The coupling moment from the displaced columns moves from the wall through the plane of the floor and eventually to shear walls surrounding the elevator core. At each of the four levels where the column grids change, about a dozen walls span the distances between the offset columns.

16- Which of the following is not a "blue" feature of the new building?

1) the use of fly ash instead of cement in the concrete mixtures.
2) the installation of a sewage treatment plant in the basement of the building.
3) the use of steel pipes to create deep piles upon which the building rests.
4) the transfer of gravity loads from one segment to another without the use of large beams.

17- What is unique about the wastewater bioreactor system installed in the building?

1) It was manufactured locally.
2) It is the first to be installed in a residential complex.
3) It has been installed in sealed chambers.
4) It works in conjunction with water-saving plumbing fixtures.

18- The sewage treatment system saves water by:

1) generating a high-quality effluent.
2) rechanneling excess water into the city sewer line.
3) providing drinking water to adjacent buildings.
4) providing treated water for use in the cooling tower and toilets.

19- It is evident from the text that, to be certified as a "blue" building by the council, the Solaire must:

1) recycle most of the sewage generated by its residents.
2) Help employ local labor by using materials manufactured in or near the city.
3) feature a variety of elements that contribute to sustainable development.
4) combine energy-saving devices with a design that will attract buyers for the apartments.

20- Why was it necessary to redistribute the load between segments of the building?

1) It was necessary to move the coupling moment toward the walls surrounding the elevator shafts.
2) The use of enormous beams to support the load would detract form the "blue" rating for the building.
3) Because nearly 12 walls span the distances between columns on the floors where the column grid changes.
4) The designers had created different apartment floor plans on several levels to appeal to the differing demands of purchasers.

21- The designer believes that Solaire is economically feasible because:
1) the sewer treatment system is less costly than is the city sewer system.
2) the cost of using "blue" construction techniques will not make the overall cost too great.
3) the cost of using fly ash is only 10 percent over the cost of using cement.
4) the cost of "blue" construction techniques will be offset by the lower cost of maintaining the building.

22- The problem of transferring loads from one segment to another was solved by:
1) changing the floor plans without altering the overall column grids.
2) substituting very large beams and the shear walls of the elevator core for the offset columns.
3) redirecting the loads onto concrete walls the same thickness as the columns.
4) relying on the plane of the floors to shift the load from missing columns to the walls of the elevator shaft.

23- Which of the following is not an aspect of making recycling part of the construction and maintenance of the building?
1) construction waste product recycled
2) industrial by products used as construction materials.
3) sewage treated to make drinkable water
4) products designed for other uses adapted to construction needs.

24- The long-term benefit of the sewage treatment system is that:
1) it will reduce the consumption need for potable water.
2) it can be recycled in the future for use in a much larger facility, such as a football stadium.
3) the ultrafiltration system allows for the creation of a high quality effluent.
4) its placement far underground eliminates the need to store the solid waste products elsewhere.

25- It can be inferred from the text that the building to be built adjacent to the complex:
1) will be identical to the Solaire.
2) is being funded by the same group that built the Solaire.
3) will not have its own sewage treatment system.
4) will be a commercial, rather than a residential, complex.

26- Some of the electricity used by the Solaire:
1) will be recycled.
2) was used to recycle construction materials.
3) will provided by solar panels.
4) comes from on of the "blue" buildings being developed in the neighborhood.

In the 4 following questions, choose the answer which best completes technically each individual item:

27- Slight --------- in tension members can be safely disregarded as they are of little consequence.
1) holes 2) corrosion 3) bending 4) imperfections

28- During strong earthquakes, important buildings should -------, while ordinary buildings may --------.
1) remain operational, sustain some damage
2) remain stable, remain stable
3) stay undamaged, be damaged
4) remain stable, collapse

29- The property of concrete by which it undergoes deformation under sustained loads is called ---------.

1) creep 2) weathering 3) shrinkage 4) loss of moisture

30- The property of a material by which it can withstand extensive deformation without failure is called its ductility. Withstand means:

1) support 2) resist 3) sustain 4) undergo

PART A: Vocabulary

***Directions:** Choose the word or phrase (1), (2), (3), or (4) that best completes each sentence. Then mark the correct choice on your answer sheet.*

1- **She emanated worldliness and the selfishness of one who is ..... to everything but her own needs and caprices.**
1) available 2) compensatory 3) visible 4) indifferent

2- **Concrete blocks were piled high to ..... the government center.**
1) circulate 2) reveal 3) fortify 4) overlap

3- **All sound has three .....: pitch, volume, and duration.**
1) properties 2) merits 3) impacts 4) realms

4- **One of Britain's most ..... criminals has escaped from prison.**
1) indigenous 2) notorious 3) meritorious 4) industrious

5- **By the 1930s the wristwatch had almost completely ..... the pocket watch.**
1) supplanted 2) thwarted 3) devised 4) founded

6- **She cared for her stepmother with unfailing ..... throughout her long illness.**
1) defect 2) conformity 3) devotion 4) prevalence

7- **Ryan needed ..... agreement to bring his proposal up for a vote.**
1) deliberate 2) adjacent 3) contentious 4) unanimous

8- **With so much water having ..... its exterior, the engine was effectively ruined.**
1) inhabited 2) penetrated 3) varnished 4) exceeded

9- **Considering the ..... of his injuries, he's lucky to be alive.**
1) extent 2) divergence 3) hurdle 4) symptom

10- **They intend to keep their force there in the region to ..... compliance with the treaty.**
1) seize 2) recollect 3) verify 4) conquer

PART B: Cloze Test

***Directions:** Read the following passage and decide which choice (1), (2), (3), or (4) best fits each space. Then mark the correct choice on your answer sheet.*

The extensive fossil record of genera and species is testimony that dinosaurs were diverse animals, (11) ..... lifestyles and adaptations. Their remains (12) ..... in sedimentary rock layers (strata) dating to the Late Triassic Period (227 million to 206 million years ago). The abundance of their fossilized bones is substantive proof (13) ..... dinosaurs were the dominant form of terrestrial animal life during the Mesozoic Era (248 million to 65 million years ago). It is likely that the known remains (14) ..... a very small fraction (probably less than 0.0001 percent) of all the individual dinosaurs (15) ..... .

11- 1) with wide varieties 2) with widely varying
3) and widely various 4) and varying with wide

12- 1) are found 2) that are found 3) found 4) have found

13- 1) when 2) if 3) whether 4) that

14- 1) a representation of 2) representative of 3) representing 4) represent

15- 1) that lived once 2) that once lived
3) were living once 4) once that they lived

PART C: Reading Comprehension

***Directions:* Read the following tow passages and answer the questions by choosing the best choice (1), (2), (3), or (4). Then mark the correct choice on your answer sheet.**

PASSAGE 1:

The seismic collapse of a structural system is one of the most important causes for the loss of life during and after a severe ground motion. Hence, quantification of the collapse potential of existing and newly designed structures is an important issue in performance-based earthquake engineering. Incremental dynamic analysis (IDA) is a widely used method for the estimation of the seismic collapse capacity of structures. This method requires non-linear response-history analyses of the specific structure for an appropriate set of strong ground motion records (SGMR's), each scaled to different intensity levels, to cover a wide range of the structural response from elastic behaviour to global instability on the basis of an engineering demand parameter (EDP) e.g. the maximum inter-storey drift ratio.
The SGMR's which are used for non-linear response-history analysis are usually chosen based on magnitude, distance and site conditions. Since there is a lack of knowledge about future earthquakes, it would be reasonable to use a relatively large set of SGMR's for the IDA analysis of a specific structure. However, this target is not very realistic, so some approximate methods have recently emerged. The approximate methods for IDA analysis usually involve the replacement of non-linear response-history analysis by a combination of the pushover analysis of a multi-degree-of-freedom (MDOF) model and a non-linear response-history analysis of a single-degree-of-freedom (SDOF) model.

16- **What is the main concern in passage 1?**
1) multi degree of freedom systems
2) Incremental dynamic analysis
3) strong ground motion selection
4) Assessments of the seismic collapse of a structure

17- **What is the latest method for collapse estimation?**
1) Incremental dynamic analysis
2) pushover analysis
3) static analysis
4) response spectrum analysis

18- **What is the common criteria for record selection?**
1) Based on M (magnitude) and R (distance)
2) Based on structure
3) Based on collapse
4) Based on maximum inter-story drift ratio

19- **Which of the following is not applicable in IDA?**
1) non-liner response- history analysis
2) scaling to different intensity levels
3) Energy calculation
4) elastic behaviour and global instability

20- **Why we need to select a large numbers of records for analysis?**
1) Need for non-linear response-history analysis
2) For robustness
3) For accuracy
4) Suffering from amount of information about next earthquake.

PASSAGE 2:

One of the challenges in the non-linear response-history analysis of sophisticated structural models is how to select a limited number of strong ground motion records (SGMR's). The selection of appropriate SGMR's needs to be performed with the goal of accurately estimating the response of a structure to a specified ground motion intensity, as measured by the spectral acceleration corresponding to the first mode period of the structure, $S_a(T_1)$. The current code-based method of record selection is based on a consideration of the magnitude and distance of the SGMR's, while matching the mean response spectrum to the uniform hazard spectrum (UHS) as a target spectrum. Based on this approach, some methods have been developed for the selection and scaling of a set of near-optimal records from a large database. Since no single earthquake is likely to produce a spectrum as high as the UHS spectrum, the code-based procedure for record selection is usually conservatively biased. Reduction of this bias and the variance of the resulting structural response can be achieved by considering the spectral shape in the record selection. ... This selection presents a significant challenge when assessing the seismic collapse capacity of a large number of structures or when developing a systematic procedure, since it implies the need to assemble specific ground motion sets for each structure. An alternative method has been proposed, whereby a general set of SGMR's is used to simulate collapse, and the resulting collapse capacity is adjusted in order to take into account the spectral shape effects that are not reflected in the selection of the general set. The major difficulty of this method is that it implies the need to apply a relatively large number of ground motion records for the collapse assessment of the structures involved.

21- **What is the target spectrum based on the passage?**
1) code – base spectrum
2) UHS spectrum
3) 2800 spectrum
4) site – specific spectrum

22- **What does bias mean?**
1) Approximate
2) Exact solution
3) Error
4) Deviation from the real solution

23- **What is the main computational challenge in the text?**
1) Modelling the structure
2) Record selection
3) Analysis time
4) How to use approximate methods

24- **What is the major difficulty in the proposed method?**
1) using standards
2) using super – computers
3) using too many records
4) using sophisticated structural models

25- **What will happen if non-appropriate records being used?**
1) the structure response is not accurate
2) $S_a(T_1)$ is not accurate –enough
3) the structure fails
4) the collapse cannot be computed

Choose the best topic for the following text:

26- During the loading of a structure, supports may settle by small amounts and since the reactive forces are most unlikely to be equal, the settlements of the various supports will differ, causing relative moments of the ends of a particular span.

1) Equilibrium of reaction forces
2) Loading of a structure
3) Settlement of supports
4) Particular span in a structure

27- The volume contraction which occurs as the concrete hardens and dries out, is called the drying shrinkage, or simply the shrinkage.

In the above text the underlined word means:

1) the process of becoming smaller
2) expansion
3) drying
4) an official written agreement

28- In the following text the word fine means:

The fine aggregate such as natural sand, or crushed stone sand or crushed gravel sand, which consist of particles mainly passing a 5 mm sieve.

1) coarse
2) good
3) sand
4) small grains

In the two following questions, choose the best answer for filling the blanc.

29- Weakness in metal or wood caused by repeated bending or stretching is called ---------- .

1) fatigue
2) stress
3) torsion
4) bending moment

30- Under repeated tension and compression forces, ---------- were formed in railway bridges made of cast iron.

1) flows
2) flaws
3) drainage
4) torsion