Examination: **Ph.D Civil Engineering**

## SECTION 1 - SECTION 1

**Question No.1**

As per IS 456-2000 for the design of reinforced concrete beam, the maximum allowableshear stress ($\tau_{cmax}$) depends on the

- grade of concrete and percentage of reinforcement
- grade of steel only
- grade of concrete only
- grade of concrete and grade of steel

**Question No.2**

According to Indian standard specifications, the temperature for curing is

- $28^oC$
- $26^{oC}$
- $27^oC$
- $25^oC$

**Question No.3**

Consumptive Use refers to the loss of water as a result of

- Crop Water Requirement
- Evaporation and Infiltration
- Evaporation and Transpiration
- Evaporation and Transpiration from cropped area.

**Question No.4**

- 60
- 120
- 75
- 45

**Question No.5**

Bearing capacity of a soil strata supporting a footing of size 3 m x 3 m will not be affected by the presence of ground water table located at a depth which is :

- 1.0 m below the base of the footing
- 1.5 m below the base of the footing
- 3.0 m below the base of the footing
- 2.5 m below the base of the footing

**Question No.6**

The important aspects of environmental impact assessment

- Risk assessment
- Environmental Management
- Past product management
- All of these

**Question No.7**

The compound which is largely responsible for initial setting and early strength gain of Ordinary Portland Cement is

- $C_2S$
- $C_3S$
- $C_3A$
- $C_4AF$

**Question No.8**

At joints, the bearing stress on loading concentrated around the periphery of the dowel bars. By this crushing action, minute voids may develop immediately around the contact surface of the bars. This type of failure is termed as _____

- nosing
- Cracking
- funnelling
- nailing

**Question No.9**

The presence of tri-calcium silicate in cement _____

- Generates less heat of hydration
- All of these
- Hydrates the cement rapidly
- Offers high resistance to sulphate attack

**Question No.10**

Determine the relative vertical displacement at a joint when 2cm of vertical error is observed during installation of 50cm length dowel bars. The expansion joint movement is 1.75cm.

- 0.07cm
- 0.07m
- 0.75cm
- 1.75cm

**Question No.11**

Sound pressure is related to

- Density of air and sound intensity
- Wave motion and sound intensity
- Atmospheric pressure and barometric pressure
- Absolute temperature and standard pressure

**Question No.12**

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**Question No.13**

If duty is 1428 ectaresa/cumec and base period is 120 days for an irrigated crop, then delta in metre is

- 102.8
- 1.38
- 0.73
- 0.01

**Question No.14**

Imhoff cone is used to determine

- Total solids
- Settleable solids
- Dissolved solids
- Suspended solids

**Question No.15**

_____ is the quality of good researcher

- Time
- Money
- Scientific temper
- Age and skills

**Question No.16**

A column of size 450 mm × 600 mm has unsupported length of 3.0 m and is braced against side
sway in both directions. According to IS 456:2000, the minimum eccentricities (in mm) with
respect to major and minor principle axes are

- 21.0 and 15.0
- 20.0 and 20.0
- 26.0 and 20.0
- 26.0 and 21.0

**Question No.17**

The specific gravity of soil solids is determined by

- Sieve analysis
- Sand bath method
- hydrometer analysis
- Pycnometer method

**Question No.18**

The swelling behaviour of black cotton soil is due to

- Illite
- Halloysite
- Montmorillonite
- Kaolinite

**Question No.19**

As per Indian standards for bricks, minimum acceptable compressive strength of any class of burnt clay bricks in dry state is

- 3.5MPa
- 5.0MPa

- 10.0MPa
- 7.5MPa

**Question No.20**

The method of finding the shear strength of very plastic cohesive soils is by means of

- Torsional shear test
- Penetration test
- Cone test
- Vane shear test

**Question No.21**

Some of the non-toxic metals normally found in natural water are

- arsenic, lead, mercury
- iron, manganese, magnesium
- iron, lime, copper
- calcium, sodium, copper

**Question No.22**

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**Question No.23**

- 15 $M_P$/L
- 16 $M_P$/L
- 16.5 $M_P$/L
- 15.5 $M_P$/L

**Question No.24**

Carriageway width for double lane (with raised curbs)highway is

- 5.0m

- 7.5m
- 5.5m
- 7.0m

**Question No.25**

Which one of the following expression is called Torricelli's theorem

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**Question No.26**

As per IS 800- 2007 for laced built-up column, the lacing bars, whether in double or single systems, shall be inclined at an angle _____

- Not less than $30^o$ nor more than $60^o$
- Not less than $60^o$ nor more than $90^o$
- Not less than $50^o$ nor more than $80^o$
- Not less than $40^o$ nor more than $70^o$

**Question No.27**

A levelling staff is used to establish:

- Vertical line of sight
- Distance of points
- Horizontal line of sight
- Location of points

**Question No.28**

The ultimate bearing capacity ($q_f$) per unit area of non-cohesive soil for circular footing is

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**Question No.29**

The 5 day BOD of a waste water sample is obtained as 190 mg/l (with k = $0.01h^{-1}$) the ultimate oxygen demand (mg/l) of the sample will be

- 190
- 475
- 3800
- 271

**Question No.30**

In case of chain riveting, the net sectional area for plate at one section is given by
Where, Anet = net cross – sectional area along the rivet chain; b = width of plate; t=thickness of plate; d = gross diameter of rivet holes; n= no of rivets at the section

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**Question No.31**

The total lost time on a traffic signal is noted to be 6sec, the actual Green time is 32sec and the amber time is 3sec.How much is the effective green time?

- 29
- 21
- 35
- 33

**Question No.32**

- 1
- 2
- 3
- 0

**Question No.33**

A value which is used to prevent water to flow back in the opposite direction.

- Blow off value
- Reflux value
- Relief value
- Safety value

**Question No.34**

What would be the possible number of total conflict points with a conventional three-legged intersection having a two-lane two-way operation?

- 32
- 24
- 6
- 9

**Question No.35**

Safe OSD at speed 100kmph,according to the IRC:66 is

- 470m
- 640m
- 300m
- 340m

**Question No.36**

A coastal city produces municipal solid waste (MSW) with high moisture, content high organic materials, low calorific value and low inorganic materials, the most effective and sustainable option for MSW management in that city is _____

- Incineration
- Bursting
- Dumping in Sea
- Composting

**Question No.37**

A blueprint of research work is called

- Research tools
- Research design
- Research problem
- Research method

**Question No.38**

Observation is a physical and _____ activity

- Social
- Personal
- Psychological

- Mental

**Question No.39**

A small discrete mass of solid or liquid matter is called

- Mist
- Fly ash
- Particle
- Fog

**Question No.40**

The permissible $e_{max}$ value for highways in plain and rolling terrain is

- 1 in 25
- 1 in 10
- 1 in 16
- 1 in 20

**Question No.41**

The dimension of the Darcy-Weisbach coefficient f are

- $L^{1/6}$
- $L^{1/2}\ T^{-4}$
- $LT^{-1}$
- $M^{o}L^{o}T^{o}$

**Question No.42**

The earth pressure at rest is calculated using

- Theory of elasticity
- Rankine's theory
- Euler's theory
- Bending theory

**Question No.43**

Two reservoirs are connected by two pipes P and Q. The pipes have the same diameter and length and are placed in parallel. If the friction factor of P is 9 times that of Q, than the discharge in P to that in Q is

- 0.33
- 0.27

- 0.45
- 0.5

**Question No.44**

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**Question No.45**

A cantilever beam is 2m long. The cross section of the beam is hollow square, with external sides 60 mm and internal side is such that I = 6 x $10^5$ $mm^4$. If safe bending stress for the material is 100 $N/mm^2$, then safe concentrated load W at the free end would be

- W = 1002 N
- W = 1001 N
- W = 1000 N
- W = 1003 N

**Question No.46**

What kind of water distribution system normally adopted in a well-planned cities

- Ring system
- Grid system
- Radial system
- Dead end system

**Question No.47**

The process of grinding clay with water and making it plastic is known as

- Blending
- Weathering
- Digging
- Pugging

**Question No.48**

The absolute pressure at a point 2.5 m below the clear water surface is

measured as 125.703 kN/$m^2$. If the atmospheric pressure is taken as 101.325 kN/$m^2$, the gauge pressure in kN/$m^2$ at this point would be

- 113.514
- 24.378
- 45.401
- 56.757

**Question No.49**

They are organisms that can live without free oxygen and do not produce their own food

- Autotrophs
- Anaerobic heterotrophs
- Aerobic heterotrophs
- Phototrophs

**Question No.50**

Express the quantity of storm water (Q) according to Ryve's formula

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**Question No.51**

The vertices of an astronomical triangle would include:

- Azimuth, Zenith, Pole
- Zenith, Pole & Heavenly Body
- Azimuth, Pole & Heavenly Body
- Azimuth, Zenith & Heavenly Body

**Question No.52**

A steel member 'M' has reversal of stress due to live loads, whereas another member 'N' has reversal of stress due to wind load. As per IS 800:2007, the maximum slenderness ratio permitted

- same for both the members
- less for member 'M' than that of member 'N'
- not specified in the Code
- more for member 'M' than for member 'N'

**Question No.53**

Double-mass curve technique is adopted to

- check the consistency of raingauge records
- find the number of raingauge required
- estimate the missing rainfall data.
- find the average rainfall over a number of years

**Question No.54**

Over burnt with irregular shaped bricks are called as

- Refractory bricks
- Jhama bricks
- Third class bricks
- Squint bricks

**Question No.55**

A hydraulic jump occurs when there is a break in grade from a

- mild slope to milder slope
- steep slope to steeper slope
- steep slope to mild slope
- mild slope to steep slope

**Question No.56**

According to Darcy's Law:

- q is equal to hydraulic gradient
- q is directly proportional to hydraulic gradient
- q is inversely proportional to hydraulic gradient
- q is equal to square of hydraulic gradient

**Question No.57**

Secondary air pollutant is

- $SO_x$
- $NO_x$
- Hydro-carbons
- $O_3$

**Question No.58**

The quantity of liquid waste which flows in sewers during rainy season is called

- Storm sewage
- sanitary sewage
- Liquid waste
- Semi-liquid water

**Question No.59**

- Flexural compression failure
- Flexural tension failure
- Diagonal compression failure
- Diagonal tension failure

**Question No.60**

Bending moment co-efficient for continuous RC slabs in IS 456-1978 code is based on

- Thrust line theory
- Yield-line theory
- Pressure line theory
- Shear stress theory

**Question No.61**

Orographic precipitation occurs due to air masses being lifted to higher altitudes by

- the density difference of air masses
- the presence of mountain barriers
- a frontal action
- extratropical cyclones.

**Question No.62**

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**Question No.63**

A column of height h with a rectangular cross section of size a x 2a has a buckling load of P. if the cross section is changed to 0.5a x 3a and its height changed to 1.5h, the buckling load of the redesign column will be

- P/4
- P/12
- 3P/4
- P/2

**Question No.64**

The process of obtaining increased density of soil in a fill by reduction of its pore spaces by the expulsion of air is known as

- Consolidation
- Soil exploration
- Soil compaction
- soil stabilisation

**Question No.65**

Which of the following statements is correct?

- Dynamic viscosity of water is nearly 50 times that of air.
- Kinematic viscosity of water is 30 times that of air.
- Vapour pressure of a liquid is inversely proportional to the temperature
- Water in soil is able to rise above the groundwater table due to viscosity.

**Question No.66**

The critical hydraulic gradient for all soils is normally equal to

- 2
- 0
- 1
- 3

**Question No.67**

For a circular column having its ends hinged, If slenderness ratio is 160, then l/d ratio of the column is

- 41
- 40

- 43
- 42

**Question No.68**

Two primary air pollutant are

- Sulphur and $O_3$
- Sulphur and $CO_2$
- Nitrogen oxide and $CO_2$
- Sulphur oxide and hydro carbon

**Question No.69**

How many parts does IS code 875 contain?

- 5
- 8
- 7
- 6

**Question No.70**

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**Question No.71**

What is the value of time gap between two vehicles, if the time headway between the vehicles is 6sec, average length of a vehicle is 5m and average space mean speed of the traffic stream is 10m/sec?

- 4sec
- 6sec
- 5.5sec
- 1sec

**Question No.72**

Which one of the following assumptions in deriving the boundary layer equation of the flow past a flat plate at zero incidence is not correct?

- The boundary layer thickness δ is very small compared to distance x.
- Uniform flow = 0
- Pressure remains constant throughout the flow both within and outside the boundary layer.
- Outside boundary layer velocity is U throughout.

**Question No.73**

Which types of impurities could be easily removed from aqueous phase using adsorption process?

- Hydrophobic
- Independent from above character
- Hydrophilic
- Both are equally removed

**Question No.74**

Efflorescence in cement is caused due to the excess of

- Iron Oxide
- Alkalies
- Lime
- Silica

**Question No.75**

- 90 Dba
- 70 dBA
- 80 dBA
- 60 dBA

**Question No.76**

A structural member subjected to compression, has both translation and rotation at one end, while only translation is restrained at the other end. As per IS 456:2000, the effective length factor recommended for design is

- 0.8
- 0.65
- 0.5
- 0.7

**Question No.77**

In a parabolic vertical curve, the rising grade g1 = +0.80% and the falling grade $g_2$ = -0.70%. The rate of change of grade is 0.05 per chain. The length of the vertical curve is:

- 50 chains
- 60 chains
- 40 chains
- 30 chains

**Question No.78**

What would be the equivalent thickness of the 180mm DBM?

- 125mmDBM+75mmBC
- 125mmDBM+75mmBM
- 120mmDBM+60mmBC
- 120mmDBM+60mmBM

**Question No.79**

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**Question No.80**

An underground pipe or conduit of circular section used for carrying sewage is called

- sludge
- scoop
- sewer
- soak pit

**Question No.81**

Type of cement recommended when the structure is exposed to the action of sea water

- Rapid hardening cement
- Sulphate resisting cement
- High alumina cement

- High steel cement

**Question No.82**

Rankine's minimum depth of foundation (D) is

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**Question No.83**

As per IS Code 800-2007. The shear area may be calculated as given below for I and channel sections, based on major axis bending (Hot rolled sections). Where , d= depth of the web between flanges; $t_w$=thickness of web: $t_f$=thickness of flange.

- h $t_w$
- d $t^f$
- h $t^f$
- d $t_w$

**Question No.84**

Example of Impulse noise is

- Moving car
- Running far
- Firing of a weapon
- Drilling machine used by a dentist

**Question No.85**

A steel column of ISHB 350 @ 72.4 kg/m is subjected to a factored axial compressive load of 2000kN. The load is transferred to a concrete pedestal of grade M20 through a square base plate. Consider bearing strength of concrete as $0.45f_{ck}$, where $f_{ck}$ is the characteristics strength of concrete. Using LSM method and the self weight of base plate and steel column, the length of a side of the base plate to be provided is

- 45cm
- 39cm
- 42cm
- 48cm

**Question No.86**

Environmental impact assessment is defined as

- A process of identifying, predicting and evaluating the likely impacts of a proposed projects
- A report written by government representatives on the planned development impacts of environment socio-economic issues and culture
- Project life-cycle assessment
- All of these

**Question No.87**

An IUH is a hydrograph of

- unit rainfall excess on infinitely small area
- unit duration and infinitely small rainfall excess
- infinitely small duration and of unit rainfall excess of an infinitely small area
- infinitely small duration and of unit rainfall excess

**Question No.88**

According to IS 10500:2012, _____ mg/L of free chlorine for _____minutes is sufficient to inactivate virus

- 0.2 mg/L , 30 minutes
- 0.5 mg/L, 30 minutes
- 0.2 mg/L, 60 minutes
- 0.5 mg/L, 60 minutes

**Question No.89**

The specific gravity of sewage is

- slightly lesser than 1
- equal to 1
- much greater that 1
- slightly greater than 1

**Question No.90**

One decibels (dB) is equal to

- 
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**Question No.91**

In the uniform flow in a channel of small bed slope, the hydraulic grade line

- is considerably below the free surface
- essentially coincides with the free surface.
- is considerably above the free surface
- coincides with the bed

**Question No.92**

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**Question No.93**

A prismatic propped cantilever beam of span L and plastic moment capacity $M_p$ is subjected to a concentrated load at its mid span. If the collapse load of beam is $\alpha (M_p/L)$, the value of $\alpha$ is..

- 3
- 6
- 1/3
- 1/6

**Question No.94**

Free flow speed on a lane was 60km/hr and jam density was 90veh/km. The maximum flow in veh/hr that could be expressed on this line is

- 5400
- 2700
- 1350
- 2750

**Question No.95**

A singly reinforced rectangular concrete beam of width 300mm and effective depth 400mm is to be designed using M25 grade concrete and Fe500 grade reinforcement steel. For the beam to be under reinforced, the maximum number of 16mm diameter reinforcing bars that can be provide is

5

- 4
- 6
- 3

**Question No.96**

According to Ministry of Forest and Environment Notification 1993, B.O.D. of treated wastewater for discharge into surface water body should be less than

- 0 mg/L
- 10 mg/L
- 20 mg/L
- 30 mg/L

**Question No.97**

Castigliano's theorem fall under the category of

- Displacement method
- Stiffness method
- Equilibrium method
- Force method

**Question No.98**

In a RCC beam, as per IS code recommendation, the side face reinforcement provided if its depth exceeds ____mm.

- 550
- 650
- 850
- 750

**Question No.99**

When chlorine is added in excess of that required for adequate bacterial purification of water is called

- Super chlorination
- Double chlorination
- Post chlorination
- Break point chlorination

**Question No.100**

An elastic bar of length L, uniform cross sectional area A, coefficient of thermal expansion α, and Young's modulus E is fixed at the two ends. The temperature of the bar is increased by T, resulting in an axial stress σ. Keeping all other parameters unchanged, if the length of the bar is doubled, the axial stress would be

- 0.25ασ
- 0.5σ
- σ
- 2σ