Andhra Pradesh State Council of Higher Education

Notations :

1.Options shown in green color and with ✔ icon are correct.

2.Options shown in red color and with ✖ icon are incorrect.

Question Paper Name :	Civil Engineering 28th Sep 2021 Shift1
Duration :	120
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Display Marks:	No
Share Answer Key With Delivery Engine :	Yes
Calculator :	None
Magnifying Glass Required? :	No
Ruler Required? :	No
Eraser Required? :	No
Scratch Pad Required? :	No
Rough Sketch/Notepad Required? :	No
Protractor Required? :	No
Show Watermark on Console? :	Yes
Highlighter :	No
Auto Save on Console? (SA type of questions will be always auto saved) :	Yes
Is this Group for Examiner? :	No

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Section Id :	5875875
Section Number :	1
Mandatory or Optional :	Mandatory
Number of Questions :	120
Section Marks :	120
Enable Mark as Answered Mark for Review and Clear Response :	Yes

Question Number : 1 Question Id : 587587481 Display Question Number : Yes Is Question Mandatory : No

A rod of length L, area of cross section A, density ρ and modulus of elasticity E hangs vertically from a roof. The maximum longitudinal strain in the rod is

Options :

1. ✖ 0

2. ✔ ρgL/2E

3. ✖ ρgL/E

4. ✖ ρgL/4E

Question Number : 2 Question Id : 587587482 Display Question Number : Yes Is Question Mandatory : No

The number of independent elastic constants required to define the stress strain relation for isotropic elastic material is

Options :

1. ✖ 4

2. ✖ 3

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3. ✔ 2

4. ✖ 1

Question Number : 3 Question Id : 587587483 Display Question Number : Yes Is Question Mandatory : No

A cantilever beam of length L is subjected to a moment M at its free end. The shear force at a distance of L/4 from the fixed end is

Options :

1. ✖ M/L

2. ✖ 3M/4L

3. ✖ 4M/L

4. ✔ 0

Question Number : 4 Question Id : 587587484 Display Question Number : Yes Is Question Mandatory : No

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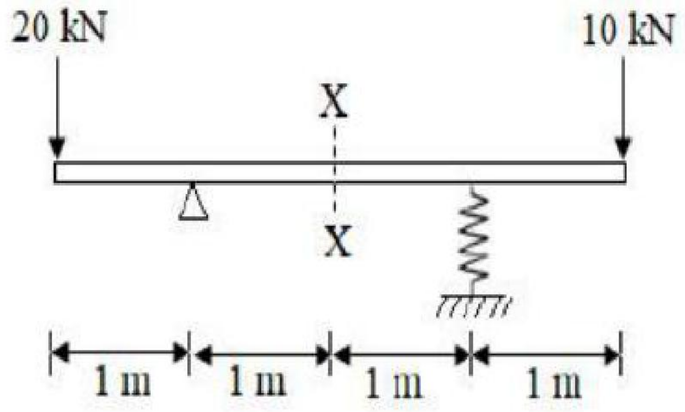
The bending moment (in kNm) at the mid span location X in the beam with overhangs shown below is equal to



Options :

1. ✖ 0

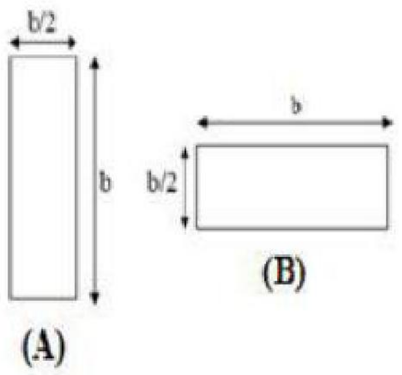
2. ✖ -10

3. ✔ -15

4. ✖ -20

Question Number : 5 Question Id : 587587485 Display Question Number : Yes Is Question Mandatory : No

A beam rectangular in cross-section is used in two different orientations as shown in the figure given below.



Bending moments applied to the beam in both cases are the same. The maximum bending stresses (σ) induced in cases (A) and (B) are related as

Options :

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1. ✖ $\sigma_A = \sigma_B$

2. ✖ $\sigma_A = 2\sigma_B$

3. ✔ $\sigma_A = \frac{\sigma_B}{2}$

4. ✖ $\sigma_A = \frac{\sigma_B}{4}$

Question Number : 6 Question Id : 587587486 Display Question Number : Yes Is Question Mandatory : No

For a given shear force across a symmetrical I section, the intensity of shear stress is maximum at the

Options :

1. ✖ Extreme fibres

2. ✔ Centroid of the section

3. ✖ At the junction of flange and web, but on the web

4. ✖ At the junction of flange and web, but on the flange

Question Number : 7 Question Id : 587587487 Display Question Number : Yes Is Question Mandatory : No

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A long shaft of diameter d is subjected to twisting moment T at its ends. The maximum normal stress acting at its cross section is equal to

Options :

1. ✔ Zero

2. ✖ $\frac{16T}{\pi d^3}$

3. ✖ $\frac{32T}{\pi d^3}$

4. ✖ $\frac{64T}{\pi d^3}$

Question Number : 8 Question Id : 587587488 Display Question Number : Yes Is Question Mandatory : No

A closed thin circular cylinder of diameter 200 mm and wall thickness of 10 mm is filled with a gas at pressure 10 MPa. The maximum shear stress developed in the wall is

Options :

1. ✔ 25 MPa

2. ✖ 50 MPa

3. ✖ 100 MPa

4. ✖ 200 MPa

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Question Number : 9 Question Id : 587587489 Display Question Number : Yes Is Question Mandatory : No

A thin cylinder of diameter 'd' and thickness 't' is subjected to an internal pressure 'p', the change in diameter is (where 'E' is the modulus of elasticity and 'μ' is the Poison's ratio)

Options :

1. ✖ $pd^2/4tE(2+\mu)$

2. ✖ $pd^2/2tE(1+\mu)$

3. ✖ $pd^2/tE(2+\mu)$

4. ✔ $pd^2/4tE(2-\mu)$

Question Number : 10 Question Id : 587587490 Display Question Number : Yes Is Question Mandatory : No

The effective length of column of length 'L' with both ends fixed is

Options :

1. ✖ L

2. ✔ L/2

3. ✖ 2L

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4. ✖ $L/\sqrt{2}$

Question Number : 11 Question Id : 587587491 Display Question Number : Yes Is Question Mandatory : No

The shear centre of a section is defined as that point

Options :

1. ✔ through which the load must be applied to produce zero twisting moment on the section

2. ✖ at which the shear force is zero

3. ✖ at which the shear force is maximum

4. ✖ at which the shear force is minimum

Question Number : 12 Question Id : 587587492 Display Question Number : Yes Is Question Mandatory : No

The number of contra flexure points that occur in a fixed end beam subjected to a concentrated load is

Options :

1. ✖ zero

2. ✔ two

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3. ✖ one

4. ✖ three

Question Number : 13 Question Id : 587587493 Display Question Number : Yes Is Question Mandatory : No

The number of joint equilibrium equations available for the analysis of plane trusses are

Options :

1. ✖ three

2. ✖ one

3. ✔ two

4. ✖ zero

Question Number : 14 Question Id : 587587494 Display Question Number : Yes Is Question Mandatory : No

At a rigid joint in a frame all the members have

Options :

1. ✖ same rotation but different displacements

2. ✖ same displacements but different rotations

3. ✖ different displacements and rotations

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4. ✔ same displacements and rotations

Question Number : 15 Question Id : 587587495 Display Question Number : Yes Is Question Mandatory : No

The fixed end moment of uniform beam of span *l* fixed at the end, subjected to a central point load *P* is

Options :

1. ✖ $Pl/2$

2. ✔ $Pl/8$

3. ✖ $Pl/12$

4. ✖ $Pl/16$

Question Number : 16 Question Id : 587587496 Display Question Number : Yes Is Question Mandatory : No

The influence lines are

Options :

1. ✔ curved for indeterminate structures

2. ✖ always straight line segments

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curved in determinate beams

3. ✖

straight line segments for indeterminate frames

4. ✖

Question Number : 17 Question Id : 587587497 Display Question Number : Yes Is Question Mandatory : No

A two hinged parabolic arch of span 'l' and rise 'h' carries a u.d.l of 'w' per unit run over the whole span. The horizontal thrust at each support is equal to

Options :

1. ✖ $Wl^2/4h$

2. ✖ $5Wl^2/8h$

3. ✔ $Wl^2/8h$

4. ✖ $Wl^2/5h$

Question Number : 18 Question Id : 587587498 Display Question Number : Yes Is Question Mandatory : No

If a point load acting at the mid span of a fixed beam of uniform cross section produces fixed end moment of 60 kNm, then the same load spread uniformly over the entire span will produce fixed end moment equal to

Options :

1. ✖ 20 kNm

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2. ✖ 45 kNm

3. ✖ 30 kNm

4. ✔ 40 kNm

Question Number : 19 Question Id : 587587499 Display Question Number : Yes Is Question Mandatory : No

A two span continuous beam ABC, fixed at 'A' and 'C' has equal spans of 5 m each.

EI is same for both spans. The distribution factor for member BA is

Options :

1. ✔ 1/2

2. ✖ 1/4

3. ✖ 1/3

4. ✖ 2/3

Question Number : 20 Question Id : 587587500 Display Question Number : Yes Is Question Mandatory : No

The number of equations required to analyse a single bay single storey portal frame with hinged supports by slope deflection is

Options :

1. ✖ 2

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2. ✔ 4

3. ✖ 3

4. ✖ 5

Question Number : 21 Question Id : 587587501 Display Question Number : Yes Is Question Mandatory : No

Shear caused by sinking of one of the supports of 'δ' of simply supported beam is

Options :

1. ✖ $12EI\,\delta/l^3$

2. ✖ $3EI\,\delta/l^3$

3. ✖ $6EI\,\delta/l^3$

4. ✔ Zero

Question Number : 22 Question Id : 587587502 Display Question Number : Yes Is Question Mandatory : No

The deflection at any point of a perfect frame can be obtained by applying a unit load

at the joint in

Options :

1. ✔ the direction in which the deflection is required

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2. ✖ vertical direction

3. ✖ horizontal direction

4. ✖ inclined direction

Question Number : 23 Question Id : 587587503 Display Question Number : Yes Is Question Mandatory : No

The unit load method used in structural analysis is

Options :

1. ✖ applicable to statically indeterminate structure

2. ✖ another name for stiffness method

3. ✖ an extension of Maxwell's reciprocal theorem

4. ✔ derived from Castigliano's theorem

Question Number : 24 Question Id : 587587504 Display Question Number : Yes Is Question Mandatory : No

What is the size of stiffness matrix for a single-bay single-storey rigid-jointed plane frame? Neglect axial deformations

Options :

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1. ✖ 6

2. ✖ 5

3. ✔ 3

4. ✖ 4

Question Number : 25 Question Id : 587587505 Display Question Number : Yes Is Question Mandatory : No

For avoiding the limit state of collapse, the safety of RC structures is checked for appropriate combinations of Dead Load (DL), Imposed Load or Live Load (IL), Wind Load (WL) and Earthquake load (EL). Which of the following load combinations is NOT considered?

Options :

1. ✖ 0.9 DL + 1.5 WL

2. ✖ 1.5 DL + 1.5WL

3. ✔ 1.5 DL + 1.5 WL + 1.5 EL

4. ✖ 1.2 DL + 1.2 IL + 1.2 WL

Question Number : 26 Question Id : 587587506 Display Question Number : Yes Is Question Mandatory : No

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The modulus of elasticity, $E = 5000\sqrt{f_{ck}}$ where f_{ck} is the characteristic compressive strength of concrete, specified in IS 456 : 2000 is based on

Options :

1. ✖ tangent modulus

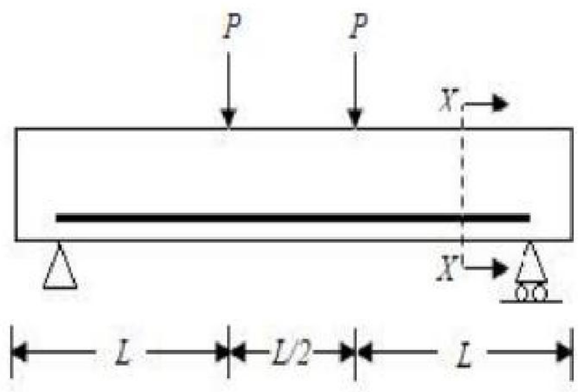
2. ✖ initial tangent modulus

3. ✔ secant modulus

4. ✖ chord modulus

Question Number : 27 Question Id : 587587507 Display Question Number : Yes Is Question Mandatory : No

Consider the singly reinforced beam shown in the figure below:



At the cross-section XX, which one of the following statements is TRUE at the limit state?

Options :

1. ✖ The variation of stress is linear and that of strain is non-linear

2. ✔ The variation of strain is linear and that of stress is non-linear

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3. ✖ The variation of both stress and strain is linear

4. ✖ The variation of both stress and strain is non-linear

Question Number : 28 Question Id : 587587508 Display Question Number : Yes Is Question Mandatory : No

The minimum quantity of cement content (in kg) needed in one m^3 of reinforced concrete which is exposed to very severe conditions is

Options :

1. ✖ 240

2. ✔ 340

3. ✖ 440

4. ✖ 540

Question Number : 29 Question Id : 587587509 Display Question Number : Yes Is Question Mandatory : No

The section in which concrete is not fully stressed to its maximum permissible value while stress in steel reaches its maximum value, is called

Options :

1. ✖ balanced section

2. ✖ critical section

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3. ✖ over reinforced section

4. ✔ under reinforced section

Question Number : 30 Question Id : 587587510 Display Question Number : Yes Is Question Mandatory : No

The minimum area of tension reinforcement in a beam shall be greater than

Options :

1. ✔ $0.85bd/f_y$

2. ✖ $0.87f_y/bd$

3. ✖ $0.04bd$

4. ✖ $0.4bd/y$

Question Number : 31 Question Id : 587587511 Display Question Number : Yes Is Question Mandatory : No

As per IS-456:2000, side face reinforcement in a beam is provided where depth of web exceeds

Options :

1. ✖ 250 mm

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2. ✖ 500 mm

3. ✔ 750 mm

4. ✖ 1000 mm

Question Number : 32 Question Id : 587587512 Display Question Number : Yes Is Question Mandatory : No

Maximum spacing of vertical shear reinforcement measured along the axis of the RCC beam shall not exceed the lowest value of

Options :

1. ✖ 0.5d or 300 mm

2. ✖ 0.75d or 400 mm

3. ✖ 0.5d or 250 mm

4. ✔ 0.75d or 300 mm

Question Number : 33 Question Id : 587587513 Display Question Number : Yes Is Question Mandatory : No

Torsion in a reinforced concrete member gives rise to

Options :

1. ✖ diagonal cracks

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2. ✖ vertical cracks

3. ✖ inclined cracks

4. ✔ spiral cracks

Question Number : 34 Question Id : 587587514 Display Question Number : Yes Is Question Mandatory : No

In a simply supported slab, alternate bars are curtailed at

Options :

1. ✖ one-fifth of span

2. ✔ one-seventh of span

3. ✖ one-sixth of span

4. ✖ one-eighth of span

Question Number : 35 Question Id : 587587515 Display Question Number : Yes Is Question Mandatory : No

The purpose of lateral ties in short columns is to

Options :

1. ✖ increase the load carrying capacity of the columns

2. ✖

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facilitate construction

3. ✔ avoid buckling of longitudinal bars

4. ✖ increase shear strength of concrete

Question Number : 36 Question Id : 587587516 Display Question Number : Yes Is Question Mandatory : No

For pre-tensioned prestressed concrete, the grade of concrete shall be not less than

Options :

1. ✖ M20

2. ✖ M25

3. ✖ M30

4. ✔ M40

Question Number : 37 Question Id : 587587517 Display Question Number : Yes Is Question Mandatory : No

The prestressing of concrete member is carried out to reduce

Options :

1. ✔ Compressive stresses

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Tensile stresses

2. ✖

Bending stresses

3. ✖

Shear force

4. ✖

Question Number : 38 Question Id : 587587518 Display Question Number : Yes Is Question Mandatory : No

Maximum size of fillet weld for a plate of square edge is

Options :

1. ✔ 1.5 mm less than the thickness of the plate

2. ✖ one half of the thickness of the plate

3. ✖ thickness of the plate itself

4. ✖ 1.5 mm more than the thickness of the plate

Question Number : 39 Question Id : 587587519 Display Question Number : Yes Is Question Mandatory : No

The permissible stress in axial tension in steel member on the net effective area of the section shall not exceed (f_y is the yield stress of steel)

Options :

1. ✖ $0.80\, f_y$

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2. ✖ $0.75\,f_y$

3. ✔ $0.60\,f_y$

4. ✖ $0.50\,f_y$

Question Number : 40 Question Id : 587587520 Display Question Number : Yes Is Question Mandatory : No

A steel column pinned at both the ends has a buckling load of 200 kN. If the column is restrained against lateral movement at its mid-height, its buckling load will be

Options :

1. ✖ 200 kN

2. ✔ 800 kN

3. ✖ 283 kN

4. ✖ 400 kN

Question Number : 41 Question Id : 587587521 Display Question Number : Yes Is Question Mandatory : No

In the case of an axially loaded column machined for full bearing, the fasteners connecting the column to the plates in gusseted base are designed for

Options :

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1. ✖ 100% of column load

2. ✔ 50% of column load

3. ✖ 25% of column load

4. ✖ erection conditions only

Question Number : 42 Question Id : 587587522 Display Question Number : Yes Is Question Mandatory : No

The maximum allowable slenderness ratio of compression member carrying forces resulting from dead load and super imposed load as per IS 800

Options :

1. ✖ 300

2. ✖ 250

3. ✔ 180

4. ✖ 400

Question Number : 43 Question Id : 587587523 Display Question Number : Yes Is Question Mandatory : No

The number of plastic hinges formed if an indeterminate beam with redundancy R is to become determinate is

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Options :

1. ✖ R-1

2. ✔ R

3. ✖ R+1

4. ✖ R+2

Question Number : 44 Question Id : 587587524 Display Question Number : Yes Is Question Mandatory : No

The consistency of a saturated cohesive soil is affected by

Options :

1. ✔ water content

2. ✖ particle size distribution

3. ✖ density index

4. ✖ coefficient of permeability

Question Number : 45 Question Id : 587587525 Display Question Number : Yes Is Question Mandatory : No

If the porosity of a soil sample is 20%, the void ratio is

Options :

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1. ✖ 0.20

2. ✖ 0.80

3. ✖ 1.00

4. ✔ 0.25

Question Number : 46 Question Id : 587587526 Display Question Number : Yes Is Question Mandatory : No

If a soil is dried beyond its shrinkage limit, it will show

Options :

1. ✖ large volume change

2. ✖ moderate volume change

3. ✖ low volume change

4. ✔ no volume change

Question Number : 47 Question Id : 587587527 Display Question Number : Yes Is Question Mandatory : No

The void ratios at the densest, loosest and natural states of a sand are 0.2, 0.6 and 0.4, respectively. The relative density of the deposit is

Options :

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1. ✖ 100%

2. ✖ 75%

3. ✔ 50%

4. ✖ 25%

Question Number : 48 Question Id : 587587528 Display Question Number : Yes Is Question Mandatory : No

The swelling nature of black cotton soil is primarily due to the presence of

Options :

1. ✖ Kaolinite

2. ✖ Illite

3. ✔ Montmorillonite

4. ✖ Vermiculite

Question Number : 49 Question Id : 587587529 Display Question Number : Yes Is Question Mandatory : No

As per Indian Standard Soil Classification system, a sample of silty clay with liquid limit of 45% and plasticity index of 32% is classified as

Options :

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1. ✖ CH

2. ✔ CI

3. ✖ CL

4. ✖ CL-ML

Question Number : 50 Question Id : 587587530 Display Question Number : Yes Is Question Mandatory : No

The bulk unit weight of soil up to a depth of 3m from the top is 17 kN/m^3. The saturated unit weight of the soil is 20 kN/m^3. The water table is at a depth of 3 m below the top. Taking unit weight of water as 10 kN/m^3, the effective stress (kN/m^2) at a depth of 4 m from the top is

Options :

1. ✖ 71

2. ✔ 61

3. ✖ 51

4. ✖ 81

Question Number : 51 Question Id : 587587531 Display Question Number : Yes Is Question Mandatory : No

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Root time method is used to determine

Options :

1. ✖ T, time factor

2. ✔ C_v, coefficient of consolidation

3. ✖ a_v, coefficient of compressibility

4. ✖ m_v, coefficient of volume compressibility

Question Number : 52 Question Id : 587587532 Display Question Number : Yes Is Question Mandatory : No

The results of a consolidation test on an undisturbed soil, sampled at a depth of 10 m below the ground level are as follows: saturated unit weight = 16 kN/m^3 and pre-consolidation pressure = 90 kPa. The water table was encountered at the ground level. Assuming the unit weight of water as 10 kN/m^3, the over consolidation ratio of the soil is

Options :

1. ✖ 0.67

2. ✔ 1.50

3. ✖ 1.77

4. ✖ 2.00

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Question Number : 53 Question Id : 587587533 Display Question Number : Yes Is Question Mandatory : No

The graphical solution of Laplace's equation (the flow net) would change

Options :

1. ✖ if the soil were to be replaced (change of k)

2. ✖ if the head loss during the flow were to be different

3. ✖ if the upstream and downstream water levels were to be reversed

4. ✔ when the boundary conditions of the flow space are altered

Question Number : 54 Question Id : 587587534 Display Question Number : Yes Is Question Mandatory : No

The number of flow channels and head drops is 4 and 12 respectively. If the difference in the upstream and downstream water levels is 3 m and coefficient of permeability $k = 0.1$ m/s, the discharge per meter width of a sheet pile wall is

Options :

1. ✖ $0.9\ m^3/s/m$

2. ✔ $0.1\ m^3/s/m$

3. ✖ $0.01\ m^3/s/m$

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4. ✖ $0.2\ m^3/s/m$

Question Number : 55 Question Id : 587587535 Display Question Number : Yes Is Question Mandatory : No

The vertical stress at a depth z directly below the point load P is (k is a constant)

Options :

1. ✖ $k\frac{P}{z}$

2. ✖ $k\frac{P}{z^3}$

3. ✔ $k\frac{P}{z^2}$

4. ✖ $k\frac{P}{\sqrt{z}}$

Question Number : 56 Question Id : 587587536 Display Question Number : Yes Is Question Mandatory : No

In a compaction test, as the compaction effort is increased, the optimum moisture content

Options :

1. ✔ decreases

2. ✖ remains same

3. ✖

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increases

4. ✖ increases first and then decreases

Question Number : 57 Question Id : 587587537 Display Question Number : Yes Is Question Mandatory : No

In an unconsolidated undrained triaxial test on a saturated clay, the Poisson's ratio is

Options :

1. ✔ $\frac{\sigma_3}{\sigma_1+\sigma_3}$

2. ✖ $\frac{\sigma_3}{\sigma_1-\sigma_3}$

3. ✖ $\frac{\sigma_1-\sigma_3}{\sigma_3}$

4. ✖ $\frac{\sigma_1+\sigma_3}{\sigma_3}$

Question Number : 58 Question Id : 587587538 Display Question Number : Yes Is Question Mandatory : No

The diameter of the Mohr's circle at failure remains constant in

Options :

1. ✖ consolidated undrained test

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2. ✖ consolidated drained test

3. ✔ unconsolidated undrained test

4. ✖ Both option 1 and option 2

Question Number : 59 Question Id : 587587539 Display Question Number : Yes Is Question Mandatory : No

According to IS:1892 – 1979, for an undisturbed sample, the inside clearance should be

Options :

1. ✖ Zero

2. ✔ 1 to 3 %

3. ✖ 0 to 2 %

4. ✖ More than 20%

Question Number : 60 Question Id : 587587540 Display Question Number : Yes Is Question Mandatory : No

The following assumption is NOT made for the friction circle method of slope stability analysis:

Options :

1. ✖ Friction is fully mobilized

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Total stress analysis is applicable

2. ✖

The resultant is tangential to the friction circle

3. ✖

The resultant passes through the center of friction circle

4. ✔

Question Number : 61 Question Id : 587587541 Display Question Number : Yes Is Question Mandatory : No

Cohesion in soil

Options :

decreases active pressure and increases passive resistance

1. ✔

decreases both active pressure and passive resistance

2. ✖

increases the active pressure and decreases the passive resistance

3. ✖

increases both active pressure and passive resistance

4. ✖

Question Number : 62 Question Id : 587587542 Display Question Number : Yes Is Question Mandatory : No

Two footings, one circular and the other square, are founded on the surface of a purely cohesionless soil. The diameter of the circular footing is same as that of the side of the square footing. The ratio of their ultimate bearing capacities is

Options :

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1. ✔ 3/4

2. ✖ 4/3

3. ✖ 1.0

4. ✖ 1.3

Question Number : 63 Question Id : 587587543 Display Question Number : Yes Is Question Mandatory : No

Increasing the depth of foundation in saturated clays results in an increased ultimate bearing capacity for strip footings because

Options :

1. ✖ the bearing capacity factor, N_q, decreases

2. ✖ the bearing capacity factor, N_c, increases as depth increases

3. ✔ the term in the bearing capacity equation, qN_q, increases with depth

4. ✖ the angle of internal friction decreases as the depth of foundation increases

Question Number : 64 Question Id : 587587544 Display Question Number : Yes Is Question Mandatory : No

The group efficiency of a pile group

Options :

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1. ✖ will always be less than 100%

2. ✖ will always be greater than 100%

3. ✖ will always be greater than 100% in dense sand, irrespective of pile spacing

4. ✔ will always be greater than 100% for free standing pile groups driven in sand for closer spacings

Question Number : 65 Question Id : 587587545 Display Question Number : Yes Is Question Mandatory : No

Negative skin friction occurs when

Options :

1. ✖ an upward drag exists in the pile

2. ✔ the surrounding soil settles more than the pile

3. ✖ the pile passes continuously through a firm soil

4. ✖ the driving operation begins

Question Number : 66 Question Id : 587587546 Display Question Number : Yes Is Question Mandatory : No

Which one of the following statements is NOT correct

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Options :

1. ✖ When the water content of soil lies between its liquid limit and plastic limit, the soil is said to be in plastic state.

2. ✔ Boussinesq's theory is used for the analysis of stratified soil.

3. ✖ The inclination of stable slope in cohesive soil can be greater than its angle of internal friction.

4. ✖ For saturated fine sands and silts, after applying overburden correction, if the Standard Penetration Test value exceeds 15, dilatancy correction is to be applied.

Question Number : 67 Question Id : 587587547 Display Question Number : Yes Is Question Mandatory : No

With increase in temperature, viscosity of a fluid

Options :

1. ✖ does not change

2. ✖ always increases

3. ✖ always decreases

4. ✔ increases if fluid is a gas and decreases if it is a liquid

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Question Number : 68 Question Id : 587587548 Display Question Number : Yes Is Question Mandatory : No

The necessary and sufficient condition for a surface to be called as a free surface is

Options :

1. ✖ no stress should be acting on it

2. ✖ tensile stress acting on it must be zero

3. ✔ shear stress acting on it must be zero

4. ✖ no point on it should be under any stress

Question Number : 69 Question Id : 587587549 Display Question Number : Yes Is Question Mandatory : No

Euler's equation for motion of liquids is based on the assumption that the

Options :

1. ✖ fluid is streamline

2. ✖ flow takes place continuously

3. ✔ flow is non-viscous

4. ✖ flow is turbulent

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Question Number : 70 Question Id : 587587550 Display Question Number : Yes Is Question Mandatory : No

A vertical triangular planar area, submerged in water, with one side in the free surface, vertex downward, altitude h has the pressure center below the free surface by

Options :

1. ✖ $h/4$

2. ✖ $h/3$

3. ✖ $2h/3$

4. ✔ $h/2$

Question Number : 71 Question Id : 587587551 Display Question Number : Yes Is Question Mandatory : No

For a body completely submerged in a fluid, the center of gravity (G) and center of buoyancy (O) are known. The body is considered to be in a stable equilibrium if

Options :

1. ✖ O does not coincide with the center of mass of the displaced fluid

2. ✖ G coincides with the center of mass of the displaced fluid

3. ✖ O lies below G

4. ✔ O lies above G

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Question Number : 72 Question Id : 587587552 Display Question Number : Yes Is Question Mandatory : No

In uniform laminar flow through a pipe, the hydraulic gradient varies

Options :

1. ✖ as the square of the diameter

2. ✖ inversely with the dynamic viscosity of the fluid

3. ✖ inversely with the kinematic viscosity of the fluid

4. ✔ as the square of the velocity

Question Number : 73 Question Id : 587587553 Display Question Number : Yes Is Question Mandatory : No

In parallel pipe systems

Options :

1. ✖ the pipes must be placed geometrically parallel to each other

2. ✖ the flow must be equal in all pipes

3. ✖ the head loss per unit length must be the same in all pipes

4. ✔ the head loss across each of the parallel pipes must be same

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Question Number : 74 Question Id : 587587554 Display Question Number : Yes Is Question Mandatory : No

For a pipe of radius, r, flowing half full under the action of gravity, the hydraulic depth is

Options :

1. ✖ r

2. ✔ $\pi r/4$

3. ✖ $r/2$

4. ✖ $0.379r$

Question Number : 75 Question Id : 587587555 Display Question Number : Yes Is Question Mandatory : No

Critical depth at a section of rectangular channel is 2 meters. The specific energy at the section is

Options :

1. ✖ 0.75 meter

2. ✖ 1.0 meter

3. ✖ 2.25 meter

4. ✔ 3.0 meter

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Question Number : 76 Question Id : 587587556 Display Question Number : Yes Is Question Mandatory : No

The range of Froude number for a weak jump is

Options :

1. ✖ 1 to 1.7

2. ✔ 1.7 to 2.5

3. ✖ 2.5 to 4.5

4. ✖ 4.5 to 9.0

Question Number : 77 Question Id : 587587557 Display Question Number : Yes Is Question Mandatory : No

The specific speed of a pump has dimensions of

Options :

1. ✔ $L^{3/4} T^{-3/2}$

2. ✖ $L^{3/4} T^{1/2}$

3. ✖ $M^0 L^0 T^0$

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$M^{1/2} L^{1/2} T^{1/4}$

4. ✖

Question Number : 78 Question Id : 587587558 Display Question Number : Yes Is Question Mandatory : No

The accumulated precipitation versus time in chronological order is called

Options :

hydrograph

1. ✖

hyetograph

2. ✖

isohyet

3. ✖

mass curve

4. ✔

Question Number : 79 Question Id : 587587559 Display Question Number : Yes Is Question Mandatory : No

Penman's equation is based on

Options :

energy budgeting

1. ✖

energy budgeting and water budgeting

2. ✖

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3. ✔ energy budgeting and mass transfer

4. ✖ water budgeting and mass transfer

Question Number : 80 Question Id : 587587560 Display Question Number : Yes Is Question Mandatory : No

Inconsistency of rainfall data can be checked by which one of the following methods:

Options :

1. ✖ normal ratio method

2. ✖ mass curve method

3. ✔ double mass curve method

4. ✖ depth duration frequency curve

Question Number : 81 Question Id : 587587561 Display Question Number : Yes Is Question Mandatory : No

A 6-hour storm has 6 cm of rainfall and the resulting runoff is 3cm. If ϕ index remains at the same value, which one of the following is the runoff due to 12 cm of rainfall in 9 hours in the catchment?

Options :

1. ✖ 4.5 cm

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2. ✖ 6.0 cm

3. ✔ 7.5 cm

4. ✖ 9.0 cm

Question Number : 82 Question Id : 587587562 Display Question Number : Yes Is Question Mandatory : No

What is the moisture depth available for evapotranspiration in the root zone of one meter depth of soil, if the dry weight of soil is 1.5 g/cc, field capacity is 30%, and the permanent wilting point is 10%.

Options :

1. ✖ 450 mm

2. ✔ 300 mm

3. ✖ 200 mm

4. ✖ 150 mm

Question Number : 83 Question Id : 587587563 Display Question Number : Yes Is Question Mandatory : No

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An agricultural land of 450 ha. is to be irrigated for a particular crop. The base period of the crop is 100 days and the total depth of water required by the crop is 150 cm. If a rainfall of 50 cm occurs during the base period, the duty (ha./cumec) of irrigation water is

Options :

1. ✖ 437

2. ✖ 486

3. ✖ 741

4. ✔ 864

Question Number : 84 Question Id : 587587564 Display Question Number : Yes Is Question Mandatory : No

A lined alluvial canal is best designed on the basis of

Options :

1. ✖ Lacey's formula

2. ✖ Kennedy's formula

3. ✔ Manning's formula

4. ✖ Bligh's formula

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Question Number : 85 Question Id : 587587565 Display Question Number : Yes Is Question Mandatory : No

The intensity of irrigation means

Options :

1. ✔ percentage of cultivable command area to be irrigated annually

2. ✖ percentage of gross command area to be irrigated annually

3. ✖ percentage of the mean of culturable command area and the gross command area to be irrigated annually

4. ✖ total depth of water supplied by the number of waterings.

Question Number : 86 Question Id : 587587566 Display Question Number : Yes Is Question Mandatory : No

A unit hydrograph for a water shed is triangular in shape with base period of 40 hours.

The area of the watershed is 400 hectares. The peak discharge in m/hour is

Options :

1. ✖ 6000

2. ✔ 2000

3. ✖ 4000

4. ✖ 1600

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Question Number : 87 Question Id : 587587567 Display Question Number : Yes Is Question Mandatory : No

The pollutant or pair of pollutants formed due to photochemical reactions are

Options :

1. ✖ CO alone

2. ✔ O_3 and PAN

3. ✖ PAN and NH_3

4. ✖ NH_3 and CO

Question Number : 88 Question Id : 587587568 Display Question Number : Yes Is Question Mandatory : No

Particulate matter (Flyash) carried in effluent gases from the furnaces burning fossil fuels are better removed by

Options :

1. ✖ Cotton bag house filter

2. ✔ Electrostatic precipitator (ESP)

3. ✖ Cyclone

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4. ✖ Wet scrubber

Question Number : 89 Question Id : 587587569 Display Question Number : Yes Is Question Mandatory : No

Nitrates more than 45 *mg/l* in drinking water lead to a disease called

Options :

1. ✖ gastroenteritis

2. ✖ polio

3. ✖ mottled teeth

4. ✔ methemoglobinemia

Question Number : 90 Question Id : 587587570 Display Question Number : Yes Is Question Mandatory : No

Erichrome Black-T is employed as an indicator for testing water and waste water for

Options :

1. ✔ hardness

2. ✖ COD

3. ✖ residual chlorine

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4. ✖ DO

Question Number : 91 Question Id : 587587571 Display Question Number : Yes Is Question Mandatory : No

The chlorine demand of a water sample was found to be 0.2 *mg/l*. The amount of bleaching powder containing 30% available chlorine to be added to treat one litre of such a water sample is

Options :

1. ✔ 0.67 mg

2. ✖ 0.06 mg

3. ✖ 1.33 mg

4. ✖ 0.14 mg

Question Number : 92 Question Id : 587587572 Display Question Number : Yes Is Question Mandatory : No

Certain waste has a BOD of 162 *mg/l* and a flow rate of 1000 m^3/day. If the domestic sewage has a BOD of 80 g/capita, then the population equivalent of waste would be

Options :

1. ✖ 20.25

2. ✖ 1296

3. ✔ 2025

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4. ✖ 12960

Question Number : 93 Question Id : 587587573 Display Question Number : Yes Is Question Mandatory : No

According to IS 1172-1971, the domestic consumption of water (lit/day/capita) under normal condition is considered as

Options :

1. ✖ 130

2. ✔ 135

3. ✖ 120

4. ✖ 125

Question Number : 94 Question Id : 587587574 Display Question Number : Yes Is Question Mandatory : No

If moisture content of a sludge is reduced from 98% to 96%, then volume of sludge will decrease by

Options :

1. ✖ 2%

2. ✖ 20%

3. ✖ 25%

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4. ✔ 50%

Question Number : 95 Question Id : 587587575 Display Question Number : Yes Is Question Mandatory : No

According to IS 4954 – 1968, the acceptable outdoor noise level(dB) in an industrial area is

Options :

1. ✖ 45 -55

2. ✔ 50 -60

3. ✖ 40 -50

4. ✖ 60 -70

Question Number : 96 Question Id : 587587576 Display Question Number : Yes Is Question Mandatory : No

Which one of the following is not present in acid rain?

Options :

1. ✖ HNO_3

2. ✖ H_2SO_4

3. ✖ H_2CO_3

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4. ✔ CH_3COOH

Question Number : 97 Question Id : 587587577 Display Question Number : Yes Is Question Mandatory : No

For a two-way traffic on a single lane road, the minimum stopping sight distance is

Options :

1. ✔ at least twice the stopping distance

2. ✖ half the required overtaking sight distance

3. ✖ one-third the required oversighting sight distance

4. ✖ three times the stopping sight distance

Question Number : 98 Question Id : 587587578 Display Question Number : Yes Is Question Mandatory : No

Camber on highway pavement is provided to take of

Options :

1. ✖ centrifugal force

2. ✔ drainage

3. ✖ sight distance

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4. ✖ off-tracking

Question Number : 99 Question Id : 587587579 Display Question Number : Yes Is Question Mandatory : No

The reaction time for calculation of stopping sight distance may be assumed as

Options :

1. ✖ 5 secs

2. ✖ 0.5 secs

3. ✔ 2.5 secs

4. ✖ 10.0 secs

Question Number : 100 Question Id : 587587580 Display Question Number : Yes Is Question Mandatory : No

If an ascending gradient 1 in 50 meets another ascending gradient of 1 in 30 then the deviation angle is

Options :

1. ✖ 1/50

2. ✔ 1/75

3. ✖

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1/30

8/150

4. ✖

Question Number : 101 Question Id : 587587581 Display Question Number : Yes Is Question Mandatory : No

The length of summit curve on a two-lane highway depends upon

Options :

1. ✖ allowable rate of change of centrifugal acceleration

2. ✖ coefficient of lateral friction

3. ✖ required stopping sight distance

4. ✔ required overtaking sight distance

Question Number : 102 Question Id : 587587582 Display Question Number : Yes Is Question Mandatory : No

While designing a hill road with a ruling gradient of 6 %, if a sharp horizontal curve of 60 m radius is encountered, the compensated gradient at the curve as Indian Roads Congress specifications should be

Options :

1. ✖ 4.5 %

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2. ✔ 4.75 %

3. ✖ 5.0 %

4. ✖ 5.25 %

Question Number : 103 Question Id : 587587583 Display Question Number : Yes Is Question Mandatory : No

The vehicles per unit length at any instant of time is called as

Options :

1. ✔ density

2. ✖ jam density

3. ✖ maximum density

4. ✖ traffic flow

Question Number : 104 Question Id : 587587584 Display Question Number : Yes Is Question Mandatory : No

The outgoing and incoming traffic are counted at

Options :

1. ✔

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traffic intersections

2. highways

3. urban roads

4. traffic symbols

Question Number : 105 Question Id : 587587585 Display Question Number : Yes Is Question Mandatory : No

As per IRC no vehicle shall have a width exceeding

Options :

1. ✔ 2.50 m

2. 2.0 m

3. 8 m

4. 1.58 m

Question Number : 106 Question Id : 587587586 Display Question Number : Yes Is Question Mandatory : No

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The penetration test for bitumen is conducted at a temperature of

Options :

1. ✖ 60°C

2. ✖ 37°C

3. ✖ 50°C

4. ✔ 25°C

Question Number : 107 Question Id : 587587587 Display Question Number : Yes Is Question Mandatory : No

The type of surveying in which the curvature of the earth is taken into account is called

Options :

1. ✖ Plane surveying

2. ✔ Geodetic surveying

3. ✖ Preliminary surveying

4. ✖ Topographical surveying

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Question Number : 108 Question Id : 587587588 Display Question Number : Yes Is Question Mandatory : No

The reduced bearing of a 10 m long line is N30°E. The departure of the line is

Options :

1. ✖ 10.00 m

2. ✖ 8.66 m

3. ✖ 7.52 m

4. ✔ 5.00 m

Question Number : 109 Question Id : 587587589 Display Question Number : Yes Is Question Mandatory : No

A series of closely spaced contour lines represent a

Options :

1. ✔ steep slope

2. ✖ gentle slope

3. ✖ uniform slope

4. ✖ plane surface

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Question Number : 110 Question Id : 587587590 Display Question Number : Yes Is Question Mandatory : No

Setting out a curve using two theodolite method involves with

Options :

1. ✖ linear measurements only

2. ✔ angular measurements only

3. ✖ one linear and one angular measurement

4. ✖ one linear and two angular measurements

Question Number : 111 Question Id : 587587591 Display Question Number : Yes Is Question Mandatory : No

If A is symmetric then A^3 is

Options :

1. ✔ symmetric

2. ✖ unitary

3. ✖ skew-symmetric

4. ✖

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Hermitian

Question Number : 112 Question Id : 587587592 Display Question Number : Yes Is Question Mandatory : No

If A has Eigen values (1, 2) then the Eigen values of $3A+4A^{-1}$ are

Options :

1. ✖ 3, 8

2. ✖ 7, 11

3. ✔ 7, 4

4. ✖ 3, 6

Question Number : 113 Question Id : 587587593 Display Question Number : Yes Is Question Mandatory : No

If $f(x)=x^3$ in $(-\pi,\pi)$ then the Fourier series of $f(x)$ contains only _____

Options :

1. ✔ b_n terms

2. ✖ a_n terms

3. ✖

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a_0

4. ✖ a_0 & a_n terms

Question Number : 114 Question Id : 587587594 Display Question Number : Yes Is Question Mandatory : No

If $f(x, y) = x^2 + y^3$; $x = t^2 + t^3$; $y = t^3 + t^9$ then the value of $^{df}/_{dt}$ at t=1 is

Options :

1. ✖ 0

2. ✖ 1

3. ✖ -1

4. ✔ 164

Question Number : 115 Question Id : 587587595 Display Question Number : Yes Is Question Mandatory : No

If a, b, c are real and distinct roots then the complementary function is

Options :

1. ✔ $c_1e^{ax} + c_2e^{bx} + c_3e^{cx}$

2. ✖ $c_1e^{ax} - c_2e^{bx} - c_3e^{cx}$

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3. ✖ $c_1e^{ax}-(c_2+c_3x)e^{cx}$

4. ✖ $c_1e^{-x}+(c_2+c_3\,x)e^{2x}$

Question Number : 116 Question Id : 587587596 Display Question Number : Yes Is Question Mandatory : No

Find $L\{t^2e^t\}$

Options :

1. ✖ $\frac{2}{(s-1)^2}$

2. ✖ $\frac{2}{(s-1)}$

3. ✔ $\frac{2}{(s-1)^3}$

4. ✖ 0

Question Number : 117 Question Id : 587587597 Display Question Number : Yes Is Question Mandatory : No

Two cards are drawn together from a pack of 52 cards. The probability that one is a spade and one is a heart, is:

Options :

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1. ✖ $\frac{3}{20}$

2. ✖ $\frac{29}{34}$

3. ✖ $\frac{47}{100}$

4. ✔ $\frac{13}{102}$

Question Number : 118 Question Id : 587587598 Display Question Number : Yes Is Question Mandatory : No

$f(x) = kx(1-x)$ in $0<x<1$ is a valid probability density function, if k=

Options :

1. ✖ 7

2. ✔ 6

3. ✖ 8

4. ✖ 9

Question Number : 119 Question Id : 587587599 Display Question Number : Yes Is Question Mandatory : No

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If $\frac{dy}{dx} = 3x^2 + 1, y(1) = 2$, $h = 0.5$ then $y(2)$ using Euler's Method is _____

Options :

1. ✔ 7.875

2. ✖ 6.875

3. ✖ 5.875

4. ✖ 8.875

Question Number : 120 Question Id : 587587600 Display Question Number : Yes Is Question Mandatory : No

The order of convergence in Newton –Raphson method is

Options :

1. ✖ 1

2. ✖ 3

3. ✖ 0

4. ✔ 2

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