

National Testing Agency

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Civil Structural and Transport Engineering

Group Number :	1
Group Id :	30169837
Group Maximum Duration :	0
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Show Attended Group? :	No
Edit Attended Group? :	No
Break time :	0
Group Marks :	300

Civil Structural and Transport Engineering

Section Id :	30169837
Section Number :	1
Section type :	Online
Mandatory or Optional :	Mandatory
Number of Questions :	75
Number of Questions to be attempted :	75
Section Marks :	300
Maximum Instruction Time :	0
Sub-Section Number :	1
Sub-Section Id :	30169855
Question Shuffling Allowed :	Yes

Question Number : 1 Question Id : 3016982717 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Is Question Mandatory : No Correct Marks : 4 Wrong Marks : 1

The solution(s) of the ordinary differential equation $y'' + y = 0$, is

- A. $\cos x$
- B. $\sin x$
- C. $1 + \cos x$
- D. $1 + \sin x$

Choose the **most appropriate** answer from the options given below:

- 1. A and D only
- 2. A and B only
- 3. C and D only
- 4. B and C only

Options :

- 30169810801. 1
- 30169810802. 2
- 30169810803. 3
- 30169810804. 4

Question Number : 2 Question Id : 3016982718 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

For the matrix, $A = \begin{bmatrix} -4.0 & 4.0 \\ -1.6 & 1.2 \end{bmatrix}$ the eigen values (λ) and eigen vectors (X) respectively are :

- 1. $\lambda = \begin{bmatrix} -6.0 \\ -0.5 \end{bmatrix}$, $X_1 = \begin{bmatrix} -1.2 \\ 1.4 \end{bmatrix}$ and $X_2 = \begin{bmatrix} 1 \\ 0.8 \end{bmatrix}$
- 2. $\lambda = \begin{bmatrix} -3.0 \\ -0.2 \end{bmatrix}$, $X_1 = \begin{bmatrix} 2 \\ 1 \end{bmatrix}$ and $X_2 = \begin{bmatrix} -1.2 \\ 1.4 \end{bmatrix}$
- 3. $\lambda = \begin{bmatrix} -2.0 \\ -0.8 \end{bmatrix}$, $X_1 = \begin{bmatrix} -1.2 \\ 1.4 \end{bmatrix}$ and $X_2 = \begin{bmatrix} 1 \\ 0.8 \end{bmatrix}$
- 4. $\lambda = \begin{bmatrix} -2.0 \\ -0.8 \end{bmatrix}$, $X_1 = \begin{bmatrix} 2 \\ 1 \end{bmatrix}$ and $X_2 = \begin{bmatrix} 1 \\ 0.8 \end{bmatrix}$

Options :

- 30169810805. 1
- 30169810806. 2
- 30169810807. 3
- 30169810808. 4

Question Number : 3 Question Id : 3016982719 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

The value of $\int_S \vec{F} \cdot \vec{N} \, ds$ where $\vec{F} = 2x^2 y \hat{i} - y^2 \hat{j} + 4xz^2 \hat{k}$ and S is the closed surface of region in the first octant bounded by the cylinder $y^2 + z^2 = 9$ and the planes $x = 0, x = 2, y = 0, z = 0$, is :
(where \vec{N} is unit outward normal to surface S)

1. 108

2. 72

3. 180

4. 144

Options :

30169810809. 1

30169810810. 2

30169810811. 3

30169810812. 4

Question Number : 4 Question Id : 3016982720 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

The value of integral $\oint_c \frac{z^3 - 6}{2z - i} \, dz$, where $c : |z| \leq 1$ is

1. $\frac{\pi}{8} - 6\pi i$

2. $\frac{\pi}{8} - 5\pi i$

3. $\frac{3\pi}{8} - 5\pi i$

4. $\frac{5\pi}{8} - 3\pi i$

Options :

30169810813. 1

30169810814. 2

30169810815. 3

30169810816. 4

Question Number : 5 Question Id : 3016982721 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

In a Binomial distribution, the sum of its mean and variance is 1.8. If the event was conducted 5 times, then the probability of two successes is:

1. 0.3402
2. 0.2048
3. 0.1543
4. 0.0564

Options :

30169810817. 1
30169810818. 2
30169810819. 3
30169810820. 4

Question Number : 6 Question Id : 3016982722 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

If $f(x) = x^2$, then the second order divided difference for the points x_0, x_1, x_2 will be:

1. -1
2. $\frac{-1}{x_1 - x_0}$
3. 1
4. $\frac{1}{x_2 - x_1}$

Options :

30169810821. 1
30169810822. 2
30169810823. 3
30169810824. 4

Question Number : 7 Question Id : 3016982723 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

The liquid limit (LL), plastic limit (PL) and shrinkage limit (SL) of a cohesive soil satisfy the relation

1. $LL > PL < SL$
2. $LL > PL > SL$
3. $LL < PL < SL$
4. $LL < PL > SL$

Options :

30169810825. 1
30169810826. 2

30169810827. 3

30169810828. 4

Question Number : 8 Question Id : 3016982724 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

In a constant head permeameter, having cross-sectional area of 20 cm^2 , when the flow was taking place under a hydraulic gradient of 0.5, the amount of water collected is 1200 cm^3 in 60 sec. The permeability of the soil is

1. 0.002 cm/sec

2. 0.02 cm/sec

3. 0.2 cm/sec

4. 2 cm/sec

Options :

30169810829. 1

30169810830. 2

30169810831. 3

30169810832. 4

Question Number : 9 Question Id : 3016982725 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

To provide safety against piping failure, with a factor of safety as 3, what should be the maximum exit gradient for soil with a specific gravity of 2.5 and porosity of 0.35?

1. 0.155

2. 0.167

3. 0.325

4. 0.213

Options :

30169810833. 1

30169810834. 2

30169810835. 3

30169810836. 4

Question Number : 10 Question Id : 3016982726 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

If the effective stress strength parameters are $C' = -10$ kPa and $\Phi' = 30^\circ$, the shear strength on a plane, within the saturated soil mass at a point where total normal stress is 300 kPa and pore water pressure is 150 kPa, will be

1. 90.5 kPa
2. 96.6 kPa
3. 101.5 kPa
4. 105.5 kPa

Options :

30169810837. 1
30169810838. 2
30169810839. 3
30169810840. 4

Question Number : 11 Question Id : 3016982727 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

From a flow-net, which of the following information can be obtained?

- A. Rate of flow
- B. Pore water pressure
- C. Exit gradient
- D. Permeability

Choose the **most appropriate** answer from the options given below:

1. A, B, C and D
2. A, B and C only
3. B, C and D only
4. A only

Options :

30169810841. 1
30169810842. 2
30169810843. 3
30169810844. 4

Question Number : 12 Question Id : 3016982728 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

Match **LIST-I** with **LIST-II**

LIST-I (Name of Test)		LIST-II (Used for)	
A.	Plate load test	I.	To estimate bearing capacity of granular soil
B.	Standard penetration test	II.	To estimate <i>in-situ</i> strength of soft clay
C.	Vane shear test	III.	To identify silt from clay
D.	Dilatancy test	IV.	To estimate bearing capacity for permissible settlement

Choose the **most appropriate match** from the options given below:

1. A - IV, B - III, C - II, D - I
2. A - II, B - I, C - IV, D - III
3. A - IV, B - I, C - II, D - III
4. A - II, B - III, C - IV, D - I

Options :

30169810845. 1
30169810846. 2
30169810847. 3
30169810848. 4

Question Number : 13 Question Id : 3016982729 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

To have zero active pressure intensity at the top of a wall in a cohesive soil, one should apply a uniform surcharge intensity of:

(Where, C =cohesion and α =angle of failure plane with major principal plane)

1. $2C \tan \alpha$
2. $2C \cot \alpha$
3. $-2C \tan \alpha$
4. $-2C \cot \alpha$

Options :

30169810849. 1
30169810850. 2
30169810851. 3
30169810852. 4

Question Number : 14 Question Id : 3016982730 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

Two footings (one is circular and the other is square) are founded on the surface of a purely cohesionless soil. The diameter of the circular footing is the same as that of the side of the square footing. The ratio between ultimate bearing capacity of circular footing to that of the square footing (using Terzaghi equation) will be:

1. 1.0
2. 1.4
3. 1.33
4. 0.75

Options :

30169810853. 1
30169810854. 2
30169810855. 3
30169810856. 4

Question Number : 15 Question Id : 3016982731 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

For an anisotropic soil, permeability in x and y directions are k_x and k_y respectively, in a two dimensional flow. The effective permeability (k_{eff}) for the soil is given by:

1. $(k_x k_y)^{1/2}$
2. k_x / k_y
3. $(k_x^2 + k_y^2)^{1/2}$
4. $k_x + k_y$

Options :

30169810857. 1
30169810858. 2
30169810859. 3
30169810860. 4

Question Number : 16 Question Id : 3016982732 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

Match **LIST-I** with **LIST-II**

LIST-I (Type of footing/ foundation)		LIST-II (Suitability)	
A.	Spread footings	I.	Soft clay for 10 m followed by hard rock stratum
B.	Friction piles	II.	Upto 3 m black cotton soil followed by medium dense sand
C.	Raft foundation	III.	Compact sand deposit extending to great depth
D.	End bearing piles	IV.	Loose sand extending to great depth

Choose the **most appropriate match** from the options given below:

1. A - IV, B - I, C - III, D - II
2. A - III, B - IV, C - II, D - I
3. A - II, B - IV, C - III, D - I
4. A - III, B - I, C - II, D - IV

Options :

30169810861. 1
30169810862. 2
30169810863. 3
30169810864. 4

Question Number : 17 Question Id : 3016982733 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

A square pile of section 50 cm x 50 cm and length 15 m penetrates a deposit of clay having $C=5$ kN/m² and the adhesion factor $\alpha = 0.8$. What is the load carried by the pile through skin friction only?

1. 192 kN
2. 120 kN
3. 60 kN
4. 48 kN

Options :

30169810865. 1
30169810866. 2
30169810867. 3
30169810868. 4

Question Number : 18 Question Id : 3016982734 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

Which of the following statements are true?

- A. The proportioning of footing in sand is more often governed by settlement rather than by bearing capacity.
- B. The pressure bulb profiles under a strip footing form as co-axially imaginable bulbs under its length.
- C. Friction piles are also called as 'floating piles'.

Choose the **most appropriate** answer from the options given below:

- 1. A, B and C
- 2. A and B only
- 3. A and C only
- 4. B and C only

Options :

- 30169810869. 1
- 30169810870. 2
- 30169810871. 3
- 30169810872. 4

Question Number : 19 Question Id : 3016982735 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

The minimum bearing capacity of a soil under a given footing occurs when the groundwater table location is at

- 1. the base of the footing
- 2. the ground level
- 3. a depth equal to one-half of the width of footing
- 4. a depth equal to the width of footing

Options :

- 30169810873. 1
- 30169810874. 2
- 30169810875. 3
- 30169810876. 4

Question Number : 20 Question Id : 3016982736 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

If the dynamic viscosity of a fluid is 1.2 poise and its specific gravity is 0.8, then kinematic viscosity in SI units will be:

1. $9.6 \times 10^{-4} \text{ m}^2/\text{s}$
2. $15 \times 10^{-4} \text{ m}^2/\text{s}$
3. $1.5 \times 10^{-4} \text{ m}^2/\text{s}$
4. $0.667 \times 10^{-4} \text{ m}^2/\text{s}$

Options :

- 30169810877. 1
- 30169810878. 2
- 30169810879. 3
- 30169810880. 4

Question Number : 21 Question Id : 3016982737 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

A practical example of steady non-uniform flow is given by the

1. motion of a river around bridge piers
2. steadily increasing flow through a pipe
3. steadily increasing flow through a reducing section
4. constant discharge through a long, straight tapering pipe

Options :

- 30169810881. 1
- 30169810882. 2
- 30169810883. 3
- 30169810884. 4

Question Number : 22 Question Id : 3016982738 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

Which of the following statements are true?

- A. The same Bernoulli's equation is applicable to all the points in the flow field if the flow is irrotational.
- B. The value of "Constant in the Bernoulli's equation" is different for different streamlines if the flow is rotational.
- C. When a nozzle is fitted at the end of a long pipeline, the discharge increases.
- D. The velocity of flow at the nozzle end is more than that in the case of a pipe without a nozzle, the head in both cases being the same.

Choose the **most appropriate** answer from the options given below:

- 1. A, B and D only
- 2. A, B and C only
- 3. A, B, C and D
- 4. B, C and D only

Options :

30169810885. 1

30169810886. 2

30169810887. 3

30169810888. 4

Question Number : 23 Question Id : 3016982739 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

Critical depth in a channel is expressed by:

(where Q =discharge; A = Area of flow; T = top width of flow and g = acceleration due to gravity)

- 1. $(QA^2/gT^3) = 1$
- 2. $(QT^2/gA^3) = 1$
- 3. $(Q^2T/gA^3) = 1$
- 4. $(Q^2A^2/gT^3) = 1$

Options :

30169810889. 1

30169810890. 2

30169810891. 3

30169810892. 4

Question Number : 24 Question Id : 3016982740 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

Reynolds number is defined as the ratio of:

1. Viscous force to Inertia force
2. Elastic force to Pressure force
3. Inertia force to Viscous force
4. Gravity force to Inertia force

Options :

30169810893. 1
30169810894. 2
30169810895. 3
30169810896. 4

Question Number : 25 Question Id : 3016982741 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

The loss of head due to sudden enlargement in a pipe is expressed by:
(where symbols have their usual meanings)

1. $(V_1^2 - V_2^2) / 2g$
2. $(V_1^2 - V_2^2) / g$
3. $(V_1 - V_2) / 2g$
4. $(V_1 - V_2)^2 / 2g$

Options :

30169810897. 1
30169810898. 2
30169810899. 3
30169810900. 4

Question Number : 26 Question Id : 3016982742 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

Match **LIST-I** with **LIST-II**

LIST-I (Flow parameter of a channel flow)		LIST-II (Proportional to)	
A.	Mean velocity in a Lacey regime channel	I.	$S^{1/2}$
B.	Mean velocity in a lined channel	II.	$S^{1/3}$
C.	Normal scour depth in an alluvial channel	III.	$Q^{1/2}$
D.	Wetted perimeter of a Lacey regime channel	IV.	$Q^{2/3}$

where S is slope of channel and Q is discharge.

Choose the **most appropriate match** from the options given below:

1. A - I, B - II, C - III, D - IV

2. A - II, B - I, C - IV, D - III

3. A - I, B - II, C - IV, D - III

4. A - III, B - IV, C - I, D - II

Options :

30169810901. 1

30169810902. 2

30169810903. 3

30169810904. 4

Question Number : 27 Question Id : 3016982743 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

Water logging is caused due to:

- A. Inadequate drainage facilities
- B. Over irrigation
- C. Presence of permeable strata
- D. Seepage of water through the canals

Choose the **most appropriate** answer from the options given below:

1. A, B and D only

2. A, B and C only

3. A, B, C and D

4. B, C and D only

Options :

30169810905. 1

30169810906. 2

30169810907. 3

30169810908. 4

Question Number : 28 Question Id : 3016982744 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

The discharge capacity required at the outlet to irrigate 2600 ha of sugarcane, having a kor depth of 17 cm and a kor period of 30 days, is:

1. $1.71 \text{ m}^3/\text{s}$

2. $2.3 \text{ m}^3/\text{s}$

3. $14.7 \text{ m}^3/\text{s}$

4. $0.18 \text{ m}^3/\text{s}$

Options :

30169810909. 1

30169810910. 2

30169810911. 3

30169810912. 4

Question Number : 29 Question Id : 3016982745 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

Match LIST-I with LIST-II

LIST-I (Parameter)		LIST-II (Equipment / method)	
A.	Stream flow velocity	I.	Anemometer
B.	Evapo-transpiration rate	II.	Penman's method
C.	Infiltration rate	III.	Norton's method
D.	Wind velocity	IV.	Current meter

Choose the **most appropriate match** from the options given below:

1. A - I, B - II, C - III, D - IV

2. A - IV, B - III, C - II, D - I

3. A - IV, B - II, C - III, D - I

4. A - III, B - IV, C - I, D - II

Options :

30169810913. 1

30169810914. 2

30169810915. 3

30169810916. 4

Question Number : 30 Question Id : 3016982746 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

A rectangular section has width= b and depth= d and a symmetrical triangular section has base width= b and depth= d . The ratio of moment of inertia of rectangular section to that of triangular section with respect to their respective centroidal axis will be:

1. 1.5

2. 2.0

3. 3.0

4. 4.0

Options :

30169810917. 1

30169810918. 2

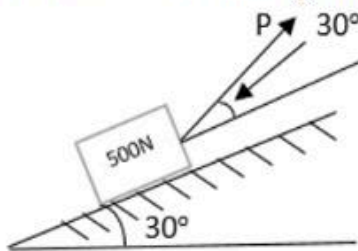
30169810919. 3

30169810920. 4

Question Number : 31 Question Id : 3016982747 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

A weight of 500 N is held on a smooth plane inclined at 30° to the horizontal by a force P acting at 30° to the inclined plane as shown in Figure given below, then the value of force P is:



1. $(500/\sqrt{3})\text{ N}$

2. $(500\sqrt{3})\text{ N}$

3. $500(\sqrt{3}/2)\text{ N}$

4. 250 N

Options :

30169810921. 1

30169810922. 2

30169810923. 3

30169810924. 4

Question Number : 32 Question Id : 3016982748 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

A steel wire of 20 mm diameter is bent into a circular shape of 10 m radius. If modulus of elasticity of wire is $2 \times 10^5 \text{ N/mm}^2$, then the maximum bending stress induced in wire is:

1. 100 N/mm^2
2. 200 N/mm^2
3. 300 N/mm^2
4. 400 N/mm^2


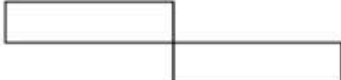

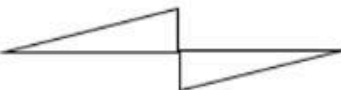
Options :

30169810925. 1
30169810926. 2
30169810927. 3
30169810928. 4

Question Number : 33 Question Id : 3016982749 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

Shape of the “shear force diagram” for a simply supported beam subjected to pure moment M at the center of span, will be:

1. 
2. 
3. 
4. 

Options :

30169810929. 1
30169810930. 2
30169810931. 3
30169810932. 4

Question Number : 34 Question Id : 3016982750 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

Which of the following statements is correct?

1. Shear force is the first derivative of bending moment
2. Shear force is the first derivative of intensity of load on the beam
3. Bending moment is the first derivative of shear force
4. Intensity of load on the beam is the first derivative of bending moment

Options :

30169810933. 1
30169810934. 2
30169810935. 3
30169810936. 4

Question Number : 35 Question Id : 3016982751 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

Which of the following statements are correct?

- A. Malleability is the ability of a material to absorb strain energy till the elastic limit.
- B. Toughness is the ability of a material to absorb energy till the rupture.
- C. Resilience is the area under the load deformation curve within the elastic limit.
- D. Stress-strain diagram of highly brittle material has no plastic zone

Choose the **most appropriate** answer from the options given below:

1. A, B and C only
2. B, C and D only
3. A, C and D only
4. A, B and D only

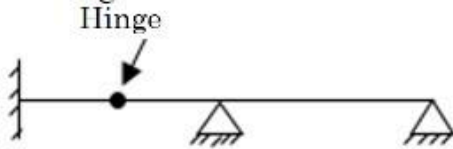
Options :

30169810937. 1
30169810938. 2
30169810939. 3
30169810940. 4

Question Number : 36 Question Id : 3016982752 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

The degree of static indeterminacy of the beam (as shown below) for general case of loading is:



1. One
2. Two
3. Three
4. Zero

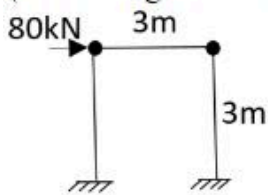
Options :

30169810941. 1
30169810942. 2
30169810943. 3
30169810944. 4

Question Number : 37 Question Id : 3016982753 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

For the frame shown in the figure below, the maximum moment in the left column shall be (Assuming Moment of Intertia (I) of all the members is same):



1. 120 kN.m
2. 240 kN.m
3. 160 kN.m
4. Zero

Options :

30169810945. 1
30169810946. 2
30169810947. 3
30169810948. 4

Question Number : 38 Question Id : 3016982754 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

Match **LIST-I** with **LIST-II**

LIST-I (Assumption/ theorem)		LIST-II (Type of analysis/ strength determination)	
A.	Plane section remains plane before and after bending	I.	Elastic analysis and superposition
B.	Material is elastic and deformations/ deflection is small.	II.	Linear strain distribution
C.	Uniqueness theorem	III.	Non-linear analysis and buckling load
D.	Large deformation	IV.	Collapse load

Choose the **most appropriate match** from the options given below:

1. A - I, B - II, C - III, D - IV
2. A - I, B - II, C - IV, D - III
3. A - II, B - I, C - III, D - IV
4. A - II, B - I, C - IV, D - III

Options :

30169810949. 1
30169810950. 2
30169810951. 3
30169810952. 4

Question Number : 39 Question Id : 3016982755 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

The basic principle of earthquake resistant design of any structure is based on the following concept:

1. Weak column-Strong beam
2. Strong column-Weak beam
3. Strong column-Strong beam
4. Weak column- Weak beam

Options :

30169810953. 1
30169810954. 2
30169810955. 3
30169810956. 4

Question Number : 40 Question Id : 3016982756 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

A singly reinforced rectangular concrete beam has a width of 200 mm and an effective depth of 300 mm. If the critical neutral axis depth coefficient is 0.48 then limiting value of the moment of resistance of the beam will be close to: (Use M-20 grade of concrete and Fe-415 steel)

1. 30 kNm

2. 40 kNm

3. 50 kNm

4. 60 kNm

Options :

30169810957. 1

30169810958. 2

30169810959. 3

30169810960. 4

Question Number : 41 Question Id : 3016982757 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

In limit state design of concrete structures, partial safety factors for material strength of concrete and steel respectively, are taken as:

1. 1.5 and 1.15

2. 1.67 and 1.5

3. 3 and 1.5

4. 1.5 and 1.2

Options :

30169810961. 1

30169810962. 2

30169810963. 3

30169810964. 4

Question Number : 42 Question Id : 3016982758 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

The time estimates obtained from four contractors (P, Q, R and S) for executing a particular job are as under:

Contractor	Optimistic time, t_o	Most likely time, t_m	Pessimistic time, t_p
P	5	10	13
Q	6	9	12
R	5	10	14
S	4	10	13

Which of these contractors is more certain about completing the job in time?

1. P
2. Q
3. R
4. S

Options :

30169810965. 1
30169810966. 2
30169810967. 3
30169810968. 4

Question Number : 43 Question Id : 3016982759 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

Which of the following statements (pertaining to CPM network analysis) are correct?

- A. It is an event-oriented method.
- B. It is an activity-oriented method.
- C. Time and cost are controlling factors.
- D. Time alone is the controlling factor.

Choose the **most appropriate** answer from the options given below:

1. A and B only
2. A and D only
3. B and C only
4. C and D only

Options :

30169810969. 1
30169810970. 2
30169810971. 3
30169810972. 4

Question Number : 44 Question Id : 3016982760 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

Which of the following is the “amount of time” by which the “start of an activity” may be delayed without delaying the “start of a following activity”?

1. Interference float
2. Free float
3. Independent float
4. Total float

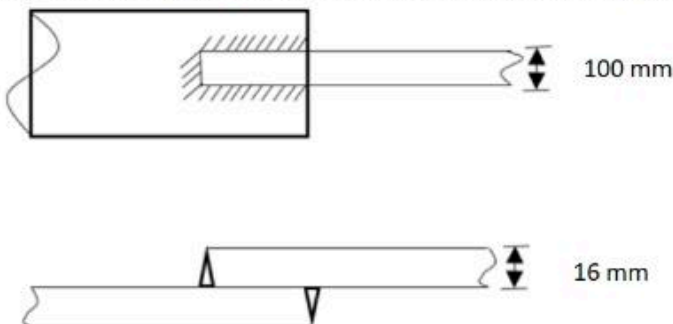
Options :

30169810973. 1
30169810974. 2
30169810975. 3
30169810976. 4

Question Number : 45 Question Id : 3016982761 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

A tie bar of 100 mm width and 16 mm thickness is to be welded to another plate using “8 mm fillet weld” (as shown in figure below). If the tensile capacity of plate is 240 kN and the shear stress in weld is 110.0 N/mm^2 , the minimum overlap required will be



(Note: Figure not to the scale)

1. 55 mm
2. 75 mm
3. 95 mm
4. 125 mm

Options :

30169810977. 1
30169810978. 2
30169810979. 3
30169810980. 4

Question Number : 46 Question Id : 3016982762 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

A steel column in a multi-storeyed building carries an axial load of 125 N. It is built up of 2- ISMC 350 channels connected by lacing. The lacing will be designed to resist a transvers shear of

1. 3.125 N
2. 12.5 N
3. 125 N
4. 62.5 N

Options :

30169810981. 1
30169810982. 2
30169810983. 3
30169810984. 4

Question Number : 47 Question Id : 3016982763 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

A propped cantilever of span 'L' is subjected to a concentrated load at mid-span. If M_p is the plastic moment capacity of the beam, then the value of collapse load will be

1. $12M_p/L$
2. $6M_p/L$
3. $8M_p/L$
4. $4M_p/L$

Options :

30169810985. 1
30169810986. 2
30169810987. 3
30169810988. 4

Question Number : 48 Question Id : 3016982764 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

Match **LIST-I** with **LIST-II**

LIST-I (Type of structure)		LIST-II (Structural behavior)	
A.	Truss	I.	Bending
B.	Beam	II.	Twisting
C.	Column	III.	Shortening
D.	Shaft	IV.	Buckling

Choose the **most appropriate match** from the options given below:

1. A - III, B - II, C - I, D - IV

2. A - III, B - I, C - II, D - IV

3. A - II, B - I, C - IV, D - III

4. A - III, B - I, C - IV, D - II

Options :

30169810989. 1

30169810990. 2

30169810991. 3

30169810992. 4

Question Number : 49 Question Id : 3016982765 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

For a given road, the safe stopping sight distance (SSD) is 80 m and the passing sight distance is 300 m. What will be the intermediate sight distance?

1. 190 m

2. 220 m

3. 160 m

4. 150 m

Options :

30169810993. 1

30169810994. 2

30169810995. 3

30169810996. 4

Question Number : 50 Question Id : 3016982766 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

A summit curve is formed at the intersection of a 3% upgrade and 5% downgrade. What is the length of the summit curve in order to provide a stopping distance of 128 m? (Assume, length of summit curve is greater than SSD, driver's eye height = 1.2 m and height of obstruction = 0.15 m).

1. 271 m

2. 298 m

3. 322 m

4. 340 m

Options :

30169810997. 1

30169810998. 2

30169810999. 3

30169811000. 4

Question Number : 51 Question Id : 3016982767 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

For a circular curve of radius 200 m, the coefficient of lateral friction is 0.15 and the design speed is 40 kmph. The equilibrium super elevation (for equal pressure on the inner and outer wheels) would be:

1. 6.3%

2. 7%

3. 4.6%

4. 8%

Options :

30169811001. 1

30169811002. 2

30169811003. 3

30169811004. 4

Question Number : 52 Question Id : 3016982768 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

What will be the theoretical maximum capacity for a single lane of highway, if the given speed of the traffic stream is 60 kmph and the average center to center spacing of the vehicle is 13.98 m.

1. 4391.84

2. 4491.84

3. 4591.84

4. 4291.84

Options :

30169811005. 1
30169811006. 2
30169811007. 3
30169811008. 4

Question Number : 53 Question Id : 3016982769 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

Match LIST-I with LIST-II (adopting standard notations)

LIST-I (Parameter)		LIST-II (Formula)	
A.	Cubic parabola equation	I.	$NS^2/4.4$
B.	Shift in transition curve	II.	$L^2/24 R$
C.	Length of valley curve	III.	$NS^2/(1.50 + 0.03S)$
D.	Length of summit curve	IV.	$X^3/6RL$

Choose the **most appropriate match** from the options given below:

1. A - I, B - II, C - III, D - IV
2. A - III, B - IV, C - I, D - II
3. A - I, B - III, C - II, D - IV
4. A - IV, B - II, C - III, D - I

Options :

30169811009. 1
30169811010. 2
30169811011. 3
30169811012. 4

Question Number : 54 Question Id : 3016982770 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

Which of the following parameters are required for the design of a transition curve for a highway system?

- A. Rate of change of grade
- B. Rate of change of radial acceleration
- C. Rate of change of super elevation
- D. Rate of change of curvature

Choose the **most appropriate** answer from the options given below:

- 1. A, B and C only
- 2. A, B and D only
- 3. A, C and D only
- 4. B, C and D only

Options :

- 30169811013. 1
- 30169811014. 2
- 30169811015. 3
- 30169811016. 4

Question Number : 55 Question Id : 3016982771 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

Traffic capacity is defined as:

- 1. Ability of roadway to accommodate traffic volume in terms of vehicles per hour
- 2. Number of vehicles occupying a unit length of roadway at a given instant expressed as vehicles per km
- 3. Capacity of the lane to accommodate the vehicles width wise (across the road)
- 4. Maximum attainable speed of the vehicles

Options :

- 30169811017. 1
- 30169811018. 2
- 30169811019. 3
- 30169811020. 4

Question Number : 56 Question Id : 3016982772 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

Bitumen grade 80/100 indicates that under the standard test conditions, the penetration value of bitumen would vary from:

1. 0.08 mm to 0.1 mm
2. 80 mm to 100 mm
3. 0.8 mm to 1 mm
4. 8 mm to 10 mm

Options :

30169811021. 1
30169811022. 2
30169811023. 3
30169811024. 4

Question Number : 57 Question Id : 3016982773 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

Match LIST-I with LIST-II

LIST-I (Method)		LIST-II (Used relations)	
A.	Group Index Method	I.	Semi-theoretical
B.	CBR Method	II.	Quasi-rational
C.	US Navy Method	III.	Empirical method using soil classification test
D.	Asphalt Institute Method	IV.	Empirical method using soil strength test

Choose the **most appropriate match** from the options given below:

1. A - III, B - I, C - IV, D - II
2. A - II, B - IV, C - I, D - III
3. A - III, B - IV, C - I, D - II
4. A - II, B - I, C - IV, D - III

Options :

30169811025. 1
30169811026. 2
30169811027. 3
30169811028. 4

Question Number : 58 Question Id : 3016982774 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

Sequentially arrange the steps involved in laying a sewer line:

- A. Transferring the center line of the sewer to the bottom of the trench.
- B. Setting sight rails over the trench.
- C. Driving pegs to the level of the invert line of the sewer.
- D. Placing the sewer in the trench.

Choose the **most appropriate answer** from the options given below:

- 1. A, B, C and D
- 2. B, C, D and A
- 3. D, B, C and A
- 4. B, C, A and D

Options :

- 30169811029. 1
- 30169811030. 2
- 30169811031. 3
- 30169811032. 4

Question Number : 59 Question Id : 3016982775 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

A sample of waste-water has 4 day 20°C B.O.D. value of 75% of the final B.O.D. The rate constant K (to the base 10) per day will be:

- 1. 0.151
- 2. 0.161
- 3. 0.171
- 4. 0.181

Options :

- 30169811033. 1
- 30169811034. 2
- 30169811035. 3
- 30169811036. 4

Question Number : 60 Question Id : 3016982776 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

Match **LIST-I** with **LIST-II**

LIST-I (Treatment method)		LIST-II (Principle/ process involved)	
A.	Tricking filter	I.	Symbiotic
B.	Activated sludge process	II.	Mechanical aeration
C.	Aerated lagoon	III.	Suspended growth
D.	Oxidation pond	IV.	Attached growth

Choose the **most appropriate match** from the options given below:

1. A - III, B - IV, C - II, D - I

2. A - IV, B - III, C - I, D - II

3. A - III, B - IV, C - I, D - II

4. A - IV, B - III, C - II, D - I

Options :

30169811037. 1

30169811038. 2

30169811039. 3

30169811040. 4

Question Number : 61 Question Id : 3016982777 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

Sequentially arrange the stepwise process of wastewater treatment :

A. Primary sedimentation

B. Screening and Grit removal

C. Disinfection

D. Secondary treatment unit and Secondary Sedimentation

Choose the **most appropriate answer** from the options given below:

1. B, A, C, D

2. A, C, B, D

3. B, A, D, C

4. C, B, D, A

Options :

30169811041. 1

30169811042. 2

30169811043. 3

30169811044. 4

Question Number : 62 Question Id : 3016982778 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

Match **LIST-I** with **LIST-II**

LIST-I (Air pollutants)		LIST-II (Impact on human health)	
A.	Particulates	I.	Impairs transport of O ₂ in the bloodstream
B.	Carbon mono-oxides	II.	Irritation of mucous membranes of the respiratory tract
C.	Sulfur oxides	III.	Cause of coughing, shortness of breath, headache etc.
D.	Photochemical oxidants	IV.	Cause respiratory illness

Choose the **most appropriate match** from the options given below:

1. A - II, B - III, C - IV, D - I
2. A - IV, B - I, C - II, D - III
3. A - II, B - I, C - IV, D - III
4. A - IV, B - III, C - II, D - I

Options :

30169811045. 1

30169811046. 2

30169811047. 3

30169811048. 4

Question Number : 63 Question Id : 3016982779 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

A rapid sand filter for a town with a water requirement of 2 MLD is to be provided with a rate of filtration at 4000 liter/hr/m² with a backwash system. The size of the filter will be:

1. 19 m²
2. 21 m²
3. 23 m²
4. 25 m²

Options :

30169811049. 1

30169811050. 2

30169811051. 3

30169811052. 4

Question Number : 64 Question Id : 3016982780 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

The plan of an area has shrunk such that a line originally 10 cm, now measures 9.5 cm. If the original scale of the plan was 1 cm=10 m (R.F. = 1:1000), the shrinkage factor is given as:

1. 1.05

2. 1.0

3. 0.95

4. 0.90

Options :

30169811053. 1

30169811054. 2

30169811055. 3

30169811056. 4

Question Number : 65 Question Id : 3016982781 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

If the declination is $5^{\circ}40'W$, which of the following magnetic bearings would represent the true bearing of $S25^{\circ}20'E$?

1. $S\ 19^{\circ}\ 20'\ E$

2. $S\ 31^{\circ}\ 00'\ E$

3. $S\ 20^{\circ}\ 00'\ E$

4. $S\ 19^{\circ}\ 20'\ W$

Options :

30169811057. 1

30169811058. 2

30169811059. 3

30169811060. 4

Question Number : 66 Question Id : 3016982782 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

The quadrantal bearing of a line is directly observed by:

1. Prismatic compass

2. Surveyor's compass

3. Celestial observations

4. Magnetic declination

Options :

30169811061. 1
30169811062. 2
30169811063. 3
30169811064. 4

Question Number : 67 Question Id : 3016982783 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Is Question Mandatory : No Correct Marks : 4 Wrong Marks : 1

Which of the following statements (with respect to compass traversing) are correct?

- A. True meridian at a station is constant.
- B. True meridian passing through different points on the earth surface converges towards the pole.
- C. The angle between the true meridian and the line is known as declination.
- D. The angle between the magnetic meridian and the line is known as azimuth.

Choose the **most appropriate** answer from the options given below:

- 1. A and B only
- 2. A and C only
- 3. B and D only
- 4. C and D only

Options :

30169811065. 1
30169811066. 2
30169811067. 3
30169811068. 4

Question Number : 68 Question Id : 3016982784 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Is Question Mandatory : No Correct Marks : 4 Wrong Marks : 1

The relationship between air-base (B), photographic base (b), flying height (H) and focal length of lens (f) for an aerial photograph is given by:

- 1. $B = bH/f$
- 2. $B = f/bH$
- 3. $B = b/fH$
- 4. $B = b/(H-f)$

Options :

30169811069. 1
30169811070. 2
30169811071. 3
30169811072. 4

Question Number : 69 Question Id : 3016982785 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

A tape (30 m long) when suspended, has a sag (dip) 'd' of 30.15 cm at the mid-span under a tension of 100 N. The total weight of the tape is given by:

1. 20 N
2. 15 N
3. 12 N
4. 8 N

Options :

30169811073. 1
30169811074. 2
30169811075. 3
30169811076. 4

Question Number : 70 Question Id : 3016982786 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

Match **LIST-I** with **LIST-II**

LIST-I (Type of seismic wave)		LIST-II (Characteristic of particle motion)	
A.	Primary Wave	I.	in horizontal plane and transverse to the direction of wave propagation
B.	Shear Wave	II.	in vertical plane and retrograde
C.	Love Wave	III.	in longitudinal direction
D.	Rayliegh Wave	IV.	is perpendicular to the direction of wave propagation

Choose the **most appropriate match** answer from the options given below:

1. A - I, B - II, C - III, D - IV
2. A - I, B - III, C - II, D - IV
3. A - I, B - II, C - IV, D - III
4. A - III, B - IV, C - I, D - II

Options :

30169811077. 1
30169811078. 2
30169811079. 3
30169811080. 4

Question Number : 71 Question Id : 3016982787 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

If the velocity of the shear wave through a soil deposit is determined as V_s the shear modulus 'G' is given as: (where, ρ = mass density of soil)

1. ρV

2. ρ/V_s

3. ρV_s^2

4. $(\rho V_s)^{1/2}$

Options :

30169811081. 1

30169811082. 2

30169811083. 3

30169811084. 4

Question Number : 72 Question Id : 3016982788 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

Which of the following computer programs is based on the one dimensional wave propagation method and used to compute the responses for a design motion?

1. ETAB

2. SHAKE

3. STAAD

4. PLAXIS

Options :

30169811085. 1

30169811086. 2

30169811087. 3

30169811088. 4

Question Number : 73 Question Id : 3016982789 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

Which of the following factors does not affect strong ground motion:

1. Wave types
2. Site conditions
3. Distance from epicenter
4. Type of structure

Options :

30169811089. 1
30169811090. 2
30169811091. 3
30169811092. 4

Question Number : 74 Question Id : 3016982790 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

Which of the following statements (with regard to earth pressure) are correct?

- A. Any movement of the retaining wall away from the fill corresponds to active earth pressure.
- B. Under earthquake loading, the pore pressure decreases in saturated silty soil.
- C. Coulomb's' earth pressure theory does not take the roughness of wall into consideration.
- D. Rankine's earth pressure theory considers that the retaining wall has a vertical back fill.

The **most appropriate answer** from the options given below:

1. A and B only
2. B and C only
3. A and D only
4. C and D only

Options :

30169811093. 1
30169811094. 2
30169811095. 3
30169811096. 4

Question Number : 75 Question Id : 3016982791 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

Sequentially arrange the reactions of observers and type of damage during an earthquake in the increasing order of earthquake intensity measured at Modified Mercalli Intensity (MMI) Scale.

- A. Earthquake is felt quite noticeably indoors, especially on upper floors of buildings. Damage: No damage. Standing motor cars may rock slightly
- B. Everyone runs outdoors. Noticed by persons driving motor cars. Damage: Considerable damage in poorly built or badly designed structures
- C. Earthquake is not felt except by a few people under especially favorable circumstances. Damage: No damage.
- D. Earthquake is felt by nearly everyone, many awakened. Damage: Some dishes, windows etc. sometimes broken, few instances of cracked plaster and unstable objects overturned.

The **most appropriate answer** from the options given below:

- 1. A, B, C, D
- 2. C, A, D, B
- 3. B, A, D, C
- 4. C, B, D, A

Options :

- 30169811097. 1
- 30169811098. 2
- 30169811099. 3
- 30169811100. 4