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SSC JE 2019-20

Civil Engineering

Mini Mock Challenge
(July 08- July 09 2020)

Questions & Solutions

1. **Select the word-pair in which the two words are related in the same way as the two words in the following word-pair.**

   Baht : Thailand

   A. Dinar : Burma   B. Drachma : Greece

   C. Yen : china   D. Guilder : Spain

Ans. B

Sol. Just like baht is the currency of Thailand, drachma is the currency of Greece.

   Hence, option B is the correct answer.

2. **In the following question, select the odd letters from the given alternatives.**

   A. VTXZ   B. OWFL

   C. GFRQ   D. LPSG

Ans. B

Sol. From the given options, only OWFL contains a vowel.

   Hence, option B is the correct answer.

3. **Arrange the given words in the sequence in which they occur in the dictionary.**

   1) Rustic

   2) Rural

   3) Roller-coaster

   4) Rustproof

   5) Robotics

   A. 53214   B. 35214

   C. 32541   D. 53142

Ans. A

Sol. Alphabetical order is:

   5. Robotics

   3. Roller-coaster

   2. Rural

   1. Rustic

   4. Rustproof

   Thus the correct sequence is 53214.

   Hence, option A is the correct answer.

4. In a code language, **CARNIVAL** is written as **LPYAJYTG**. How will **DISTANCE** be written as in that language?

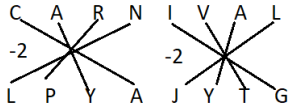   A. RQGBDAMY   B. SQHBCALZ
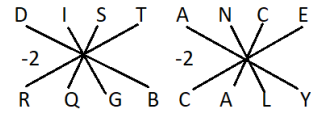
   C. RQGBCALY   D. RPGBCZLY

Ans. C

Sol. As,

Similarly,

Hence, option C is the correct answer.

5. **Select the number that can replace the question mark (?) in the following series.**

13, 15, 19, 25, 33, ?

A. 54

B. 43

C. 42

D. 41

Ans. B

Sol. Logic is:

13+2=15

15+4=19

19+6=25

25+8=33

33+10=43

Hence, option B is the correct answer.

6. A + B means 'A is brother of B'

A − B means 'A is father of B'

A × B means 'A is mother of B'

A ÷ B means 'A is sister of B'

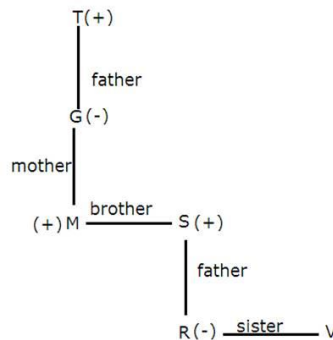If T − G × M + S − R ÷ V, then how is T related to V?

A. Great-grand-father

B. Father

C. Grand-father

D. Uncle

Ans. A

Sol. Diagram of the expression T − G × M + S − R ÷ V can be drawn as given below as per the means given in the question-

From the above figure, it's clear that T is the great-grand-father of V.

Hence, the correct answer is option A.

7. **In the following question, select the missing number from the given alternatives.**

6	15	20
8	4	5
3	5	20
51	65	?

    A. 12   B. 51

    C. 56   D. 120

Ans. D

Sol. As,

(8*6) + 3 = 48+3 = 51

(15*4) + 5 = 60 + 5 = 65

Similarly,

(20*5) + 20 = 100 + 20 =120

Hence, option D is the correct answer.

8. **In the following question, select the word which cannot be formed using the letters of the given word.**

CAPABILITIES

    A. PLATE   B. PIABLE

    C. PALATE   D. PAYABLE

Ans. D

Sol. Letter 'Y' is not present in the word CAPABILITIES. Thus we cannot form word PAYABLE. Hence, option D is the correct answer.

9. **Which two signs do need to be interchanged to correct the following equation?**

$$\frac{1}{4} \div \frac{1}{64} - 5 + 45 \times 120 = 5$$

    A. + and ×   B. × and -

    C. + and -   D. - and ÷

Ans. B

Sol. **By checking Option(A)-**

$$\frac{1}{4} \div \frac{1}{64} - 5 + 45 \times 120 = 5$$

After interchanging-

$$\frac{1}{4} \div \frac{1}{64} - 5 \text{ x} 45 + 120 = 5$$

Apply BODMAS,

16-225+120=16-105=-89

Thus, $\frac{1}{4} \div \frac{1}{64} - 5 + 45 \times 120 = 5$ is not the correct equation.

By checking Option(B)-

$$\frac{1}{4} \div \frac{1}{64} - 5 + 45 \times 120 = 5$$

After interchanging-

$$\frac{1}{4} \div \frac{1}{64} \times 5 + 45 - 120 = 5$$

Apply BODMAS,

16x5+45-120=80+45-120=125-120=5

Thus, $\frac{1}{4} \div \frac{1}{64} - 5 + 45 \times 120 = 5$ is the correct equation.

As we found the correct answer, therefore not need to check more options.

Hence, the correct answer is option B.

10. **Select the option that will come next in the given series.**

A.

B.

C.

D.
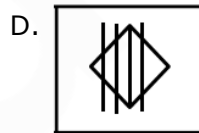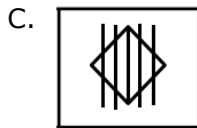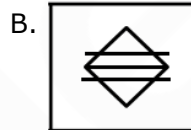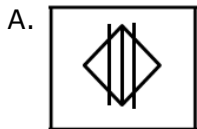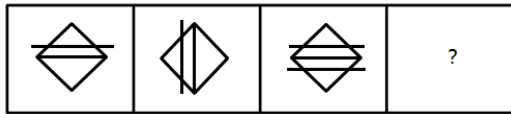
Ans. A

Sol. After carefully observing the figures given in the question, it is very clear that the answer figure A is the next figure.

Logic - Fig 1 rotates 90 degree left and form fig 2 in the same way fig 3 rotates 90 degree left to form fig 4 .

Hence, option A is the correct answer.

11. In which year, the Indian National Congress was established?

A. 1885 AD   B. 1889 AD

C. 1895 AD   D. 1900 AD

Ans. A

Sol.   ● The **Indian National Congress** was founded by **Allan Octavian Hume** in **1885**. It was founded as **Indian National Union** but later on the suggestion of **Dadabhai Naoroji**, it was renamed as **Indian National Congress**.

● The Indian National Congress conducted its **first** session in **Bombay** from **28–31 December 1885**. This first session of Congress was presided over by **Womesh Chandra Banerjee** and he was also elected as the **first president** of the organization.

12.   Which of the following is related to Faraizi Movement?

A. Haji Shariatullah   B. Dudu Miyan

C. Shah Abdul Aziz   D. Both A and B

Ans.   A

Sol.   The Faraizi Movement developed under Haji Shariatullah.

• The movement was aimed to spread the new found realisation of Shariatullah about Islam.

• He raised small army which attacked zamindars and European Indigo planters.

• After the death of Shariatullah, his son Muhsinuddin Ahmad Dudu Miyan became the leader of the movement.

• The movement slowly died after the death of Dudu Miyan in 1862.

13.   In which state, president's rule was imposed for the first time?

A. Jammu & Kashmir   B. Goa

C. Punjab   D. Sikkim

Ans.   C

Sol.   ● **The President rule was first imposed in the Punjab State.**

● The president rule is imposed under Article 356.

● It is the suspension of state government and imposition of direct central government rule in a state.

14.   Veld grasslands are located in which of the following country?

A. New Zealand   B. Australia

C. South Africa   D. USA

Ans.   C

Sol.   Veld grasslands are found in South Africa.

• Veld grasslands come under Temperate Grasslands.

• Temperate grasslands are found in the regions with temperate and semi arid to semi humid climates.

• Temperate grasslands have hot summers and cold winters and here rainfall is moderate.

• Other temperate grasslands- The Puszta of Hungary, The Pampas of Argentina and Uruguay, The Steppes of the former Soviet Union.

15. Alaknanda & Pindaki rivers confluence at which place?

    A. Vishnuprayag
    B. Nandaprayag
    C. Karnaprayag
    D. Rudraprayag

Ans. C

Sol. The Panchprayags and Rivers which confluence in each prayag are as follow-

    1. **Vishnuprayag-** Confluence of Alakhnanda and Dhauli Ganga.

    2. **Nandprayag-** Confluence of Alakhnanda and Nadakini Rivers.

    3. **Karnaprayag-** Confluence of Alakhnanda and Pinder Rivers.

    4. **Rudraprayag-** Confluence of Mandakini and Alakhnanda Rivers.

    5. **Devprayag-** Confluence of Alakhnanda and Bhagirathi Rivers.

16. What principle does Hydraulic lift work on?

    A. Pascal's law
    B. Newton's law of motion
    C. Angular Momentum
    D. Motion in one dimension

Ans. A

Sol. ● Pascal's law states that if any force is applied to any point of a confined fluid, then the pressure is equally and undiminished transmitted throughout the liquid. Hydraulic lift works on this principle.

17. Which of the following gas was used as a chemical weapon during World War I?

    A. Phosgene
    B. Hydrogen
    C. Xenon
    D. Nitrous Oxide

Ans. A

Sol. • **Phosgene, Chlorine, Mustard gas & tear gas were used in World War 1** as chemical weapons.

    • Phosgene was responsible for 85% of chemical-weapons fatalities.

    • Chemical Warfare was a major component of World Ward 1.

18. The National Action Plan on Climate Change consists of how many national missions?

    A. 4
    B. 8
    C. 12
    D. 15

Ans. B

Sol. * The National Action Plan on Climate Change consists of **8 National Missions**.

    * National Action Plan on Climate Change was **launched in 2008** by Prime Minister's Council on Climate Change.

    * In 2018, the Estimates Committee submitted its report on the performance of the NAPCC.

    * **National Mission on Strategic Knowledge** for Climate Change is a submission under NAPCC to ensure exchange or knowledge and informed research in India.

    * NAPCC is established to line up climate efforts and targets in accordance to **UNFCCC**.

19. Rani ki Vav is a UNESCO World Heritage site and also printed in new hundred Rupee note, is located in which state?

A. Rajasthan

B. Gujrat

C. Madhya Pradesh

D. Uttar Pradesh

Ans. B

Sol. * **Rani ki Vav is located in Gujrat**.

* It is a UNESCO World Heritage Site and is located on the banks of **Saraswati River**.

* It was constructed during the rule of the **Chaulukya Dynasty**.

* It was named India's "**Cleanest Iconic Place**" at the **2016** Indian Sanitation Conference.

* **Rani Udayamati** commissioned this vav or stepwell, in 1063 in the memory of her husband King Bhimdev I of the Solanki dynasty.

20. E Biz programme is being run by which company?

A. Google

B. Wipro

C. Amazon

D. Infosys

Ans. D

Sol. * **e Biz** programme is being run by **Infosys**.

* It is a part of **27 mission mode** projects under the National E Governance Plan.

* It aims to improve business environment in country.

* Infosys implement it under the guidance of Department of Industrial Policy and Promotion.

21. Calculate the preliminary estimate for a building having a total carpet area of 500 square meters. Extra provision as 10% of the carpet area is provided for walls and verandah. The plinth area rate is Rs. 1,200 per square meter.

A. 60000

B. 540000

C. 600000

D. 660000

Ans. D

Sol.   Total carpet area of building = 500 sq.m

Area for walls and verandah = 500x10 / 100 = 50 square meter

So total area = 500 + 50 = 550 sq.m

Preliminary estimate for total Area

= 550x1200

= 660000 Rs.

22. Cut- Back bitumen

A. is prepared by adding volatile diluents

B. has viscosity lower than ordinary bitumen

C. is classified in three classes

D. All of the above

Ans. D

Sol. Cut back bitumen is prepared by adding volatile diluents such as kerosene to decrease the viscosity of bitumen. It is classified in 3 classes: Rapid curing, Medium curing and slow curing.

23. The calcination of pure lime result in:-

A. quick lime
B. hydraulic lime

C. hydrated lime
D. fat lime

Ans. A

Sol. Calcination of pure lime result in quick lime.

24. Which of the following statements is true?

A) Mud plastering does not require curing

B) Mud plastering requires curing.

C) It depends on the situation

A. Only A
B. Only B

C. Only C
D. None of these

Ans. A

Sol. In mud plastering, after 2 coats of plastering, a wash of earth, cow dung and cement in 3:2:1 proportion is done. It does not require curing, but should be allowed to dry in shade for 3-4 days.

25. A bolt of grade 4.6 has a nominal yield stress of:

A. 400 N/mm^2
B. 410 N/mm^2

C. 240 N/mm^2.
D. 250 N/mm^2

Ans. C

Sol. x.y is the grade of the bolt which is symbolised as,

$$x = \frac{F_{ub}}{100}, 0.y = \frac{F_{yb}}{F_{ub}}$$

Where F_{yb} = yield strength of the bolt

F_{ub} = ultimate strength of the bolt

Therefore, $4 = \frac{F_{ub}}{100}$

F_{ub} = 400

$0.6 = \frac{F_{yb}}{F_{ub}}$

F_{yb} = 0.6 × 400

F_{yb} = 240 MPa = 240 N/mm^2

26. Which of the following is correct regarding Equipments and Pollutants removed?

    A. Cyclones – Coarse particulate matter

    B. Wet scrubbers – Oxides of nitrogen

    C. Electrostatic precipitators – Oily gas emission

    D. Adsorbers – Fine particulate matter

Ans. A

Sol. Wet scrubbers – Oily gas emission

    Electrostatic precipitators – Fine particulate matter

    Adsorbers – Oxides of nitrogen

27. The unit oxidizing power of chlorine is 35.5 and that of dichloramine is 21.48. What is the approximate percentage of the available chlorine in dichloramine?

    A. 165%   B. 140%

    C. 76%   D. 60%

Ans. D

Sol. The oxidising power of x amount of dichloramine and px amount of chlorine will be same, where p is the fraction of chlorine available in dichloramine

    24.48 x = 35.5 px

    p = 0.605 or 60.5 %

28. For $\mu = 0.06$ poise, $\gamma = 0.9$ gm/cm^3, kinematic viscosity v in Stokes is:

    A. 0.04   B. 0.054

    C. 0.067   D. 0.4

Ans. C

Sol. Kinematic viscosity $= v = \dfrac{\mu}{\rho} = \dfrac{0.06}{0.9} = 0.067$ stokes

29. If the capillary rise of water in a 1 mm diameter tube is 3 cm, the height of capillary rise of water in a 0.2 mm diameter tube in cm will be:

    A. 1.5   B. 7.5

    C. 15   D. 75

Ans. C

Sol. Capillary rise $h = \dfrac{4T\cos\theta}{\rho g d}$

    $\dfrac{h_2}{h_1} = \dfrac{d_1}{d_2}$, $h_2 = \dfrac{1}{0.2} \times 3 = 15$ cm

30. Which of the following is equivalent to one kilo-Pascal?

    A. 1000 N/m^2 B. 1000 N/mm^2

    C. 1000 N/cm^2 D. 100 N/m^2

Ans. A

Sol. As we know

One pascal = 1 N/mm²

So one kilo-pascal = 1000 N/mm²

One kilo-pascal is represented as 1000 N/mm².

31. Calculate the total quantity (cubic meter) of the coarse aggregate required for an isolated rectangular footing of size 3m × 2m, if 1:2:4 cement concrete is used. The depth footing is 600 mm.

A. 2.05
B. 2.46
C. 3.16
D. 3.82

Ans. A

Sol. Option A should be correct.

Volume of concrete required for footing = 3 × 2 × 0.6

= 3.6 cubic meter

Quantity of coarse aggregate required $= \dfrac{4}{7} \times 3.6$

= 2.05 Cubic meter

32. The volume of atmosphere moisture is 12900 km³ and the flow rate of precipitation is 577000 km³/yr. Find the residence time of moisture?

A. 10.4 days
B. 9.6 days
C. 8.2 days
D. 7.5 days

Ans. C

Sol. Storage of water in form of moisture S = 12900 km³

Flow of water as precipitation Q = 577000 km³/yr

So, the residence time is $T_r = \dfrac{S}{Q} = \dfrac{12900}{577000} = 0.022$ year = 8.2 days

33. Calculate the hydraulic mean depth of regime channel by Lacey's theory, IF velocity is 1 m/s with silt factor is 0.75.

A. 1.33
B. 2.33
C. 3.33
D. 4.33

Ans. C

Sol. Given velocity of flow, v = 1 m/s

Silt factor, f = 0.75

Hydraulic mean depth, $R = \dfrac{5}{2}\left(\dfrac{v^2}{f}\right) = \dfrac{5}{2} \times \dfrac{1}{0.75} = 3.33$

34. The earthen embankments constructed parallel to the river at some suitable distance for protection from flooding are called:

A. Guide banks
B. Levees
C. Terraces
D. gryones

Ans. B

Sol. A levee, dike, dyke, embankment, floodbank or stopbank is an elongated naturally occurring ridge or artificially constructed fill or wall that regulates water levels. It is usually earthen and often parallel to the course of a river in its floodplain or along low-lying coastlines.

35. Calculate the coefficient of hardness if the loss of weight of aggregates is 30 gm in the abrasion test?

A. 10   B. 20

C. 25   D. 30

Ans. A

Sol. Coefficient of hardness $= 20 - \dfrac{\text{loss of weight in gm}}{3}$

$$= 20 - \dfrac{30}{3}$$

Coefficient of hardness = 10

36. Lateral ties in RC columns are provided to resist

A. Bending moment   B. Shear

C. Buckling of longitudinal steel bars   D. Both bending moment and shear

Ans. C

Sol. Lateral ties are provided to prevent Premature buckling of individual bars, to confine the concrete in the core thus improving ductility and strength.

The role of *lateral ties* is to prevent premature buckling of bars, improve strength, to provide resistance against shear & torsion, to hold bars in position during construction

37. For a design of a simply supported beam under uniformly distributed load _____.

A. check the section at centre for Bending Moment as well as for shear

B. check the section at centre for Bending Moment and at the support for shear

C. Check at the centre for shear and at the support for Bending Moment

D. None of these

Ans. B

Sol. For design of simply supported beam there are two critical points

1. Bending moment at center of beam

2. Shear forces at support

38. The design horizontal seismic coefficient is 0.083 and seismic weight is 1020 KN. The design base shear is:

A. 63.9 KN   B. 75.60 KN

C. 80.35 KN   D. 85 KN

Ans. D

Sol. The design base shear $V_B = A_h W = 0.083 \times 1020 = 85$ KN

39. If W is the weight of a retaining wall and P is the horizontal earth pressure, the factor of safety against sliding is

A. 1
B. 1.25
C. 1.5
D. 2

Ans. C

Sol. The factor of safety against sliding is defined as forces preventing sliding along the bottom divided by the forces that will cause sliding along the bottom surface. Factor of safety should not be less than 1.5 for sliding condition.

40. Which one in the following list does not possess plasticity?

A. Bentonite
B. Kaolinite
C. Rock flour
D. Fat clay

Ans. C

Sol. Rock flour, or glacial flour, consists of fine grained, silt sized particles of rock, generated by mechanical grinding of bedrock by glacial erosion or by artificial grinding to a similar size. Kaolinite, bentonite and fat clay are all types of clay and possess plasticity.

41. The angle of repose of a soil is the maximum angle which the outer face of the soil mass makes

A. with the horizontal
B. with the vertical
C. with the perpendicular to the inclined plane of the soil
D. None of these

Ans. A

Sol. The angle of repose, or critical angle of repose, of a granular material is steepest angle of descent or dip relative to the horizontal plane to which a material can be be piled without slumping. At this angle, the material on the slope face is on the verge of sliding. The angle of repose can range from 0° to 90°.

42. The changes that take place during the process Of consolidation of a saturated clay would include

A. an increase in pore water pressure and an increase in effective pressure
B. an increase in pore water pressure and a decrease in effective pressure
C. a decrease in pore water pressure and a decrease in effective pressure
D. a decrease in pore water pressure and an increase in effective pressure

Ans. D

Sol. The excess hydrostatic pressure developed after the application of the load sets up a hydraulic gradient, and the water starts escaping from the voids. As the water escapes, the applied pressure is transformed from the water to the solids. Eventually, the whole of the pressure is transferred to the soil solids as the effective stress, and the excess water pressure becomes zero. As the effective stress increases, the Volume of the soil decreases.

43. According to Euler's column theory, the crippling load of a column is given by $P = \dfrac{\pi^2 EI}{Cl^2}$. In this equation, the value of C for a column one end fixed and other end free, is

A. $\dfrac{1}{4}$
B. $\dfrac{1}{2}$

C. 4
D. 2

Ans. C

Sol. Length of column is l.

Effective length of one end fixed and other end free is, $l_{ef} = 2l$

General equation of crippling load of a column is given by, $P = \dfrac{\pi^2 EI}{\left(l_{ef}\right)^2}$

Since $l_{ef} = 2l$ for a column one end fixed and other end free

Hence crippling load of a column for a column one end fixed and other end free is given by,

$P = \dfrac{\pi^2 EI}{(2l)^2} = \dfrac{\pi^2 EI}{4l^2}$

$C = 4$

44. Consider the following factors

A) Large number of loading cycles

B) Large variations in stress

C) Large stress concentrations

Those associated with fatigue failure would include _____.

A. A and B
B. A and C

C. B and C
D. A, B and C

Ans. D

Sol. in case of loading, the fatigue condition will occur when load is applied zero-to-max-to-zero & when varying load or stresses acting on member.

In case of stress, the fatigue condition will occur when any tensile stress is acting on a member & then released suddenly.

45. A thin cylindrical pressure pipe with both ends closed has diameter 1000 mm. The pipe is subjected to an internal pressure of 4 N/mm². The permissible tensile stress in the material is 100 N/mm². What is the minimum required thickness of the pipe?

A. 5 mm
B. 10 mm

C. 40 mm
D. 20 mm

Ans. D

Sol. $\sigma_t = \dfrac{pd}{2t}$ (in case of cylindrical pipe)

$100 = \dfrac{pd}{2t}$

$100 = \dfrac{4 \times 1000}{2t}$

t = 20 mm

46. A simple mass-spring oscillatory system consists of mass m = 1 kg, suspended from a spring of stiffness k = 9 N/m. Considering z = 20 mm as the displacement of system at time t = 2 second, the equation of motion for the free vibration of the system is $m\ddot{z} + kz = 0$. The natural frequency of the system is

A. 0.314 rad/sec   B. 3 rad/sec

C. 0.11 rad/sec   D. 9 rad/sec

Ans. B

Sol. Natural frequency of system = ω

From equation, $m\ddot{z} + kz = 0$

$$\ddot{z} + \frac{k}{m}z = 0$$

Comparing with equation of spring displacement, a= $\omega^2 x$

Where a is acceleration of system and x is displacement

$$\omega^2 = \frac{k}{m}$$

$$\omega = \sqrt{\frac{k}{m}}$$

$$\omega = \sqrt{\frac{9}{1}} = 3 \text{ rad/sec}$$

47. What is the area of influence line diagram for the reaction at the hinged end of a uniform propped cantilever of span 4m ?

A. ½   B. 2

C. 1   D. 3/2

Ans. C

Sol.

ILD for reaction at the hinged end of the propped cantilever

Deflection curve is a 3∘curve.

Hence area of ILD = $\frac{L \times 1}{3+1}$ = L/4 = 4/4 = 1

48. Calculate the length of one division of the vernier scale, if least count of the combination of main and vernier scale is 0.05 mm. The least count of the main scale is 1 mm.

A. 0.95   B. 1

C. 1.05   D. 0.05

Ans. A

Sol. Let length of one part of vernier = n

Length of one part of main scale = 1 mm

And length of one part of vernier + length of one part of main scale = 0.05

n + 1 = 0.05

n = -0.95 = **0.95**

49. In transit theodolite, the line of the sight can be reversed by revolving the telescope through
_____.

    A. 90 ° in horizontal plane   B. 90 ° in vertical plane

    C. 180 ° in horizontal plane   D. 180 ° in vertical plane

Ans. D

Sol. Transit theodolite is theodolite the telescope of which can be rotated completely about its horizontal axis.

Transiting of theodolite is also known as reversing. It is the process of turning gthe telescope about its horizontal axis through 180 in vertical plane.

50. A train is hauled by a 2-8-2 locomotive with 22.5 tonne load on each driving axle. Assuming the coefficient of rail wheel to be 0.25, what would be the hauling capacity of the locomotive?

    A. 15 tonne   B. 22.5 tonne

    C. 45 tonne   D. 90 tonne

Ans. B

Sol. Hauling capacity is defined as the load that can be handled by the locomotive. It is an indicative of the power which is available to the locomotives.

Where N = $\frac{m}{2}$ = $\frac{8}{2}$ = 4 where locomotive 2-m-2

H.C. = W x F x N = 22.5 x 0.25 x 4 = 22.5 tonne

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Upcoming Mini Mock Challenge in July Month

SSC JE

Civil Engineering

Exam	Live Date	Syllabus	No. of Questions	Time
SSC JE Mini Mock Test-1	08 July 2020	Full Syllabus (Tech. (30 Q's) & Non-Tech. (20 Q's))	50	30
SSC JE Mini Mock Test-2	15 July 2020	Full Syllabus (Tech. (30 Q's) & Non-Tech. (20 Q's))	50	30
SSC JE Mini Mock Test-3	22 July 2020	Full Syllabus (Tech. (30 Q's) & Non-Tech. (20 Q's))	50	30
SSC JE Mini Mock Test-4	29 July 2020	Full Syllabus (Tech. (30 Q's) & Non-Tech. (20 Q's))	50	30

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