RVUNL 2021

Civil Engineering

Mini Mock Challenge
(April 30th - May 1st 2021)

Questions & Solutions

1. Five people L, M, N, O and P work at different places. N works at School and O works at a Bank. Two people work at an MNC. M is house-wife. Who works at an MNC?

A. O   B. M

C. L   D. N

E. None of these

Ans. C

Sol.

People	Work
L	MNC
M	House-wife
N	School
O	Bank
P	MNC

Clearly, L works at an MNC.

2. |||Common||| In each of the following questions two statements are given and these statements are followed by two conclusions numbered (1) and (2). You have to take the given two statements to be true even if they seem to be at variance from commonly known facts. Read the conclusions and then decide which of the given conclusions logically follows from the two given statements, disregarding commonly known facts. |||End|||

Statements: Some classes are schools. Some schools are colleges. All colleges are universities.
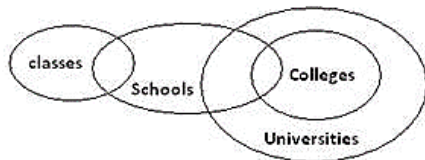
Conclusions: I. No university is a class.

II. At least some universities are classes.

A. Only I follows   B. Only II follows

C. Either I or II follows   D. Neither I nor II follows

E. Both I and II follow

Ans. C

Sol.

For either or case :

Given conclusion must be false.

For example:
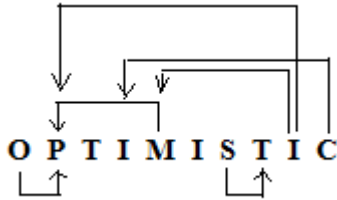
Some A's are not B => should be false.

Some B's are A=> should be false.

Then, it will be a case of either or.

3. How many such pairs of letters are there in the word OPTIMISTIC each of which has as many letters between them in the word (in both forward and backward directions) as in the English Alphabet?

    A. Five   B. Four

    C. Six   D. Three

    E. More than six

Ans. C

Sol.

Hence, option C is the correct response.

4. Which of the following should be at the blank space in the statement, so that the conclusion O > P is definitely true?

    Statement: $O = N \_ M \geq P \leq S > R < Q$

    A. <   B. =

    C. ≥   D. >

    E. ≤

Ans. D

Sol. We can conclude that-

    $O = N \_ M > P < S > R < Q$

    Now O > P is possible only when M > P and N > M.

    So only option which satisfies the given condition is D.

5. India's first 'Snow leopard' Conservation Centre will be established in

    A. Langtang National Park   B. Sagarmatha National Park

    C. Nanda Devi National Park   D. Gangotri National Park

Ans. D

Sol. India's first 'Snow Leopard Conservation Centre' will be set up in Gangotri National Park under the project 'Secure Himalaya' of the United Nations Development Program (UNDP). The International Union for Conservation of Nature (IUCN) has included snow leopard in the threatened species category. Gangotri National Park is in Uttarkashi District of Uttarakhand and its habitats consists of coniferous forests, alpine meadows and glaciers.

6. Who amongst the following described Democracy as "government of, by and for the people"?

A. Abraham Lincoln
B. Theodore Roosevelt

C. Ralph Nader
D. Thomas Jefferson

Ans. A

Sol. Abraham Lincoln, the 16th US president, described democracy as 'government of, by and for the people'. He uttered the famous words in his Gettysburg address, which was delivered post American civil war.

7. What is 'Nai Roshni'?

A. An upcoming Bollywood movie on the life and contributions of Tatas

B. An express train launched for women passenger only

C. The scheme for leadership development of Minority Women

D. A scheme to provide education and skill training to the youth from Minority Communities

Ans. C

Sol. Nai Roshni is a scheme of Ministry of Minority Affairs for leadership development of Minority Women. The objective of the scheme is to empower and instill confidence among minority women, including their neighbours from other communities living in the same village/locality by providing knowledge, tools and techniques for interacting with Government systems, banks and other institutions at all levels.

8. Article 131 of the Indian constitution, recently seen in news signifies,

A. Original Jurisdiction of the Supreme Court of India

B. Pardoning Powers of the President of India

C. Writs issuing powers of the Supreme Court of India

D. Advising President on constitutional or pre-constitutional matters.

Ans. A

Sol. Article 131 of the Indian constitution specifies the Original Jurisdiction of Supreme Court of India, i.e., the exclusive power of the supreme court to deal with any dispute between the Centre and a state; the Centre and a state on one side and another state on other side; and two or more states.

9. Transition zone between two ecosystems is called

A. Eco-cline
B. Eco-tone

C. E-cad
D. Eco-barrier

Ans. B

Sol. An ecotone is a transition area between two biological communities. It is the place where two communities meet and integrate. Examples of ecotone include *Kra ecotone* (connecting Thai-Malay peninsula with Asia) and Wallace line connecting Wallacea with Indomalayan peninsula. An Eco-cline is a gradation from one ecosystem to another without any sharp boundary.

10. As per National Sports Awards 2020, who amongst the following was awarded Rajiv Gandhi Khel Ratna Award?

A. Mariyannapn Thangavelu
B. Dharmendra Tiwary
C. Kuldip Singh Bhullar
D. Karan Avtar Singh

Ans. A

Sol. Of the above, Rajiv Gandhi Khel Ratna was awarded to Mariyannapn Thangavelu (para-athlete). He was awardee the honour along with Rohit Sharma (cricketer), Vinesh Phogat (wrestler), and Rani Rampal (women hockey captain). Apart from them, Dharmendra Tiwary was awarded Arjuna Award for Archery and Kuldip Singh Bhullar (with Jincy Philips) was awarded with Dhyan Chand award for Athletics.

11. The headquarter of National Bank for Agriculture and Rural Development (NABARD) is situated at

A. New Delhi
B. Bangalore
C. Kolkata
D. Mumbai

Ans. D

Sol. The headquarter of National Bank for Agriculture and Rural Development (NABARD) is situated at Mumbai. Founded in 1982 as a statutory body and has been entrusted with "matters concerning policy, planning, and operations in the field of credit for agriculture and other economic activities in rural areas in India". Its basic function is to look after rural finance via refinancing RRBs (Regional Rural Banks).

12. Which amongst the following ecosystem types has the lowest annual net primary productivity?

A. Tropical deciduous forests
B. Salt marsh
C. Open ocean
D. Temperate evergreen forests

Ans. C

Sol. Amongst the following, Open ocean has the least annual net primary productivity. Primary productivity is a term used to describe the rate at which plants and other photosynthetic organisms produce organic compounds in an ecosystem. Ecosystems, apart from open ocean with least primary productivity, include deserts, tundra region, lakes and streams biomes.

13. What is programme *GOAL*?

A. It is a joint initiative of Facebook India with Ministry of Tribal affairs to provide mentorship to tribal youth through digital mode.

B. It is an initiative of a Manipur-based NGO to create India's first transgender football team.

C. It is launched by Indian Navy as a part of national effort to repatriate Indian citizens from overseas.

D. It is a public-private partnership, launched by U.S., to facilitate and accelerate development of COVID-19 vaccines, therapeutics, and diagnostics.

Ans. A

Sol. GOAL is a joint initiative of Facebook India with Ministry of Tribal affairs to provide mentorship to tribal youth through digital mode. It intends to upskill and empower 5,000 tribal youths to harness their full potential of digital platforms to learn new ways of doing business, explore and connect with domestic and international markets.

14. Who is the author of the book 'Beli Krishan Rukmani Ri'?

A. Col. James Tod

B. Prithviraj Rathore

C. Gopi Das

D. None of the above

Ans. B

Sol. Prithviraj Rathore is the author of the book 'Beli Krishan Rukmani Ri'.

15. Which of the following species of bat is recently resighted in Rajasthan after its extinction?

A. Leaf nosed Bat

B. Dormer's Pipistrelle Bat

C. Greater False Vampire Bat

D. Egyptian Free-tailed Bat

Ans. A

Sol. A species of the bats identified as leaf-nosed bat (HipposiderosFulvus), aboriginal to the Thar desert, has been re-sighted by a group of zoological researchers roosting in ancient caves at Daijar near Jodhpur.

The bat specie has been re-sighted after 37 years, last being not reported since 1979 in the Thar.A thorough search inside the cave and its channels has revealed the presence of more than 20 individuals of leaf-nosed bats in a separate chamber in one of the closed channels.

Further analysis of the baculum and DNA of one male individual confirmed theiridentity as the extinct Fulvous Leaf Nosed Bat. There are 25 species of bats are reported in Rajasthan, of which 17 are found in the Thar desert.

16. What is the motto of Rajasthan Police?

A. Shanti Seva Nyaya

B. Serving for Humanity

C. Committed to serve

D. Sahyog Seva

Ans. C

Sol. The Rajasthan Police is the law enforcement agency for the state of Rajasthan in India. The Rajasthan Police has its headquarters in Jaipur, the state capital.

The motto of the force is **'Sevarth Katibaddhata'** सेवार्थ कटिबद्धता, which means "committed to serve".

17. Welspun Energy has commissioned Asia's largest solar power project in which of the following city?

A. Mumbai

B. Rohtak

C. Jodhpur

D. Ahmedabad

Ans. C

Sol. **Welspun Energy** has commissioned **Asia's largest solar power project** in **Jodhpur**. The company had earlier started a **15 MW solar generation unit** at the site and now plans to install two more units of **15 MW** and **20 MW**. The entire **50 MW solar project** will be developed in three phases and the project will generate total electricity of **90 million kWh** annually.

18. In which of the following year Jaipur was conferred the title of the World Craft City?

    A. 2014   B. 2015

    C. 2016   D. 2013

Ans. B

Sol. In **2015**, **Jaipur** was conferred the title of the **World Craft City** by the World Crafts Council, becoming the only city in the world to have received the title for **multiple crafts**. Jaipur, in particular, and Rajasthan, in general, has seen some successful crafts based businesses and startups reach scale in the last few decades, notably – **Jaipur Rugs, Rangsutra, Anokhi, Kilol, Sadhna** and **Soma**.

19. Who was the first Chief Minister of Rajasthan?

    A. C S Venkatachari   B. Manikya Lal Verma

    C. Pandit Hiralal Shastri   D. Tika Ram Paliwal

Ans. C

Sol. Pandit Hiralal Shastri (24 November 1899 – 28 December 1974) was an Indian politician and the first chief minister of Rajasthan state in northern India. He was in office from 7 April 1949 to 5 January 1951. Hiralal Shastri was born at Jobner in Jaipur District in a peasant family. He completed his early education in Jobner. Hiralal passed the degree of Sahitya Shastri in 1920. In 1921, he stood first in the B.A. examination from Maharaja's College, Jaipur.

20. Who was the famous ruler of Mewar who repaired the fort of Achalgarh?

    A. Rana Ratan Singh   B. Maharana Kumbha

    C. Rana Sanga   D. Maharana Raj Singh

Ans. B

Sol. Achalgarh is a fort situated about 11 kilometres (6.8 mi) north of Mount Abu, a hill station in Rajasthan, India. The fort was originally built by the Paramara dynasty rulers and later reconstructed, renovated and named as Achalgarh by Maharana Kumbha in 1452 CE, one of the several forts built during his reign.

21. Rajasthan has the shortest inter-state border with which state?

    A. Gujarat   B. Madhya Pradesh

    C. Punjab   D. Haryana

Ans. C

Sol. Rajasthan has the shortest 89-km inter-state border with Punjab and the longest 1600-km distance with Madhya Pradesh. 5 states share boundaries with Rajasthan.

22. What are the districts of Rajasthan in which no river flows?

A. Bikaner and Churu   B. Sriganganagar and Hanumangarh

C. Jodhpur and Jaisalmer   D. Nagaur and Pali

Ans. A

Sol. Bikaner and Churu are the two districts in Rajasthan in which no river flows, but the Kantali River originating from Khandela, Sikar disappears in an area called Sahaba in Churu district.

23. What is the length of Rajasthan from north to south?

A. 828 km   B. 848 km

C. 836 km   D. 826 km

Ans. D

Sol. Rajasthan is located in the western part of the map of India. The shape of Rajasthan is like a rhombus. Rajasthan is 869 kilometers from east to west, while 826 kilometers from north to south. The latitudinal extension of Rajasthan is 23 ° 03 ' North to 30 ° 12 ' North with a difference of 7 ° 09 minutes. The longitudinal extension of Rajasthan is 78 ° 17 ' E longitude from 69 ° 30 ' East longitude. The difference is 8 ° 47 minutes.

The Tropic of Cancer cuts Rajasthan in Banswara and Dungarpur districts. Because of this, the sun shines right here on 22 June.

24. Which river was also known as Charmanavati river in ancient times?

A. Chambal   B. Banas

C. Ghaggar   D. Sabarmati

Ans. A

Sol.

The Chambal river was known as Charmanavati in ancient times. The Chambal river originated from the Janapav hill near Manpur near Mhow in Madhya Pradesh. It enters Kota near Chaurasigarh (Chittorgarh district) in Rajasthan, forming the border of Kota, Bundi districts, and meets the river Yamuna at the end via Sawai Madhopur, Karauli and Dhaulpur. The principal tributaries of Chambal are Banas, Kalisindh and Parvati.

25. The first plasma bank of Rajasthan will be established at which place?

A. Udaipur   B. Ajmer

C. Jaipur   D. Kota

Ans. C

Sol. The government of Rajasthan is to set up the first plasma bank of the state in Jaipur. India's first plasma bank was established in Delhi. Under plasma therapy, blood plasma is collected from a COVID-19 recovered patient. This is then transfused into a COVID-19 patient. Blood

plasma is the fluid released after removing the components of blood. The components of blood are RBC, WBC, and platelets. RBC is Red Blood Corpus and WBC is White Blood Corpus. RBCs carry oxygen to the blood.

26. Which Air Force helicopter has been deployed by the Indian Air Force in Rajasthan for Locust control?

A. Rudra
B. Mig
C. Apache
D. MI 17

Ans. D

Sol. The versatile Mi-17 helicopter was used for spraying in Jodhpur district, making it the first-of-its-kind activity in the history of locust control in India, according to the Agriculture Ministry.

Aerial spraying capacity has been strengthened for anti-locust operations with the deployment of a Bell helicopter in Rajasthan for use in Scheduled Desert Area as per the need and the Indian Air Force has also conducted trials in anti-locust operation by using Mi-17 helicopter.

27. When did Rajasthan government announced ban on pan masala and tobacco?

A. 8 March 2020
B. 2 October 2019
C. 26 January 2020
D. 30 November 2019

Ans. B

Sol. Rajasthan government has announced ban on pan masala and tobacco on 02 October 2019 on Mahatma Gandhi Jayanti. The government has announced a ban on the production, storage, distribution and sale of pan masala and flavored tobacco containing magnesium carbonate, nicotine, tobacco or mineral oil.

After Maharashtra and Bihar, Rajasthan is the third state to impose this ban. According to the Medical Department of Rajasthan, this important step has been taken to prevent drug addiction among the youth. The government has banned these items under the Food Security Act.

28. Identify the wrong pair related to wildlife mascots district wise.

A. Sirohi - Wild Fowl
B. Hanumangarh - Chhota Kilkila
C. Dhaulpur – Ghonsiga
D. Sikar - Shahin

Ans. C

Sol.

i. Ajmer Khadmore
ii. Bundi Sukarbh
iii. Chittorgarh Chausinga
iv. Churu Krishna Deer

v. Dosa rabbit

vi. Dholpur Pachira (Indian Screamer)

vii. Hanumangarh Chhota Kilkila

viii. Jaisalmer Godavan

ix. Jalore bear

x. Sikar - Shaheen

xi. Sirohi - Wild Fowl

29. One of the factors of $x^3 - 3x^2 + 3x - 2$ is:

A. $x^2 + x + 1$ B. $x^2 - x + 1$

C. $x^2 - x - 1$ D. $x^2 + x - 1$

Ans. B

Sol. Putting x = 2 in equation $x^3 - 3x^2 + 3x - 2$

We get

$2^3 - 3(2)^2 + 3(2) - 2 = 0$

i.e. x − 2 is the factor of $x^3 - 3x^2 + 3x - 2$

Dividing $(x^3 - 3x^2 + 3x - 2)$ by $(x - 2)$ we get Quotient $(x^2 - x + 1)$

30. A certain sum is distributed among A, B, C and D in the ratio 3: 4 : 8 : 6 respectively. If the share of C is Rs 2,820, more than that of B, then what is the sum of shares of A and D?

A. Rs 5,460   B. Rs 5,640

C. Rs 3,564   D. Rs 6,345

Ans. D

Sol. Let total sum be x

According to question

$\left(\dfrac{8}{3+4+8+6} - \dfrac{4}{3+4+8+6}\right) \times x = 2820$

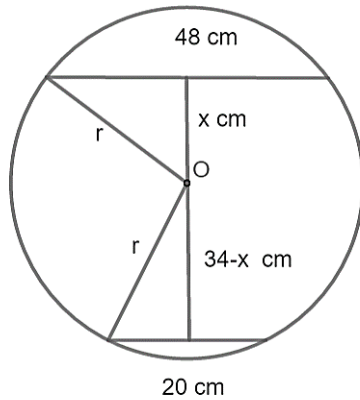$\Rightarrow \dfrac{4x}{21} = 2820$

$\Rightarrow x = 14805$

Required sum = $\dfrac{3+6}{21} \times 14805 = 6345$

31. In a circle with centre O. chords A13 and CD are parallel chords on opposite side of O. If AB = 20 cm. CD = 48 cm and the distance between the chords is 34 cm. then the diameter (in cm) of the circle is:

A. 26   B. 39

C. 42   D. 52

Ans. D

Sol.

$r^2 = x^2 + 24^2$ and $r^2 = (34 - x)^2 + 10^2$

equating the value of r^2 we have

$x^2 = (34 - x)^2 + 100 + (24*24)$

$\Rightarrow x^2 = 34^2 + x^2 - 68x - 576 + 100$

$\Rightarrow 68x = 680$

$\Rightarrow x = 10$ cm

Now

$r^2 = 10^2 + 24^2 = 676 = 26^2$

r= 26 cm

D= 52 cm

32. If $\sqrt{24} = 4.899$, then the value of $\sqrt{\dfrac{8}{3}}$ is—

A. 0.544   B. 2.666

C. 1.633   D. 1.333

Ans. C

Sol.

$$\because \sqrt{24} = 4.899$$

$$\therefore \sqrt{\frac{8}{3}} = \sqrt{\frac{24}{3^2}}$$

$$= \frac{1}{3}\sqrt{24}$$

$$= \frac{1}{3} \times 4.899$$

$$= 1.633$$

33. |||Common||| निर्देशः प्रत्येक प्रश्न में एक वाक्य दिया हुआ है। वाक्य के जिस भाग में गलती हो, (A), (B) या (C) तो वही भाग आपका उत्तर होगा। यदि कोई गलती न हो, तो आपका उत्तर (D) होगा। |||End|||

(A) सज्जनों से मित्रता /(B) रखने से /(C) सुखशान्ति मिलती है /(D) कोई गलती नहीं ।

A. A
B. B
C. C
D. D

Ans. A

Sol. 'सज्जनों' के स्थान पर 'सज्जन' होगा ।

34. निम्न में से किस शब्द में "**नि**" उपसर्ग का प्रयोग किया गया है?

A. निर्वास
B. निपात
C. निर्भय
D. निर्दोष

Ans. B

Sol. उपसर्ग = उप (समीप) + सर्ग (सृष्टि करना) का अर्थ है- किसी शब्द के समीप आ कर नया शब्द बनाना।

उपसर्ग कहलाते हैं।

यहाँ केवल निपात शब्द में 'नि' उपसर्ग है, अन्य शब्दों में 'निर्' उपसर्ग का प्रयोग किया गया है।

निपात = नि + पात

निर्वास = निर् + वास

निर्भय = निर् + भय

निर्दोष = निर् + दोष

35. दिए गए विकल्पों में तत्सम शब्द के लिए सही विकल्प कौन सा है ?

A. तमोली
B. औधर
C. आभीर
D. तुरन्त

Ans. C

Sol. तत्सम - तद्भव

आभीर – अहीर

अन्धक – औधर

त्वरित – तुरन्त

तम्बोली - तमोली

इतिहास या उत्पत्ति के आधार पर शब्द पाँच प्रकार के होते है।

तत्सम , तद्भव , देशज , विदेशज , संकर

तद्भव – संस्कृत के शब्दों से उत्पन्न हुए तद्भव शब्द कहते है ।

तत्सम – वे शब्द जो संस्कृत की तरह ही प्रयोग में लाए जाते है तत्सम शब्द कहलाते है।

36. निम्नलिखित में से "**सुदामाचरित**" का काव्य रूप क्या माना जाता है ?

    A. महाकाव्य   B. खंडकाव्य

    C. एकार्थकाव्य   D. चरितकाव्य

Ans. B

Sol. खंडकाव्य - खण्डकाव्य साहित्य में प्रबंध काव्य का एक रूप है। जीवन की किसी घटना विशेष को लेकर लिखा गया काव्य खण्डकाव्य है।

सुदामाचरित - कवि नरोत्तमदास (सम्वत 1602) कृत 'सुदामाचरित' इस परम्परा की सर्वाधिक महत्वपूर्ण रचना है। यह एक संक्षिप्त खण्ड काव्य है, जो दोहा, कवित्त और सवैया छन्दों में रचा गया ह

37. |||Common||| **Direction:** Fill in the blank with appropriate verb to make the sentence past perfect tense: |||End|||

The guest _____ when I reached the club.

    A. were leaving   B. left

    C. have been leaving   D. had left

Ans. D

Sol.

The correct sentence with the appropriate verb is: The guest had left when I reached the club. The formula to identify past perfect tense is: had + third form of verb. This type of verb is used to express an action completed before a certain moment in the past.

38. Choose the correct order of the sentences to rearrange them in a suitable manner.

P. the next

Q. supposed to be

R. cricket legend

S. He is

OPTIONS:

    A. SRPQ   B. SQPR

    C. QSPR   D. SRQP

Ans. B

Sol. The correct order of the sentence is "He is supposed to be the next cricket legend".

39. Which of the following prefix is suitable for the word "mature"?

    A. im-   B. a-

    C. dis-   D. in-

Ans. A

Sol. The correct prefix for the word mature is "im", i.e., immature.

40. **Direction:** Fill in the blank with the most appropriate modal from the given options:

My office is two hours away from my home so, I _____ leave early every day. A. can

B. may

C. shall

D. would

Ans. C

Sol. The correct sentence with the most appropriate modal is: My office is two hours away from my home so I shall leave early every day. The modal 'shall' is used to express offers, suggestions and is used with only 'I' and 'We'.

41. Doglegged stairs are

A. Quarter turn stairs

B. Three quarter turn stairs

C. Half turn stairs

D. Straight stair

Ans. C

Sol. Dog legged stair case is the most economical staircase. These stairs are arranged with two adjacent flights running parallel with a mid landing. Where space is less, dog legged staircase is generally provided resulting in economical utilization of available space.

42. For what reason is it taken that the nominal maximum size of aggregate may be as large as possible?

A. Larger the maximum size of aggregate, more the cement required and so higher the strength

B. Larger the maximum size of aggregate, smaller is the cement requirement for a particular water cement ratio and so more economical the mix.

C. Larger the maximum size of aggregate, lesser are the voids in the mix and hence also lesser the cement required.

D. Larger the maximum size of aggregate, more the surface area and better the bond between aggregates and cement, and so higher the strength.

Ans. B

43. List-I

A) The bond containing 1 brick laid with headers toward the face of wall

B) The bond containing alternate courses of stretchers and headers

C) The bond containing bricks laid with their length in the longitudinal direction of the wall

D) The bond containing alternatively stretchers and headers in each course

List-II

1) Stretcher bond

2) Header bond

3) English bond

4) Double Flemish bond

A - B - C - D

A. A2 - B3 - C1 - D4

B. A1 - B2 - C3 - D4

C. A4 - B3 - C2 - D1

D. A3 - B4 - C1 - D2

Ans. A

Sol. Stretcher bond- The bond containing bricks laid with their length in the longitudinal direction of the wall.

Header bond- The bond containing 1 brick laid with headers toward the face of wall.

English bond- The bond containing alternate courses of stretchers and headers.

Double Flemish bond- The bond containing alternatively stretchers and headers in each course

44. Calculate the cost of the plastering required for a wall of 5 m long, 4 m high and 300 mm thick, if the rate of plastering is Rs. 10 per square meter.

A. 101 B. 200

C. 336 D. 423

Ans. B

Sol. Area of the wall = 5 x 4 = 20 m^2

Rate of plastering per square meter = Rs10/-

Cost of plastering = 20 x 10 =Rs 200 /-

45. Which of the following is measured in square meter?

A. Cornice B. Concrete work

C. Shuttering D. Steel reinforcement bar

Ans. C

Sol. Shuttering is measured in terms of area. But generally, square meter and square foot of the contact area with concrete is taken as the unit of measurement.

The dimensions of a shuttering should be measure correct to the centimeter or inches whichever the case may be.

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

A. flow acoss streamline

B. flow takes place continuously

C. flow is homogeneous, non-viscous and incompressible

D. flow is turbulent

Ans. C

Sol. Euler's equation is based on the following assumptions:

♣ The fluid is non-viscous (i,e., the frictional losses are zero).

♣ The fluid is homogeneous and incompressible (i.e., mass density of the fluid is constant).

♣ The flow is continuous, steady and along the streamline.

♣ The velocity of the flow is uniform over the section.

♣ No energy or force (except gravity and pressure forces) is involved in the flow.

47. The flow in open channel is laminar if the Reynolds number is

    A. 2000   B. more than 2000

    C. more than 4000   D. less than 500

Ans. D

Sol. In OCF,

    Reynolds number value for laminar flow should be below 500.

    For turbulent flow same must be more than 2000.

48. The stable equilibrium is achieved in the floating body when _____.

    A. center of gravity is below the center of buoyancy

    B. metacenter is above the center of gravity

    C. metacenter is below the center of gravity

    D. metacentric height is zero

Ans. B

Sol. Condition of stability of floating body,

    If M is above G- stable equilibrium.

    If M coincide G – neutral equilibrium.

    And if M is below G – unstable equilibrium.

    Where M is metacenter and G is center of gravity.

49. Maximum length of offset depends upon

    i. Degree of accuracy required

    ii. Scale of plotting

    iii. General layout of chain line

    iv. Nature of ground

    A. i, ii and iii only   B. i, iii and iv only

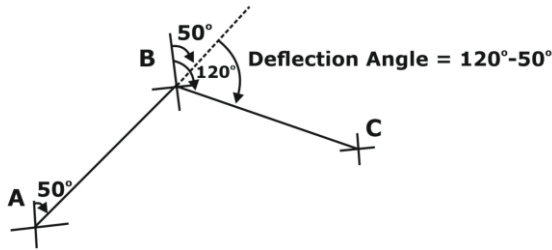   C. ii, iii and iv only   D. i, ii and iv only

Ans. D

Sol. Maximum length of offset does not depends upon general layout of chain line.

50. The Whole Circle Bearing of line AB is 50° and of line BC is 120°. The defection angle at B from AB to BC is

    A. 50° B. 70°

    C. 110° D. 120°

Ans. B

Sol. Deflection angle = $120^0 - 50^0 = 70^0$

51. The rise and fall method for obtaining the reduced levels of points provides a check on

    1) Fore sight
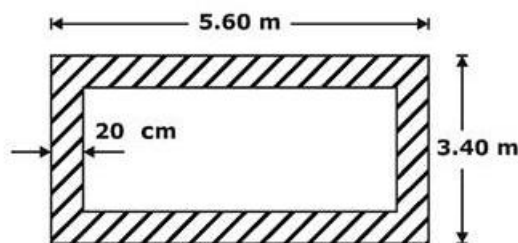
    2) Back sight

    3) Intermediate sight

    Which of the above statements are correct?

    A. 1 and 2 only   B. 1 and 3 only

    C. 2 and 3 only   D. 1, 2 and 3

Ans. D

Sol. In rise and fall method R.L of back sight and fore sight sight are checked along with intermediate sight.

52. For the given plan, estimate the total quantity of brickwork if the height of the wall is 3.25 m

    A. 5.65 cum   B. 11.18 cum

    C. 14.86 cum   D. 18.19 cum

Ans. B

Sol. Length of long wall = 5.60 m

    Length of short wall = 3 m

    Total length = 2 × (5.60 + 3) = 17.2 m

    Total quantity of brickwork = 17.2 × 0.20 × 3.25 = 11.18 cum

53. The value of a property at the end of its lifespan is known as

    A. Scrap value   B. Salvage value

    C. Capitalized value   D. Sinking fund

Ans. B

Sol. The value of the property at the end of its utility period is known as salvage value and the value of material after it dismantled at the end of its utility period is known as scrap value.

54. Beams composed of more than one material, rigidly connected together so as to behave as one piece, are known as

    A. Compound beams   B. Indeterminate beams

    C. Determinate beams   D. Composite beams

Ans. D

Sol. A structural member composed of two or more dissimilar materials joined together to act as a unit.

55. The ratio of polar moment of inertia of hollow shaft having outer diameter '3d' and inner diameter 'd' to the solid shaft of diameter '2d' is

    A. $\dfrac{1}{5}$ B. 5

    C. $\dfrac{15}{81}$ D. $\dfrac{81}{15}$

Ans. B

Sol. Polar moment of inertia is the moment of inertia of a plane area with respect to an axis perpendicular to the plane. Polar moment of inertia basically describes the cylindrical object's (including its segments) resistance to torsional deformation when torque is applied in a plane

Polar moment of inertia of solid shaft of diameter 2d,

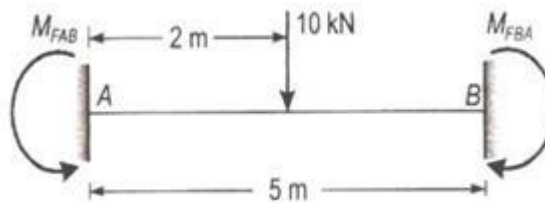$$J_S = \frac{\pi}{32} D^4 = \frac{\pi}{32}(2d)^4 = \frac{16\pi}{32}d^4 = \frac{\pi}{2}d^4$$

Polar moment of inertia of hollow shaft,

$$J_H = \frac{\pi}{32}(D^4_{outer} - D^4_{inner}) = \frac{\pi}{32}[(3d)^4 - d^4]$$

$$= \frac{\pi}{32}(81d^4 - d^4) = \frac{80\pi}{32}d^4 = \frac{5\pi}{2}d^4$$

Ratio of Polar moment of inertia of hollow shaft to solid shaft = $\dfrac{\frac{5\pi}{2}d^4}{\frac{\pi}{2}d^4} = 5$

56. A fixed beam AB, of constant EI, shown in the figure below, supports a concentrated load 10 kN. What is the fixed end-moment M_{AB} at support A?

    A. 4.8 kN-m   B. 6.0 kN-m
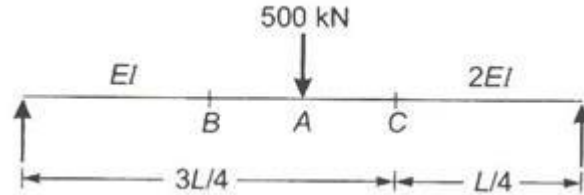
    C. 7.2 kN-m   D. 9.5 kN-m

Ans. C

Sol. $M_{FAB} = \dfrac{Pab^2}{L^2}$

Here P = 10 KN, a = 2 m.

b = 3 m, L = 5 m

$\therefore \quad M_{FAB} = \dfrac{10 \times 2 \times 3^2}{5^2} = 7.2\,KN-m$

57. A load 500KN applied at point A as shown in the figure elow. Produces a vertical deflection at B and C of the beam as Δ_B = 10 mm and Δ_C = 15 mm, respectively.

What is the deflection at A when loads of 100 KN and 300 KN are applied at B and C, respectively?

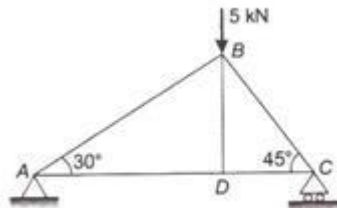A. 6 mm

B. 8 mmm

C. 11 mm

D. 12.5 mm

Ans. C

Sol. Using Maxwell-Betti's theorem

$500\Delta_A = 100\Delta_B + 300\Delta_C$

$\therefore \Delta_A = \dfrac{\Delta_B}{5} + \dfrac{3}{5}\Delta_C = \dfrac{10}{5} + \dfrac{15 \times 3}{5} = 11mm$

58. What is the magnitude of the force in the membe BD in the figure given below?

A. 5 KN

B. 7KN (approx)

C. $4\sqrt{2}KN$

D. Zero

Ans. D

Sol. If three members meet at a joint which carries no load then one member will carry zero forces which is not collinear.

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19

59. Which of the following statement is correct for the Pore water pressure?

    A. It is the pressure caused by water outside the soil surface

    B. It acts on 2 sides of the particles

    C. It has shear components

    D. It does not cause particles to press against adjacent particles

Ans. D

Sol. For the Pore water pressure

    * It is the pressure of water filling the void space between soil particles

    * It act on all sides of the particles

    * It has no shear components

    * It does not cause particles to press against adjacent particles

60. The best spacing of timber piles from centre to centre is

    A. 600 mm   B. 700 mm

    C. 800 mm   D. 900 mm

Ans. D

Sol. The best spacing of timber piles from centre to centre is 900mm

    Note:

    Timber pile

    Timber piles are prepared from trunk of trees. They may be circular or square. They are 30–50 cm in diameter with a length not exceeding 20 times its top width. At the bottom, a cast iron shoe is provided and at the top a steel plate is fixed. The best spacing of timber piles from centre to centre is 900mm.

61. The piles which do not support the load by themselves, but act as a medium to transmit the load from the foundation to the resisting sub-stratum, are known as

    A. Friction pile   B. Bearing pile

    C. Batter pile   D. Fender pile

Ans. B

Sol. The piles which do not support the load by themselves, but act as a medium to transmit the load from the foundation to the resisting sub-stratum, are known as bearing pile.

    Note:

    Bearing piles:

    These piles penetrate through soft soils and their bottom rests on a hard stratum. The soft ground through which the piles pass also gives lateral support and increases the load carrying capacity of the bearing piles.

62. If settling velocity is 1 cm/sec then corresponding surface loading in litre per day per m² will be

A. 36000

B. 864000

C. 24000

D. 6000

Ans. B

Sol. Settling velocity, $v_s = 1 \text{ cm/sec}$

Surface loading = 864000 x settling velocity

= 864000 x 1

= 864000 litre per day per m²

63. If for diluting 25 ml of water sample in 200 ml of taste free water is required to be added to make the water sample to just loose its taste, then the flavor threshold number (FTN) will be

A. 5

B. 7

C. 8

D. 9

Ans. D

Sol. The flavor threshold number is the factor of dilution at which change in taste is just detectable.

Volume of water sample, A = 25 ml

Volume of taste free water, B = 200 ml

$$\text{FTN} = \frac{A + B}{A} = \frac{25 + 200}{25} = 9$$

64. A square column section of size 350 mm × 350 mm is reinforced with four bars of 25 mm diameter and four bars of 16 mm diameter. Then the transverse tie reinforcement would be

A. 5 mm dia @ 240 mm c/c

B. 6 mm dia @ 250 mm c/c

C. 8 mm dia @ 250 mm c/c

D. 8 mm dia @ 300 mm c/c

Ans. C

Sol. Given column size is 350 mm × 350 mm.

Reinforcement 4 – 25 mm diameter bar and 4 – 16 mm diameter bars.

As per clause 26.3.2 of IS 456:2000, diameter of tranverse bar is

Maximum of $\begin{cases} (i) \left(\frac{1}{4}\right) \text{diameter of } largest \text{ longitudinal bar} = \frac{1}{4} \times 25 = 6.25 \simeq provide\,8\,mm \\ (ii)\,6\,mm \end{cases}$

Spacing, S_v = min of $\begin{cases} (i)\ \text{Least lateral dimension of column} = 350\,mm \\ (ii)\,16 \times smallest\ diameter\ bar\ of\ longitudinal\,reinforcement = 256\ mm \\ (iii)\ 300\,mm \end{cases}$

= 256 mm or taking it as 250 mm.

So, provide 8 mm φ @250 mm, as transverse reinforcement.

65. From limiting deflection point of view, use of high strength steel in RC beam results in
_____.

A. Reduction in depth
B. No change in depth

C. Increase in depth
D. Increase in width

Ans. C

Sol. Deflection criteria for simply supported beam should be <20, for continuous beam <26 & for cantilever beam <7. These factors also have to be multiplied with modification factor K1, K2, K3 & K4.

As the value of tension reinforcement increases modification factor decreases thus leading to increase in depth.

66. In case of simply supported rectangular beam of span L and loaded with central load W, the length of elasto-plastic zone of plastic hinge is

A. $\dfrac{L}{3}$
B. $\dfrac{L}{2}$

C. $\dfrac{2L}{3}$
D. None of the above

Ans. A

Sol. Shape factor for a rectangular section = 1.5

Length of elasto-plastic zone of plastic hinge, l_p = L $\left(1 - \dfrac{1}{Shape\ factor}\right)$

= L $\left(1 - \dfrac{1}{1.5}\right)$

= $\dfrac{L}{3}$

67. Intermediate vertical stiffeners are provided in plate girder to:

A. prevent excessive deflections
B. eliminate local buckling

C. transfer concentric loads
D. eliminate shear web buckling

Ans. D

Sol. Intermediate vertical stiffeners are required when there are concentrated loads acting on the plate girder. When the web thickness is less, the web may buckle due to shear under this concentrated loads. Intermediate stiffeners are provided in order to improve the buckling strength of the web.

68. A series of steps without any platform is known as

A. Going
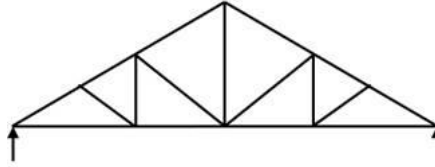B. Riser

C. Flight
D. Nosing

Ans. C

Sol. Going – width of tread between two successive risers

Riser – Vertical member between two tread

Flight – Series of steps without any platform

Nosing – Outer projecting edge of the tread.

69. The type of truss shown in the given figure is

   A. Fink Truss   B. King Post Truss
   C. Howe Truss   D. Pratt Truss

Ans. C

Sol. The truss shown in the given figure is a form of Howe truss.

70. What type of sketch shows the front in true shape?
   A. Isometric   B. Perspective
   C. Oblique   D. Axonometric

Ans. C

Sol. Oblique drawing is a projective drawing of which the frontal lines are given in true proportions and relations and all others at suitable angles other than 90 degrees without regard to the rules of linear perspective.

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