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॥ आपकी सफलता, हमारी प्रतिबद्धता ॥

1. Answer A

Solution

Festivals of the Bhadrapad month (Bhado):

Jal-Jhulni Ekadashi - On Bhadrapad Shukla Ekadashi.

Sati Puja - On Bhadrapad Shukla Ashtami.

Anant Chaturdashi - On Bhadrapad Shukla Chaturdashi.

Satyanarayan Purnima - This falls on Kartik Purnima; it is also known as Tripurari Purnima.

Sheetala Ashtami - On Chaitra Krishna Ashtami, seven days after Holi; involves the worship of Goddess Sheetala and the consumption of cold food (Basyoda).

Karwa Chauth - On Kartik Krishna Chaturthi.

भाद्रपद माह (भादो) के त्यौहार:

जलझूलनी एकादशी - भाद्रपद शुक्ल एकादशी को।

सती अमावस्या - भाद्रपद अमावस्या को।

अनन्त चतुर्दशी - भाद्रपद शुक्ल चतुर्दशी को।

सत्यनारायण पूर्णिमा - ये कार्तिक पूर्णिमा को होती है, इसे त्रिपुरारी पूर्णिमा भी कहते हैं

शीतलाष्टमी - चैत्र कृष्ण अष्टमी को, होली के 7 दिन बाद। शीतला माता की पूजा, ठंडा भोजन (बास्योड़ा)।

करवा चौथ - कार्तिक कृष्ण चतुर्थी

2. Answer B

Solution

Kodamar Holi - Bhinay (Ajmer)

Pattharmar Holi - Badwa/Bhorda, Barmer (Balotra)

Lathmar Holi - Karauli (Shri Mahavirji)

Devar-Bhabhi Holi - Beawar (Ajmer)

कोड़मार होली - भिनाय (अजमेर)

पत्थरमार होली - बाड़मेर के बाड़वा/भोरड़ा (बालोतरा)

लठ्ठमार होली - करौली (श्री महावीरजी)

देवर-भाभी होली - ब्यावर (अजमेर)

3. Answer B

Solution

Kanan Fair - Barmer - The Kanan Fair is held in Kanan village, Barmer district.

Rani Sati Fair - Jhunjhunu - The most famous Sati fair. The temple of Rani Sati Ji (Narayani Devi) is located in Jhunjhunu. A massive fair takes place on Bhadrapad Amavasya, attracting hundreds of thousands of devotees. Rani Sati is also known as 'Dadiji'.

Bhojanthali Fair - Kama (Deeg/Bharatpur) - The Bhojanthali Fair is held in Kama (Braj region).

Vikramaditya Fair - Udaipur

कानन मेला - बाड़मेर - कानन मेला बाड़मेर जिले के कानन गाँव में लगता है।

रानी सती मेला - झुंझुनूं - सबसे प्रसिद्ध सती मेला। झुंझुनूं में रानी सती जी (नारायणी देवी) का मंदिर। भाद्रपद अमावस्या को विशाल मेला, लाखों श्रद्धालु। रानी सती को दादीजी भी कहते हैं।

भोजनथाली मेला - कामां (डीग/भरतपुर) - कामां (ब्रज क्षेत्र) में भोजनथाली मेला।

विक्रमादित्य मेला - उदयपुर

4. Answer C

Solution

Abhaneri Festival - Abhaneri, Dausa - A two-day festival held in September-October.

आभानेरी महोत्सव - आभानेरी, दौसा - सितम्बर-अक्टूबर में 2 दिन का महोत्सव।

5. Answer A

Solution

Lohagarh Fort, Bharatpur - Mud Fort / Earthen Fort - Built by Jat King Surajmal in 1733.

Its outer wall is made of mud, while the interior is constructed of brick and lime.

Because of the mud composition, cannonballs would sink into the wall rather than exploding upon impact.

Consequently, even the British could not conquer it—making it an impregnable fort.

Nickname: Lohagarh (Strong as iron).

लोहागढ़ दुर्ग, भरतपुर - मिट्टी का किला / मिट्टी का दुर्ग - निर्माण: 1733 में जाट राजा सूरजमल ने करवाया।

इसकी बाहरी दीवार मिट्टी की बनी है, अंदर ईंट और चूना।

मिट्टी होने से तोप के गोले धंस जाते थे, फटते नहीं थे।

इसलिए अंग्रेज भी इसे नहीं जीत पाए - अजय दुर्ग।

उपनाम: लोहागढ़ (लोहे जैसा मजबूत)

6. Answer C

Solution

Located within the Chittorgarh Fort are: the Tulja Mata Temple (also known as the Tulja Bhavani Temple), dedicated to the clan goddess of the Solankis; the Navlakha Bhandar, built by Banvir to house the royal treasury (named 'Navlakha' because it held a treasure worth nine lakh); the Bhamashah Haveli, the residence of the philanthropist Bhamashah, where he provided the funds to Maharana Pratap for the defense of Mewar; and the Tripolia Gate, one of the inner gates among the seven gates of Chittorgarh (the seven main gates being Padan Pol, Bhairav Pol, Hanuman Pol, Ganesh Pol, Jodla Pol, Lakshman Pol, and Ram Pol).

चित्तौड़गढ़ दुर्ग में स्थित हैं: तुलजा माता मंदिर - तुलजा भवानी मंदिर, सोलंकियों की कुलदेवी।

नवलखा भण्डार - बनवीर ने बनवाया, राजकोष (खजाना) रखा जाता था, 9 लाख का खजाना, इसलिए नवलखा।

भामाशाह की हवेली - दानवीर भामाशाह का घर, यहीं महाराणा प्रताप को मेवाड़ की रक्षा के लिए धन दिया था।

त्रिपोलिया दरवाजा - चित्तौड़गढ़ के 7 दरवाजों में से एक अंदर का दरवाजा (पाडनपोल, भैरवपोल, हनुमानपोल, गणेशपोल, जोड़लापोल, लक्ष्मणपोल, रामपोल - ये 7 मुख्य)।

7. Answer B

Solution

Neminath/Lanvasahi/Devrani-Jethani Temple: Two temples built by the architect Shobhandev (in 1230-31 AD) by Tejpal and Vastupala, the general secretary of Chalukya king Veer Dhaval, in the memory of their brother Luna. There are two niches on either side of the entrance of the main temple, which are called the Gavaksh of the sister-in-law and sister-in-law. A black stone statue of the 22nd Jain Tirthankar Neminath ji has been installed here.

नेमीनाथ/ लूनवसाही/देवरानी-जेठानी मंदिर : चालुक्य राजा वीर धवल के महामंत्री तेजपाल व वास्तुपाल ने अपने भाई लूणा की स्मृति में शिल्पी शोभनदेव द्वारा (1230-31 ई. में) निर्मित दो मंदिर। मुख्य मंदिर के द्वार के दोनों ओर दो ताक हैं, जिन्हें देवराणी-जेठानी के गवाक्ष कहते हैं। यहाँ 22वें जैन तीर्थंकर नेमीनाथ जी की काले पत्थर की प्रतिमा स्थापित की गयी है।

8. Answer A

Solution

The Chal Phir Shah Dargah is located within the Chittorgarh Fort. It is believed that Chal Phir Shah was a saint who was constantly on the move—hence the name "Chal Phir Shah." Both Hindus and Muslims offer chadars (ceremonial cloth coverings) here.

चल फिर शाह की दरगाह - चित्तौड़गढ़ दुर्ग में स्थित - चित्तौड़गढ़ किले के अंदर स्थित है। मान्यता है कि चल फिर शाह एक संत थे जो हमेशा चलते-फिरते रहते थे, इसलिए नाम "चल फिर शाह"। यहाँ हिन्दू-मुस्लिम दोनों चादर चढ़ाते हैं,

9. Answer D

Solution

Umaid Bhawan (Jodhpur) - Its foundation stone was laid by Maharaja Umaid Singh on November 18, 1928. Umaid Bhawan is one of the grandest palaces in Asia. Its construction was completed as part of famine relief works (1928-1940). Umaid Bhawan is also known as 'Chhittar Palace' because it is built using Chhittar stone.

उम्मीदभवन (जोधपुर)- इसका शिलान्यास 18 नवम्बर, 1928 को महाराजा उम्मेदसिंह द्वारा किया गया। उम्मेदभवन एशिया के भव्य प्रासादों में से एक है। इसका निर्माण अकाल राहत कार्यों के तहत (1928-1940) सम्पन्न हुआ। उम्मेदभवन को छीतर पत्थर से बनने के कारण छीतर पैलेस भी कहा जाता है।

10. Answer C

Solution

Chhatri of Eighty-Four Pillars (Devpura Village, Bundi): Dedicated to Lord Shiva, this chhatri (cenotaph) was constructed between 1683 and 1695 AD by Deva, the brother of King Aniruddh. According to page 110 of the RBSE Class 10 textbook, this chhatri was built by Aniruddh Singh in memory of his foster brother, Deva. Located near Devpura village on the Kota Road, this two-story chhatri features stone carvings of various animals, birds, and other figures around its platform.

चौरासी खम्भों की छतरी (देवपुरा गाँव, बूँदी) : भगवान शिव को समर्पित इस छतरी का निर्माण (1683-1695 ई.) राजा अनिरुद्ध के भ्राता देवा ने करवाया। RBSE कक्षा 10 के पृष्ठ संख्या 110 के अनुसार यह छतरी अनिरुद्ध सिंह द्वारा अपने धाय भाई देवा की स्मृति में बनायी गयी थी। कोटा रोड पर स्थित देवपुरा गाँव के पास इस दो मंजिला छतरी के चबूतरे के चारों ओर विभिन्न पशु-पक्षियों आदि के चित्र पत्थर पर उकेरे गये हैं।

11. Answer C

Solution

The Havelis of Jodhpur - Pushya Haveli, Bade Miyan Ki Haveli, Pokaran Haveli, Rakhi Haveli, Pal Haveli, Pachisa Haveli.

जोधपुर की हवेलियाँ - पुष्य हवेली, बड़े मियाँ की हवेली, पोकरण हवेली, राखी हवेली, पाल हवेली, पच्चीसा हवेली।

12. Answer A

Solution

Jaya Baori - Ramsar De - (Jodhpur)

Rani Ji ki Baori (Bundi) - Rani Nathavati -

Ghosundi Baori (Chittorgarh) - Shringar Devi

Naulakha Baori (Dungarpur) - Premal Devi

जया बावड़ी - रामसर दे - (जोधपुर)

रानी जी की बावड़ी (बूँदी) - रानी नाथावती -

घोसुंडी बावड़ी (चित्तौड़गढ़) - श्रृंगार देवी

नौलखा बावड़ी (डूंगरपुर) - प्रेमल देवी

13. Answer B

Solution

Ramsnehi Sect – 18th Century – Founder: Saint Ramcharan Ji (1720-1798); Saint Ramcharan Ji was born in Soda village, Tonk.

He established the Ramsnehi sect in Shahpura.

It is a sect based on Nirgun Bhakti (devotion to the formless Divine) and the worship of the name 'Ram'.

4 major seats/branches (Rain, Shahpura, Singhtal, Khedapa).

रामस्नेही सम्प्रदाय - 18वीं सदी - संस्थापक संत रामचरण जी (1720-1798): संत रामचरण जी का जन्म सोडा गांव, टोंक में।

इन्होंने शाहपुरा में रामस्नेही सम्प्रदाय की स्थापना की।

यह निर्गुण भक्ति का पंथ है, राम नाम की उपासना।

4 प्रमुख पीठ / शाखाएं (रैन, शाहपुरा, सिंहथल, खेड़ापा)

14. Answer A

Solution

Mirabai (1498-1547) – Born in Merta (Kudki village, Nagaur/Pali); granddaughter of Rathore Rao Duda and daughter of Rao Ratan Singh.

Married to Bhojraj, the son of Rana Sanga of Chittor.

Immersed in devotion to Krishna; she left the royal palace and accepted Saint Raidas as her guru. She was Rajasthan's greatest saint-poetess devoted to Krishna and a prominent figure of the Bhakti movement.

Mira's devotion was characterized by deep emotion, reverence, and love (specifically the Madhurya Bhava or 'conjugal love' mode of devotion).

She did not follow the Nirgun path of knowledge (like Kabir or Jasnath) but instead embraced the loving devotion (Prem-Bhakti) of the Sagun Krishna—Krishna with a manifest form.

मीराबाई (1498-1547) - जन्म मेड़ता (कुड़की गांव, नागौर/पाली), राठौड़ राव दूदा की पोती, राव रतन सिंह की बेटी।

विवाह चित्तौड़ के राणा सांगा के पुत्र भोजराज से।

कृष्ण भक्ति में लीन, राजमहल छोड़ा, संत रैदास को गुरु बनाया। राजस्थान की महानतम कृष्ण भक्त संत कवयित्री, भक्ति आंदोलन की प्रमुख।

मीरा की भक्ति भाव प्रधान, श्रद्धा और प्रेम प्रधान (माधुर्य भाव) थी।

उन्होंने निर्गुण ज्ञान मार्ग (कबीर, जसनाथ) नहीं अपनाया, बल्कि सगुण साकार कृष्ण की प्रेम-भक्ति को अपनाया।

15. Answer D

Solution

Jambhoji (Jambheshwar Ji) – 1451-1536 – Samrathal Dhora (Bikaner-Nagaur border):

Birth: Born in 1451 at Pipasar (Nagaur); father: Lohat Ji Panwar, mother: Hansa Devi.

Place of Activity: Samrathal Dhora – a sand dune near Bikaner where he founded the Bishnoi sect in 1485.

Formulated 29 rules (20 + 9 = Bees + Noi = Bishnoi).

जाम्भोजी (जंभेश्वर जी) - 1451-1536 - समराथल धोरा (बीकानेर-नागौर बॉर्डर):

जन्म: पीपासर (नागौर) में 1451 में, पिता लोहत जी पंवार, माता हंसा देवी।

कर्मस्थल: समराथल धोरा - बीकानेर के पास रेतीला टीला/धोरा, जहाँ उन्होंने 1485 में विश्वोई संप्रदाय की स्थापना की।

29 नियम (20+9 = बीस+नोई = विश्वोई) दिए।

16. Answer B

Solution

Hazrat Khwaja Moinuddin Chishti—revered as Hindul-Wali (Saint of India) and Ata-e-Rasool (Gift of the Messenger)—was born in Sistan (Iran) on the 9th of Rajab, 530 Hijri (1143 CE). He was a disciple of Hazrat Sheikh Usman Haruni and belonged to the Chishti order of Sufism. In 1215 CE, Khwaja Sahib authored the book titled Kanjul Israr.

हिन्दुल्वली, अताए रसूल हजरत ख्वाजा मोईनुद्दीन चिश्ती का जन्म 9 रज्जब 530 हिजरी सन् 1143 ई. को सीस्तान (ईरान) में हुआ। ख्वाजा मोईनुद्दीन चिश्ती हजरत शेख उस्मान हारुनी के शिष्य थे। ये सूफीमत के चिश्तिया सम्प्रदाय के थे। 1215 ई. में ख्वाजा साहब ने कंजुल इसरार (Kanjul Israr) नामक पुस्तक लिखी।

17. Answer C

Solution

Sugali Mata – the family deity of Thakur Kushal Singh of Auwa. She is known as the Goddess of the 1857 Revolution. Her idol, which features 10 heads and 54 arms, is currently housed in the Pali Museum.

सुगाली माता - आउवा के ठाकुर कुशल सिंह की कुलदेवी। इसे 1857 की क्रांति की देवी कहते हैं। इसकी मूर्ति वर्तमान में पाली संग्रहालय में रखी गई है। जिसके 10 सिर व 54 हाथ हैं।

18. Answer B
Solution
Usta Kala – A renowned art form from Bikaner involving gold-leaf embossing or painting on camel hide.
Key artisan family – The Usta family; Hisamuddin was the greatest master of this art.
उस्ता कला - बीकानेर की प्रसिद्ध कला, ऊँट की खाल पर सुनहरी नक्काशी/चित्रकारी।
मुख्य कलाकार परिवार - उस्ता परिवार, हिसामुद्दीन इस कला के सबसे बड़े उस्ताद।
19. Answer C
Solution
Aaradari – Sirohi
Jajam Print (Jajam printing) – Chittorgarh
Sports goods / Toys – Hanumangarh
Lac work – Sawai Madhopur
आरातारी - सिरौही
जाजम प्रिन्ट (जाजम छपाई) - चित्तौड़गढ़
खेल का सामान / खिलौने - हनुमानगढ़ -
लाख का कार्य - सवाई माधोपुर
20. Answer D
Solution
A is not correct, but R is correct. Rao Chhatrasal built the famous 'Rang Mahal', which is world-renowned for its beautiful murals.
A सही नहीं है लेकिन R सही है। राव छत्रसाल ने प्रसिद्ध 'रंगमहल' बनवाया जो सुन्दर भित्ति चित्रों के लिए विश्व प्रसिद्ध है।
21. Answer A
Solution
Devgarh Style (Rajsamand) – A sub-style of Mewar:
Consequently, the paintings here exhibit a blend of three elements: the color palette of Marwar, the elegance of Dhundhar, and the spirit of Mewar.
Characteristic feature of the Devgarh style: Predominant use of green and yellow (specifically, a yellowish-green) colors.
Bagta, Kanvla (I and II), Chokha, and Baijnath – prominent painters of Devgarh.
देवगढ़ शैली (राजसमंद) - मेवाड़ की उपशैली:
इसलिए यहाँ के चित्रों में मारवाड़ का रंग, ढूँढाड़ का सौष्ठव और मेवाड़ की भावना तीनों का मेल दिखता है।
देवगढ़ शैली की पहचान - हरा और पीला (पीलाई लिए हरा) रंग सबसे ज्यादा प्रयोग।
बगता, कंवला (प्रथम और द्वितीय), चौखा, बैजनाथ - देवगढ़ के प्रमुख चित्रकार।

22. Answer C
Solution
Painting Style Painter
Chavand Style Nisardin
Jaipur Style Mohammad Shah
Kishangarh Style Surajmal
चित्रकला चित्रकार
चावण्ड शैली निसारदीन
जयपुर शैली मोहम्मदशाह
किशनगढ़ शैली सूरजमल
23. Answer C
Solution
Dhati / Dhatki - Barmer
Dhavdi - Udaipur
Jagarauti / Jagaroti - Karauli
Khairadi - Jahazpur (Bhilwara)
ढाटी / ढाटकी - बाड़मेर
धावड़ी - उदयपुर
जगरौती / जागरौती - करौली
खैराड़ी - जहाजपुर (भीलवाड़ा)
24. Answer A
Solution
Hemaratna Suri – Jain Acharya
Works – Shilavati Katha / Shilavati Ras (16th century),
Gora Badal Padmini Chaupai (1589 CE)
हेमरतन सूरि - जैन आचार्य
रचनाएँ - शीलवती कथा / शीलवती रास (16वीं शताब्दी),
गोरा बादल पद्मिनी चौपाई (1589 ई.)
25. Answer A
Solution
Chandrasinh Birkali: He was born in the village of Birkali in the Nohar tehsil of Hanumangarh. With the assistance of Rawat Saraswat, he established the 'Rajasthani Bhasha Prachar Sabha' and launched the publication of a monthly magazine in Rajasthani titled 'Maruvani'. His significant work, 'Baadli', is the first poetic composition of modern Rajasthan. His other work, 'Loo', also features a vivid portrayal of nature. 'Dapar', 'Saanjh', 'Seep', 'Vaalsad', 'Dilip', 'Chitrangada', 'Kaalje Ri Kor', 'Kah-Mukarni', and 'Zafarnama' are among his other famous works.
चन्द्रसिंह बिरकाली : इनका जन्म हनुमानगढ़ की नोहर तहसील के गाँव बिरकाली में हुआ। रावत सारस्वत के सहयोग से उन्होंने राजस्थानी भाषा प्रचार सभा का गठन किया और राजस्थानी में 'मरुवाणी' नामक मासिक पत्रिका का प्रकाशन शुरू किया। इनकी महत्वपूर्ण रचना 'बादली' आधुनिक राजस्थान की प्रथम काव्यकृति है। चन्द्रसिंह की दूसरी कृति 'लू' में भी प्रकृति का विशुद्ध चित्रण है। डपर, साँझ, सीप, वाळसाद, दिलीप, चित्रांगदा, काळजे री कोर, कह-मुकरणी तथा जफरनामों इनकी अन्य प्रसिद्ध प्रचनाएँ हैं।

26. Answer D
Solution
Bilawal, Sorath, Maru – Professional Ragas developed by musical communities.
बिलावल, सोरठ, मारू – संगीत समुदायों द्वारा विकसित व्यावसायिक राग (Professional Ragas)
27. Answer B
Solution
Hamsidho – Mewar / Mountainous region
Timing – Shravan / Phalguna
Performance – Duet by Bhils (men and women)
हमसीढ़ो - मेवाड़ / पर्वतीय क्षेत्र में
समय - श्रवण / फाल्गुन
गायन भीलों का युगल (स्त्री पुरुषों द्वारा)
28. Answer C
Solution
Walar Dance: Tribe – Garasia
Feature 1 – No musical instruments are played; the rhythm builds up gradually, relying solely on singing, clapping, and foot-tapping.
Feature 2 – It begins with a man holding an umbrella or a sword; he initiates the rhythm, after which men and women dance in pairs.
Occasion – Weddings; it is also known as the "Ghoomar of the Garasias."
वालर नृत्य: जनजाति - गरासिया
विशेषता
1. कोई वाद्ययंत्र नहीं बजता - धीरे-धीरे लय पकड़ता है, केवल गीत और ताली/पदचाप। विशेषता
2. प्रारम्भ पुरुष द्वारा हाथ में छाता या तलवार लेकर किया जाता है - वही लय शुरू करता है, फिर स्त्री-पुरुष युगल में नृत्य करते हैं।
अवसर - वैवाहिक अवसर, इसे "गरासियों का घूमर" भी कहते हैं।
29. Answer D
Solution
Machhli Dance – Banjara Tribe: Banjara – A nomadic trading tribe, originally from the Marwar region of Rajasthan.
Machhli Dance – A dance performed by Banjara women; named 'Machhli' (fish) due to movements resembling those of a fish.
Occasions – Festivals and weddings.
Jhumar / Jhumariya Dance – Gurjar Tribe: A famous dance of the Gurjar community (Hadoti and Mewar regions).
Jhumar – Performed with swaying movements; involves both men and women.

- मछली नृत्य - बनजारा (बंजारा) जनजाति: बनजारा - घुमक्कड़ जनजाति,
मूलतः राजस्थान के मारवाड़ क्षेत्र में, व्यापार करने वाली।
मछली नृत्य - बनजारा महिलाओं द्वारा किया जाने वाला नृत्य, मछली की तरह गति होने से नाम मछली।
अवसर - तीज-त्योहार, विवाह।
झूमर / झूमरिया नृत्य - गुर्जर जनजाति: गुर्जर समुदाय (हाड़ौती, मेवाड़ क्षेत्र) का प्रसिद्ध नृत्य।
झूमर - झूम-झूम कर किया जाता है, पुरुष-महिला दोनों
30. Answer B
Solution
Charbait is a form of folk theatre—resembling a musical duel—prevalent in the city of Tonk, Rajasthan. In this style, songs are sung with great emotional intensity while kneeling, accompanied by the playing of the traditional Dhap instrument, much like Qawwali performances. This tradition was initiated by Abdul Karim Khan and Khalifa Karikh Khan Nihang during the reign of Nawab Faizullah Khan of Tonk. Originally, Charbait is an art form associated with the Pathans. The Dhapli is the primary musical instrument used in Charbait.
चारबैत- राजस्थान के टोंक नगर में प्रचलित संगीत दंगल रूपी लोकनाट्य विद्या। इसमें परम्परागत वाद्य ढप बजाकर कव्वालों की भांति भावावेश में घुटनों के बल खड़े होकर गीत गाये जाते हैं। यह शैली टोंक के नवाब फैजुल्ला खाँ के समय अब्दुल करीम खाँ एवं खलीफा करीख खाँ निहंग ने प्रारम्भ की। मूलतः चारबैत पठानों की विद्या है। चारबैत में ढपली ही मुख्य वाद्ययंत्र होता है।
31. Answer C
Solution
Four types of Rajasthani folk instruments:
Tat Vadya (String instruments): Ravanhattha, Jantar, Ektara, Sarangi, Kamaycha, Bhapang
Sushir Vadya (Wind instruments): Pungi/Been, Algoja, Nar, Mashak, Satara, Morchang, Shehnai, Nafiri
Avanaddha Vadya (Percussion instruments – membrane-covered): Mridang, Chang, Khanjari, Dhol, Naubat, Nagada, Nishan, Dholak, Madal
Ghan Vadya (Idiophones – metal instruments played by striking): Manjira, Shankh, Thali, Khartal, Chimta, Ghunghru, Jhanjh, Kartal

राजस्थान के लोक वाद्य 4 प्रकार:

तत् वाद्य (तार वाले): रावणहत्था, जंतर, इकतारा, सारंगी, कामायचा, भपंग

सुषिर वाद्य (फूंक से बजने वाले): पुंगी/बीन, अलगोजा, नड़, मशक/मशक, सतारा, मोरचंग, पुंगी, शहनाई, नफीरी

अवनद्ध वाद्य (चमड़े से मढ़े - थाप से): मृदंग, चंग, खंजरी, ढोल, नौबत, नगाड़ा, निशान, ढोलक, मादल

घन वाद्य (धातु के - टकराने से): मंजीरा, शंख, थाली, खड़ताल, चिमटा, घुघरू, झांझ, करताल

32. Answer B

Solution

Ramnath Chaudhary – Algoza Player

Title – "Magician of the Algoza / Emperor of the Algoza"

Algoza – A wind instrument consisting of two flutes played simultaneously; one provides the melody (sur) and the other the rhythm (taal).

रामनाथ चौधरी - अलगोजा वादक

उपाधि - "अलगोजा का जादूगर / अलगोजा सम्राट"

अलगोजा - सुषिर वाद्य, दो बांसुरी एक साथ बजाई जाती है, एक से सुर और दूसरी से ताल।

33. Answer D

Solution

Kandora is a waistband consisting of dangling gold or silver chains worn by women; it is also known as Kandora, Kanghati, or Kardhani. Ornaments worn by men on their ears include Murkiyan, Birbali, Laung, Jhale, and Chhailkadi.

कंदोरा-स्त्रियों द्वारा कमर में पहनी जाने वाली सोने या चाँदी की झूलती श्रृंखलाओं की पट्टी। इसे कंदोरा, कणघती या करधनी कहते हैं। पुरुषों के कान के आभूषण-मुर्कियां, बीरबली, लौंग, झाले एवं छैलकडी है।

34. Answer D

Solution

Madhupark – When the wedding procession (baraat) arrives at the bride's home or village, the reception and hospitality extended to the groom's party by the bride's family—including the tilak ceremony, garlanding, aarti, and refreshments—is known as Madhupark.

मधुपर्क - बारात जब वधू के घर/गाँव पहुँचती है, तो वधू पक्ष द्वारा वर पक्ष का जो स्वागत-सत्कार किया जाता है - तिलक, माला, आरती, जलपान - उसे मधुपर्क कहते हैं।

35. Answer B

Solution

Pomcha Odhni:

Design – A large lotus flower motif (boota) in the center, surrounded by smaller motifs (bootis).

A Lahariya-style (wave-pattern) vine along the edges.

Colors – Yellow/Saffron (primary), with a red border.

पोमचा ओढ़नी:

डिजाइन - बीच में कमल के फूल का बड़ा अभिप्राय (बूटा) और चारों ओर छोटी बूटियाँ।

किनारे पर लहरिया जैसी बेल।

रंग - पीला/केसरिया मुख्य, लाल बॉर्डर।

36. Answer B

Solution

Rajasthan Tourism Development Corporation Ltd. (RTDC): It was established on April 1, 1979, to provide facilities such as accommodation, food, and transportation to tourists. Its headquarters is located in Jaipur.

राजस्थान पर्यटन विकास निगम लि. (RTDC): पर्यटकों को आवास, भोजन एवं यातायात आदि सुविधाएँ देने के लिए इसकी स्थापना 1 अप्रैल, 1979 में की गयी। इसका मुख्यालय जयपुर में है।

37. Answer D

Solution

Bar Bagh, or Bada Bagh, is located in Jaisalmer.

बर बाग या बड़ा बागजैसलमेर में स्थित है

38. Answer B

Solution

Sahariya Tribe:

Center – Baran district (Shahbad and Kishanganj) Shahbad is known as the capital of the Sahariyas.

Habitat – In forests; their huts are called "Tapra/Bangla," and their settlements are called "Sahrana."

Chieftain – Kotwal

सहरिया जनजाति:

केन्द्र - बारां जिला (शाहबाद और किशनगंज)

शाहबाद को सहरियाओं की राजधानी कहते हैं।

निवास - जंगलों में, झोपड़ी को "टापरा/बंगला" कहते हैं, बस्ती को "सहराना" कहते हैं।

मुखिया - कोतवाल,

39. Answer C

Solution

Orans are sacred forest areas in western Rajasthan that are traditionally protected and managed by rural communities. They are also known by names such as Devara, Malvan, Devrai, Rakhat Bani, Dev Ghat, Mandir Van, and Bagh. ओरण पश्चिमी राजस्थान के पवित्र वन क्षेत्र हैं जो पारंपरिक रूप से ग्रामीण समुदाय द्वारा संरक्षित और प्रबंधित किये जाते हैं। इन्हें देवरा, मालवन, देवराई, रखत बणी, देव घाट, मंदिर वन और बाग भी कहा जाता है।

40. Answer B

Solution

War Museum, Jaisalmer: Inaugurated on August 24, 2015, this is the first war museum in the western part of the country. Upon entering the complex, you can view and learn about the tanks, aircraft, and military vehicles used in various wars.

युद्ध संग्रहालय, जैसलमेर : 24 अगस्त, 2015 को शुरू किया गया, यह देश के पश्चिमी हिस्से का पहला युद्ध संग्रहालय है। इस परिसर में घुसते ही आप विभिन्न युद्धों में इस्तेमाल किए गए टैंकों, विमानों और सैन्य वाहनों को देख-समझ सकते हैं।

41. Answer A

Solution

Water content is defined as the ratio of the weight of water to the weight of dry soil solids, expressed as a percentage.

$$w = \frac{W_w}{W_s} \times 100$$

Where:

(W_w) = Weight of water

(W_s) = Weight of dry soil solids

Water content can exceed 100% when the weight of water is greater than the weight of dry soil solids. This is commonly observed in highly organic soils and peat.

42. Answer D

Solution

According to Darcy's Law, the rate of flow of water through soil is directly proportional to the hydraulic gradient and the cross-sectional area of flow. $Q = kiA$

$$k = \frac{Q}{iA}$$

When the hydraulic gradient is unity ($i=1$) and the cross-sectional area is unity ($A=1$):

$$k = \frac{Q}{1 \times 1} = Q$$

Therefore, the coefficient of permeability is defined as the discharge per unit cross-sectional area of soil under a unit hydraulic gradient.

43. Answer C

Solution

The general flow equation for seepage through soil is derived using Darcy's Law and the continuity equation.

The assumptions commonly used in its derivation are:

1. The soil is fully saturated.
2. The soil medium is homogeneous and isotropic.
3. The soil and water are incompressible.
4. The flow is laminar and obeys Darcy's Law.
5. For the steady-state flow equation, flow conditions do not change with time.

44. Answer C

Solution

In AutoCAD, the Circle Tool in the Draw panel provides 6 different methods to draw a circle.

1. Center, Radius
2. Center, Diameter
3. 2-Point (2P)
4. 3-Point (3P)
5. Tan, Tan, Radius (TTR)
6. Tan, Tan, Tan (TTT)

Command Shortcut: C + Enter

45. Answer B

Solution

A flow net is a graphical representation of two-dimensional steady-state seepage through soil. It consists of flow lines and equipotential lines.

The following information can be obtained from a flow net

1. Rate of Flow
2. Pore Water Pressure
3. Exit Gradient

46. Answer C

Solution

According to Terzaghi's Effective Stress Principle, effective stress is given by:

$$\sigma' = \sigma - u$$

Statement 1: Correct

When the groundwater table is lowered, pore water pressure decreases. Consequently, effective stress generally increases, assuming hydrostatic conditions and conventional soil unit weights.

Thus, lowering the water table increases effective stress in the soil mass.

Statement 2: Correct

Effective vertical stress at a depth below the groundwater table can be calculated as

$$\sigma' = \gamma_{\text{bulk}} h_1 + \gamma' h_2$$

Where:

γ_{bulk} = Bulk unit weight of soil above the water table

γ' = Submerged unit weight of soil below the water table

h_1 = Depth above the water table

h_2 = Depth below the water table

The submerged unit weight is:

$$\gamma' = \gamma_{\text{sat}} - \gamma_w$$

Therefore, effective stress depends on the bulk unit weight above the groundwater table and the submerged unit weight below it.

Important Note: The increase in effective stress due to lowering the water table assumes hydrostatic conditions. Capillary effects and other changes in soil conditions may affect the actual stress distribution.

47. Answer B

Solution

In AutoCAD, the Arc Tool is used to draw curved segments (arcs). The shortcut command for the Arc Tool is A. By typing A in the command line and pressing Enter, the Arc command is activated.

48. Answer A

Solution

In AutoCAD, a Circle is a closed geometric object that has no starting or ending point. A Line and an Arc have two endpoints, whereas a Rectangle is a closed shape made up of four sides.

49. Answer A

Solution

Statement (i): Incorrect

A consolidated undrained (CU) test cannot be easily performed using a conventional direct shear apparatus because drainage conditions cannot be controlled adequately during shearing. The Triaxial Shear Test is preferred for conducting consolidated undrained tests.

Statement (ii): Correct

In an Unconfined Compression Test (UCC), the minor principal stress is zero

$$\sigma_3 = 0 \quad \sigma_1 = q_u$$

The centre and radius of Mohr's circle are:

$$C = \frac{\sigma_1 + \sigma_3}{2} = \frac{q_u}{2}$$

$$R = \frac{\sigma_1 - \sigma_3}{2} = \frac{q_u}{2}$$

Since the centre and radius are equal, Mohr's circle passes through the origin

Statement (iii): Correct

For normally consolidated clay, the effective cohesion intercept is approximately zero.

$$c' = 0$$

According to the Mohr-Coulomb failure criterion:

$$\tau_f = c' + \sigma' \tan \phi'$$

Substituting ($c' = 0$)

$$\tau_f = \sigma' \tan \phi'$$

Therefore, the effective stress failure envelope passes through the origin.

50. Answer A

Solution

Statement S1: False

Consolidation is the process of gradual reduction in the volume of saturated soil due to the expulsion of pore water under sustained loading. Consolidation: Reduction in soil volume due to expulsion of pore water.

Compaction: Densification of soil primarily due to the expulsion of air from soil voids by mechanical energy.

Therefore, Statement S1 is incorrect.

Statement S2: Incorrect.

In the capillary zone above the groundwater table, water rises through soil pores due to capillary action.

The pore water pressure in this zone is negative relative to atmospheric pressure because water is under tension.

The pore water pressure is given by:

$$u = -\gamma_w h_c$$

51. Answer C

Solution

In AutoCAD, the @ symbol is used for relative coordinates, which specify a point with respect to the previously selected point.

To draw a rectangle with a length of 6 units along the X-axis and a width of 4 units along the Y-axis:

1. Type REC and press Enter.
2. Specify the first corner point anywhere in the drawing.
3. Type @6,4 and press Enter to specify the opposite corner.

52. Answer D

Solution

Statement 1: Correct

In a triaxial compression test, a cylindrical soil specimen is subjected to three mutually perpendicular principal stresses.

In a conventional triaxial compression test:

$$\sigma_1 > \sigma_2 = \sigma_3$$

σ_1 Major principal stress (axial stress)

σ_2 Intermediate principal stress

σ_3 Minor principal stress (cell pressure)

Statement 2: Incorrect

In a standard triaxial compression test, the height-to-diameter ratio of the cylindrical soil specimen is generally maintained between 2 and 2.5.

Statement 3: Correct

According to Terzaghi's effective stress principle:

$$\sigma' = \sigma - u$$

The effective minor principal stress is:

$$\sigma'_3 = \sigma_3 - u$$

53. Answer D

Solution

Statement I: True

In soil mechanics, lateral earth pressure is classified into three states:

Active Earth Pressure (P_a): Develops when the retaining wall moves away from the backfill.

Earth Pressure at Rest (P_0): Develops when the retaining wall does not undergo lateral movement.

Passive Earth Pressure (P_p): Develops when the retaining wall moves towards the backfill.

For conventional cohesionless soil conditions:

$$P_p > P_0 > P_a$$

According to Rankine's theory

$$K_a = \frac{1 - \sin \phi}{1 + \sin \phi}$$

$$K_p = \frac{1 + \sin \phi}{1 - \sin \phi}$$

K_a = Coefficient of active earth pressure

K_p = Coefficient of passive earth pressure

ϕ = Angle of internal friction

Therefore, Statement I is correct under conventional earth-pressure assumptions

Statement II: True

In the passive earth pressure condition, the retaining structure moves towards the soil mass. The structure acts as the actuating element, applying pressure to the soil.

The soil acts as the resisting element, developing passive resistance against the movement of the structure.

This passive resistance helps maintain the stability of the retaining structure.

Therefore, Statement II is correct and explains why passive earth pressure is greater than active earth pressure and earth pressure at rest under conventional conditions.

54. Answer D

Solution

In AutoCAD, the Quadrant Object Snap (Osnap) is represented by a diamond-shaped marker.

The Quadrant Osnap is used to select the four quadrant points of a circle, arc, or ellipse, corresponding to 0°, 90°, 180°, and 270° in a standard circle.

55. Answer A

Solution

According to Coulomb's Wedge Theory, the earth pressure acting on a retaining wall is determined by considering the equilibrium of a soil wedge bounded by the wall, the ground surface, and a potential failure plane.

Statement 1: Correct

In the active earth pressure condition:

The retaining wall moves away from the backfill.

The soil wedge tends to slide downwards and outwards along the failure plane.

The lateral earth pressure reduces until the active earth pressure condition is reached.

The soil wedge is considered to be in limiting equilibrium.

Therefore, Statement 1 is correct.

Statement 2: Correct

In the passive earth pressure condition:

The retaining wall moves towards the backfill.

The soil wedge is pushed upwards and inwards along the failure plane.

The lateral earth pressure increases until the passive earth resistance is fully mobilized.

The soil wedge resists the movement of the retaining wall.

56. Answer A

Solution

Statement I: Correct

According to Coulomb's Earth Pressure Theory:

The retaining wall can have a vertical or inclined back face.

Wall friction is considered in the analysis.

The wall surface may be rough, and the friction angle between the wall and soil is represented by δ .

Therefore, Statement I is correct.

Statement II: Correct

According to Rankine's Earth Pressure Theory:

The failure surface is assumed to be planar for the classical homogeneous, cohesionless backfill case.

The failure plane makes an angle with the horizontal.

For the active state

$$\theta_a = 45^\circ + \frac{\phi}{2}$$

For the passive state: $\theta_p = 45^\circ - \frac{\phi}{2}$

Statement III: Incorrect

In Rankine's theory, soil reaches a state of plastic equilibrium in both active and passive earth pressure conditions, not only in the active condition.

Active State: Soil reaches plastic equilibrium when the wall moves away from the backfill.

Passive State: Soil reaches plastic equilibrium when the wall moves towards the backfill.

57. Answer C

Solution

Soil Type	Correct Match
A. Alluvial Soil	4. Running Water
B. Lacustrine Soil	3. Fresh and Still Water
C. Marine Soil	1. Sea Water
D. Colluvial Soil	2. Gravity

58. Answer A

Solution

Final Matching

List-I	List-II
A. Sand	3. Particle size 4.75 mm - 75 microns
B. Silt	2. Non-plastic or slightly plastic
C. Clay	1. Exhibits plastic properties

59. Answer B

Solution

In AutoCAD, an object's properties define its characteristics, such as line weight, elevation, and hyperlinks.

Line Weight: Defines the thickness of an object's lines.

Measure: It is a command used to measure or divide objects at specified intervals, not an object property.

Hyperlink: Links an object to a webpage, file, or document.

Elevation: Specifies the Z-coordinate or height of an object relative to the XY plane.

60. Answer B

Solution

According to Terzaghi's One-Dimensional Consolidation Theory, the time factor is given by:

$$T_v = \frac{C_v t}{H_d^2}$$

T_v = Time factor

C_v = Coefficient of consolidation

t = Time required for consolidation

H_d = Maximum drainage path length

For the same degree of consolidation (90%), the time factor remains constant.

Assuming the same soil properties and drainage conditions

$$t \propto H_d^2$$

$$\frac{t_2}{t_1} = \left(\frac{H_2}{H_1} \right)^2$$

$$t_1 = 20 \text{ years}$$

$$H_2 = \frac{H_1}{2}$$

$$\frac{t_2}{20} = \left(\frac{1}{2} \right)^2$$

$$t_2 = 20 \times \frac{1}{4}$$

$$t_2 = 5 \text{ years}$$

61. Answer C

Solution

$$\text{We know that, } \gamma = \frac{G(1+w)}{(1+e)} \gamma_w$$

For dry soil, $w = 0$

For saturated soil, $w = w_s$

And for wet soil $0 < w < w_s$

Thus, dry density < wet density < saturated density

$$\text{Now } \gamma_d = \frac{G \gamma_w}{1+e}$$

$$\text{And } \gamma_{\text{sub}} = \gamma_{\text{sat}} - \gamma_w = \frac{(G-1) \gamma_w}{1+e}$$

Thus, submerged density < dry density

62. Answer B

Solution

In AutoCAD, the UCS (User Coordinate System) is a movable coordinate system that allows users to define the origin and orientation of the X, Y, and Z axes.

Its primary function is to establish a working plane (XY plane) at a desired position and orientation in 3D space, allowing users to create 2D drawings on that plane.

UCS defines the working coordinate system.

The XY plane determines the current drawing plane.

The Z-axis is perpendicular to the XY plane.

63. Answer A

Solution

$$\text{Given: Porosity; } n = \frac{V_v}{V} = 50\% = 0.5$$

$$\text{Degree of saturation; } S = \frac{V_w}{V_v} = 90\% = 0.9$$

To find, n_a = percentage air void

$$S + a_c = 1$$

a_c = Air content

$$a_c = 1 - S = 1 - 0.9$$

$$= 0.1 = 10\%$$

$$n_a = n \times a_c$$

$$= 0.5 \times 0.1 = 0.05 = 5\%$$

$$n_a = 5\%$$

64. Answer D

Solution

Peat and muck are organic soils.

Indurated clay is a type of clay which has been hardened due to heat and pressure so it does not soften under prolonged wetting.

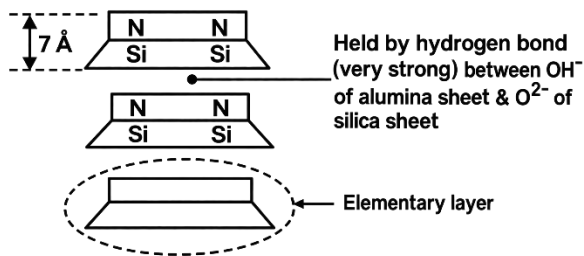
65. Answer B

Solution

Kaolinite

Kaolinite consists of structure based on single sheet of silica combined with single sheet of gibbsite.

The combined silica gibbsite sheet are held together strongly by hydrogen bond which is very strong and stable, thus water can not easily enter between the structural units and cause swelling.



66. Answer D

Solution

In AutoCAD, the STRETCH command modifies objects by moving selected vertices or endpoints. A circle has no endpoints or vertices that can be stretched.

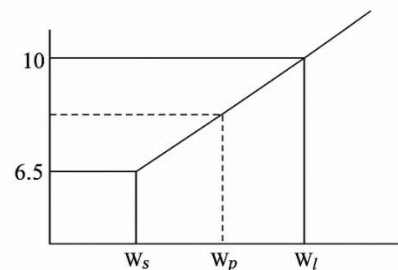
A circle cannot be converted into an ellipse using the STRETCH command.

If the circle is fully enclosed in the crossing selection, it can be moved, but its shape and radius remain unchanged.

Therefore, the STRETCH command does not change the shape of a circle.

67. Answer A

Solution



$$\frac{V_1}{V_2} = \frac{1+e_1}{1+e_2}$$

$$e_1 = \frac{w_f \times G}{S_L} = \frac{0.6 \times G}{1} = 0.6G$$

$$e_2 = \frac{w_s \times G}{S_s} = \frac{0.25 \times G}{1} = 0.25G$$

$$\frac{10}{6.5} = \frac{1+0.6G}{1+0.25G}$$

$$G = 2.5$$

68. Answer A

Solution

For very fine-grained soil, ordinary sieve analysis is not suitable because the particles are too small to be accurately separated using sieves.

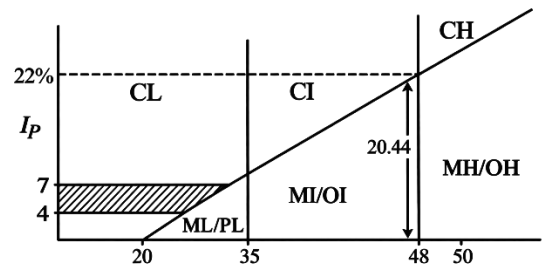
When nearly all the soil particles pass through the 75-micron IS sieve i.e. $75\mu\text{m} = 0.075\text{mm}$

the finer fraction is analyzed by wet analysis/sedimentation methods, such as hydrometer analysis.

Therefore, 0.075 mm

69. Answer B

Solution



W_L is 48%

$$I_p = W_L - W_P$$

$$= 48 - 26 = 22\%$$

$$\text{A line equation} = 0.73 [W_L - 20]$$

$$= 0.73 [48 - 20]$$

$$= 20.44$$

A line below the I_p so, classification of soil is C.I

70. Answer C

Solution

Low compressible, intermediate compressible, high compressible.

71. Answer A

Solution

$$\frac{k_H}{k_V} = \frac{\left(\frac{k_1 Z_1 + k_2 Z_2 + k_3 Z_3}{Z_1 + Z_2 + Z_3} \right)}{\left(\frac{Z_1 + Z_2 + Z_3}{\frac{Z_1}{k_1} + \frac{Z_2}{k_2} + \frac{Z_3}{k_3}} \right)}$$

$$k_1 = 1, k_2 = 2, k_3 = 3$$

$$Z_1 = Z_2 = Z_3 = Z$$

$$\frac{k_H}{k_V} = \frac{\frac{Z(1+2+3)}{3Z}}{\frac{Z \left[\frac{1}{1} + \frac{1}{2} + \frac{1}{3} \right]}{3Z}}$$

$$= \frac{6}{3} \times \frac{1}{3} \times \frac{(6+3+2)}{6}$$

$$= \frac{6}{3} \times \frac{1}{3} \times \frac{11}{6}$$

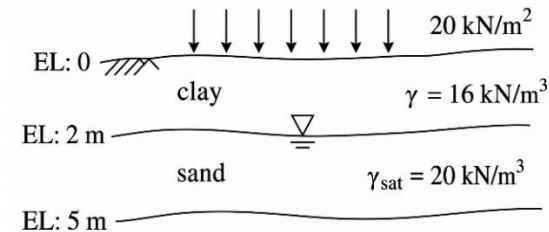
$$\frac{k_H}{k_V} = \frac{22}{18}$$

72. Answer C

Solution

BMP (Bitmap Image File) is a raster graphics file format that stores images as a grid of pixels.

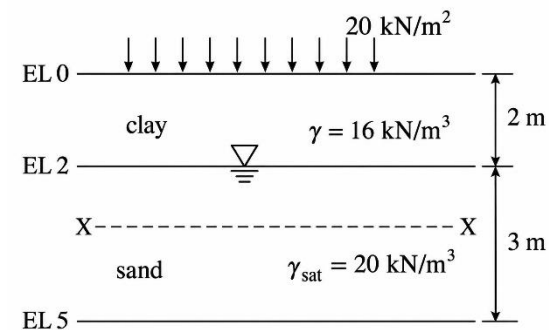
73. For the soil profile shown taking $\gamma_w \text{ kN/m}^3$, the effective vertical stress at the, middle of the sand layer is clay $\gamma = 16 \text{ kN/m}^3$



- (a) 72 kN/m^2 (b) 47 kN/m^2
(c) 82 kN/m^2 (d) 67 kN/m^2

Answer D

Solution



$$\sigma = \text{Total stress} = q + \gamma H + \gamma_{\text{sat}} \times h$$

$$= 20 + (16 \times 2) + (20 \times 1.5)$$

$$= 82 \text{ kN/m}^2$$

$$u = \text{Pore pressure} = \gamma_w h$$

$$= 10 \times 1.5 = 15 \text{ kN/m}^2$$

$$\sigma' = \text{effective stress} = \sigma - u$$

$$= 82 - 15 = 67 \text{ kN/m}^2$$

74. Answer A

Solution

DWF (Design Web Format) files can be attached directly to an email and shared with others. It is not necessary to convert them into a ZIP file before sending.

75. Answer C

Solution

Ultimate bearing capacity: Maximum pressure which a foundation soil can withstand without the occurrence of shear failure.

Gross bearing capacity: The bearing capacity inclusive of the pressure exerted by the weight of the foundation.

Net bearing capacity: Gross bearing capacity minus the overburden pressure at the foundation level.

Safe bearing capacity: Ultimate bearing capacity divided by a factor of safety is called safe bearing capacity. The factor of safety should be applied to the net ultimate bearing capacity, and the overburden pressure due to the depth of foundation should be added to it to obtain the safe capacity. It is thus the maximum pressure that can be transmitted to the soil without the risk of shear failure, irrespective of the settlement that might occur.

76. Answer C

Solution

In AutoCAD, the Line Tool can be activated by typing L in the command line and pressing Enter.

77. Answer C

Solution

$$\therefore h_c \propto \frac{1}{D_{10}}$$

$$\frac{h_{c_2}}{h_{c_1}} = \frac{(D_{10})_1}{(D_{10})_2}$$

$$h_{c_2} = \frac{0.06}{0.1} \times 60 = 36 \text{ cm}$$

78. Answer D

Solution

$$\text{Factor of safety } F = \frac{i_c}{i}$$

$$i_c = (G - 1) (1 - n)$$

$$= (2.65 - 1) (1 - 0.35)$$

$$= 1.0725$$

$$i = \frac{h}{z} = \frac{0.85}{1.25} = 0.68$$

$$\therefore F = \frac{1.0725}{0.68} = 1.58$$

79. Answer A

Solution

$$\text{Seepage loss rate } Q = KH \frac{N_f}{N_d}$$

$$k = \sqrt{k_H k_V}$$

$$= \sqrt{1.4 \times 9 \times 1.4} = 4.2 \text{ m/day}$$

$$\therefore Q = 4.2 \times [12.5 - 3.5] \times \frac{6}{8}$$

$$= 28.35 \text{ m}^2 / \text{day}$$

80. Answer C

Solution

$$a_v = \frac{\Delta e}{\Delta \sigma'}$$

$$m_v = \frac{a_v}{1 + e_0}$$

$$C_c = \frac{\Delta e}{\log_{10} \left(\frac{\sigma'_f}{\sigma'_0} \right)}$$

$$T_v = \frac{C_v t}{d^2}$$

81. Answer B

Solution

If the temperature rises the rate of consolidation increases due to increases of permeability.

82. Answer A

Solution

$$\text{Time factor } T_v = \frac{C_v t}{d^2}$$

$$\text{Coefficient of consolidation } C_v = \frac{K}{\gamma_w m_v}$$

$$T_v = \frac{K}{\gamma_w m_v} \times \frac{t}{d^2}$$

$$t \propto \frac{m_v d^2}{k}$$

Time is directly proportional to Compaction

83. Answer D

Solution

In theoretically

$$\gamma_{d_{\max}} = \frac{\gamma_w G}{1 + wG}$$

$$= \frac{10 \times 2.6}{1 + (0.14 \times 2.6)}$$

$$\gamma_{d_{\max}} = 19.06 \text{ kN/m}^3$$

84. Answer A

Solution

$$\Delta u_3 = B \Delta \sigma_3$$

$$130 = B [250 - 100]$$

$$B = \frac{130}{150} = 0.87$$

85. Answer B

Solution

Settlement in sands

$$\frac{S_F}{S_P} = \left[\frac{B_F (B_P + 0.3)}{B_P (B_F + 0.3)} \right]^2$$

S_P = Settlement of plate of width B_P

S_F = Settlement of footing of width B_F

$$S_F = 5 \left[\frac{5(0.3 + 0.3)}{0.3(5 + 0.3)} \right]^2 = 17.79 \text{ mm}$$

86. Answer C

Solution

Critical hydraulic gradient,

$$i_c = \frac{G - 1}{1 + e} = \frac{G - 1}{1 + 0.5}$$

$$G = 1.5i + 1$$

87. Answer C

Solution

Increase in lateral earth pressure $\Delta \sigma_h = K_a q$

Active earth pressure coefficient,

$$K_a = \frac{1 - \sin \phi}{1 + \sin \phi} = \frac{1 - \sin 30}{1 + \sin 30} = \frac{1}{3}$$

$$\therefore \Delta \sigma_h = \frac{1}{3} \times 12 = 4 \text{ t/m}^2$$

88. Answer C

Solution

Liquidity Index

$$= \frac{W - W_p}{W_L - W_p} = \frac{50 - 35}{60 - 35} = \frac{15}{25} = 0.6$$

$$\text{Consistency Index} = 1 - 0.6 = 0.4$$

89. Answer C

Solution

$$k = \frac{Q}{iA} = \frac{10}{100 \times 10} \times 10^{-2}$$

$$= 1 \times 10^{-4} \text{ m/s}$$

90. Answer B

Solution

Using, Compression index,

$$C_c = \frac{\Delta e}{\log_{10} P_2 - \log_{10} P_1} = \frac{0.5}{\log_{10} 10 - \log_{10} 1} = 0.5$$

91. Answer D

Solution

We know,

$$\gamma_d = \frac{\gamma_t}{1+w} \text{ where, } w \text{ is in fraction}$$

$$\gamma_d = \gamma_t \left[\frac{100}{100+w} \right] \text{ where, } w \text{ is in \%}$$

Hence option (d) is correct.

92. Answer B

Solution

$$e_{\min} = 0.4$$

$$e_{\max} = 1.2$$

$$e = 0.6$$

$$I_D = \frac{e_{\max} - e}{e_{\max} - e_{\min}}$$

$$I_D = \frac{1.2 - 0.6}{1.2 - 0.4} \times 100$$

$$I_D = 75\%$$

93. Answer C

Solution

Hydrometer analysis is based on stoke's law.

94. Answer B

Solution

we know, for falling head permeability test

$$k = \frac{2.303 a L \log_{10} \left(\frac{h_1}{h_2} \right)}{A \times t}$$

For constant time interval

$$\log_{10} \left(\frac{h_1}{h_2} \right) = \frac{k A t}{2.303 a \times L} = \text{constant}$$

$$\therefore \log_{10} \left(\frac{h_1}{h_2} \right) = \log_{10} \left(\frac{h_2}{h_3} \right)$$

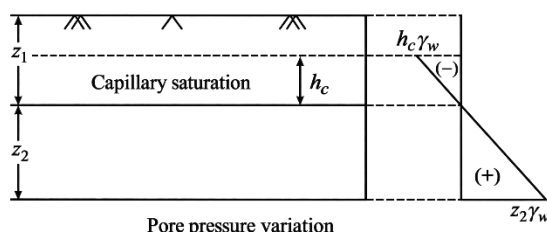
$$\frac{h_1}{h_2} = \frac{h_2}{h_3}$$

$$h_2^2 = h_1 \times h_3$$

95. Answer C

Solution

In capillary zone pore pressure is negative



96. Answer D

Solution

1. Provision of sheet pile: Impermeable sheet piles are provided below the hydraulic structures. Hence length of flow path increase and Hydraulic gradient get reduced.

2. Provision of inverted filters: Inverted filters permits movement of water but does not permit movement of soil molecules. The pore size of filter is designed in such a way that water will enter but soil molecules will not enter.

97. Answer A

Solution

Active earth pressure at any depth z,

$$P_a = k_a (q + \gamma z) - 2C\sqrt{k_a}$$

Where q = uniform surcharge

At top, i.e. z = 0 (Ground level)

$$0 = k_a q - 2C\sqrt{k_a}$$

$$q = \frac{2C}{\sqrt{k_a}}$$

$$k_a = \tan^2 \left(45 - \frac{\phi}{2} \right)$$

$$q = 2c \cot \left(45 - \frac{\phi}{2} \right)$$

98. Answer B

Solution

$$q_u = CN_c + \gamma D_f N_q + \frac{1}{2} \gamma B N_\gamma$$

for cohesionless soils, C = 0

$$\therefore q_u = 0 + \gamma D_f N_q + \frac{1}{2} \gamma B N_\gamma$$

when water table rise to G.L,

then

$$\gamma = \gamma_{\text{submerged}} = \gamma'$$

$$q_u = \gamma' D_f N_q + \frac{1}{2} \gamma' B N_\gamma$$

$$\text{Generally } \gamma_{\text{sub}} = \frac{1}{2} \gamma_{\text{sat}}$$

$$q_u = \frac{1}{2} \left[\gamma_{\text{sat}} D_f N_q + \frac{1}{2} \gamma_{\text{sat}} B N_\gamma \right]$$

= 50% reduced

99. Answer A

Solution

- Maximum Dry Density (MDD) Increases
Higher compaction energy causes soil particles to rearrange into a denser configuration.
More air is expelled from the soil voids.
Consequently, the maximum dry density increases.

- Optimum Moisture Content (OMC) Decreases
At higher compaction energy, less water is required to achieve maximum dry density.

Therefore, the optimum moisture content decreases.

100. Answer C

Solution

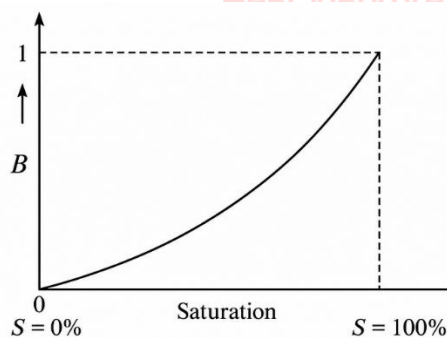
The pore pressure parameter 'B' is the response of the ratio of change in pore pressure to change in cell pressure

$$B = \frac{\Delta U_c}{\Delta \sigma_c}$$

where, ΔU_c = change in pore pressure

$\Delta \sigma_c$ = change in cell pressure

$$0 \leq B \leq 1$$



Hence for saturated clayey soil $B = 1$

101. Answer A

Solution

For pure clays,

$$N_c = 5.7, N_q = 1 \text{ and } N_\gamma = 0$$

For square footing,

$$q_u = 1.3 C N_c + \gamma D_f N_q + 0.4 \gamma B N_\gamma$$

$$q_u = 1.3 \times 5.7 C + \gamma D_f + 0$$

$$q_u = 7.41 C + \gamma D_f$$

Net ultimate bearing capacity

$$q_{nu} = q_u - \gamma D_f$$

$$q_{nu} = 7.41 C$$

Similarly for circular footing,

$$q_u = 1.3 C N_c + \gamma D_f N_q + 0.3 \gamma D N_\gamma$$

$$q_u = 1.3 \times 5.7 C + \gamma D_f + 0$$

$$q_u = 7.41 C + \gamma D_f$$

Net ultimate bearing capacity,

$$q_{nu} = q_u - \gamma D_f$$

$$q_{nu} = 7.41 C$$

$$\frac{(q_{nu})_{\text{square}}}{(q_{nu})_{\text{circular}}} = \frac{7.41 C}{7.41 C} = 1$$

102. Answer C

Solution

Given,

$$I_p = 25$$

$$\%C = 15$$

$$\text{Activity ratio, } A_c = \frac{\%I_p}{\%C} = \frac{25}{15} = 1.67$$

103. Answer A

Solution

We know that,

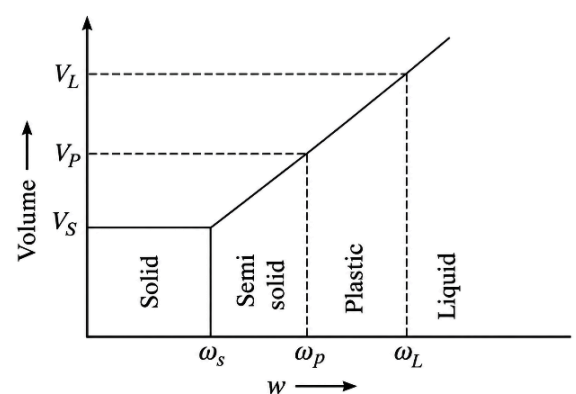
$$S_e = wG$$

where,

S = degree of saturation; e = void ratio; w = water content; G = sp. gravity of solid

104. Answer D

Solution



At SL, PL and LL soil is fully saturated. If water content is reduced below shrinkage limit (w_s) then soil will be in partial saturation state.

105. Answer D

Solution

For a purely cohesive soil

$$N_\gamma = 0$$

$$N_q = 1$$

$$q_u = CN_c + \gamma D_f N_q + 0.5 \gamma B N_\gamma$$

$$q_u = CN_c + \gamma D_f$$

$$(q_u)_{\text{net}} = CN_c + \gamma D_f - \gamma D_f$$

$$= CN_c$$

$(q_u)_{\text{net}}$ is independent of both, depth and width of footing.

106. Answer D

Solution

$$C_u = \frac{D_{60}}{D_{10}}$$

107. Answer D

Solution

Foundations are geometrically categorized as shallow or deep. As per Terzaghi, a foundation is shallow if its depth is equal to or less than its width otherwise it is deep.

108. Answer B

Solution

When ground water table is at the location of ground level

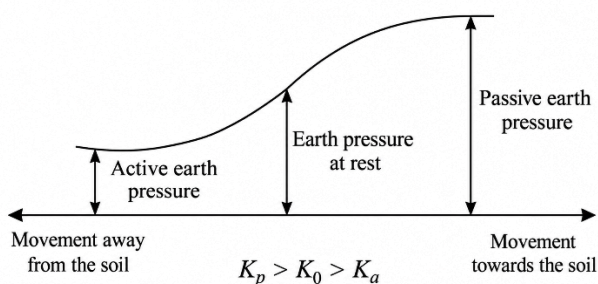
$$q_{u_{\min}} = CN_c + qN_q + \frac{1}{2} \gamma_{\text{sub}} BN_\gamma$$

$$= CN_c + \gamma_{\text{sub}} zN_q + \frac{1}{2} \gamma_{\text{sub}} BN_\gamma$$

In this condition soil above and below the foundation is in submerged condition, this results in minimum bearing capacity.

109. Answer B

Solution



110. Answer A

Solution

In rest condition wall is stationary (strain = 0) and the pressure acting on the wall is known as earth pressure at rest.

111. Answer B

Solution

According to the Mohr-Coulomb Failure Criterion, the shear strength of soil is expressed as:

$$\tau_f = c' + \sigma' \tan \phi'$$

Therefore, cohesion and angle of internal friction are the two fundamental shear strength parameters of soil.

Under Idealized Conditions, Cohesion is zero for pure sand and angle of internal friction is zero for pure clay.

112. Answer B

Solution

Vane shear test is primarily used to find shear parameters of clayey soil.

It can also be used to determine liquid limit of silty clay.

113. Answer C

Solution

In consolidation test volume changes very slowly and this is the reason consolidation test is performed in days.

114. Answer C

Solution

Compaction is the mechanical densification of soil (using rollers, rammers, etc.) that expels air from soil voids — a fast, artificial process.

Consolidation — it's a slow, natural process where water (not air) is squeezed out of saturated clay under load.

Compression — too general a term, not specific to machine-based densification.

Soil stabilisation — involves chemical additives (cement, lime), not mechanical compaction.

115. Answer C

Solution

Entrapped air has pronounced effect on permeability. It reduces the permeability of soil.

Organic foreign matter also has the tendency to move towards flow channel and choke them, thus decreasing the permeability.

116. Answer B

Solution

- (1) Smooth wheel rollers: Most suited for compacting coarse grained soil
- (2) Sheep-foot rollers: Only cohesive soil
- (3) Pneumatic tyred rollers: Both cohesive and cohesionless soil
- (4) Rammers: In confined areas.

117. Answer C

Solution

The max water content at which further reduction in water content does not cause any reduction in the volume is called shrinkage limit. It is the minimum water content at which soil is saturated.

Montmorillonite has large amount of water and other exchangeable ions can easily enter between the layer causing the layers to be separated. So, it is expansive in nature.

118. Answer C

Solution

Kaolinite has hydrogen bond which is fairly strong hence mineral lattice is stable.

Montmorillonite mineral is a 2:1 clay mineral.

Bonding force between units is weak Van der Waal's forces. Hence large quantity of water and exchangeable cations can easily enter between the layers causing the separation of layers. This adsorbed water results in high plasticity index of the clay mineral.

Illite has bonds of non-exchangeable potassium K^+ ions though stronger than that in montmorillonite but is considerable weaker than hydrogen bond in kaolinite. The swelling of Illite is more than that of Kaolinite but less than that of montmorillonite.

119. Answer C

Solution

Soil Symbol	Correct Match
A. GW	Uniformity coefficient > 4
B. SW	Uniformity coefficient > 6
C. ML	Silt having low compressibility
D. CL	Clay having low plasticity

120. Answer A

Solution

The property of soil due to which loss of strength on remoulding can be regained if left undisturbed for sometime is known as "Thixotropy".

Increase in strength with passage of time is due to tendency of clay soil to regain their chemical equilibrium with the reorientation of water molecule in adsorbed layer.



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