MPPSC-2021

MADHYA PRADESH
PUBLIC SERVICE COMMISSION 2021

Assistant Engineer

Civil Engineering

Exam held on 03-07-2022

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Detailed Solutions**

1. The highest peak of Madhya Pradesh is located in:
(a) Mahadeo hills
(b) Kaimur range
(c) Vindhyachal range
(d) Bhander range

Ans. (a)
Mount Dhupgarh or Dhoopgarh is the highest point in the Mahadeo Hills, Madhya Pradesh, India.

2. Match **List-I** with **List-II** and select the correct answer from the codes given below:

List-I (River)	List-II (River drainage area Town/District)
A. Wainganga	1. Multai
B. Tapti	2. Seoni
C. Narmada	3. Jabalpur
D. Betwa	4. Vidisha

Codes:

	A	B	C	D
(a)	2	1	3	4
(b)	1	2	3	4
(c)	2	1	4	3
(d)	1	2	4	3

Ans. (a)

3. The most important Geographical factor affecting average temperature in Madhya Pradesh is:
(a) Proximity to the Bay of Bengal
(b) Tropic of Cancer passes through the middle of Madhya Pradesh
(c) About 25 percent part of the land area of Madhya Pradesh is covered by forests
(d) Proximity to the Equator of the Southern part of Madhya Pradesh

Ans. (b)
Tropic of Cancer passing through the state: Resulting in high Temp.

4. Consider the following statements with reference to soils:
1. Large amount of iron and lime are found in black soil.
2. Red and yellow soil is found in Baghelkhand.
3. Alluvial soil is found in Bhind and Morena District.
Select the correct statement from the above.
(a) 1, 2 and 3
(b) 1 and 2
(c) Only 1
(d) Only 2

Ans. (a)

5. Which of the following pair is **not** correctly matched?

District	Mining area
(a) Panna	Diamond
(b) Balaghat	Copper
(c) Katni	Limestone
(d) Sagar	Manganese

Ans. (d)
Iron ore, Limestone, Bauxite, dimensional stone (granites) and rock phosphates are the important mineral occurrences of the Sagar district of Madhya Pradesh.

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6. Which Tiger Reserve of Madhya Pradesh has been declared the Biosphere Reserve by UNESCO?
(a) Kanha Tiger Reserve
(b) Pench Tiger Reserve
(c) Satpuda Tiger Reserve
(d) Panna Tiger Reserve

Ans. (d)

7. The two states that have been recently in news for inner-state border dispute are
(a) Mizoram - Meghalaya
(b) Manipur - Meghalaya
(c) Mizoram - Arunachal Pradesh
(d) Mizoram - Assam

Ans. (d)

8. Match **List-I** with **List-II** and using the given codes, select the correct answer.

List-I (Player)	List-II (Sport)
A. Chinki Yadav	**1.** Horse riding
B. Akshat Joshi	**2.** Shooting
C. Muskan Kirar	**3.** Hockey
D. Khamman Singh	**4.** Archery

Codes:

	A	B	C	D
(a)	1	2	3	4
(b)	2	1	3	4
(c)	2	1	4	3
(d)	1	2	4	3

Ans. (c)

9. With which sport is "Rajmata Vijya Raja Sindhia Competition" associated?
(a) Cricket
(b) Hockey
(c) Football
(d) Chess

Ans. (c)

10. Yogesh Malviya has been awarded the Dronacharya Award - 2020 for which sport?
(a) Kabaddi
(b) Wrestling
(c) Mallakhamba
(d) Boxing

Ans. (c)

11. Which of the following is an example of input devices?
(a) Trackball
(b) Speaker
(c) Printer
(d) Plotter

Ans. (a)

12. Who is called the 'father of artificial intelligence'?
(a) V. Rajaraman
(b) Alan Turing
(c) John McCarthy
(d) Tim Berners-Lee

Ans. (c)

13. The smallest unit of memory in a computer is
(a) Megabyte
(b) Nibble
(c) Byte
(d) Bit

Ans. (d)

14. E-Pathshala App is related to
(a) Books
(b) Scholarship
(c) Medicine
(d) Farmers

Ans. (a)

15. Which of the following is an anti-virus software?
(a) Monkey
(b) Norton
(c) Adware
(d) Trojan Horse

Ans. (b)

16. It was the capital of 'Raja Bhoj'
(a) Ujjain
(b) Dewas
(c) Dharanagari
(d) Bhopal

Ans. (c)

17. Who was the last successful and glorious King of Garha Mandala?
(a) Raja Shah
(b) Vikram Shah
(c) Shankar Shah
(d) Vishnu Shah

Ans. (c)

18. Who built Sanchi Stupa?
(a) Chandragupta-I
(b) Bimbisara
(c) Bindusara
(d) Ashoka

Ans. (d)

19. Amritlal Vegad is related to
(a) Sculpture (b) Painting
(c) Singing (d) Music

Ans. (b)

20. Who is the 'Bhilat Baba'?
(a) The chief deity of the 'Bharia'
(b) The chief deity of the 'Bhils'
(c) The chief deity of the 'Baiga'
(d) The chief deity of the 'Saharia'

Ans. (b)

21. Which of the following campaign has been initiated under the "Beti Bachao Beti Padhao" scheme run by Madhya Pradesh Government?
(a) Sankh (b) Lado
(c) Uma (d) Pankh

Ans. (d)

22. Under the Madhya Pradesh Mukhyamantri Kisan Kalyan Yojana, how much amount is to be given to beneficiary family in a financial year?
(a) ₹ 4000 (b) ₹ 5000
(c) ₹ 6000 (d) ₹ 7000

Ans. (a)

23. Consider the following statements related to Mission Gramodaya Yojana of Madhya Pradesh Government.
I. Families living in rural areas will be provided with residential facility.
II. Basic amenities of rural areas will be expanded.
III. This scheme was inaugurated in the district headquarter of Bhopal.
Choose the correct option:
(a) I and III (b) II and III
(c) I and II (d) All of the above

Ans. (c)

24. Which award has been given to Prof. Sharad Pagare?
(a) Saraswati Samman - 2020
(b) Kalidas Samman - 2020
(c) Vyas Samman - 2020
(d) Tansen Samman - 2020

Ans. (c)

25. Singorgarh fort is situated in which district of Madhya Pradesh?
(a) Sagar (b) Damoh
(c) Jabalpur (d) Chhatarpur

Ans. (b)

26. Which of the following is **not** a mobile operating system?
(a) Palm OS (b) Web OS
(c) Symbian OS (d) Mac OS

Ans. (d)

27. Which of the following is the core protocol of www?
(a) DSI (b) HTTP
(c) NNTP (d) FTP

Ans. (b)

28. URL stands for
(a) Universal Reference Location
(b) Uniform Resource Locator
(c) Universal Resource Locator
(d) University Resource Locator

Ans. (b)

29. Which of the following describe E-Commerce?
(a) Business of Electronic Goods
(b) Business of Electrical Goods
(c) Doing Business Electronically
(d) All of the above

Ans. (c)

30. Which of the computer language is used in "Artificial Intelligence"?
(a) JAVA (b) Pascal
(c) PROLOG (d) FORTRAN

Ans. (c)

31. Venganga river flows
(a) Balaghat   (b) Betul
(c) Khandwa   (d) Dindori

Ans. (a)

32. Chanderi is famous for
(a) Sarees   (b) Wooden work
(c) Bidi industry   (d) Diamond industry

Ans. (a)

33. 'Matki' dance is famous in which area?
(a) Malwa   (b) Nimar
(c) Bundelkhand   (d) Baghelkhand

Ans. (a)

34. In which district is 'Chidikho tourist place' located?
(a) Bhopal   (b) Rajgarh
(c) Raisen   (d) Sehore

Ans. (b)

35. 'Poet Bihari' was related from
(a) Madhya Pradesh
(b) Bihar
(c) Rajasthan
(d) Uttar Pradesh

Ans. (a)

36. Which of the following is correct order of Ministers from senior to junior in the State Council of Ministers?
(a) Minister of State, Cabinet Minister, Deputy Minister, Parliamentary Secretary
(b) Cabinet Minister, Deputy Minister, Minister of State, Parliamentary Secretary
(c) Cabinet Minister, Minister of State, Parliamentary Secretary, Deputy Minister
(d) Cabinet Minister, Minister of State, Deputy Minister, Parliamentary Secretary

Ans. (d)

37. Who was the first leader of opposition of Madhya Pradesh Legislative Assembly?

(a) Vishnu Vinayak Sarvate
(b) Vishnu Nath Tamashkar
(c) V. G. Ghate
(d) Vishwanath Yadavrao Tamashkar

Ans. (d)

38. Which of the following body is the highest decision making body in the politico-administrative system according to Indian Constitution?
(a) Ruling party
(b) Cabinet
(c) Legislative Assembly
(d) Collectively all

Ans. (b)

39. In which Article of the Indian Constitution there is a provision to constitute Gram Sabha in Gram Panchayat?
(a) 243 A   (b) 243 B
(c) 243 C   (d) 243 D

Ans. (a)

40. When Madhya Pradesh was declared as "Open Defection Free" State?
(a) 16 January 2016 (b) 01 May 2018
(c) 15 August 2016 (d) 02 October 2018

Ans. (d)

41. By whom is the work of diamond mining done in Panna district?
(a) National Mineral Development Corporation
(b) Bharat Diamond Bourse
(c) Jindal Sales Corporation
(d) Alrosa

Ans. (a)

42. Which of the following option is **not** correct?
(a) The coal found in Madhya Pradesh is deposit in Gondwana rock group
(b) Pench Kanhan coalfield is an important coal mining area in Madhya Pradesh

(c) Singrauli coalfield is spread over Madhya Pradesh and Chhatisgarh

(d) Pathakheda coalfield is situated in Betul district and provides coal to Sarni Thermal Power Station

Ans. (c)

Singrauli coalfields are spread over Madhya Pradesh and Uttar Pradesh.

43. Which coalfield is **not** located in Madhya Pradesh?

(a) Korba coalfield

(b) Mohpani coalfield

(c) Sohagpur coalfield

(d) Pathakheda coalfield

Ans. (a)

Korba coalfield are located in Chhattisgarh.

44. Which of the following pair is **not** correctly matched?

Irrigation project	River/Tributary
(a) Ban Sagar project	Son
(b) Tawa project	Tawa
(c) Pench project	Pench
(d) Kolar project	Betwa

Ans. (d)

45. Balaghat district gets irrigation facility from the canal of which river?

(a) Wainganga   (b) Narmada

(c) Tapti   (d) Matiyari

Ans. (a)

46. Which of the following tribe is **not** a sub-tribe of "Baiga Tribe"?

(a) Bijhwar   (b) Narotia

(c) Badoya   (d) Kathmaina

Ans. (c)

47. The scale of measuring the values of the components of "Physical Quality of Life Index" lies between

(a) In between 0 to 1

(b) In between 1 to 100

(c) In between 1 to 50

(d) In between 0 to 100

Ans. (d)

48. As per 2011 Census, what is the population density of Madhya Pradesh from the following?

(a) 225/sq. km   (b) 236/sq. km

(c) 246/sq. km   (d) 382/sq. km

Ans. (b)

49. In which district of Madhya Pradesh thickest layer of coal of India is found?

(a) Chhindwara   (b) Singrauli

(c) Shahdol   (d) Betul

Ans. (b)

50. How much amount is being provided by the Madhya Pradesh Government under the "Kisan Kalyan Yojana" annually in addition to the amount announced by the Central Government under "Kisan Samman Nidhi Yojana"?

(a) ₹ 2000   (b) ₹ 3000

(c) ₹ 4000   (d) ₹ 5000

Ans. (c)

51. A riveted connection with 18 mm diameter rivets in double shear are used to connect 10 mm thick plates. If permissible stresses for rivets in shear and bearing are 80 MPa and 250 MPa respectively as well as for the plate in bearing is 250, then the strength of rivet is

(Values are rounded off to nearest integer value)

(a) 48750 N   (b) 23892 N

(c) 97500 N   (d) 47784 N

Ans. (d)

Nominal diameter of rivet = 18 mm

Gross diameter of rivet = 18 + 1.5 = 19.5 mm

Rivet value = $\min.\{80\,\text{MPa}, 250\,\text{MPa}\}$

Rivet value = 80 MPa

Strength of rivet = $2 \times \dfrac{\pi}{4} \times (19.5)^2 \times 80$

$= 47783.62 \simeq 47784 \text{ N}$

52. An ISLB 300 section is used as a simply supported beam having span of 5 m. If the sectional modulus is 4.889×10^5 mm^3 and plastic modulus is 5.4206×10^5 mm^3 then the shape factor of the beam is
(a) 1.10   (b) 0.90
(c) 0.80   (d) 0.72

Ans. (a)

Plastic modulus, $Z_p = 5.4206 \times 10^5$ mm^3
Section modulus $(Z) = 4.889 \times 10^5$ mm^3

Shape factor = $\dfrac{Z_p}{Z} = \dfrac{5.4206 \times 10^5}{4.889 \times 10^5} = 1.10$

53. A steel section is being used as tension member. The cross section area is 1100 mm^2 and yield strength of steel section is 250 MPa. If the design is governed by yielding of the cross-section under axial tension, then the design strength (T_{ds}) of the member is
(a) 150 kN   (b) 250 kN
(c) 100 kN   (d) None of the above

Ans. (b)

Gross area of tension member,

$T_{ds} = \dfrac{A_g \cdot f_y}{1.1}$

$T_{ds} = \dfrac{1100 \times 250}{1.1}$

$T_{ds} = 250 \text{ kN}$

54. A column base is subjected to combined action of axial load and moment. If the intensity of bearing pressure due to axial load is equal to maximum pressure generated due to moment, then the total bearing pressure between the column base and concrete is
(a) Uniform compression throughout
(b) Zero at one end and compression at other end

(c) Tension at one end and compression at other end
(d) Uniform tension throughout

Ans. (b)

Let 'L' be the length and 'B' be the width of footing.
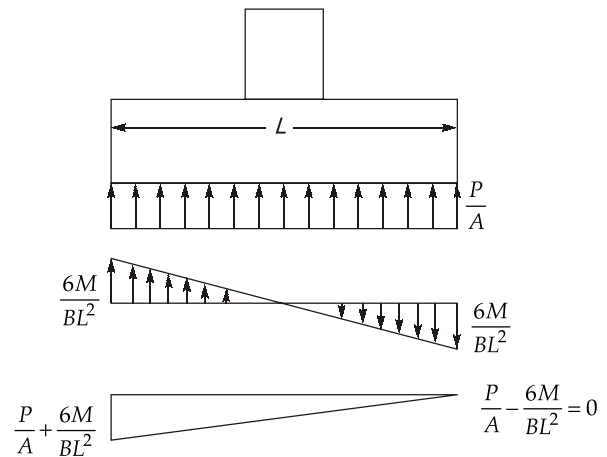
Since, $\dfrac{P}{A} = \dfrac{6M}{BL^2}$ (given)

55. Butt weld used in a welded connection is subjected to combined action of bearing, bending and shear. If bearing stress f_{br} = 200 MPa, bending stress f_b = 120 MPa and shear stress q = 90 MPa, then the equivalent stress f_e the butt weld subjected is equal to (Values rounded off to integer)
(a) 420 MPa   (b) 200 MPa
(c) 270 MPa   (d) 320 MPa

Ans. (d)

As per IS 800 : 2007

$f_e = \sqrt{f_b^2 + f_{br}^2 + f_b \cdot f_{br} + 3q^2}$

where, f_e : equivalent stress N/mm^2
f_b : bending stress N/mm^2
f_{br} : bearing stress N/mm^2
q : shear stress N/mm^2

$f_e = \sqrt{120^2 + 200^2 + 120 \times 200 + 90^2}$

$f_e = 320.47 \text{ N/mm}^2 \simeq 320 \text{ N/mm}^2$

56. An activated sludge process operates at a flow rate of 540 m³/d having influent BOD_5 of 200 mg/l. Volume of aeration tank is 60 m³ and biomass concentration in aeration tank is 3000 mg/l. The Food to Micro-organism (F/M) ratio is
(a) 0.4   (b) 0.6
(c) 0.8   (d) 0.2

Ans. (b)

$$Q = 540 \text{ m}^3/\text{d}$$
$$S_0 = BOD_5 = 200 \text{ m}/l$$
$$X = 3000 \text{ mg}/l$$
$$V = 60 \text{ m}^3$$

$$\frac{F}{M} = \frac{Q_0 S_0}{VX} = \frac{540 \times 200}{60 \times 3000}$$

$$\frac{F}{M} = 0.6$$

57. An egg shaped section of sewer
(a) is economical than circular section
(b) provides self-cleansing velocity
(c) is more stable than circular
(d) is easy to construct

Ans. (b)

Egg shaped sewer has greater depth for small discharges which increases the velocity as compared to circular sewer of equivalent capacity. Thus egg shaped sewer provides better self-cleansing velocity. It requires invert block for stability.

58. Suitable layout of distribution system for a city with road of rectangular pattern
(a) Grid iron system
(b) Ring system
(c) Radial system
(d) Dead end system

Ans. (a)

A city with rectangular pattern is a planned city, thus grid iron system is most preferred water distribution system for the city.

59. Dissolved oxygen in stream is
(a) Minimum at noon
(b) Maximum at mid night
(c) Same throughout the day
(d) Maximum at noon

Ans. (d)

In streams due to the presence of plants, dissolved oxygen levels rises from morning through the afternoon as a result of photosynthesis. Therefore reaching a peak in afternoon and is minimum just before day break.

60. In children "Methemoglobinemia" disease is caused by
(a) Conversion of nitrites to nitrates
(b) Due to total nitrogen
(c) Conversion of nitrates to nitrites
(d) Reaction between haemoglobin and CO_2

Ans. (c)

Methemoglobinemia is a rare condition in which haemoglobin iron is in the oxidized state. This iron is oxidized by nitrates, thus nitrates gets reduced to nitrites.

61. Find the specific energy of flowing water through a rectangular channel of width 5 m, when the depth of water is 3 m and discharge is 10 m³/s
(a) 30.2 m   (b) 3.0226 m
(c) 3022. 4 cm   (d) 3.0224 cm

Ans. (b)

Specific energy, $E = y + \dfrac{v^2}{2g}$

$$E = y + \frac{Q^2}{2gB^2 y^2}$$

$$= 3 + \frac{10^2}{2 \times 9.81 \times 5^2 \times 3^2}$$

$$E = 3.0226 \text{ m}$$

62. Find the rate of flow of water through a rectangular channel of 6 m wide and 3 m

deep, when it is running full. The bed slope of channel is 1 in 2000. Take Chezy's constant C = 55.
(a) 27.108 m³/s   (b) 2.7108 m³/s
(c) 1.506 m³/s   (d) 0.2710 m³/s

Ans. (a)

Discharge, $Q = AV$

$\Rightarrow \qquad Q = A \times C\sqrt{RS}$

$A = 6 \times 3 = 18 \text{ m}^2$

$R = \dfrac{A}{P} = \dfrac{18\,\text{m}^2}{6 + (2 \times 3)}$

$\Rightarrow \qquad R = 1.5 \text{ m}$

$Q = 18 \times 55\sqrt{1.5 \times \dfrac{1}{2000}}$

$\Rightarrow \qquad Q = 27.112 \text{ m}^3/\text{s}$

63. Which of the following devices are usually used in measuring pipe flow?
(a) Mouthpiece   (b) Cipolletti weir
(c) Pitot tube   (d) Venturimeter

Ans. (d)

Mouthpiece – Measure discharge in tank/reservoir

Cipolletti Weir – Measure discharge in open channels.

Pitot tube – Measure velocity of flowing fluid

Venturimeter – Measure discharge in pipe.

64. The most desirable location for the surge tank is
(a) Immediately upstream of the turbine
(b) Immediately upstream of the tail water
(c) Immediately downstream of the reservoir
(d) Immediately upstream of the reservoir

Ans. (a)

A surge tank is defined as a water storage device that is used for a purpose of a pressure neutralizer in a hydropower water conveyance system to withstand excess pressure rise and pressure drop condition.

65. For the laminar boundary layer, its thickness is expressed by the relationship (where R_x is the local Reynolds number based on distance x from the leading edge)

(a) $\delta = \dfrac{0.664x}{R_x^{0.20}}$ (b) $\delta = \dfrac{0.664x}{\sqrt{R_x}}$

(c) $\delta = \dfrac{5x}{\sqrt{R_x}}$ (d) $\delta = \dfrac{1.75x}{\sqrt{R_x}}$

Ans. (c)

66. The size of the wooden sleeper used on broad gauge is
(a) 275 cm × 32 cm × 13 cm
(b) 275 cm × 25 cm × 18 cm
(c) 275 cm × 25 cm × 13 cm
(d) 275 cm × 25 cm × 32 cm

Ans. (c)

Dimension of wooden sleeper is 275 cm × 25 cm × 13 cm

67. Fish plates used in Indian Railway should have the carbon contents equal to
(a) 0.38% to 0.47%   (b) 0.30% to 0.42%
(c) 0.25% to 0.42%   (d) 0.15% to 0.47%

Ans. (b)

A fish plate contains carbon = 0.3 – 0.42%

Manganese $\not> 0.6\%$

68. Morgan keys are suitable for CI chairs, plate sleepers and metal sleepers. There specifications are
(a) 12 cm long with a taper of 1 in 48
(b) 12 cm long with a taper of 1 in 30
(c) 18 cm long with a taper of 1 in 48
(d) 18 cm long with a taper of 1 in 32

Ans. (d)

69. Train resistance due to gradient is given as
(a) Weight of train × rate of grade
(b) Weight of train × $\dfrac{1}{\text{rate of grade}}$

(c) Weight of train × $\dfrac{2}{\text{rate of grade}}$

(d) Twice the weight of train × rate of grade

Ans. (a)

Resistance due to gradient = wG or $w\left(\dfrac{1}{N}\right)$

i.e. weight of train × rate of grade.

70. Worn up rail should not be used if the wear exceeds the limit between
(a) 7% to 10%
(b) 3% to 4.5%
(c) 10% to 12.5%
(d) 5% to 8.0%

Ans. (*)

When wear on rail exceeds 5% or atmost 8% of total weight of rail, use of worn up rail should be discarded.

71. If drainage is permitted throughout the test, during the application of both normal and shear stresses, so that full consolidation occurs and no excess pore pressure is set-up at any stage of the test, is known as
(a) Drained test
(b) Quick test
(c) C-U test
(d) Compression test

Ans. (a)

In consolidated drained test, drainage is permitted at both cell pressure stage and deviator stage.

72. In site exploration, depth upto which the increase in pressure is likely to cause shear failure is known as
(a) Significant depth
(b) Failure depth
(c) Pressure depth
(d) Exploration depth

Ans. (a)

The depth upto which stress increment due to superimposed load can produce significant settlement and shear stress is known as significant depth. The depth of exploration should be atleast equal to significant.

73. The minimum net pressure intensity causing shear failure of soil, is known as
(a) Safe bearing capacity
(b) Net safe bearing capacity
(c) Ultimate bearing capacity
(d) Net ultimate bearing capacity

Ans. (d)

Net ultimate bearing capacity is the minimum net pressure intensity at which soil just fail in shear.

74. Which of the following is a characteristic of general shear failure?
(a) Failure is accompanied by compressibility of soil
(b) Failure is sudden
(c) Bulging of shearing mass of soil
(d) Depression of soil

Ans. (b, c)

General shear failure is a sudden catastrophic failure accompanied by bulging of ground surface adjacent to foundation before failure.

75. The piles that are used for protecting structures from ships and floating objects are
(a) Anchor piles
(b) Compaction piles
(c) Batter piles
(d) Fender piles

Ans. (d)

Fender piles are used to protect concrete deck or other water front structure from impact which may be caused by waves generated by ships and floating objects.

76. The stress in cement concrete pavement changes
(a) Seasonally
(b) Annually
(c) Daily
(d) None of the above

Ans. (a, c)

Seasonal variation result in overall change in slab temperature due to which frictional daily variation result in change in temperature across the depth of the slab due to which working stress are developed, in cement concrete pavement.

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77. The rise of water level near bridge due to obstruction caused by the construction to bridge is called as
(a) Superlex   (b) Afflux
(c) Dulex   (d) Scouring

Ans. (b)

Afflux is an increase in water level that can occur upstream of a structure, such as a bridge or culvert, that creates an obstruction in the flow.

Bridge slab

Pier

Rise in water is efflux

Original water level
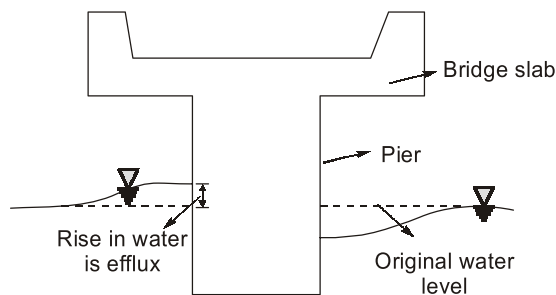
78. According to ICAO, all markings on the runways are
(a) Yellow   (b) White
(c) Black   (d) Red

Ans. (b)

79. The maximum transverse grade as per ICAO of 'D' type airport is
(a) 1.5%   (b) 2.0%
(c) 2.5%   (d) 3.0%

Ans. (b)

For ISAO D-type airport (small airport) transverse gradient $\not> 2\%$.

80. Airport elevation is the reduced level above mean sea level of
(a) Control tower
(b) Hanger
(c) Highest point of the landing area
(d) Lowest point of the landing area

Ans. (c)

Airport elevation is elevation of highest point

on any of runway of airport, also known as airport height.

81. A steel rod of 2.5 m in height and area of 125 mm^2 is subjected to a pull of 30 kN. If Young's modulus is 200 GPa, the elongation of the rod will be
(a) 3 mm   (b) 30 mm
(c) 300 mm   (d) 0.3 mm

Ans. (a)

Length of rod, L = 2.5 m
Area of rod, A = 125 mm^2
Axial pull = 30 kN
Young's modulus,
E = 200 GPa = 2×10^5 N/mm^2

Elongation, $\Delta = \dfrac{30 \times 10^3 N \times 2.5 \times 10^3 \text{ mm}}{125 \text{ mm}^2 \times 2 \times 10^5 \text{ N/mm}^2}$

$$= 3 \text{ mm}$$

82. For a given material, if E, G and v are Young's modulus, modulus of rigidity and Poisson's ratio respectively, then the relation E =
(a) $2G(1 + v)$ (b) $2G(1 - v)$
(c) $\dfrac{2G}{(1+v)}$ (d) $\dfrac{2G}{(1-v)}$

Ans. (a)

$$E = 2G(1 + v)$$
$$E = 3K(1 - 2v)$$

83. Every material obeys the Hooke's law within its
(a) Elastic limit
(b) Limit of proportionality
(c) Plastic limit
(d) Modulus of elasticity

Ans. (b)

84. A framed structure is perfect, if the number of member are _____ ($2J - 3$), where J is joint.
(a) Equal to   (b) Less than
(c) Greater than   (d) None of the above

Ans. (a)

85. The strain energy per unit volume due to direct stress 'σ' and strain '∈' is equal to the

(a) $\dfrac{2\sigma^2}{E}$ (b) $2E\in^2$

(c) $\dfrac{1}{2}E\in^2$ (d) None of the above

Ans. (c)

Strain energy per unit volume $= \dfrac{1}{2}\sigma\in = \dfrac{1}{2}E\in^2$.

86. The limitation of Bligh's theory observed as
(a) Made no distinction between horizontal and vertical creep.
(b) Made no explanation of exit gradient
(c) Made no distinction between outer and inner faces of sheet piles
(d) All of the above

Ans. (d)

Limitations of Bligh's creep theory:
1. No distinction between horizontal and vertical creep.
2. He did not explain the idea of exit gradient.
3. No distinction between outer and inner faces of sheet piles or the intermediate sheet piles.
4. Loss of head does not take place in the same proportion as the creep length.
5. He considered the uplift pressure distribution as linear inactual it follows a sine curve.

87. A device where silt is excluded from water entering the canal is known as the following and placed at
(a) Silt ejector placed in front of head regulator
(b) Silt ejector placed behind the head regulator
(c) Silt excluder placed in front of head regulator
(d) Silt excluder placed behind the head regulator

Ans. (c)

Silt excluders are constructed on the bed of river, in upstream of head regulator of canal and it arrests the silt particles to prevent their entry into the canal.

Whereas silt ejectors are provided in canal at a certain distance from head regulator to eject the silt particles from canal water.

**88.** Which statement is **not** true for canal lining?
(a) Minimize the seepage losses
(b) Reduce maintenance of canal
(c) Prevent erosion
(d) Decrease discharge

Ans. (d)

By lining of canal higher discharge can be permitted by increasing the flow velocity.

89. A larger length of groyne pointing upstream used for river training works is known as
(a) Attracting Groyne
(b) Repelling Groyne
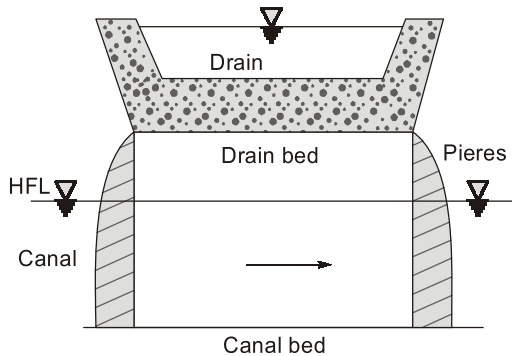(c) Deflecting Groyne
(d) Sedimentary Groyne

Ans. (b)
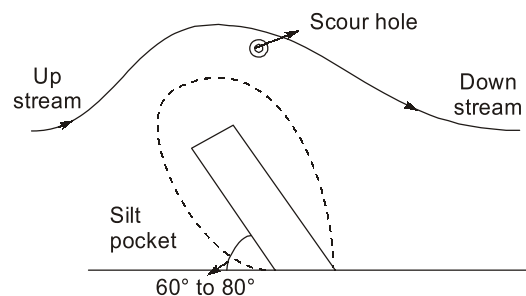
The Groyne pointing upstream is repelling Groyne.

90. In cross drainage works, if natural drainage is carried over the canal where F.S.L. of the canal is lower than the underside of the trough carrying drainage water, then it can be said as
(a) Aqueduct   (b) Syphon aqueduct
(c) Canal syphon   (d) Super passage

Ans. (d)

Super Passage:

A super passage is reverse of an aqueduct. A super passage is constructed where the bed of drain is well above the canal FSL and canal flows at atmospheric pressure under the bed of drain.

91. In a bracket with riveted connections the number of rivets (n) essential for resisting the external moment M is equal to _____. Where, R - rivet value, m - number of rivet lines and p – pitch of rivets

(a) $n = \sqrt{\dfrac{6Rm}{Mp}}$ (b) $n = \sqrt{\dfrac{6M}{mpR}}$

(c) $n = \sqrt{\dfrac{6M}{mR}}$ (d) $n = \sqrt{\dfrac{6Mm}{pR}}$

Ans. (b)

Number of rivets (n) for resisting external moment 'M'.

$$n = \sqrt{\dfrac{6M}{mpR}}$$

m = number of rivet line
p = pitch
R = rivet value

92. If the fillet welds are subjected to a combination of normal stress (f_a) and shear stress (q), the equivalent stress (f_e) is

(a) $\sqrt{f_a^2 + q^2}$ (b) $\sqrt{3f_a^2 + 3q^2}$

(c) $\sqrt{f_a^2 + 3q^2}$ (d) $\sqrt{3f_a^2 + q^2}$

Ans. (c)

Resultant stress when fillet welds are subjected to a combination of normal stress (f_a) and shear stress (q),
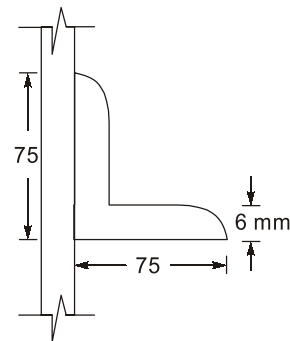
$$f_e = \sqrt{(f_a)^2 + 3q^2}$$

93. An angle ISA 75 × 75 × 6 is connected to a gusset plate through single leg as shown in figure. Bolt used are M 20 grade 4.6. What is net area of angle?
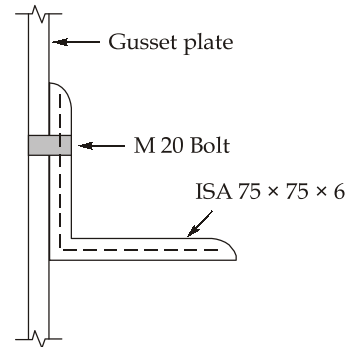
(a) 732 mm^2 (b) 862 mm^2
(c) 600 mm^2 (d) 432 mm^2

Ans. (a)

ISA 75 × 75 × 6

Diameter of M20 bolt = 20 mm
Diameter of bolt hole, d_0 = 20 + 2 = 22 mm
Area of connected leg

$$(A_1) = \left[75 - 22 - \dfrac{6}{2}\right] \times 6 = 300 \text{ mm}^2$$

Area of cut stand leg $(A_2) = \left[75 - \dfrac{6}{2}\right] \times 6$

$$= 732 \text{ mm}^2$$

Net area = $A_1 + A_2$
Net area = 300 + 432 = 732 mm^2

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94. A steel structure subjected to a combination of Dead Load (DL) and Earthquake Load (EL), the partial safety factors for limit state of strength are _____ and _____ respectively.
(a) 1.2; 1.2   (b) 1.5; 1.0
(c) 1.5; 1.5   (d) 1.0; 1.2

Ans. (c)
Refer IS Code 800 : 2007, Table 4. Cl. 3.5.1 and 5.3.3.

95. If the intermediate transverse stiffeners to web are not subjected to external loading, then it shall be designed to withstand a minimum shear force (in kN/mm) of (where, t_w = Web thickness in mm, b_s = Outstand width of the stiffener in mm)

(a) $\dfrac{t_w^3}{5b_s}$ (b) $\dfrac{t_w^2}{5b_s}$

(c) $\dfrac{5t_w^2}{b_s}$ (d) $\dfrac{t_w}{5b_s^2}$

Ans. (b)
IS 800 : 2007 CI. 8.7.2.6 connection of intermediate stiffness to web.
Intermediate transverse stiffeners not subject to external loading should be connected to the web so as to withstand a shear between each component of the stiffener and the web (in kN/mm) of not less than:

$$\frac{t_w^2}{(5b)}$$

where, t_w = web thickness, in mm; and
         b_s = outstand width of the stiffener, in mm

96. $\dfrac{V_v}{V_s} =$

(a) Porosity   (b) Water content
(c) Void ratio   (d) Degree of saturation

Ans. (c)

97. At shrinkage limit, the soil is
(a) Dry
(b) Fully saturated
(c) partially saturated
(d) None of the above

Ans. (b)
Shrinkage limit is minimum water content at which soil is in fully saturated state. Below this water content, soil becomes partially saturated.

98. If the natural water content of the soil mass lies between its liquid limit and plastic limit, the soil mass is said to be in
(a) Liquid state   (b) Semi-solid state
(c) Solid state   (d) Plastic state

Ans. (d)
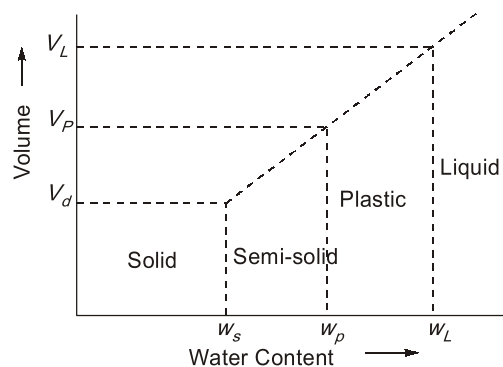
99. The co-efficient of compressibility of soil is the ratio of
(a) Stress to strain
(b) Strain to stress
(c) Stress to settlement
(d) Rate of loading to settlement

Ans. (b)

$$a_v = \frac{-\Delta e}{\Delta \overline{\sigma}}$$

Here, $\dfrac{\Delta e}{1+e_0} = \dfrac{\Delta H}{H}$

$\Rightarrow$ $\Delta e = \dfrac{\Delta H}{H}(1+e_0)$

$\dfrac{\Delta H}{H}$ represents strain in soil due to applied stress.

100. Under-reamed piles are generally
(a) Driven piles (b) Pre-cast piles
(c) Bored piles (d) None of the above

Ans. (c)
Bored piles: Under reamed piles are generally bored, cast in situ pile with an enlarged bulb.

101. The activity does **not** involve consumption of resources and does **not** need any time is called as
(a) Negative activity
(b) True activity
(c) Dummy activity
(d) Positive activity

Ans. (c)
Dummy is an artificial activity which does not require any resources and any time for its completion.

102. The difference between total float and free float is defined as
(a) Independent float
(b) Interference float
(c) Dependent float
(d) Independent stack time

Ans. (b)
$$F_{IN} = F_T - F_F$$
$$= S^j$$

103. Which of the following contract is not measurement contract?
(a) Lump-sum contract
(b) Item rate contract
(c) Percentage rate contract
(d) None of the above

Ans. (a)
In this type of compact, a computer if required to quite a fixed sum for execution of work compute in all respect.

Detailed measurement of workdone are not required.

104. Worker's productivity is defined as
(a) Total work done per week
(b) Quantity of work done per man hour
(c) Quantity of work done per month
(d) None of the above

Ans. (b)
Workers productivity can be defined as the amount of work (or output) produced by an employee in a specific period of time.

105. The cost slope is given by
(a) $\dfrac{\text{Normal cost} - \text{Crash cost}}{\text{Normal time} - \text{Normal time}}$

(b) $\dfrac{\text{Crash cost} - \text{Normal cost}}{\text{Crash duration} - \text{Normal time}}$

(c) $\dfrac{\text{Crash cost} - \text{Normal cost}}{\text{Normal duration} - \text{Crash duration}}$

(d) None of the above

Ans. (c)

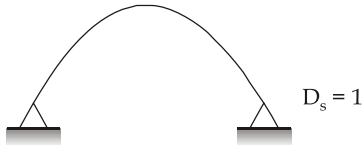$$\text{Cost slope} = \dfrac{C_c - C_h}{t_n - t_c}\,\text{Rs./day}$$

106. A simply supported beam of span '*l*' carries a concentrated load '*W*' at the centre. The bending moment at mod-point will be
(a) $\dfrac{1}{8}Wl$ (b) $\dfrac{1}{2}Wl$

(c) $\dfrac{1}{4}Wl$ (d) $\dfrac{1}{8}Wl^2$

Ans. (c)
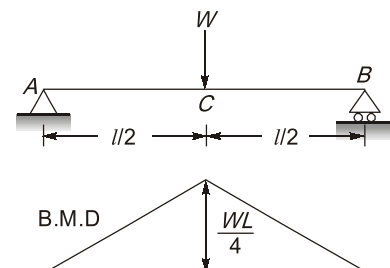
107. The two hinged arch is an example of
(a) Statically indeterminate structure
(b) Statically determinate structure
(c) Both (a) and (b)
(d) None of the above

Ans. (a)

$D_s = 1$

108. The bending equation is written as
(a) $\dfrac{I}{M} = \dfrac{\sigma}{y} = \dfrac{E}{R}$ (b) $\dfrac{M}{I} = \dfrac{\sigma^2}{y} = \dfrac{E^2}{R^2}$

(c) $\dfrac{M}{I} = \dfrac{\sigma}{y} = \dfrac{E}{R}$ (d) $\dfrac{M^2}{I} = \dfrac{\sigma^2}{y} = \dfrac{E^2}{R}$

Ans. (c)
$$\frac{M}{I} = \frac{\sigma}{y} = \frac{E}{R}$$

109. For ductile materials, the most appropriate failure theory is
(a) Maximum principal stress theory
(b) Maximum shear stress theory
(c) Maximum principal strain theory
(d) Shear strain energy theory

Ans. (b, d)
For ductile material both maximum shear stress theory (over safe) and maximum shear strain energy theory (most appropriate, exact) are valid.

110. The maximum principal stress theory was postulated by
(a) Rankine   (b) St. Venant
(c) Mohr   (d) Tresca

Ans. (a)
Maximum principal stress theory was postulated by Rankine which is suitable for brittle materials.

111. Width of Ballast section at bottom of track for B.G. is
(a) 4200 mm   (b) 4600 mm
(c) 4800 mm   (d) 5000 mm

Ans. (*)
• Although it depend on slope and depth of cushion provided.
• Top width of ballast can be taken as 3350 mm for BG track.

112. Which type of transition curve is mostly used by Indian Railways?
(a) Cubic parabola curve
(b) Spiral curve
(c) Sine curve
(d) Leminiscate of Bernoulli's curve

Ans. (a)
To introduce superelevation gradually or to introduce radius of curvature with slower rate for a long vehicle like train, cubic parabola is most suitable transition curve.

113. The displacement of the track from its original position due to insufficient expansion gap in the track is known as
(a) Distorting   (b) Hogging
(c) Creeping   (d) Buckling

Ans. (d)
Due to insufficient expansion gap when rails are subjected to temperature change, it results into buckling that leads to widening of gauge.

114. Heel Divergence is defined as
(a) Ratio of length of tongue rail to switch angle
(b) Ratio of switch angle to length of tongue rail
(c) Multiplication of length of tongue rail and switch angle
(d) Multiplication of wing rail and switch angle

Ans. (c)
Switch angle depends on heel divergence and length of tough rail in following manner
$$\sin\alpha = \frac{d}{s}$$

sinα = switch angle

d = heel divergence

s = length of tongue rail

115. The outer rim of the railway wheels are coned to prevent the rubbing of the wheel flanges with sides of the top flanges of the rail at a slope of

(a) 1 to 20   (b) 1 to 24

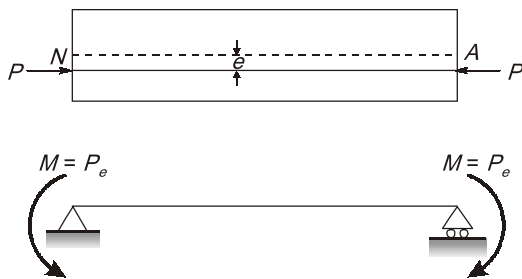(c) 1 in 26   (d) 1 in 30

Ans. (a)

Coning of wheel provided at slope of 1 in 20.

116. The deflection of a beam with straight tendon's having uniform eccentricity below the centroid axis is given by (where P = effective prestressing force, e = eccentricity, L = length of beam, a = deflection)

(a) $a = -\dfrac{PeL^2}{12EI}$ (b) $a = -\dfrac{PeL^3}{12EI}$

(c) $a = -\dfrac{PeL^2}{8EI}$ (d) $a = -\dfrac{PeL^3}{8EI}$

Ans. (c)

For straight tendon's with uniform eccentricity.

$$\text{Deflection} = \frac{-(Pe)(L)^2}{8EI}$$

117. The foundation that is used when bearing power of soil is so low that independent column footings are impracticable and pile foundation cannot be used advantageously is

(a) Strap foundation

(b) Combined foundation

(c) Raft or Mat foundation

(d) Rectangular combined foundation

Ans. (c)

Raft or Mat foundations raft foundations are used in situations when load transmitted by columns in a structure are so heavy or allowable soil pressure so small that individual footing would cover more than about one half of area.

118. As per IS : 1343 : 1980, in prestressed concrete minimum grade of concrete for pre-tensioned system will be

(a) M 40   (b) M 55

(c) M 30   (d) M 20

Ans. (a)

Minimum grade of concrete for

Pretensioned   : M40

Past tensioned : M30

119. As per IS : 456 : 2000, in case of flat slab the minimum thickness of slab shall be

(a) 100 mm   (b) 115 mm

(c) 125 mm   (d) 150 mm

Ans. (c)

120. As per IS : 1893 : 2002, the critical damping ratio in case of steel structures, concrete structures and earthen structures are respectively

(a) 5%, 2% and 20%

(b) 2%, 20% and 5%

(c) 20%, 5% and 20%

(d) 2%, 5% and 20%

Ans. (d)

121. Classification of road in India was done by

(a) Central Government

(b) Indian Road Congress

(c) Ministry of Surface Transport

(d) Nagpur Road Plan

Ans. (b, d)

Classification of road in India was done by 1st 20 year road plan and later in 3rd 20 year road plane Lucknow Road Plan.

122. The drainage layer in the highway pavement is known as
(a) Base course   (b) Sub-base course
(c) Surface course (d) Subgrade

Ans. (b)

123. If R is the radius of a main curve and L is the length of the transition curve, the shift of the curve is

(a) $\dfrac{L^2}{24R}$ (b) $\dfrac{L}{24R}$

(c) $\dfrac{L^4}{24R}$ (d) $\dfrac{L^3}{24R}$

Ans. (a)

124. In California Bearing Ratio test, the value of CBR is calculated at
(a) 2.5 mm penetration only
(b) 5.0 mm penetration only
(c) Both 2.5 mm and 5.0 mm penetrations
(d) 7.5 mm penetration only

Ans. (c)

125. For the construction of cement concrete pavement slabs, The desirable limit of maximum aggregate crushing value is
(a) 35%   (b) 30%
(c) 27%   (d) 24%

Ans. (b)

The aggregate crushing value for surface course should not exceed more than 30% and for base course should not exceed 45%.

126. The water required for firefighting (known as fire-demand) may be computed using National Board of Fire underwrites formula given as $Q = 4637\sqrt{P}\left(1 - 0.01\sqrt{P}\right)$ where

(a) Q = quantity of water in m^3/s and P is more than 200000
(b) Q = quantity of water in L/min and P is more than 200000
(c) Q = quantity of water in m^3/s and P is less than or equal to 200000
(d) Q = quantity of water in L/min and P is less than or equal to 200000

Ans. (d)

127. Modern turbidimeters working on the principles of scattering of light, are known as
(a) Jackson turbidimeter
(b) Modern ion chromatography
(c) Nephlo turbidimeter
(d) Atomic turbidimeter

Ans. (c)

128. In a waste water treatment plant, grit chamber are designed to remove particles by using the principles of
(a) Type - I settling
(b) Type - II settling
(c) Type - III settling
(d) Type - IV settling

Ans. (a)

129. London Smog was primarily caused by
(a) Burning of oil
(b) Burning of coal
(c) Eruption of volcano
(d) None of the above

Ans. (b)

130. Which one of the following method is generally **not** adopted for safe disposal of biomedical washes?
(a) Shredding after disinfection
(b) Incineration
(c) Sanitary landfill
(d) None of the above

Ans. (c)

131. A singly reinforced beam 200 mm wide is 400 mm deep to the center of the tensile reinforcement. Determine the limiting moment of resistance of the beam section. Use M 20 Concrete and Fe 250 Steel.
(a) 9.536 kN.m   (b) 95.36 kN.m
(c) 953.60 kN.m   (d) 80.00 kN.m

Ans. (b)
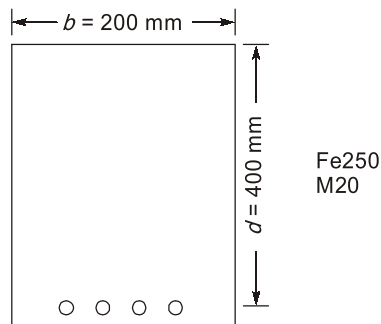
$$M_{u,\,lim} = 0.148\, f_{ck}\, bd^2$$
$$M_{u,\,lim} = 0.148 \times 20 \times 200 \times 400^2$$
$$M_{u,\,lim} = 94.72 \text{ kNm} \simeq 94.36 \text{ kNm}$$

132. For bond stress of deformed bars conforming to IS 1786, design bond stress of plain bars in tension in limit state method shall be increased by
(a) 25%   (b) 40%
(c) 60%   (d) 75%

Ans. (c)
Band stress of plane bars in tension shall be increased by 60%.
For bar in compression, band stress in increased by 25%.

133. The Hoop tension per meter height for circular tank with a flexible joint between the walls and base is given by (where w = specific wt. of water, D = internal diameter of tank, h = depth and T = hoop tension)
(a) $D = wh \times \dfrac{T}{2}$ (b) $T = wh \times \dfrac{D}{4}$

(c) $T = wh \times \dfrac{D}{6}$ (d) $T = wh \times \dfrac{D}{2}$

Ans. (d)

134. What is the recommended value of effective length, if the column is effectively held in position and fixed against rotation in both ends? (l = unsupported length of column)
(a) 0.65l (b) 0.80l
(c) 1.00l (d) 1.20l

Ans. (a)
Table 11 (Cl – 7.2.2) IS 800 : 2007

135. The development length (L_d) of a deformed bar (ϕ = nominal diameter) as per IS : 456 : 2000 in limit state design is given by (where σ_s = stress in a bar at the section considered at design load, τ_{bd} = design bond stress)

(a) $L_d = \dfrac{\sigma_s \phi}{4.5\tau_{bd}}$ (b) $L_d = \dfrac{\sigma_s \phi}{5.0\tau_{bd}}$

(c) $L_d = \dfrac{\tau_{bd} \cdot \phi}{5.0\sigma_s}$ (d) $L_d = \dfrac{\sigma_s \cdot \phi}{4\tau_{bd}}$

Ans. (*)

Development length, $L = \dfrac{\sigma_s \phi}{4\tau_{bd}}$

For deformed bar, bond stress is increased by 60%.

So, $L_d = \dfrac{\sigma_s \phi}{4(1.6\tau_{bd})}$

            $L_d = \dfrac{\sigma_s \phi}{6.4\tau_{bd}}$

136. An object placed in a fluid stream may experience drag and lift forces. These forces are due to
(a) Viscosity and turbulence
(b) Pressure and gravity
(c) Pressure and turbulence
(d) Pressure and viscosity

Ans. (d)

137. In 1 and 40 model of a spillway, the velocity and discharge are 2 m/s and 2.5 m³/s,

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respectively. Find the velocity in the prototype.

(a) 126.5 m/s   (b) 12.65 mm/s
(c) 12.65 m/s   (d) 0.126 m/s

Ans. (c)

$$L_r = \frac{1}{40}$$

$$V_m = 2 \text{ m/s}$$
$$Q_m = 2.5 \text{ m}^3/\text{s}$$

For spillway, gravity force is predominant. Hence, Froude's law is valid.

$$V_r = \sqrt{L_r}$$

$$\frac{V_m}{V_p} = \sqrt{\frac{1}{40}}$$

$$\Rightarrow \qquad V_p = 2\sqrt{40} \text{ m/s} = 12.65 \text{ m/s}$$

138. The flownet is a graphical representation of _____ irrotational flow.
(a) One dimensional
(b) Two dimensional
(c) Three dimensional
(d) None of the above

Ans. (b)

139. The energy loss in pipe is due to
(a) Surface roughness only
(b) Turbulent shear stress
(c) Friction offered by pipe wall and viscous action
(d) Viscous action only

Ans. (c)

140. A wide unlined channel carrying silt free water has a depth of 2 m. The maximum tractive stress permissible on the bed to prevent scour is 1.96 N/m². What is maximum slope that can be given to the channel?
(a) 3 in 10^4 (b) 2 in 10^4
(c) 1 in 10^3 (d) 1 in 10^4

Ans. (d)

Canal is wide, hence $R = y = 2$ m

Given: $\tau_c = 1.96$ N/m²

We know that, for safety of bed as per shield's theory

$$\tau_0 \leq \tau_c$$
$$\Rightarrow \qquad \gamma_w RS \leq \tau_c$$
$$\Rightarrow \qquad \gamma_w RS \leq 1.96 \text{ N/m}^2$$
$$\Rightarrow \quad 9.81 \times 10^3 \frac{N}{m^3} \times 2\,m \times S \leq 1.96 \text{ N/m}^2$$

$$\Rightarrow \qquad S \leq \frac{1}{10010.2}$$

141. Which is **not** the hydro power scheme plant?
(a) Run-off river scheme
(b) Storage scheme
(c) Pumped storage scheme
(d) Canal scheme

Ans. (d)

Canal scheme is not sued for hydro power generation.

142. Measurements of duty should **not** be taken
(a) At the head of the main canal
(b) At the head of the branch canal
(c) At the middle of the canal
(d) At the outlet of the canal

Ans. (c)

The measurement of duty is not measured at the middle of canal, because the velocity or discharge measuring arrangements are usually installed at canal head or outlet.

143. A unit hydrograph consists of a hydrograph of direct runoff resulting from the following mentioned below which takes place uniformly over the basin at a uniform rate during a specified period of time
(a) One cm of rainfall
(b) Ten cm of rainfall
(c) One cm of effective rainfall
(d) Ten cm of effective rainfall

Ans. (c)

Unit hydrology: It is DRH which result into 1 cm or 1 unit of rainfall excess when rainfall intensity if uniform.

144. Ground water is widely distributed under the ground and the geologic formation which can absorb water but **cannot** transmit significant amount of water known as with example

(a) Aquiclude such as shale

(b) Aquiclude such as basalt

(c) Aquifuge such as clay

(d) Aquifuge such as granite

Ans. (*)

145. Stilling basin used for

(a) Drip irrigation

(b) Sprinkler irrigation

(c) Dissipation of energy

(d) Cross drainage work

Ans. (c)

146. If N = Number of years prescribed for completion of project

A = Maximum value of works completed during last 5 years

B = Value of on going work in the next N years

then Bid capacity is calculated as

(a) 2AB – N   (b) 2BN – A

(c) 2AN – B   (d) None of the above

Ans. (c)

Bid capacity= ZAN - B

where

B = liability of present work in hand during company period.

N = Number of years prescribed for completion of the compact.

A = maximum value of works executed in any one year during last five year or maximum turnover in works executed in any year during last five years.

147. Building and other construction workers Central Rules, 1988 is **not** related

(a) To ensure all mechanical equipments are provided with safety features

(b) To ensure minimum salary to be provided to all labours

(c) To ensure workers do not lift weight beyond prescribed limit

(d) To maintain clean and hygienic conditions on site

Ans. (b)

• No lifting appliance, lifting gear or wire rope is used in unsafe way in such a way as to involve rise to life of building workers and they are not loaded beyond their safe working local except for testing purposes under the direction of competent purpose.

• It shall be the duty of the employer to maintain the latrines, urinals, washing facilities and canteen in a clean and hygienic condition. The canteen shall be located in a place away from the latrine and urinals polluted atmosphere and at the same time be easily accessible to the building works.

• It shall be duty of every employer not to allow lifting appliance, lifting gear, lifting device, transport equipment, vehicle or any other device or equipment to be used by the building workers which does not comply with the provision given in the rules.

148. A concrete mixer having a initial cost of ₹ 2 lakh and a salvage value of ₹ 50000 at the end economic life of 5 years. What will be annual depreciation each year using straight line method?

(a) ₹ 30000   (b) ₹ 40000

(c) ₹ 50000   (d) ₹ 33333

Ans. (a)

$$D = \frac{C_i - C_j}{\eta} = \frac{200000 - 50000}{5}$$

$$= ₹\,30000$$

149. Performance security is refunded to the contractor
(a) After issue of defect liability certificate
(b) After issue of completion certificate
(c) As per contractor demand after completion of work
(d) None of the above

Ans. (a)

The performance security deposit will be refunded to computer after 90 days of satisfactory completion of works/defects liability period under the compact (including extension, if any), but a pay or whole of which shall be used by the company in realization of liquidized damage or claims.

150. The estimate prepared for approval to include additional item of work during execution which was **not** foreseen in initial stage is called as
(a) Rough order of magnitude estimate
(b) Cube rate estimate
(c) Indicative cost estimate
(d) Supplementary estimate

Ans. (d)

The estimate for additional work if called supplementary estimate.

Supplementary estimates are also required to be prepared when some of items are overlooked. During the execution of project, structural modification arerequired or additional work is added for construction.

■■■■

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