# SSC SOLVED PAPER 2018 (SET 1)

## GENERAL INTELLIGENCE AND REASONING

**1.** In the following question, select the related word pair from the given alternatives.

**Rain : Clouds : : ? : ?**

(a) Rice : Food      (b) Grey : Colour

(c) Heat : Sun      (d) Snow : Mountains

**2.** In the following question, select the related word from the given alternatives.

**Cactus : Plant : : Rice : ?**

(a) Basmati      (b) Crop

(c) White      (d) Rabi

**3.** In the following question, select the related word from the given alternatives.

**Pink : Colour : : Eagle : ?**

(a) Black      (b) Symbol

(c) Bird      (d) Sky

**4.** In the following question, select the related letter pair from the given alternatives.

**TOM : NIG : : ? : ?**

(a) EAT : YUN      (b) EAT : XXM

(c) FAT : LMV      (d) EAT : ZXC

**5.** In the following question, select the related letters from the given alternatives.

**LERI : PJVN : : MONT : ?**

(a) WRTY      (b) QTRY

(c) RITY      (d) RQYB

**6.** In the following question, select the related letters from the given alternatives.

**SAT : WEX : : MET : ?**

(a) AQI      (b) IYX

(c) FHY      (d) QIX

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

**43 : 7 : : 23 : ?**

(a) 6      (b) 4

(c) 7      (d) 5

**8.** In the following question, select the related number from the given alternatives.

**38 : 53 : : 53 : ?**

(a) 72      (b) 68

(c) 79      (d) 87

**9.** In the following question, select the related number from the given alternatives.

**9 : 81 : : 11 : ?**

(a) 78      (b) 93

(c) 121      (d) 146

**10.** In the following question, select the odd word from the given alternatives.

(a) Goggle      (b) Purse

(c) Accessories      (d) Belt

**11.** In the following question, select the odd word from the given alternatives.

(a) Grapes      (b) Guava

(c) Cauliflower      (d) Orange

**12.** In the following question, select the odd word from the given alternatives.

(a) Sparrow      (b) Rat

(c) Ostrich      (d) Parrot

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

(a) GCXTO      (b) KGBXS

(c) RNIEX      (d) QMHDY

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

(a) SOKG      (b) AWSO

(c) RNJF      (d) CYTP

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

(a) KNQ      (b) DGJ

(c) WZB      (d) TWZ

**16.** In the following question, select the odd number from the given alternatives.

(a) 7 – 11      (b) 12 – 16

(c) 14 – 18      (d) 9 – 15

**17.** In the following question, select the odd number from the given alternatives.

(a) 2 – 4      (b) 3 – 9

(c) 4 – 18      (d) 5 – 25

**18.** In the following question, select the odd number pair from the given alternatives.

(a) 76 – 42      (b) 92 – 20

(c) 73 – 21      (d) 93 – 27

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

**1. Flagrant**          **2. Flavour**

**3. Flatter**          **4. Flick**

**5. Flawed**

(*a*) 13254          (*b*) 31254

(*c*) 23541          (*d*) 32541

**20.** According to dictionary, which of the following word will come at **THIRD** position?

**1. Heritage**          **2. Helpful**

**3. Hectic**          **4. Heroic**

**5. Heroism**

(*a*) Hectic          (*b*) Heritage

(*c*) Heroic          (*d*) Helpful

**21.** From the given alternatives, according to dictionary, which word will come at **LAST** position?

(*a*) Juvenile          (*b*) Justify

(*c*) Judge          (*d*) Justice

**22.** A series is given with one term missing. Select the correct alternative from the given ones that will complete the series.

**F, M, T, ?, H, O**

(*a*) B          (*b*) C

(*c*) A          (*d*) D

**23.** A series is given with one term missing. Select the correct alternative from the given ones that will complete the series.

**ROK, LIE, FCY, ZWS, ?**

(*a*) LAQ          (*b*) SRV

(*c*) TQM          (*d*) FMQ

**24.** A series is given with one term missing. Select the correct alternative from the given ones that will complete the series.

**FAQ, LGW, RMC, ?, DYO**

(*a*) VIR          (*b*) XSI

(*c*) LSI          (*d*) MIS

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

**14, 22, 49, 113, 238, ?**

(*a*) 386          (*b*) 532

(*c*) 454          (*d*) 576

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

**42, 21, 21, 31.5, 63, ?**

(*a*) 169.75          (*b*) 157.5

(*c*) 152.5          (*d*) 126.75

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

**14, 44, 135, 409, 1232, ?**

(*a*) 2962          (*b*) 3340

(*c*) 3702          (*d*) 3406

**28.** E is sitting between D and A, B is to the right of A, C is at one of the ends and C and D are sitting next to each other. Who is sitting third?

(*a*) D          (*b*) A

(*c*) B          (*d*) E

**29.** Showing a photograph of a married couple B said that the gentleman in it was his father's father and A said that the lady in it was her mother. How is A related to B?

(*a*) A is B's mother's sister

(*b*) A is B's sister

(*c*) A is B's Father's sister

(*d*) A is B's mother

**30.** From the given alternative words select the word which cannot be formed using the letters of the given word.

**MERCANTILE**

(*a*) truce          (*b*) learn

(*c*) trace          (*d*) claim

**31.** If **OLYMPUS** is coded as **MJWKNSQ**, then how will **TEN** be coded as?

(*a*) RCL          (*b*) GVM

(*c*) SDM          (*d*) UFO

**32.** In a certain code language, 1875 means 'wound the round watch', 6143 means 'a cake is round' and 7321 means 'watch a round wheel'. Find the code for 'watch'.

(*a*) 1          (*b*) 8

(*c*) 5          (*d*) 7

**33.** In a certain code language, '+' represents '–', '–' represents '×', '×' represents '÷' and '÷' represents '+'. Find out the answer to the following question.

**96 × 4 ÷ 125 + 25 – 5 = ?**

(*a*) 23          (*b*) 24

(*c*) 50          (*d*) 8

**34.** If 17 $ 22 = 4 and 56 $ 13 = 7, then find the value of 71 $ 25 = ?

(*a*) 56          (*b*) 96

(*c*) 1          (*d*) 8

**35.** If A $ B means A is son of B, A # B means A is brother of B and If A * B means A is father of B, then what does X # Y * Z $ W mean?

(*a*) W is X's brother's wife

(*b*) W is X's wife

(*c*) W is X's mother

(*d*) W is X's sister

**36.** Select the missing number from the given responses

| 1 | 4 | 2 |
|---|---|---|
| 2 | 7 | 10 |
| 3 | ? | 12 |

(a) 3           (b) 9

(c) –3         (d) 11

**37.** Which of the following terms follows the trend of the given list?

**OOXXXXX, OXOXXXX, OXXOXXX, OXXXOXX, OXXXXOX, _____.**

(a) XOXXXXO       (b) XOXXXOX

(c) OXXXOXX       (d) OXXXXOX

**38.** A scientist is studying the behaviour of an ant. The ant picks food and walks 5 cm North, then it turns to its right and walks for another 11 cm. then it turns right and walks 3 cm, then it turns West and walks 15 cm, then finally it turns to its left and walks 2 cm. Where is the ant now with respect to its starting point?

(a) 4 cm East      (b) 26 cm West

(c) 4 cm West      (d) 26 cm East

**39.** Two football players start running from the same point on the ground. Player A runs 10 km East, then turns to his left and runs 13 km. In the meanwhile Player B runs 6 km South, then he runs 3 km East, the then turns to his left and runs 19 km. Where is Player A with respect to Player B?

(a) 7 km West      (b) 7 km East

(c) 13 km East     (d) 13 km West

**40.** In the question two statements are given, followed by two conclusions, I and II. You have to consider the statements to be true even if it seems to be at variance from commonly known facts. You have to decide which of the given conclusions, if any, follows from the given statements.

**Statement I:** Some chapters are physics

**Statement II:** All science is physics

**Conclusion I:** All science is chapters

**Conclusion II:** Some physics is science

(a) Only conclusion I follows

(b) Only conclusion II follows

(c) Both conclusions I and II follow

(d) Neither conclusion I nor conclusion II follows

**41.** In the question three statements are given, followed by three conclusions, I, II and III. You have to consider the statements to be true even if it seems to be at variance from commonly known facts. You have to decide which of the given conclusions, if any, follows from the given statements.

**Statement I:** All success is victory

**Statement II:** All luck is success

**Statement III:** Some hard work is luck

**Conclusion I:** Some success is hard work

**Conclusion II:** Some hard work is victory

**Conclusion III:** No victory is luck

(a) Only conclusions I and II follow

(b) Only conclusions II and III follow

(c) Only conclusions I and III follow

(d) All conclusions I, II and III follow

**42.** Which of the following cube in the answer figure cannot be made based on the unfolded cube in the question figure?
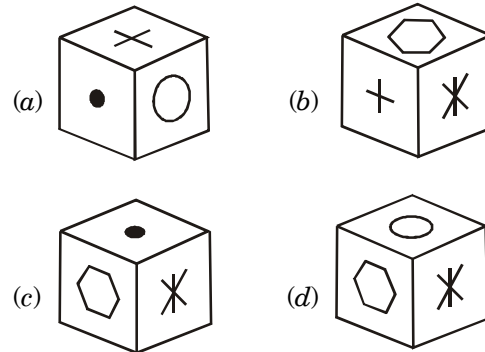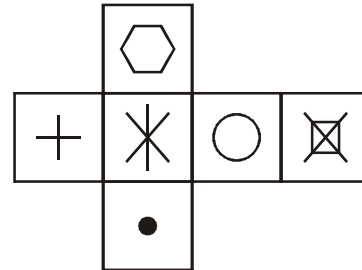


**43.** Which of the following answer figure patterns can be combined to make the question figure?
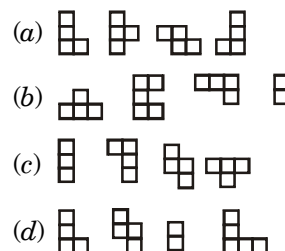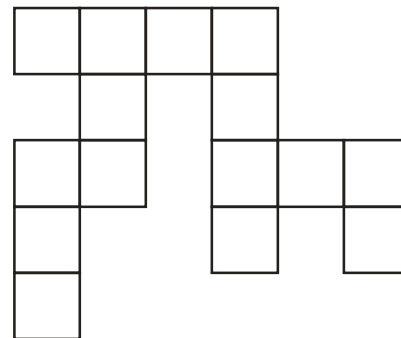
**44.** In the following figure, square represents Professors, triangle represents Social Workers, circle represents Dieticians and rectangle represents Men. Which set of letters represents Dieticians who are not men?
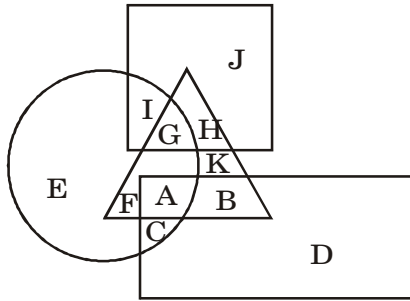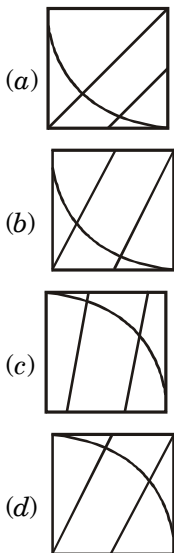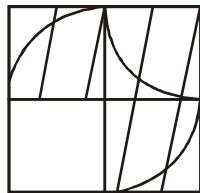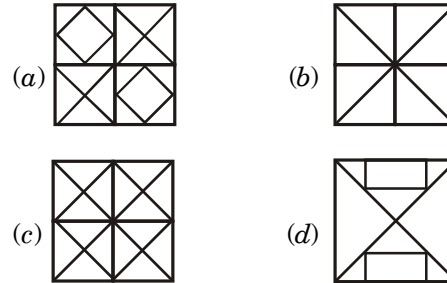


(a) EFGI       (b) BDKHJ

(c) IGAC       (d) DEJI

**45.** Which of the following Venn diagrams represents the relationship between Butterflies, Animals and Insects?



(a)       (b)

(c)       (d)
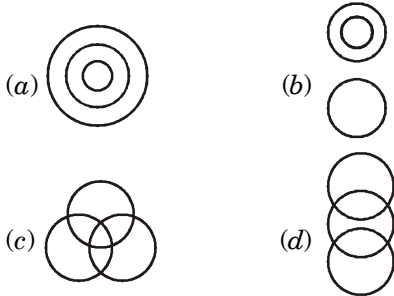
**46.** Which answer figure will complete the pattern in the question figure?



(a)

(b)

(c)

(d)

**47.** From the given answer figures, select the one in which, the question figure is hidden/embedded.



(a)       (b)

(c)       (d)
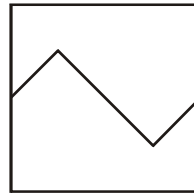
**48.** A piece of paper is folded and punched as shown below in the question figures. From the given answer figures, indicate how it will appear when opened.



(a)       (b)

(c)       (d)
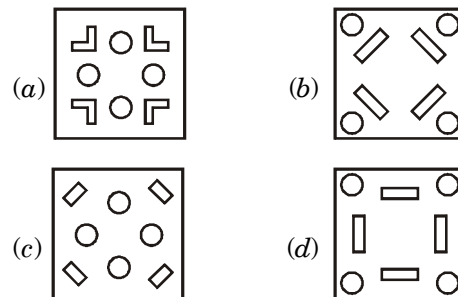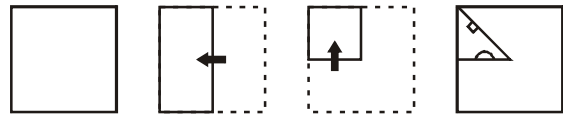
**49.** If a mirror is placed on the line MN, then which of the answer figures is the right image of the given figure?



(a)       (b)

(c)       (d)
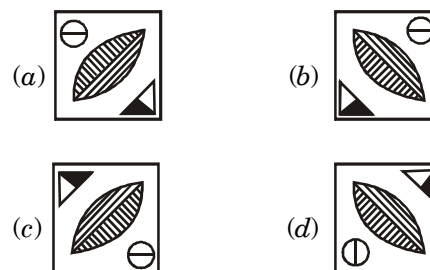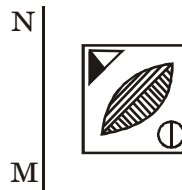
**50.** A word is represented by only one set of numbers as given in any one of the alternatives. The sets of numbers given in the alternatives are represented by two classes of alphabets as shown in the given two matrices. The columns and rows of Matrix-I are numbered from 0 to and that of Matrix-II are numbered from 5 to 9. A letter from these matrices can be represented first by its row and next by its column, for example 'C' can be represented by 43, 41 etc and 'O' can be represented by 97, 98 etc. Similarly, you have to identify the set of the word 'SPAN'

| Matrix I | | | | | |
|---|---|---|---|---|---|
| | 0 | 1 | 2 | 3 | 4 |
| 0 | M | M | M | I | E |
| 1 | A | M | J | I | A |
| 2 | F | I | M | I | E |
| 3 | I | J | A | L | K |
| 4 | D | C | A | C | L |

| Matrix II | | | | | |
|---|---|---|---|---|---|
| | 5 | 6 | 7 | 8 | 9 |
| 5 | N | V | Q | U | S |
| 6 | R | S | T | U | N |
| 7 | S | Z | X | O | V |
| 8 | X | S | P | W | P |
| 9 | U | X | O | Y | Y |

(*a*) 66,87,33,56      (*b*) 59,78,42,31
(*c*) 86,89,32,55      (*d*) 78,43,22,98

## GENERAL AWARENESS

**51.** Preliminary expenses are the examples of
(*a*) Capital expenditure
(*b*) Capital gain
(*c*) Revenue expenditure
(*d*) Deferred revenue expenditure

**52.** Which economic activity cannot be included in the tertiary sector?
(*a*) Working in a call-centre
(*b*) Tuition occupation
(*c*) Bee-keeping
(*d*) Banking

**53.** Which of the following statement is true for the Public Sector Unit?
(*a*) Most of assets is owned by a group of people
(*b*) Most of assets is owned by big companies
(*c*) Most of assets is owned by government
(*d*) Most of assets is owned by an individual

**54.** The percentage of India's population in the total population of the world as per 2011 census is: .
(*a*) 17.5%      (*b*) 18.01%
(*c*) 19.35%      (*d*) 20.25%

**55.** Which of the following five year plan of India recognized human development as the core of development efforts?
(*a*) Eighth five year plan
(*b*) Ninth five year plan
(*c*) Tenth five year plan
(*d*) Eleventh five year plan

**56.** Which of the following thinker is associated with "the concept of political sovereignty"?
(*a*) MacIver      (*b*) Socrates
(*c*) Rousseau      (*d*) Plato

**57.** Who said, "A good citizen makes a good state and a bad citizen makes a bad state"?
(*a*) Plato      (*b*) Aristotle
(*c*) G. B. Shaw      (*d*) Rousseau

**58.** Panchayat Samiti at the block level in India is a/an .
(*a*) Advisory Body
(*b*) Coordinating Authority only
(*c*) Supervisory Authority only
(*d*) Administrative Authority

**59.** According to Indian Constitution, who decides the salary of members of Parliament?
(*a*) Union Council of Ministers
(*b*) Parliament
(*c*) Supreme Court
(*d*) President of India

**60.** Which one of the following is not correctly matched?
(*a*) Eighth Schedule : Languages
(*b*) Second Schedule : Form of Oath of office
(*c*) Fourth Schedule : Allocation of seats in Rajya Sabha
(*d*) Tenth Schedule : Defection related provisions

**61.** When did the Chinese traveler 'Sung Yun' come to India?
(*a*) 510 AD      (*b*) 518 AD
(*c*) 525 AD      (*d*) 528 AD

**62.** Which among the following state 'Odantpuri' education center was situated?
(*a*) Bengal      (*b*) Gujarat
(*c*) Bihar      (*d*) Tamil Nadu

63. Who was the founder of Bahmani Kingdom?
   (a) Hasan Gangu      (b) Firoz Shah
   (c) Mahmud Gawan     (d) Asaf Khan

64. During whose rule in India did the Khilafat movement begin?
   (a) Lord Mountbatten  (b) Lord Dalhousie
   (c) Lord Chelmsford   (d) Lord Curzon

65. Who among the following was the founder of the Arya Mahila Samaj in the early 1880s?
   (a) Swami Dayananda Saraswati
   (b) Swami Vivekananada
   (c) Ramabai Ranade
   (d) Pandita Ramabai

66. Dasht-e Kavir Desert is located in which country?
   (a) Iran              (b) Saudi Arab
   (c) Iraq              (d) Sudan

67. Which of the following layers is called "Barysphere"?
   (a) Earth's most internal layer
   (b) Earth's intermediate layer
   (c) Earth's topmost layer
   (d) Lowest part of the atmosphere where climate changes occur

68. The Blue Nile river originates from which of the following lakes?
   (a) Lake Victoria     (b) Lake Tana
   (c) Lake Edward       (d) Lake Albert

69 - Which of the following states of India has the largest percentage of geographical area under forest as per the report of the Forest survey of India?
   (a) Manipur           (b) Meghalaya
   (c) Mizoram           (d) Nagaland

70. At which of the following towns the Alaknanda and the Bhagirathi combines to form River Ganga?
   (a) Haridwar          (b) Rishikesh
   (c) Rudraprayag       (d) Devprayag

71. 'Nirvana Fund' was set up by NSDC for financial help to                .
   (a) Entrepreneurs from the bottom rungs of society
   (b) Displaced Kashmiri Pandits
   (c) Old age people having no means of livelihood
   (d) Ventures of selected candidates trained under PMKVY but did not get any job.

72. Nakul Swasthya Patra' is a scheme by the Government for which among the following purposes?
   (a) Wellness of animals
   (b) Wellness of animal owners
   (c) Taking care of lactating mother in the rural areas
   (d) Taking care of newborn babies in the rural areas

73. Which mine of India was in the news recently for becoming the country's first iron-ore mine to have a solar plant for reducing carbon footprint?
   (a) Talchar mine      (b) Koraput mine
   (c) Noamundi mine     (d) Ratnagiri mine

74. Where will the Summer Olympics be held in 2028?
   (a) Sydney            (b) Paris
   (c) Los Angeles       (d) Copenhagen

75. Which country has won the 2017 Davis Cup Tennis Tournament?
   (a) Switzerland       (b) Serbia
   (c) France            (d) Belarus

76. "You are Unique" is written by
   (a) Dr. A. P. J. Abdul Kalam
   (b) Khushwant Singh
   (c) Taslima Nasrin
   (d) Arvind Adiga

77 - The third Indian Council for Cultural Relations (ICCR) Distinguished Indologist Award for the year 2017 was awarded to Japanese professor  .
   (a) Hiroshi Marui     (b) Shimamaru Marui
   (c) Nagasaki Marui    (d) Toyota Marui

78. Which of the following city has became first Indian city to get UNESCO's world heritage city tag?
   (a) Jaipur            (b) Ahmedabad
   (c) Gandhi Nagar      (d) Allahabad

79. In June 2017, which of the following countries have signed a protocol of co-operation in the field of archive?
   (a) India and Israel
   (b) India and Portugal
   (c) India and Netherland
   (d) India and Iran

80. India has signed an agreement to provide USD 318 million as line of credit for developing railway sector of which of the following country?
   (a) Bangladesh        (b) Nepal
   (c) China             (d) Sri Lanka

**81.** Dot Matrix is a type of
(*a*) Tape
(*b*) Disk
(*c*) Printer
(*d*) Bus

**82.** The secondary storage devices can only store data but they cannot perform.
(*a*) Arithmetic operations
(*b*) Logic operations
(*c*) Fetch operations
(*d*) All options are correct.

**83.** In the modern periodic table metals, metalloids and non metals are found in which block?
(*a*) s-Block
(*b*) p-block
(*c*) d-block
(*d*) f-block

**84.** Cinnabar is ore of which of the following?
(*a*) Magnesium
(*b*) Aluminium
(*c*) Mercury
(*d*) Iron

**85.** In which of the following mirror size of image formed is always equal to the size of object?
(*a*) Convex mirror
(*b*) Concave mirror
(*c*) Plane mirror
(*d*) Both convex and concave mirror

**86.** Mass of a hydrogen atom is how many time the mass of an electron?
(*a*) 1000
(*b*) 8000
(*c*) 1837
(*d*) 5000

**87.** Which of the following are Fabrics that may contain polyester?
I. Polycot
II. Polywool
III. Terrycot
(*a*) Only I and II
(*b*) Only I and III
(*c*) Only II and III
(*d*) All I, II and III

**88.** Which of the following term does **NOT** represent electrical power in circuit?
(*a*) I2R
(*b*) IR2
(*c*) VI
(*d*) V2/R

**89.** A positively charged particle projected towards west is deflected towards north by a magnetic field. What is the direction of magnetic field?
(*a*) toward south
(*b*) toward east
(*c*) downward
(*d*) upward

**90.** Which of the following is **NOT** positively charged?
(*a*) Alpha particle
(*b*) Proton
(*c*) Helium nucleus
(*d*) Electron

**91.** Which is a water soluble Vitamin?
(*a*) Vitamin A
(*b*) Vitamin C
(*c*) Vitamin D
(*d*) Vitamin K

**92.** Match the items given in column (A) with those in column (B).

| Column-A | Column-B |
| --- | --- |
| I. Frog | 1. Skin |
| II. Leaves | 2. Stomata |
| III. Earthworm | 3. Lungs and skin |

(*a*) I-3, II-2, III-1
(*b*) I-1, II-2, III-3
(*c*) I-3, II-1, III-2
(*d*) I-2, II-1, III-3

**93.** How many number of chambers are there in human heart?
(*a*) Two
(*b*) Three
(*c*) Four
(*d*) Five

**94.** Which of the following is **NOT** present in a matured stomata?
(*a*) Plasmodesma
(*b*) Chloroplast
(*c*) Cell wall
(*d*) Vacuole

**95.** What is/are the cause(s) of arise hypermetropia?
(*a*) Excessive curvature of the eye lens.
(*b*) Elongation of the eye ball.
(*c*) Focal length of the eye lens is too long.
(*d*) No option is correct.

**96.** Antibiotics are useful for which type of infections?
(*a*) Only bacteria
(*b*) Only virus
(*c*) Both bacteria and virus
(*d*) Neither bacteria nor virus

**97.** Which one of the following is **NOT** responsible for water shortage?
(*a*) Rapid growth of industries
(*b*) Increasing population
(*c*) Forestation
(*d*) Mismanagement of water resources

**98.** Which gas is major contributor to greenhouse effect?
(*a*) Carbon dioxide
(*b*) Chloroûurocarbon
(*c*) Sulphur dioxide
(*d*) Nitrogen dioxide

**99.** Which of the following is **NOT** a major problem in development of resources?
(*a*) Depletion of resources for satisfying the greed of few individuals.
(*b*) Accumulation of resources in few hands.
(*c*) An equitable distribution of resources.
(*d*) Indiscriminate exploitation of resources.

**100.** Which of the following is **NOT** man made ecosystem?
(*a*) Orchards
(*b*) Home aquarium
(*c*) Botanical gardens
(*d*) Grassland

## CIVIL & STRUCTURAL

**101.** Which of the following represent the crushing strength (MPa) for the good quality stone that are used in the construction of buildings?
- (*a*) Less than 20
- (*b*) 20 to 60
- (*c*) 60 to 80
- (*d*) Greater than 100

**102.** Which of the following is examined to determine the age of timber?
- (*a*) Annular ring
- (*b*) Sapwood
- (*c*) Pith
- (*d*) Timber defects

**103.** Which of the following is determined with the help of Le Chatelier's device?
- (*a*) Abrasion resistance
- (*b*) Chemical resistance
- (*c*) Soundness
- (*d*) Strength

**104.** The type of mortar which is used for the construction works carried out in water-logged area is _____.
- (*a*) cement mortar
- (*b*) loose mortar
- (*c*) mortar of very low consistency
- (*d*) mortar having high w/c ratio

**105.** For M 25 grade concrete, the split tensile strength in terms of percentage of its compressive strength is _____.
- (*a*) 7 to 11%
- (*b*) 18 to 28%
- (*c*) 28 to 38%
- (*d*) 38 to 48%

**106.** Distempers are generally used to coat _____.
- (*a*) compound wall
- (*b*) external concrete surfaces
- (*c*) interior surface which are not exposed to environment
- (*d*) wood works

**107.** Which of the following is commonly used as retarder in cement?
- (*a*) Calcium sulphate
- (*b*) Gypsum
- (*c*) Potassium carbide
- (*d*) Sodium chloride

**108.** In the process of hydration of OPC, to complete all chemical reaction, the water requirement (expressed as the percentage of cement) is _____.
- (*a*) 5 to 8%
- (*b*) 8 to 16%
- (*c*) 20 to 25%
- (*d*) 35 to 45%

**109.** The slump test is performed to check the _____.
- (*a*) presence of water in cement
- (*b*) ratio of concrete ingredients
- (*c*) temperature resistance
- (*d*) workability of concrete

**110.** The reason behind the low expansion and shrinkage of the plywood is _____.
- (*a*) plies are placed at the right angles with each other
- (*b*) they are glued under the high pressure
- (*c*) they are held in the position with the help of adhesives
- (*d*) they are prepared with the help of veneers

**111.** Which one of the following method is used for the approximate estimation?
- (*a*) Both central line and short wall and long wall method
- (*b*) Central line method
- (*c*) Plinth area method
- (*d*) Short wall and long wall method

**112.** Accuracy in the measurement of the thickness of the slab or sectional dimension of column and beam (in centimetre) should be _____.
- (*a*) 0.5
- (*b*) 1
- (*c*) 5
- (*d*) 10

**113.** Deduction at T-junction of the wall for total length of the central line is _____.
- (*a*) half of thickness of wall
- (*b*) no deduction
- (*c*) thickness of wall
- (*d*) twice of the thickness of wall

**114.** For estimation of painted area of semi corrugated asbestos cement sheets, percentage increase in area above plain area is _____.
- (*a*) 0.1
- (*b*) 0.14
- (*c*) 0.2
- (*d*) 0.25

**115.** Scrap value of a property may be _____.
- (*a*) both negative or positive
- (*b*) constant
- (*c*) negative
- (*d*) positive

**116.** What is the unit of measuring cornice?
- (*a*) Cubic metre
- (*b*) Number
- (*c*) Running metre
- (*d*) Square metre

**117.** Calculate the number of bricks in 20 cubic metres brick works.
- (*a*) 500
- (*b*) 1000
- (*c*) 10000
- (*d*) 100000

**118.** Calculate the area (square metre) of the formwork required for a beam of 2 m span and cross section dimension of 400 mm × 200 mm.
- (*a*) 0.8
- (*b*) 0.16
- (*c*) 1.2
- (*d*) 2

**119.** The cross section areas of three sections of an embankment at an interval of 40 m are 10 square metres, 15 square metres and 35 square metres. Calculate the quantity of earthwork for the embankment. Use prismoidal method.

(a) 1200  (b) 1400
(c) 1500  (d) 2400

**120.** Calculate the annual depreciation (Rs.) of a machine having initial cost of Rs. 10,000. The scrap value is Rs. 1,000 and useful life of 30 years.

(a) 300  (b) 367
(c) 1333  (d) 333333

**121.** What is the difference between the sum of interior angles of plane triangle and spherical triangle for area of triangle 195 square kilometre on the Earth's surface?

(a) one degree  (b) one minute
(c) one second  (d) one radian

**122.** Which one of the following is the largest scale?

(a) $1:500$  (b) $1:1000$
(c) $1:2500$  (d) $1:50000$

**123.** The quadrantal bearing of the line lies in the third quadrant making angle in clockwise with the north is _____.

(a) $N(\theta-180)°E$  (b) $N(\theta-180)°W$
(c) $S(\theta-180)°E$  (d) $S(\theta-180)°W$

**124.** Calculate the volume of the embankment (in cubic metre) using trapezoidal method, if the cross section areas of the three sections of an embankment at an interval of 30 m are 20 square metres, 40 square metres and 50 square metres.

(a) 1100  (b) 1150
(c) 2250  (d) 2350

**125.** Which one is the CORRECT order of the tapes based on their accuracy?

(a) Linen tape > invar tape > metallic tape > steel tape
(b) Invar tape > steel tape > metallic tape > linen tape
(c) Metallic tape > steel tape > linen tape > invar tape
(d) Metallic tape > steel tape > Invar tape > linen tape

**126.** In the leveling between two points A and B on the opposite sides of a pond, the level is first set up near the point A and staff reading on A and B are 2.5 m and 2.0 m respectively. Then the level is moved and set near the point B, staff reading on points A and B are 1.2 m and 1.7 m respectively. Calculate the difference of heights between the two points A and B (in metre).

(a) 0  (b) 0.5
(c) 1  (d) 1.85

**127.** Calculate the combined correction for curvature and refraction (in m) for a distance of 2 km.

(a) 0.045  (b) 0.135
(c) 0.269  (d) 3.14

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

(a) 90° in horizontal plane
(b) 90° in vertical plane
(c) 180° in horizontal plane
(d) 180° in vertical plane

**129.** Which one is the CORRECT sequence for the temporary adjustment of the theodolite?

(a) Centering, elimination of parallax, leveling, and setting
(b) Centering, setting, elimination of parallax and leveling
(c) Setting, centering, leveling and elimination of parallax
(d) Setting, leveling, elimination of parallax and centering

**130.** Which of the following is used for determining the location of station occupied by the plane table?

(a) Both intersection and radiation
(b) Intersection method
(c) Radiation method
(d) Two point problem

**131.** Which of the following is responsible for the formation of residual soil?

(a) Glaciers  (b) Water
(c) Wind  (d) None of these

**132.** The coefficient of gradation and the coefficient of uniformity of a given soil sample is 1.0 and 4.0 respectively. The ratio of effective size to the diameter through which 30% of the total mass is passed is _____.

(a) 1.25  (b) 1.5
(c) 1.75  (d) 2

**133.** Which of the following shows the CORRECT order of increasing surface areas of the given soil?

(a) Clay < silt < sand < colloids
(b) Gravel < silt < colloids < clay
(c) Sand < silt < clay < colloids
(d) Silt < gravel < colloids < clay

**134.** What is the assumption made about back of wall, in the Rankine's theory of earth pressure?

(a) Plane and rough  (b) Plane and smooth
(c) Vertical and rough  (d) Vertical and smooth

**135.** Which of the following is CORRECT about the viscosity of gas?

(a) Inversely proportional to the temperature

(b) Increases with an increase in the temperature

(c) Independent of pressure

(d) Independent of temperature

**136.** Pressure of 200 kPa is equivalent to the head of z metre of liquid having relative density 1.59. The value of z (m) is_____.

(a) 11.6             (b) 11.82

(c) 12.82            (d) 13.14

**137.** Which one of the following statement is CORRECT about the center of buoyancy?

(a) It is the point where buoyant force act.

(b) It coincides with the centroid of volume of water displaced

(c) It is the point where buoyant force act. and It coincides with the centroid of volume of water displaced

(d) It acts outside the body.

**138.** A longitudinal rectangular surface is hanged into the water such that its top and bottom points are at depth of 1.5 m and 6.0 m respectively. The depth of center of pressure (m) from the top surface is _____.

(a) 3.8              (b) 4.2

(c) 4.6              (d) 4.8

**139.** The velocity potential which follow the equation of continuity is _____.

(a) $x^2 y$

(b) $x^2 - y^2$

(c) $\cos x$

(b) $x^2 + y^2$

**140.** At what distance from the boundary layer, the value of the wall shear is three times of the turbulent shear?

(a) $\dfrac{1}{3}R$           (b) $\dfrac{1}{2}R$

(c) $\dfrac{2}{3}R$           (d) $\dfrac{3}{4}R$

**141.** Which of the following statement is CORRECT about the stream lines and equipotential lines?

(a) Both can be drawn graphically for viscous flow around any boundary.

(b) Meshes formed by them are always squares.

(c) They always meet orthogonally.

(d) They can be calculated for all boundary conditions.

**142.** The Rankine half oval body MM is subjected to the two-dimensional flow having velocity V. The typical stream line is shown in the following diagram. The point A in diagram shows _____.
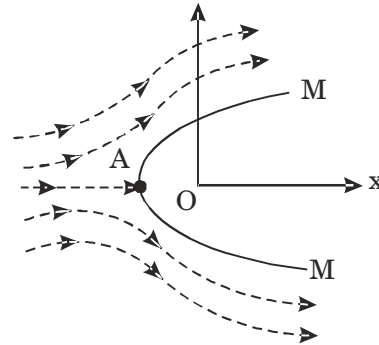


(a) point at which velocity is maximum

(b) separation point

(c) stagnation point

(d) stall point

**143.** Which of the following is CORRECT ratio for Froude number?

(a) Compressive force to inertia force.

(b) Inertia force to gravity force.

(c) Inertia force to tension force.

(d) Viscous force to inertia force.

**144.** For the most economical triangular channel section, the angle of sloping sides from the vertical is _____.

(a) 30°            (b) 45°

(c) 60°            (d) 75°

**145.** Method of applying water directly to the root zone of the plant is called _____.

(a) check flooding     (b) drip method

(c) furrow method     (d) sprinkler irrigation

**146.** A field of 500 hectares is to be irrigated for a particular crop having 100 days base period. The total depth of water required by the crop is 100 cm. Calculate the duty of the water (in hectares per cubic metre).

(a) 8.64

(b) 57.87

(d) 86.4

(d) 864

**147.** The traffic volume of a roadway is defined as the multiplication of _____.

(a) speed and time headway

(b) speed and distance way

(c) traffic density and speed

(d) time head way and distance headway

**148.** Calculate the equivalent radius (cm) of the resisting section of 20 cm slab, if the ratio of radius of wheel load distribution to the thickness of the slab is 2.
(*a*) 20
(*b*) 35.6
(*c*) 40
(*d*) 40.9

**149.** On peak hourly demand, what is the maximum daily consumption for the city which have average daily consumption of 100,000 m³ ?
(*a*) 140000
(*b*) 170000
(*c*) 200000
(*d*) 270000

**150.** For which of the following, distribution mains is designed?
(*a*) Average daily demand
(*b*) Annual peak demand
(*c*) Monthly peak demand
(*d*) Maximum hourly demand on maximum day

**151.** Which of the following statements is true?
A. Most of the loads applied to a building are environmental load.
B. Most of the loads are dead followed by live loads.
(*a*) Only A
(*b*) Only B
(*c*) Both A and B
(*d*) Neither A nor B

**152.** How does an increase in the pitch of the roof affects the amount of load that can be placed on it?
(*a*) It increases
(*b*) It decreases
(*c*) Remains constant
(*d*) Depends upon case

**153.** What will be the rain load (in psf) if $d_s$ is 2 inches and $d_h$ is 1 inches?
(*a*) 5.2
(*b*) 10.4
(*c*) 15.6
(*d*) 20.8

**154.** Concrete is:-
(*a*) Good in compression, good in tension
(*b*) Good in compression, weak in tension
(*c*) Weak in compression, weak in tension
(*d*) Weak in compression, good in tension

**155.** If in planar system, X parts/members are there with Y number of forces, then condition for statically determinacy is:-
(*a*) Y < 3X
(*b*) Y > 3X
(*c*) Y = 3X
(*d*) None of these

**156.** If a system has more equations of equilibrium than number of forces, then the system is:-
(*a*) Improperly constrained
(*b*) Partially constrained
(*c*) Stable
(*d*) None of these

**157.** Which of the following material is not used in making trusses?
(*a*) Wooden struts
(*b*) Metal bars
(*c*) Channel
(*d*) Concrete

**158.** In a truss it is assumed that the members are joined by_____.
(*a*) Rough pins
(*b*) Smooth pins
(*c*) Either rough or smooth pins
(*d*) None of these

**159.** What is the major difference between truss and beam?
(*a*) Beam can't transmit load in vertical direction while truss can
(*b*) Truss can't transmit load in vertical direction while beam can
(*c*) Beam can't transmit load in axial direction while truss can
(*d*) Truss can't transmit load in axial direction while beam can

**160.** Given that J is number of joints. B and R are no. of members and number of reactions.
If B = 4, R = 3 and J = 4, then the truss is:-
(*a*) Statically determinate
(*b*) Statically indeterminate and stable
(*c*) Stable
(*d*) Unstable

**161.** Which IS code gives details regarding water to be used in concrete?
(*a*) IS 456
(*b*) IS 383
(*c*) IS 565
(*d*) IS 3012

**162.** Which of the below is an example of plasticizer?
(*a*) Hydroxylated carboxylic acid
(*b*) Fluoro-silicate
(*c*) Gypsum
(*d*) Surkhi

**163.** How many methods of batching of concrete are there?
(*a*) 2
(*b*) 3
(*c*) 5
(*d*) 6

**164.** Concrete is generally placed on a:
(*a*) Form work
(*b*) Stand
(*c*) Mould
(*d*) Platform

**165.** The effective width of a column strip of a flat slab is taken as

(a) one-fourth the width of the panel

(b) half the width of the panel

(c) half the diameter of the column

(d) the diameter of the column

**166.** Permanent dimension changes due to loading of concrete is termed as:

(a) Strain        (b) Extent

(c) Creep        (d) Ambit

**167.** In design of R.C.C. structures, the tensile strength of concrete is taken as:

(a) $5N/mm^2$        (b) $2N/mm^2$

(c) $0.3N/mm^2$        (d) None of these

**168.** Flexure strength of concrete is determined as:

(a) Modulus of rigidity

(b) Modulus of rupture

(c) Modulus of plasticity

(d) Modulus of elasticity

**169.** Properties of concrete can broadly be divided into:

(a) 1        (b) 4

(c) 2        (d) 3

**170.** Which IS code gives specifications about cement plaster?

(a) IS 1500        (b) IS 1221

(c) IS 1400        (d) IS 1661

**171.** In a lime-cement plaster, ratio 1:1:6 corresponds to:

(a) Lime : cement : sand

(b) Cement : Lime : sand

(c) Lime : sand : gravel

(d) Cement : sand : gravel

**172.** On which of the following does the correct proportion of ingredients of concrete depend upon?

(a) bulking of sand

(b) water content

(c) absorption and workability

(d) All options are correct

**173.** If X, Y and Z are fineness moduli of coarse fine and combined aggregates, the percentage (P) of fine aggregates to combined aggregates is

(1) $P = \dfrac{Z-X}{Z-Y} \times 100$    (2) $P = \dfrac{X-Z}{Z-Y} \times 100$

(3) $P = \dfrac{X-Z}{Z+Y} \times 100$    (4) $P = \dfrac{X+Z}{Z-Y} \times 100$

(a) [1] only        (b) [2] only

(c) [3] only        (d) [4] only

**174.** Which of the following statements is false?

(a) Workability of the concrete mix decreases with an increase in the moisture content

(b) Concrete for which preliminary tests are conducted, is called controlled concrete

(c) Bulking of sand depends upon the fineness of grains

(d) All options are correct

**175.** Which of the following statements is false?

(a) Space between the exterior walls of a warehouse and bag piles should be 30 cm

(b) Cement bags should preferably be piled on wooden planks

(c) Cement bags should be placed such that bags of one layer does not touch the bags of the adjacent layer

(d) None of these

**176.** Which of the following statements is false?

(a) With passage of time, the strength of cement increases

(b) With passage of time, the strength of cement decreases

(c) After a period of 24 months, the strength of cement reduces to 50%

(d) The concrete made with storage deteriorated cement gains strength with time

**177.** For a concrete mix 1:3:6 and water cement ratio 0.6 both by weight, what is the quantity of water required per bag?

(a) 10 kg        (b) 12 kg

(c) 14 kg        (d) None of these

**178.** Transport of concrete by pumps, is done for a distance of

(a) 100 m        (b) 200 m

(c) 300 m        (d) 400 m

**179.** The compression in PSC is done by _____ of high-strength tendons.

(a) Compression        (b) Tensioning

(c) Shearing        (d) Bending

**180.** In which beam tension capacity of steel is greater than combined compression capacity of steel and concrete?

(a) Over-reinforced        (b) Under-reinforced

(c) Singly reinforced        (d) Doubly reinforced

**181.** If W is total load per unit area on a panel, D is the diameter of the column head, L is the span in two directions, then the sum of the maximum positive bending moment and average of the negative bending moment for the design of the span of a square flat slab, should not be less than

(A) $\dfrac{WL}{12}\left(L - \dfrac{2D}{3}\right)^2$     (B) $\dfrac{WL}{10}\left(L + \dfrac{2D}{3}\right)^2$

(C) $\dfrac{WL}{10}\left(L - \dfrac{2D}{3}\right)^2$     (D) $\dfrac{WL}{12}\left(L - \dfrac{D}{3}\right)^2$

(*a*) A only      (*b*) B only

(*c*) C only      (*d*) D only

**182.** For a circular slab carrying a uniformly distributed load, the ratio of the maximum negative to maximum positive radial moment is

(*a*) 1      (*b*) 2

(*c*) 3      (*d*) 4

**183.** If permissible compressive stress in concrete is 15 kg/cm$^2$, tensile stress in steel is 1400 kg/cm$^2$ and modular ratio is 18, the depth of the beam is

(1) $d = \sqrt{\dfrac{0.11765 \times B.M.}{breadth}}$    (2) $d = \sqrt{\dfrac{0.22765 \times B.M.}{breadth}}$

(3) $d = \sqrt{\dfrac{0.33765 \times B.M.}{breadth}}$    (4) $d = \sqrt{\dfrac{0.44765 \times B.M.}{breadth}}$

(*a*) [1] only      (*b*) [2] only

(*c*) [3] only      (*d*) [4] only

**184.** The breadth of a ribbed slab containing two bars must be between

(*a*) 6 cm to 7.5 cm      (*b*) 8 cm to 10 cm

(*c*) 10 cm to 12 cm      (*d*) None of these

**185.** A foundation rests on which of the following?

(*a*) base of the foundation

(*b*) sub grade

(*c*) foundation soil

(*d*) Both Sub grade and foundation soil

**186.** Which of the following statements is true?

(*a*) To ensure uniform pressure distribution, the thickness of the foundation is kept uniform throughout

(*b*) To ensure uniform pressure distribution, the thickness of the foundation is increased gradually towards the edge

(*c*) To ensure uniform pressure distribution, the thickness of the foundation is decreased gradually towards the edge

(*d*) To ensure uniform pressure distribution, the thickness of the foundation is kept zero at the edge

**187.** The weight of a foundation is assumed as which of the following?

(*a*) 5% of wall weight    (*b*) 7% of wall weight

(*c*) 10% of wall weight (*d*) 12% of wall weight

**188.** If the width of the foundation for two equal columns is restricted, the shape of the footing generally adopted is

(*a*) Square      (*b*) rectangular

(*c*) trapezoidal      (*d*) triangular

**189.** Maximum shear stress theory for the failure of a material at the elastic limit is known as

(*a*) Guest's or Trecas' theory

(*b*) St.Venant's theory

(*c*) Rankine's theory

(*d*) Haig's theory

**190.** A simply supported beam carries a varying load from zero at one end and w at the other end. If the length of the beam is a, the maximum bending moment will be

(A) $\dfrac{wa}{27}$      (B) $\dfrac{wa^2}{27}$

(C) $\dfrac{w^2 a}{\sqrt{27}}$      (D) $\dfrac{wa^2}{9\sqrt{3}}$

(*a*) A only      (*b*) B only

(*c*) C only      (*d*) D only

**191.** When not specified, the volume of steel in R.C.C. work is taken as:-

(*a*) 1% to 1.6% of R.C.C. volume

(*b*) 2% to 4% of R.C.C. volume

(*c*) 4% to 6% of R.C.C. volume

(*d*) 0.6% to 1% of R.C.C. volume

**192.** The ratio of maximum shear stress to average shear stress of a circular beam is:

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

C. $\dfrac{3}{4}$      D. $\dfrac{4}{3}$

(*a*) A only      (*b*) B only

(*c*) C only      (*d*) D only

**193.** The property of a material by which it can be beaten or rolled into plates, is called

(*a*) ductility      (*b*) plasticity

(*c*) elasticity      (*d*) none of these

**194.** What is the limit to Poisson's ratio?

(*a*) 0.1      (*b*) 0.2

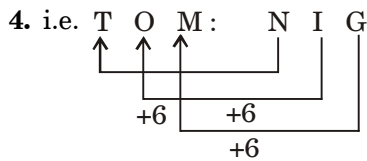(*c*) 0.3      (*d*) None of these

**195.** Among the following, which is least elastic?

(*a*) Iron

(*b*) Copper

(*c*) Both Copper and Silver

(*d*) Rubber

**196.** Two bars of different materials are of the same size and are subjected to same tensile forces. If the bars have unit elongations in the ratio of 4 : 7, then the ratio of modulius of elasticity of the two materials is

A. 4:7

B. 4:10

C. 16:49

(*a*) A only          (*b*) B only

(*c*) C only          (*d*) None of these

**197.** If a composite bar of steel and copper is heated, then the copper bar will be under:

(*a*) tension

(*b*) shear

(*c*) torsion

(*d*) none of these

**198.** Pick up the incorrect statement from the following : The torsional resistance of a shaft is directly proportional to

(*a*) modulus of rigidity

(*b*) angle of twist

(*c*) reciprocal of the length of the shaft

(*d*) moment of inertia of the shaft section.

**199.** Net sectional area of a tension member, is equal to its cross section area_____.

(*a*) plus the area of the rivet holes

(*b*) divided by the area of rivet holes

(*c*) multiplied by the area of the rivet holes

(*d*) minus the area of the rivet holes

**200.** When a tension member consists of two channel sections, the allowance for rivet hole is made for two holes from

(*a*) each web

(*b*) each flange

(*c*) each web or one hole from each flange whichever is more

(*d*) each web or one hole from each flange whichever is less
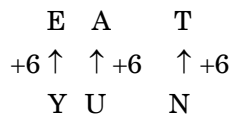
## ANSWERS

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| **1.** (*c*) | **2.** (*b*) | **3.** (*c*) | **4.** (*a*) | **5.** (*b*) | **6.** (*d*) | **7.** (*d*) | **8.** (*b*) | **9.** (*c*) | **10.** (*c*) |
| **11.** (*c*) | **12.** (*b*) | **13.** (*c*) | **14.** (*d*) | **15.** (*c*) | **16.** (*d*) | **17.** (*c*) | **18.** (*b*) | **19.** (*a*) | **20.** (*b*) |
| **21.** (*a*) | **22.** (*c*) | **23.** (*c*) | **24.** (*b*) | **25.** (*c*) | **26.** (*b*) | **27.** (*c*) | **28.** (*d*) | **29.** (*c*) | **30.** (*a*) |
| **31.** (*a*) | **32.** (*d*) | **33.** (*b*) | **34.** (*c*) | **35.** (*a*) | **36.** (*d*) | **37.** (*d*) | **38.** (*c*) | **39.** (*b*) | **40.** (*b*) |
| **41.** (*a*) | **42.** (*a*) | **43.** (*b*) | **44.** (*a*) | **45.** (*a*) | **46.** (*c*) | **47.** (*c*) | **48.** (*c*) | **49.** (*d*) | **50.** (*c*) |
| **51.** (*a*) | **52.** (*c*) | **53.** (*c*) | **54.** (*a*) | **55.** (*a*) | **56.** (*c*) | **57.** (*b*) | **58.** (*d*) | **59.** (*b*) | **60.** (*b*) |
| **61.** (*b*) | **62.** (*c*) | **63.** (*a*) | **64.** (*c*) | **65.** (*d*) | **66.** (*a*) | **67.** (*a*) | **68.** (*b*) | **69.** (*c*) | **70.** (*d*) |
| **71.** (*d*) | **72.** (*a*) | **73.** (*c*) | **74.** (*c*) | **75.** (*c*) | **76.** (*a*) | **77.** (*a*) | **78.** (*b*) | **79.** (*b*) | **80.** (*d*) |
| **81.** (*c*) | **82.** (*d*) | **83.** (*b*) | **84.** (*c*) | **85.** (*c*) | **86.** (*c*) | **87.** (*d*) | **88.** (*b*) | **89.** (*d*) | **90.** (*d*) |
| **91.** (*b*) | **92.** (*a*) | **93.** (*c*) | **94.** (*a*) | **95.** (*c*) | **96.** (*a*) | **97.** (*c*) | **98.** (*a*) | **99.** (*c*) | **100.** (*d*) |
| **101.** (*d*) | **102.** (*a*) | **103.** (*c*) | **104.** (*d*) | **105.** (*a*) | **106.** (*c*) | **107.** (*b*) | **108.** (*c*) | **109.** (*d*) | **110.** (*a*) |
| **111.** (*c*) | **112.** (*a*) | **113.** (*a*) | **114.** (*a*) | **115.** (*a*) | **116.** (*c*) | **117.** (*c*) | **118.** (*d*) | **119.** (*b*) | **120.** (*a*) |
| **121.** (*c*) | **122.** (*a*) | **123.** (*d*) | **124.** (*c*) | **125.** (*b*) | **126.** (*a*) | **127.** (*c*) | **128.** (*d*) | **129.** (*c*) | **130.** (*d*) |
| **131.** (*d*) | **132.** (*d*) | **133.** (*c*) | **134.** (*d*) | **135.** (*b*) | **136.** (*c*) | **137.** (*c*) | **138.** (*b*) | **139.** (*b*) | **140.** (*c*) |
| **141.** (*c*) | **142.** (*c*) | **143.** (*b*) | **144** (*b*) | **145.** (*b*) | **146.** (*d*) | **147.** (*c*) | **148.** (*c*) | **149.** (*d*) | **150.** (*d*) |
| **151.** (*b*) | **152.** (*b*) | **153.** (*c*) | **154.** (*b*) | **155.** (*c*) | **156.** (*b*) | **157.** (*d*) | **158.** (*b*) | **159.** (*b*) | **160.** (*d*) |
| **161.** (*a*) | **162.** (*a*) | **163.** (*a*) | **164.** (*a*) | **165.** (*b*) | **166.** (*c*) | **167.** (*d*) | **168.** (*b*) | **169.** (*c*) | **170.** (*d*) |
| **171** (*b*) | **172.** (*d*) | **173.** (*b*) | **174.** (*d*) | **175.** (*d*) | **176.** (*a*) | **177.** (*c*) | **178.** (*d*) | **179.** (*b*) | **180.** (*b*) |
| **181.** (*c*) | **182.** (*b*) | **183.** (*a*) | **184.** (*b*) | **185.** (*d*) | **186.** (*c*) | **187.** (*c*) | **188.** (*b*) | **189.** (*a*) | **190.** (*d*) |
| **191.** (*d*) | **192.** (*d*) | **193.** (*a*) | **194.** (*d*) | **195.** (*d*) | **196.** (*d*) | **197.** (*d*) | **198.** (*d*) | **199.** (*d*) | **200.** (*d*) |

# EXPLANATIONS

1. As Cloud gives rain, similarly Sun gives heat

2. As Cactus is a plant, similarly Rice is a crop

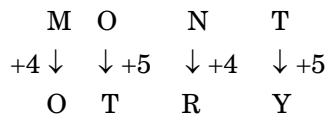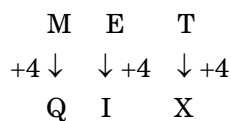3. As pink is a colour, similarly Eagle is a bird

4. i.e. T  O  M :  N  I  G

   with +6, +6, +6 mapping

   Similarly

   E  A    T

   +6↑  ↑+6   ↑+6

   Y  U    N

5.    L    E    R    I

   +4↓  ↓+5  ↓+4  ↓+5

      P    J    V    N

   Similarly

      M  O    N    T

   +4↓  ↓+5  ↓+4  ↓+5

      O  T    R    Y

6.    S    A    T

   +4↓  ↓+4  ↓+4

      W    E    X

   Similarly,

      M    E    T

   +4↓  ↓+4  ↓+4

      Q    I    X

7. 43 : 7 : : 23 : ?

   43 → 4 + 3 = 7

   Similarly,

   23 ⇒ 2 + 3 = 5.

8. 38 : 53 : : 53 : ?

   38 + 15 = 53

   similarly

   53 + 15 = ?

   ∴  ? = 68

9. 9 : 81 : : 11 : ?

   $(9)^2 = 81$

   similarly

   $(11)^2 = 121$

10. Among the given options Google, purse and belt are in singular form but Accessories are in plural form

11. Among the given options, Grapes, Guava and Orange are fruits while Cauliflower is vegetable.

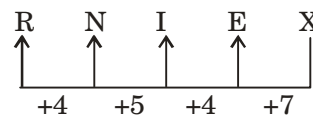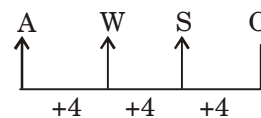12. Among the given options, sparrow, Ostrich and parrot are bird but Rat is a rodent.
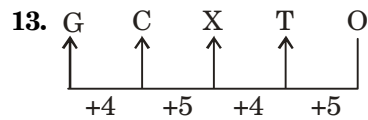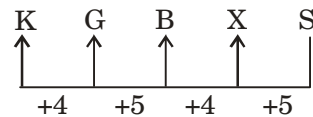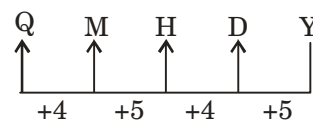
13. G   C   X   T   O

    +4  +5  +4  +5

    Similarly,

    K   G   B   X   S

    +4  +5  +4  +5

    Similarly,

    Q   M   H   D   Y

    +4  +5  +4  +5

    While,

    R   N   I   E   X

    +4  +5  +4  +7

14. S   O   K   G

    +4  +4  +4

    Similarly,

    A   W   S   O

    +4  +4  +4

    Similarly,

    R   N   J   F

    +4  +4  +4

    While

    C   Y   T   P

    +4  +5  +4

15. K   N   Q

    +3  +3

    Similarly,

    D   G   J

    +3  +3

Similarly

T     W     Z



+3     +3

While

W     Z     B



+3     +2
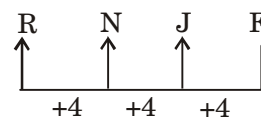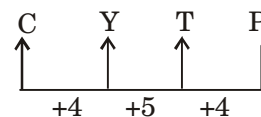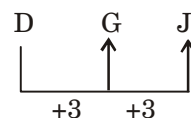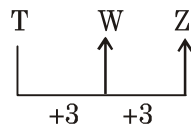
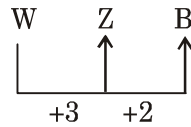**16.** $7 - 11 \Rightarrow 7 + 4 = 11$

similarly $12 - 16 \Rightarrow 12 + 4 = 16$

similarly $14 - 18 \Rightarrow 14 + 4 = 18$

while $9 - 15 \Rightarrow 9 + 4 = 13 \neq 15$

**17.** $2 - 4 \Rightarrow (2)^2 = 4$

$3 - 9 \Rightarrow (3)^2 = 9$

$4 - 18 \Rightarrow (4)^2 = 16 \neq 18$

$5 \rightarrow 25 \Rightarrow (5)^2 = 25$

**18.** $76 - 42 \Rightarrow 7 \times 6 = 42$

$92 - 20 \Rightarrow 9 \times 2 = 18 \neq 20$

$73 - 21 \Rightarrow 7 \times 3 = 21$

$93 - 27 \Rightarrow 9 \times 3 = 27$

**19.** Arranging the given words as per dictionary order we get the following sequence.

Flagrant, Flatter, Flavour, Flawed, Flick

**20.** Arranging the given words as per dictionary order we get the following sequence.

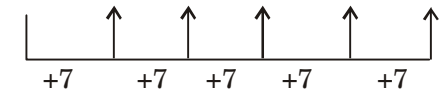Hectic, Helpful, Heritage, Heroic, Heroism.

Hence 'Heritage' word is at the third position

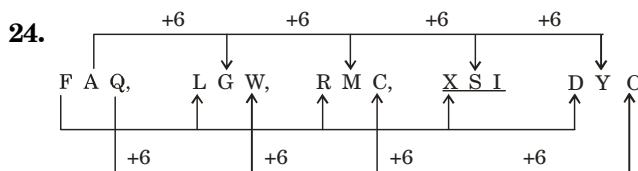**21.** Arranging the given word as per dictionary order we get the following sequence.

Judge, Justice, Justify, Juvenile

Hence 'Juvenile' words comes at last position

**22.** F,    M,    T,    <u>A</u>    H,    O



+7    +7    +7    +7    +7

**23.** R O K   L I E   F C Y   Z W S   T Q M



–3 –4 –1 –3 –4 –1 –3 –4 –1 –3 –4 –1 –3 –4

**24.**



**25.** 14, 22, 49, 113, 238, _____

$14 + 2^3 = 22$

$22 + 3^3 = 49$

$49 + 4^3 = 113$

$113 + 5^3 = 238$

$238 + 6^3 = 454$

**26.** 42, 21, 21, 31.5, 63, _____

$42 \times 0.1 = 21$

$21 \times 1 = 21$

$21 \times 1.5 = 31.5$

$31.5 \times 2 = 63$

$63 \times 2.5 = 157.5$

**27.** 14, 44, 135, 409, 1232, _____

$14 \times 3 + 2 = 44$

$44 \times 3 + 3 = 135$

$135 \times 3 + 4 = 409$

$135 \times 3 + 4 = 409$

$409 \times 3 + 5 = 1232$

$1232 \times 3 + 6 = 3702$

**28.** According to given information, we get the following sitting arrangement

C D E A B

'E' is sitting at third position

**29.** According to given relation,

A is B's father's sister.

**30.** From the given word 'MERCANTILE', 'TRUCE' word can't be form as letter 'U' of 'TRUCE' is not present in word 'MERCANTILE'.

**31.** O    L    Y    M    P    U    S

↑ +2 ↑ +2 ↑ +2 ↑ +2 ↑ +2 ↑ +2 ↑ +2

M   J    W    K    N    S    Q

   T    E    N

+2 ↑   + 2 ↑   + 2 ↑

   R    C    L

**32.**

| Code | Statement |
|------|-----------|
| 1875 | wound the round watch ...(1) |
| 6143 | a cake is round ..(2) |
| 7321 | watch a round wheel ...(3) |

From (1), (2) and (3)

Code for watch is '7'.

**33.** $+ \rightarrow -$

$- \rightarrow \times$

$\times \rightarrow \div$

$\div \rightarrow +$

$96 \times 4 \div 125 + 25 - 5$

$\Rightarrow 96 \div 4 + 125 - 25 \times 5$

$\Rightarrow 24 + 125 - 125$

$\Rightarrow 24$

**34.** 17 $ 22 = 4

$\Rightarrow (1 + 7) - (2 + 2) = 4$

similarly 56 $ 13 = 7

$\Rightarrow (5 + 6) - (1 + 3) = 7$
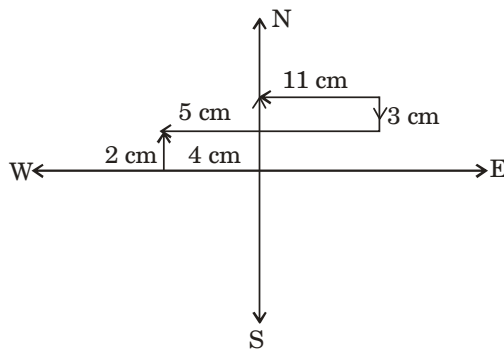
similarly 71 $ 25 = (7 + 1) - (2 + 5) = 1$

**35.** $ → son

\# → brother.

\* → father

X \# Y \* Z $ W

$X^+ → Y^+ ↔ \overline{W}$

$\qquad ↓$

$\qquad Z^+$

∴ W is X's brother's wife

**38.** 1 + 2 = 3
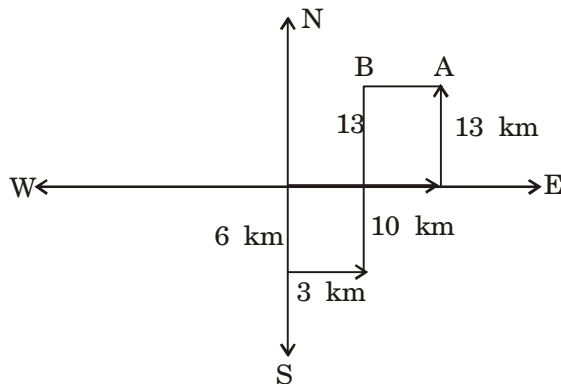
2 + 10 = 12

∴ 4 + 7 = ?

∴ ? = 11

**37.** At each step 'O' is shifting one position towards right
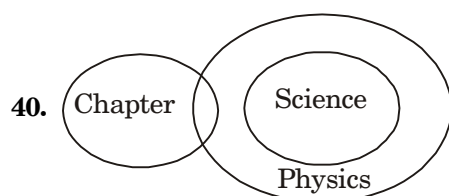
**38.**



Ant is 4 cm west from the starting position
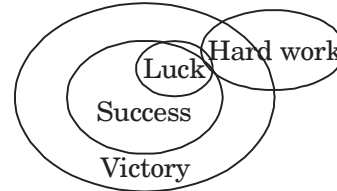
**39.**



Player 'A' is 7 km east from player 'B'.

**40.**



Conclusion: All science is chapters (×)

Some physics is science ✓.

**41.**



Conclusion: Some success is hard work ✓

Some hard work is victory ✓

No victory is luck (×).

**44.** Professors = {I, G, H, J}
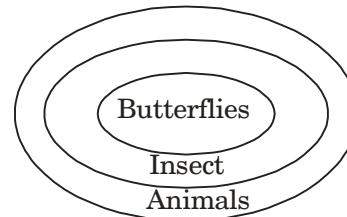
Social workers = {G, H, K, F, A}

Dieticians = {I, G, A, F, C, E}

Men = {A, C, B, D}

Dieticians who are not men

Dieticians – Men = {I, G, A, F, C, E} – {A, C, B, D}

$\qquad$ = {I, G, F, E}

**45.**



**50.** 'SPAN'

From option (a),

66, 87, 33, 56

↓ ↓ ↓

S   P   L(×)

from option (b),

59, 78, 42, 31

↓ ↓

S   O   (×)

from option (c),

86, 89, 32, 55

↓ ↓ ↓ ↓

S   P   A   N

∴ option (c) is correct

**51.** The expenses incurred when a company is formed and before the start of any business operations are termed as preliminary expenses. Capital expenditure is an example of Preliminary expenses.

**52.** The service sector of the economy is called tertiary sector. Services of various kinds like education, health, banking, insurance, trade and transport are included in this sector.while Bee keeping is not the tertiary sector.

53. In public sector unit, most of the assets is owned by Government

54. The population of India as per 2011 census was 1,210,193,422. India added 181.5 million to its population since 2001, slightly lower than the population of Brazil. India, with 2.4% of the world's surface area, accounts for 17.5% of its population.

55. Eighth five year plan of India recognized human development as the core of development efforts

56. Rousseau is associated with "the concept of political sovereignty"

57. "A good citizen makes a good state and a bad citizen makes a bad state" is said by Aristotle.

58. The Panchayti system has three levels: Gram Panchayat (village level), Mandal Parishad or Block Samiti or Panchayat Samiti(block level), and Zila Parishad (district level). Panchayat Samiti at the block level in India is an Administrative Authority

59. The Government has asserted "it is the sacrosanct right of Parliament" to decide on the perks and salaries of its members .

60. 8th schedule of the Indian constitution includes the list of recognised languages. ,

62. Odantapuri was a Buddhist Mahavihara which is now in Bihar, India. It was established by the Pala Emperor Gopala I in the 8th century. It is considered the second oldest of India's Mahaviharas after Nalanda University and was situated in Magadha.

63. The founder of the Bahmani kingdom was Alauddin Bahman Shah also known as Hasan Gangu in 1347.

64. The Khilafat Movement (1919-20 ) was essentially a movement to express Muslim support for the Caliph of Turkey against the allied powers particularly. During the rule of Lord Chelmsford in India the Khilafat movement begin.

65. In 1882 Pandita Ramabai established the Arya Mahila Samaj in Pune for women's education

66. Kavir Desert, great salt desert of north-central Iran.Located in a basin southeast of the Elburz Mountains.

67. The inner most layer of the earth is called the "Core or Barysphere"

68. The Blue Nile is a river originating in natural springs above Lake Tana in Ethiopia. The river has played a significant role in human history by supplying the majority of the water for the Nile River, providing the means for the land through which it flowed to be agriculturally productive

69. In terms of percentage of the total geographical area, Top states: Lakshadweep, Mizoram, Andaman & Nicobar Island, Arunachal Pradesh, Manipur .

70. Starting point of river Ganga after confluence of river Bhagirathi & Alaknanda at Devprayag After this join of two rivers the combined river is officially known as the river Ganga.

71. 'Nirvana Fund' was set up by NSDC for financial help to Ventures of selected candidates trained under PMKVY who did not get any job.

72. Government has announced four schemes for the maintaining the health of animals and livestock. These are "Pashudhan Sanjivani", an animal wellness programme and provision of Animal Health Cards ('Nakul Swasthya Patra'). Under this scheme, 8.5 crore animals in milk will be identified using UID and their data will be uploaded to the INAPH data base. Second is an advanced breeding technology. The third is Creation of E-Pashudhan Haat, an e market portal for connecting breeders and farmers and fourth is a National Genomic Centre for indigenous breeds.

73. Tata steel commissions solar power plant at Noamundi iron ore mines

74. The 2028 Summer Olympics, is a forthcoming international multi-sport event that is scheduled to take place from July 21 to August 6, 2028, in Los Angeles, California, United States.

75. The 2017 Davis Cup a tournament between national teams in men's tennis was won by France with Lucas Pouille defeating Steve Darcis of Belgium

76. "You are Unique" is written by Dr. A. P. J. Abdul Kalam.

77. The third Indian Council for Cultural Relations (ICCR) Distinguished Indologist Award for the year 2017 was awarded to Professor Hiroshi Marui of Japan. He was presented with this award by President Ram Nath Kovind at a function in Rashtrapati Bhavan, New Delhi.

78. The 600-year-old Walled City of Ahmedabad was declared World Heritage City by theWorld Heritage Committee (WHC) of UNESCO after it met in Karlow, Poland. It is first Indian city getting the honour.

79. India and Portugal have signed 11 pacts after in-depth talks between Prime Minister Narendra Modi and his Portuguese counterpart Antonio Costa in areas like counter-terrorism, space and climate studies.

80. India has signed an agreement with Sri Lanka to provide USD 318 million as line of credit for developing Sri Lanka's railway sector. The agreement was signed between Sri Lanka's Ministry of Finance and Mass media, and Managing Director of India's Export Import Bank in Colombo.

81. A dot matrix printer (DMP) is a type of printer which uses pins impacting an ink ribbon to print. These printers are generally considered outdated, as they cannot create high-quality prints and are costly as well.

82. The secondary storage devices can only store data but they cannot perform Arithmetic operations, Logic operations, or fetch operations

83. The p-block is on the right side of the periodic table and includes elements from the six columns beginning with column 13 and ending with column 18. This block contains a variety of elements and is the only block that contains all three types of elements: metals, nonmetals, and metalloids

84. Cinnabar is a toxic mercury sulfide mineral with a chemical composition of $HgS$. It is the only important ore of mercury.

85. A plane mirror always produces an image which is of the same size as the object.

86. Mass of a hydrogen atom is 1837 time the mass of an electron.

87. In Polycot, Polywool, Terrycot, contains polyster.

89. A positively charged particle projected towards west is deflected towards north by a magnetic field. The direction of magnetic field is upward. Hence, according to Fleming's left hand rule, the direction of magnetic field will be upwards.

90. Electron is negatively charged.

91. Among the given options, Vitamin C is water soluble vitamin.

92. Frog has skin and lungs, Leaves has stomata for exchange of Gases while Earthworm has skin.

93. In humans, other mammals, and birds, the heart is divided into four chambers: upper left and right atria and lower left and right ventricles. Commonly the right atrium and ventricle are referred together as the right heart and their left counterparts as the left heart.

94. Plasmodesma is not present in a matured stomata

95. Hypermetropia is a defect of vision that causes the impossibility for rays of light to be focused on the retina, but behind it. The main cause for this defect is the insufficiente eye length.i.e. Focal length of the eye lens is too long.

96. Antibiotics are used to treat or prevent bacterial infections.

97. Among the given option, Forestation is correct answer.

98. Carbon dioxide gas is major contributor to green house effect.

99. An equitable distribution of resources is not a major problem in development of resources

100. Among the given options, Grassland is not man made ecosystem.

101. Crushing strength of a stone can be defined as the load per unit area at which the stone starts cracking. It should be greater than 100 $N/mm^2$ to ensure sufficient strength for use in construction.

102. The age of timber can be determined by counting the annual rings of wood growth

103. Soundness of cement indicates quality to expand on the setting whereas unsound cement expands too much on setting and develops cracks, distortion, and disintegration in the structure. Soundness of cement is tested by Le Chatelier's device.

104. The mortar having high water cement ratio is used for the construction works carried act is water logged areas.

105. M 25 grade concrete, this split tensile strength is terms of percentage of its compressive strength is 7 to 11%.

106. Distemper are generally in powdered form which is used to coat interior surface which are not exposed to environment.

107. Retarders are admixture which prolong the chemical reaction between cement and water leading to increase is setting time. Following are the admixture used as a retarder are :- Gypsum, sugar, tartaric acid, lignin's etc.

108. In the process of hydration of OPC, purely chemical requirements for the purpose of complete hydration of cement is about 20-25%

109. Workability of concrete can be measured by following methods are:-
   → Slump test
   → Compacting factor test
   → Vee-Bee consistometer.

110. In plywood, the piles are placed at the right angles with each other hence it has good strength both along and across the grains which leads to low shrinkage and low expansion.

**111.** The following are the methods used for preparation of approximate construction cost estimates : Plinth area method, cubical contexts methods and unit base method. It plinth are method, the cost of construction is determined by multiplying plinth area with plinth area rate. Plinth area rate are fixed with respect of quality and quantity of material and labour, type of foundation, height of buildings, roof, wood work, fix tunes, number of storeys etc.

**112.** Accuracy required for the measurement of the thickness of the slab or sectional dimensions of column and beam should be 0.5 cm.

**113.** Taking out quantities for construction estimates by deduction of junction of the wall for total length of the central line for different junction are :-

**T-junction:-** Half $\left(\frac{1}{2}\right)$ breadth wall measurement should be deducted for a T junction.

**L-junction:-** No need to deduct from total centreline length.

**Star junction:-** Wall breadth measurement should be deducted to the total length of centreline.

**114.** For estimation of painted area of semi corrugated asbestos cement sheet, percentage increase in area above plain area is 0.1%.

**115.** It is usually a positive number, but it could be negative if there is a cost of disposal, hence scrap value can be negative or positive.

**116.** Works consists of linear measurement involve length like cornice, fencing, hand rail, bands of specified width etc, are expressed in running metre (RM).

**117.** consider modular Brick,

size of brick = 19 cm × 9 cm × 9 cm

Now, volume of brick with mortar

= 20 cm × 10 cm × 10 cn = 0.002 m³

Volume of Brick work in 1 m³

No. of Brick = $\dfrac{\text{Volume of Brick work}}{\text{Volume of 1 brick with mortar}}$

$= \dfrac{1}{0.002}$

= 500 bricks

No. of bricks for 20m³ brick work

= 20 × 500

= 10,000 Bricks

**118. Beam we require:-**

Bottom = 2 × 0.4 = 0.8

Sides = 2 × 1 × 2 × 0.2 = 0.8

Ends = 2 × 1 × 0.4 × 0.2 = 0.16

Total requirements = 0.16 + 0.8 + 0.8 = 1.76 ≈ 2m²

**119.** Prismoidal formula for volume (V)

$$= \frac{d}{3}\ [(A_1 + A_n) + 4(A_2 + A_4 + ....) + 2(A_3 + A_5 + ..)]$$

$$V = \frac{40}{3}\big[(10 + 35) + 4(15)\big]$$

V = 1400 m³.

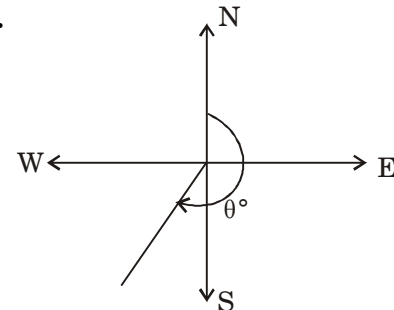**120.** Depreciation Rate for every year is

$$\text{Depreciation} = \frac{\left(\text{Original cost of machine} - \text{Scrap value}\right)}{\text{Useful life of machine}}$$

$$= \frac{(10000 - 1000)}{30} = 300$$

Thus. the amount of depreciation of machine would be Rs 300.

**121.** There is difference of one second between the sum of interior angles of plane triangle and spherical triangle for area of triangle 195 km² on the earth surface.

**123.**



Whole circle Bearing = θ

The quadrantal bearing of the line = S(θ − 180°)W

**124.** By trapezoidal method:-

$$V = d\left[\frac{A_1 - A_n}{2} + A_2 + A_3 + ..... + A_{n-1}\right]$$

$$V = 30\left[\frac{50 + 20}{2} + 40\right]$$

V = 2250 m³.

**125.** Most accurate tape is Invar tape correct order:-

Invar tape > Steel tape > Metallic tape > Linen tape.

**126.** $\quad H = \dfrac{\left(h_B - h_A\right) + \left(h_B - h_A{'}\right)}{2}$

When instrument at A:-

$h_A$ = Reading on staff at A = 2.5 m

$h_B$ = Reading on staff at B = 2.0 m

When instrument at B:-

$h_A' = $ Reading on staff at A = 1.2 m

$h_B' = $ Reading on staff at B. = 1.7 m

$$H = \frac{(2.5 - 2.0) + (1.2 - 1.7)}{2}$$

$$\boxed{H = 0}$$

**127.** Combined connection $C_c = -0.06728\ d^2$

d = 2km = Distance

$C_c = -0.067258 \times 2 \times 2$

$$\boxed{C_c = -0.296\ m}$$

**128.** In transit theodolites, the line of right can be reversed by revolving the telescope through 180° in vertical plane.

**129.** Sequence of temporary adjustment of theodolite is :-

→ Setting of instrument

→ Centering of instrument

→ Levelling the instrument by the help of bubble tube

→ Elimination of parallax.

**130.** Reaction is process of determining the location of the station (on the map) occupied by the plane table.

→ Resection by two point problem

→ Resection by three point problem.

**131.** Residual soils are formed when soils or rocks weather at the same location due to chemical, water and other environmental elements without being transported.

**132.** $C_c = 1.0$

$C_u = 4.0$

$$\frac{D_{30}}{D_{10}} = ?$$

$$Cc = \frac{D_{30}{}^2}{D_{60} \times D_{10}}$$

$$C_u = \frac{D_{60}}{D_{10}} \Rightarrow 4.0$$

$4\ D_{10} = D_{60}$

$$1.0 = C_c = \frac{D_{30}{}^2}{4D_{10}{}^2}$$

$$4 = \left(\frac{D_{30}}{D_{10}}\right)^2$$

$$\boxed{\frac{D_{30}}{D_{10}} = 2}$$

**133.** Increasing order of surface areas of given soil:-

Sand < Silt < Clay < Colloids

**134. Assumptions of Rankine theory:-**

→ The soil mass in homogenous, isotropic, semifinite, elastic, dry and cohesionless.

→ The ground surfaces in planar which may be horizontal or inclined.

→ The face of wall in contact with backfill is vertical and smooth.

→ The soil is in the state of plastic equilibrium in positive and active earth pressure condition.
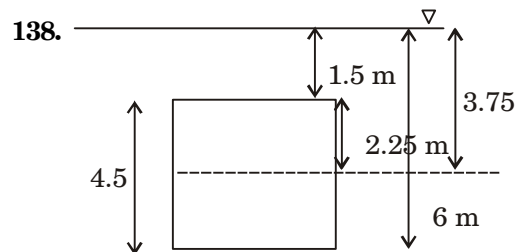
→ The rupture surface is planar.

**135.** Viscosity of liquids decreases with temperature where as viscosity of gases increases with increase in temperature.

**136.** $P = \rho g h$

$200 \times 10^3$ Pa $= (1000 \times 1.59) \times 9.81 \times Z$

Z = 12.82 m.

**137.** Center of buoyancy is the point where the buoyant force act and it coincide with the centroid of volume of water displaced.

**138.**



$$hcp = \overline{x} + \frac{Ia}{A\overline{x}}$$

$$hcp = 3.75 + \frac{bd^3}{12 \times bd \times 3.75}$$

$$hcp = 3.75 + \frac{4.5^2}{12 \times 3.75}$$

$$\boxed{hcp = 4.2\ m}$$

**139.** Equation of continuity :-

$$\frac{\partial p}{\partial t} + \frac{\partial(\rho u)}{\partial x} + \frac{\partial(\rho v)}{\partial y} + \frac{\partial(\rho w)}{\partial x} = 0$$

According to given conditions :-

$$\frac{\partial u}{\partial x} + \frac{\partial v}{\partial y} = 0$$

$$u = \frac{\partial \phi}{\partial x}, v = \frac{\partial \phi}{\partial y}$$

Now, $\Rightarrow \dfrac{\partial^2 \phi}{\partial x^2} + \dfrac{\partial^2 \phi}{\partial y^2} = 0$

**Case 1:-**

If $\phi = x^2y$

$\Rightarrow\ 2 \ne y + 0 \ne 0$

**Case 2:-**

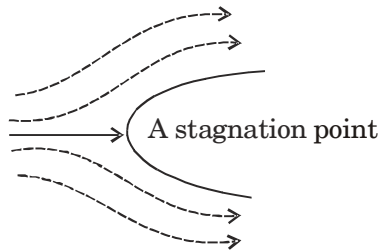If $\phi = (x^2 - y^2)$

$\Rightarrow\ +2 - 2 = 0$

**140.** Wall shear stress is 3 times of the turbulent shear, when the distance from the boundary layer is $\left(\dfrac{2}{3}\right) R$.

**141.** Streamliner and equipotential lines always acts orothogonally.

**142.** Stagnation point is a point is a flow field where the local velocity of the fluid is zero



A stagnation point

Separation point is defined as the point between the forward and backward flow where the shear stress is zero.

Stall is a condition in aerodynamic and aviation such that if the angle of attack increase beyond a certain point then lift begins to decrease.
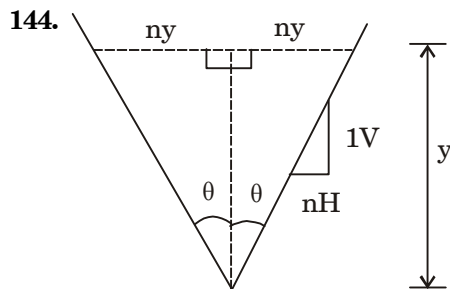
**143.** Froude number $= \sqrt{\dfrac{\text{Inertial force}}{\text{Gravity force}}}$

Reynolds Number $= \dfrac{\text{Inertial force}}{\text{Viscous force}}$

Euler Number $= \sqrt{\dfrac{\text{Inertial force}}{\text{Pr essure force}}}$

Weber Number $= \sqrt{\dfrac{\text{Inertial force}}{\text{Surface tention force}}}$

Mach Number $= \sqrt{\dfrac{\text{Inertial force}}{\text{Elastic force}}}$

**144.**



Let us consider a triangular section with side slope 1 V : nH. Depth of flow is y

$\tan \theta = \dfrac{ny}{y} = n$

$\boxed{n = \tan \theta}$

$A = \dfrac{1}{2} \times y \times 2ny$

$A = ny^2$

$\boxed{y^2 = \dfrac{A}{n}}$

$P = 2y \sqrt{1 + n^2}$

$P^2 = 4y^2 (1 + m^2)$

Take $P^2 = Z$

$Z = 4\dfrac{A}{n}\left(1 + n^2\right)$

$Z = 4A\,[\cot \theta + \tan \theta]$

**For minimum P :-**

$\dfrac{d2}{d\theta} = 0$

$4A\,[-\text{coses}^2\,\theta + \sec^2\,\theta] = 0$

$\therefore\ \cos^2\,\theta = \sec^2\theta.$

$\therefore\ \dfrac{1}{\sin^2\theta} = \dfrac{1}{\cos^2\theta}$
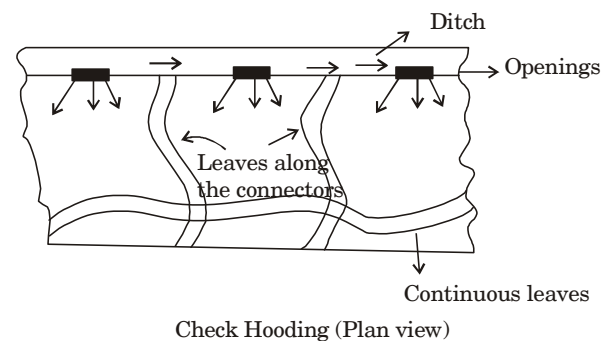
$\therefore\ \tan^2\,\theta = 1$ or $\cot^2\,\theta = 1$

it mean that $\boxed{\theta = 45°}$

$\boxed{m = 1}$

**145.** → **Check flooding :-**

→ In check flooding the crop area is divided into some plots which are relatively leveled by checks or bunds

→ Water from field channels is allowed to enter to each plots or check basin and the plots are flooded to the required depth.



Check Hooding (Plan view)

**Check flooding (plan view)**

→ **Drip Method:-**

Drip irrigation is a type of micro-irrigation system that has the potential to save water and nutrients by allowing water to drip slowly be the roots of plants, either from above the soil surface or buried below the surface. The goal is to place water directly into the root zone and minimize preparation.

→ **Furrow irrigation:-**

It is a type of irrigation in which trenches or 'furrow' are dug between crop row in a field farmer flow water down the furrows and it seeps vertically and horizontally to refill the soil reservoir.

→ **Sprinkler irrigation :-**

Sprinkler irrigation is the method of applying water in a controlled manner in way similar to rainfall.

**146.** Base period B = 100 days

Depth of water $\Delta$ = 100 cm = 1 m.

Duty of the water D = $8.64 \dfrac{B}{\Delta}$

$$= 8.64 \times \frac{100}{1} = 864 \text{ ha/m}^3.$$

**147.** Traffic density = K

Speed of which = V

Traffic volume = q

$\boxed{q = kxv}$

**148.** h = Slab thickness = 20 cm

$\dfrac{\text{Radius of wheel load distribution}\,(a)}{\text{Thickness of Slab}\,(h)} = 2$

$\dfrac{a}{20\text{cm}} = 2$

a = 40 cm

For $\dfrac{a}{h} > 1.724$

$\Rightarrow$ b = a

Hence b = equivalent radius of resisting section
= 40 cm

**149.** Maximum Hourly

Demand of maximum day

= 2.7 × (Annual Average hourly demand)

= 2.7 × 100,000

= 270000 m³

**150.** Service reservoir and distribution mains are designed for :-

$\left.\begin{array}{l}\rightarrow \text{Maximum hourly demand} \\ \quad \text{on maiximum day} \\ \rightarrow \text{Coincident draft} - \text{Average} \\ \quad \text{daily demand}\end{array}\right\}$ Maximum

**151.** Most of the loads are dead load followed by line loads.

Most of loads applied in the building is not environmental load.

**152.** The heating load is found to increase with the roof pitch, so the amount by load in decreased that can be placed on it.

**153.** As per ASCE 7,

$$\text{Rain Road} = \frac{5.2}{1} \times (d_1 + d_2)$$
$$= 5.2 \times (2 + 1)$$
$$= 15.6 \text{ psf.}$$

**154.** Concrete is a brittle material. It is good in compression but weak in tension.

**155.** X = parts / members

Y = No. of forces

In planar system, the statically determinacy is-

$\boxed{Y = 3X}$

**156.** Partially constrained, if it has two or fewer reaction compound (There is not enough reaction to prevent motion under all possible loading condition). Improperly constrained, if has three or more reaction.

**157.** Concrete cannot be used for making trusses because trusses undergo reversal of stresses and concrete is very weak in tension.

**158. Assumption for truss analysis:-**

→ The member cannot develop moments at the ends forces.

→ The connections to other member are perfectly pinned/hinged through frictionless (smooth) pips.

→ Each member is of uniform cross sectional area.

→ The entire structure is in one plane if it is a plane truss.

→ Load act at the joints only.

→ Self weight of the truss is neglected.

→ It the member are connected at the ends with gusset plates and welded, no fixity is assumed.

**159.** Truss member are always subjected to axial loads while beam is subjected to axial force, shear force and bending moments.

**160.** Ds = m + r − zj

m = B = No. of member = 4

r = R = No. of reaction = 3

j = J = No. of joints = 4

Ds = 4 + 3 − (2 × 4)

Ds = −1 < 0 (unstable)

**161.** IS 456 – 2000 gives details regarding mix design and water used in concrete.

**162.** Hydroxylate carboxylic acid, lignosulfonates are common plasticizers.

**163.** There are only method of batching of concrete:-

→ **Volume Batching :-** In volume batching materials are measured on the basis of volume.

→ **Weight Batching :-** The batching is done measured on the basis of weight.

**164.** → Form work is temporary or permanent molds into which concrete or similar materials are poured.

→ Moulds are used to make something into a particular shape or form by pressing it or by putting it into a mould.

→ For working at Height the working platform is used.

**165.** As per IS 456 : 2000

The effective width of a column strip of a flat slab is taken as half the width of panel.

**166.** Permanent and some temporary dimension changes due to constant load at constant temperature for long duration of time is called as creep.

**167.** Concrete does not take up tensile loads, it is taken as zero (We basically design cracked section). But IS 456 – 2000 recommends the tensile strength to be calculated using $f_t = 0.7 \sqrt{fck}$ N/mm². It is bending (flexural) tensile strength.

**168.** Flexural strength or modulus of rupture of concrete $= 0.7\sqrt{fck} \ N/mm^2$

**169.** Based on the state of concrete, its properties vary. Concrete in the fresh state has different properties than concrete in a hardened state.

**170.** IS 1661 → Code of proactive for the application of cement and cement-time plastering on building

IS 1542 : 1992 → Specification for sound for plaster

IS 1500 - (2005) → Method for Brinell Hardness Test.

**171.** Lime – Cement plaster, ratio is given as - Cement : Lime : Sand

**172. Factor affecting the Design mix of concrete:-**

→ Compressive strength of concrete

→ Workability of concrete

→ Durability of concrete

→ Water-Cement Ratio

→ Maximum Nominal size of aggregrate

→ Grading of combined Aggregrate

→ Quality control at site

→ Bulking of sand.

**173.** $P = \left(\dfrac{X - 2}{2 - Y}\right) \times 100$

X = Fineness modulus of coarse aggregrate

Y = FM of fine aggregrate

Z = FM of combined.

**174.** → Concrete for which preliminary test are conducted, is called controlled concrete

→ Bulking of sand depend upon the fineness of grains

→ Workability of concrete is inversely proportional to water cement ratio because if the amount of w/c ratio increases, workability decreases.

**175.** Following points are kept in mind for cement warehouse:-

→ Space between the exterior walls of a warehouse and bag piles should be 30 cm

→ Cement bag should be placed closer together in the piles.

→ Width and height of the piles should not exceed 3 m and 2.70 m respectively

**176.** Strength of concrete increases with time but for cement decreases with time

**178.** Transporting of concrete by pump is done for horizontal distance 400 m and vertical distance of 90 m. Pumped with a rate of 8 to 70 m³/hour.

**179.** By tensioning the tendons in pre stressed concrete it undergoes compression

**180.** In under-reinforced section

→ ta = fst

→ Ca < $\sigma_{cbc}$ (characteristic strength of concrete)

**182.** Maximum negative radial moment $= \dfrac{3WR^2}{16}$

Maximum positive radial moment $= \dfrac{6WR^2}{16}$

Ratio of both $= \dfrac{\dfrac{6WR^2}{16}}{\dfrac{3WR^2}{10}} = 2.$

**183.** Compressive strength of concrete $\sigma_{cbc} = 50$ kg/cm$^2$.

Tensile stress in steel = 1400 kg/cm$^2$.

Modulus Ratio m = 18

$K = \dfrac{m\,\sigma_{cbc}}{m\,\sigma_{ckt}\sigma_{st}} = \dfrac{18 \times 50}{18 \times 50 + 1400} = 0.3913$

$j = 1 - \dfrac{K}{3} = \dfrac{1 - 0.3913}{3} = 0.87.$

$Q = \dfrac{1}{2}\sigma_{cbc} \times jk$

$\phantom{Q} = \dfrac{1}{2} \times 50 \times 0.87 \times 0.3913 = 8.510775$

BM = Q bd$^2$

$\sqrt{\dfrac{BM}{Qb}} = d$

$\boxed{d = \sqrt{\dfrac{0.1175 \times BM}{breadth}}}$

**184.** → Clear spacing between rips shall not be greater than 4.5 cm.

→ Width of the rib shall not be less than 7.5 cm

→ Overall depth of the slab shall not exceed four times the breadth of the rib

→ The thickness of the topping of a ribbed slab varies between 5 cm to 8 cm.

→ The breadth of a ribbed slab containing two bars must be between 8 cm to 10 cm.

→ The maximum diameter bar used in ribbed slab is 22 mm.

**185.** Foundation rests on both subgrade soil and foundation soil.

**186.** The maximum load acts at centre line of footing or centre of foundation. Intensity of load in reduced towards the outer edge of footing. footing is designed according to load distribution, thickness of fasting is maximum at centre and reduced towards edge of footing. But pressure distribution will be uniform throughout width of footing.

**187.** Weight of foundation generally taken as 10% of wall weight or column load.

**188.** Rectangular shaped footing is generally adopted if the width of the foundation for two equal columns is restricted.

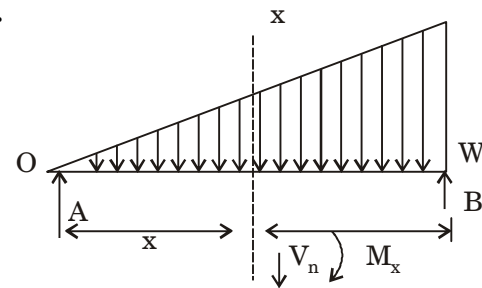**189.** Maximum principle stress theory-Rankine theory.

Maximum principle strain theory-St. Venant's theory.

Maximum shear stress theory-Guest and Tresca's theory.

Maximum strain energy theory-Haigh's theory

Maximum shear strain theory- Distortion theory Mises Henky theory .

**190.**



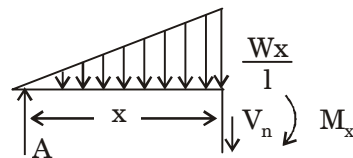$\Sigma Y = 0$

$R_A + R_B = \dfrac{1}{2}Wa$

$\Sigma M_A = 0$

$R_B \times Q + \dfrac{1}{2}W.l\dfrac{.a \times 2}{.3} = 0$

$R_B = \dfrac{wa}{3}$

$R_B = \dfrac{wa}{6}$

$\Sigma\,BM_x = 0$



$-R_A \times x + \dfrac{1}{2}\dfrac{wx}{a}.x.\dfrac{x}{3} + [x] = 0$

$M_x = -R_A \times x + \dfrac{1}{2}\dfrac{wx}{a}x\dfrac{xx}{3} \ldots..(i)$

$\dfrac{dMx}{dx} = 0\ \{for\ maximum\ BM\}$

$0 = \dfrac{dMx}{dx} = -\dfrac{wa}{6} + \dfrac{3wx^2}{6Q}$

$\dfrac{wa}{6} = \dfrac{wx^2}{2a}$

$$\frac{wa^2}{3} = wx^2$$

$$x = \sqrt{\frac{a^2}{3}}$$

$$\boxed{x = \frac{a}{\sqrt{3}}}$$

Put value of x in equation (i) we go →

$$M_x = R_A = \frac{Q}{\sqrt{3}} + \frac{1}{2}\frac{w}{a}\left(\frac{a}{\sqrt{3}}\right)^3 \times \frac{1}{3}$$

$$M_x = -\frac{wa}{6}\frac{a}{3} + \frac{1}{2}\frac{w}{a}\left(\frac{a}{\sqrt{3}}\right)^2 \times \frac{1}{3}$$

$$\boxed{M_x = \frac{wa^2}{9\sqrt{3}}}$$

**191.** If not specified, the volume of steel in RCC work is taken as 0.6% to 1% OF RCC volume.

**192.** Maximum shear stress $= \dfrac{4}{5}\dfrac{V_u}{bd}$

$\qquad\qquad\qquad = \dfrac{4}{3}$ average shear stress

**193.** Property of a material by which it can be beaten or rolled into plates is called malleability.

**194.** Limiting value of Poisson's Ratio are $-1 < \mu < 0.5$.

**195.** Rubber is least elastic materials.

Young modulus of iron = 162 – 170 GPa

$\qquad\qquad$ or

Modulus of elasticity

Youngs modulus of silver = 85 GPa

Young modulus of copper = 128 GPa

Young modulus of rubber < Silver < Copper < Iron

**196.** $\Delta = \dfrac{PL}{AE}$

$P_1 = P_2$

$A_1 = A_2$

$L_1 = L_2$

$\dfrac{\Delta_1}{\Delta_2} = \dfrac{4}{7}$

$$\frac{\Delta_1 = \dfrac{P_1 L_1}{AE}}{\Delta_2 = \dfrac{P_2 L_2}{A_2 E_2}}$$

$\dfrac{\Delta_1}{\Delta_2} = \dfrac{E_2}{E_1}$

**197.** In composite bar the final length of bath bars must remain same. As we know, thermal coefficient of copper is more than steel, but the final length to be compressive force is induced in copper bar.

**198.** $\dfrac{T}{J} = \dfrac{G\theta}{l} = \dfrac{\tau}{R}$

$\dfrac{T}{J} = \dfrac{G\theta}{l}$

**199.** Net sectional area

$\qquad$ = Area of cross section – Area of Rivet holes

**200.** If a tension member consists of two channel section, the allowance for rivet holes is made for two holes from each web or one hole from flange whichever is less.