

**DO NOT BREAK THE SEAL OF THE BOOKLET UNTIL YOU ARE TOLD TO DO SO****QUESTION BOOKLET****SERIES : I****Subjects : General English, General Knowledge and Civil Engineering**

Full Marks : 350

Time Allowed : 2½ Hours

*Read the following instructions carefully before you begin to answer the questions.***INSTRUCTIONS TO CANDIDATES**

1. This Booklet contains 175 Questions to be answered in a separate OMR Answer Sheet using Black Ballpoint Pen in the following three Parts :

<b>Part—A</b>	<b>: General English</b>	<b>: 50 questions</b>
<b>Part—B</b>	<b>: General Knowledge</b>	<b>: 25 questions</b>
<b>Part—C</b>	<b>: Civil Engineering</b>	<b>: 100 questions</b>

2. All questions are compulsory.
3. You will be supplied the Answer Sheet separately by the Invigilator. You must complete the details of particulars asked for.
4. Answers must be shown by completely blackening the corresponding circles in the Answer Sheet against the relevant question number by Black Ballpoint Pen. OMR Answer Sheet without marking Series shall not be evaluated.

**Example :**

Suppose the following question is asked :

**The Capital of Meghalaya is**

- (A) Guwahati  
 (B) Kohima  
 (C) Shillong  
 (D) Delhi

You will have four alternatives in the Answer Sheet for your response corresponding to each question of the Question Booklet as below :

(A) (B) (C) (D)

In the above illustration, if your chosen response is alternative (C), i.e., Shillong, then the same should be marked on the Answer Sheet by blackening the relevant circle with a Black Ballpoint Pen only as below :

(A) (B) ● (D)

**The example shown above is the only correct method of answering.**

5. Answer the questions as quickly and as carefully as you can. Some questions may be difficult and others easy. Do not spend too much time on any one question.
6. There will NOT be any negative marking for wrong answers.
7. The Answer Sheet must be handed over to the Invigilator before you leave the Examination Hall.
8. No Rough Work is to be done on the Answer Sheet. Space for Rough Work has been provided in the Question Booklet.

## PART—A : GENERAL ENGLISH

( Marks : 100 )

Each question carries 2 marks

**Directions :** Read the following passage and complete the sentences by selecting the answer choice from the alternatives given. Mark the correct answer in your Answer Sheet.

Former Delhi Metro Chief, E. Sreedharan, popularly called Metro Man for his contribution towards setting up the Delhi Metro, has written to the Prime Minister Narendra Modi asking him not to agree to the Delhi Government's proposal to make travel free for women commuters.

The Aam Aadmi Party government in Delhi had recently announced its decision to give free travel facility to women passengers on buses and Metro trains. As the Delhi Metro Rail Corporation is an equal partnership between the Delhi Government and the Centre, Mr. Sreedharan, a principal advisor to DMRC, said the Prime Minister's 'personal intervention' was required.

"One shareholder cannot take a unilateral decision to give concession to one section of the community and push Delhi Metro into inefficiency and bankruptcy," he wrote in his letter of June 10. After being an instrumental part of the Delhi Metro since its inception, Mr. Sreedharan stepped down as Managing Director in 2011. He wrote that he had decided not to intervene in the working of the Delhi Metro after stepping down, but the Delhi

Government's decision had forced him to come forward.

"Sir, when the first section of the Delhi Metro was to be opened, I had taken a firm and conscious decision that no one would be given any travel concession on Delhi Metro. This stand was taken to maximize revenues so that Metro fares could be kept low so as to be affordable to ordinary citizens... ." At the same time, Metro would make sufficient operational surpluses to pay back loans taken from JICA, Mr. Sreedharan wrote.

He recalled that the then Prime Minister Atal Bihari Vajpayee bought a ticket for himself when he went to inaugurate the first section of the Metro on December 23, 2002. "Now, if ladies are to be given free travel concession in Delhi Metro, it would set an alarming precedence for all other Metros in the country. The argument of Delhi Government that the revenue losses would be reimbursed to DMRC is a poor solace. The amount involved is about ₹ 1,000 crores per annum today. This will go on increasing as the Metro network expands and with further fare hikes on the Metro," he wrote.

He said other sections of commuters, including the 'more deserving' like students, the disabled and senior citizens, as well as other Metros in the country would raise

similar demands if Delhi's proposal for free travel for women becomes a reality.

1. What has Mr. Sreedharan written to the Prime Minister regarding the decision taken by the Delhi Government allowing free travel for women in Metro trains?

- (A) He has supported the decision and has asked the Prime Minister to replicate the same in all the other Metro networks in the country
- (B) He has supported the move but he is not satisfied with the extent of relaxation being given by the Delhi Government
- (C) He has requested the Prime Minister to make sure that this decision is disapproved by the PM
- (D) He has requested the Prime Minister to reimburse the Delhi Metro for the losses it would incur due to the latest decision taken by it

2. When did Mr. Sreedharan quit as the Managing Director of Delhi Metro?

- (A) 2010
- (B) 2013
- (C) 2017
- (D) 2011

3. What will the Delhi Government do in order to take care of the losses incurred by Delhi Metro due to free travel permission for women?

- (A) The government will make sure that other commuters pay more amount so that there is no revenue shortfall

(B) The government will make sure that nobody can travel without ticket so that fines can reimburse the loss

(C) The government will reimburse the loss incurred by the Delhi Metro due to the decision of the government

(D) The government has not taken any decision regarding the reimbursement of the losses incurred by the Delhi Metro for the decision to allow free travel to women commuters

4. Which among the following is correct regarding the ownership pattern of the Delhi Metro as described in the given passage?

(A) It is an equal partnership between the Delhi Government and Uttar Pradesh Government as it covers areas of both

(B) It is an equal partnership between the Central Government and the Delhi Government

(C) It is wholly owned by Indian Railways and no Central Government Ministry is involved in its general administration

(D) It is wholly owned by the Delhi Government and foreign agencies have lent support to the government

5. Which among the following is correct regarding the concerns raised by Mr. Sreedharan regarding the decision taken by the Delhi Government?

- (A) It will set a precedent for all the other metro networks operating in the country as similar demands will be raised there also
- (B) It will be very difficult to make sure that male commuters use the Metro network to go to work from now onwards
- (C) It is going to make sure that Delhi Metro is always crowded with women and this will actually increase crimes against them
- (D) All of the above

**Directions : For the given idioms, choose the best alternative which expresses the closest meaning of the idiom. Mark the correct answer in your Answer Sheet.**

6. Beat a dead horse

- (A) Exploit someone to the point of killing him/her
- (B) To continue playing a game knowing very well that you are going to lose
- (C) Show extreme level of cruelty especially to animals
- (D) To uselessly dwell on a subject far beyond its point of resolution

7. Out of print

- (A) A book no longer available from the publisher
- (B) All publishers refuse to publish your book
- (C) Not able to print due to being short on paper
- (D) Intentionally not mention some items in the article or book

8. Keep under one's hat

- (A) Take care of somebody else's valuables given to you for safe keeping
- (B) Steal and hide something
- (C) To keep something a secret
- (D) Keep all your wealth in your home

9. The ball is in your court

- (A) Request someone to return your belonging
- (B) To tell someone politely about his/her mistake
- (C) Put the blame on the other person
- (D) It is up to you to make the next decision or step

10. Make one's flesh creep

- (A) To flatter someone
- (B) To frighten someone
- (C) To confuse someone
- (D) To abuse someone

**Directions :** In the following questions, substitute each sentence with a single word from among the given alternatives. Mark the correct answer in your Answer Sheet.

11. A place to bury dead bodies.  
(A) Catacomb  
(B) Crypt  
(C) Cemetery  
(D) Sepulchre
12. A hundred-year-old man.  
(A) Century  
(B) Centurion  
(C) Centenarian  
(D) Cent
13. The absence of government.  
(A) Unruly  
(B) Misrule  
(C) Anarchy  
(D) Chaos
14. A man who remains unmarried.  
(A) Bachelor  
(B) Artist  
(C) Spinster  
(D) Uncle
15. The yearly return of a date.  
(A) Ceremony  
(B) Recurrence  
(C) Commemoration  
(D) Anniversary

**Directions :** In the following questions, choose a word that is opposite in meaning to the given word from among the given alternatives. Mark the correct answer in your Answer Sheet.

16. Military  
(A) Civil  
(B) Civility  
(C) Militant  
(D) Coup
17. Embrace  
(A) Obscure  
(B) Contradict  
(C) Reject  
(D) Disobey
18. Sinister  
(A) Good  
(B) Long  
(C) Evil  
(D) Short
19. Sterile  
(A) Short  
(B) Common  
(C) Fertile  
(D) Wild
20. Abundance  
(A) Lavish  
(B) Scarcity  
(C) Profusion  
(D) Generous

**Directions :** In the following questions, choose a word that is most similar in meaning to the given word from among the given alternatives. Mark the correct answer in your Answer Sheet.

21. Massive

- (A) Strong
- (B) Little
- (C) Gaping
- (D) Huge

22. Cease

- (A) Begin
- (B) Stop
- (C) Create
- (D) Dull

23. Germinate

- (A) Decay
- (B) Breed
- (C) Sprout
- (D) Produce

24. Interfere

- (A) Intrude
- (B) Stay out of
- (C) Facilitate
- (D) Delay

25. Pacify

- (A) Gather
- (B) Allot
- (C) Calm
- (D) Scold

**Directions :** In the following questions, a sentence is given in Direct/Indirect speech. Out of the four alternatives suggested, choose the one which best expresses the same sentence in Direct/Indirect speech. Mark the correct answer in your Answer Sheet.

26. The doctor said, "You take rest."

- (A) The doctor advised me to take rest.
- (B) The doctor was advised me to take rest.
- (C) The doctor advised me to took rest.
- (D) The doctor said me to you had taken rest.

27. He said to her, "What a sunny day !"

- (A) He told her that it was a sunny day.
- (B) He exclaimed that it was a sunny day.
- (C) He exclaimed sorrowfully that it was a sunny day.
- (D) He exclaimed that it was a very sunny day.

28. Mr. Lambert exclaimed that his wallet was stolen.

- (A) "My wallet was stolen!" Mr. Lambert said.
- (B) "Somebody stole my wallet!" exclaimed Mr. Lambert.
- (C) Mr. Lambert exclaimed, "My wallet was stolen!"
- (D) Mr. Lambert cried, "My wallet was stolen".

29. The leader says, "A country cannot be peaceful until good education is provided to each child."

- (A) The leader says that a country could not be peaceful until good education is provided to each child.
- (B) The leader says that a country cannot be peaceful until good education was provided to each child.
- (C) The leader says that a country cannot be peaceful until good education will be provided to each child.
- (D) The leader says that a country cannot be peaceful until good education is provided to each child.

30. The man asked the boy if he could tell him where the nearest bus station is.

- (A) Where is the nearest bus station?  
The man asked the boy.
- (B) The man asked the boy, "Could you tell me where the nearest bus station is"?"
- (C) The man asked the boy, "Where is the nearest bus station?"
- (D) The man said to the boy, "Where is the nearest bus station"?"

**Directions :** In the following questions, some sentences have errors and some do not. The underlined words are the key words where you can identify whether the sentence is erroneous or not. From the given set of choices, choose the correct alternative for the identified errors. Where there is no error, choose the specified option (D). Mark the correct answer in your Answer Sheet.

31. The little boy does whatever his father was done.

- (A) has done (B) did
- (C) does (D) No errors

32. The man to who I sold the house was a cheat.

- (A) to whom I sell
- (B) to whom I sold
- (C) who was sold to
- (D) No errors

33. The intruder stood quietly for a few moments.

- (A) for few moments
- (B) for few time
- (C) for moments
- (D) No errors

34. The notorious robbers were finally captured with the police.

- (A) over (B) under
- (C) by (D) No errors

35. They continued to work in the field despite of the heavy raining.

- (A) even though it rained heavily
- (B) in spite of raining
- (C) although heavily raining
- (D) No errors

**Directions :** In the following questions, there are jumbled up sentence parts which are labelled as A, B, C and D. Rearrange the sequence in order to produce the correct sentence. Choose the correct sequence order from the given set of alternatives. Mark the correct answer in your Answer Sheet.

36. A. tramp  
B. I was  
C. as free  
D. as a

- (A) ABCD  
(B) DABC  
(C) BCDA  
(D) CABD

37. A. the first film  
B. he ever  
C. that is  
D. saw

- (A) ACBD  
(B) CABD  
(C) BACD  
(D) DCAB

38. A. by her indulgent parents  
B. the child was so spoiled  
C. when she did not receive all of their attention  
D. that she pouted and became sullen

- (A) BADC  
(B) CDBA  
(C) ADCB  
(D) BCDA

39. A. that  
B. racialism  
C. should be wiped out  
D. people want

- (A) BCAD  
(B) DBCA  
(C) DABC  
(D) ABDC

40. A. checked regularly  
B. you should have  
C. blood pressure  
D. your

- (A) DCAB  
(B) ADCB  
(C) BADC  
(D) BDCA



**Directions :** In the following cloze passage, there are blank spaces which are numbered. Against each number, choose the most appropriate choice from the set of given alternatives. Mark the correct answer in your Answer Sheet.

Now-a-days, under the modern system of education, however good it may be, when a young man comes out of the university, there seems to be this 41 in him that the higher the standard of living rises, the less should a man work. Thus, mathematically, higher the standard of living, according to this misconceived notion, the less the 42 ultimately. What should be the highest standard of living then? No work! This leads to an unhealthy ambition among the workers. A typist who types over twenty letters a day asks his 43 how many letters he had typed that day. The latter replies 'fifteen'. The former thinks, "Tomorrow I should type only fifteen or even less." This tendency is quite 44 and may ultimately lead to 45 even one's family life may be affected adversely due to such tendency.

41. (A) anxiety  
(B) realization  
(C) misconception  
(D) apprehension
42. (A) work (B) time  
(C) salary (D) energy
43. (A) colleague (B) boss  
(C) subordinate (D) client
44. (A) unnatural (B) healthy  
(C) unfortunate (D) discouraging
45. (A) retardation (B) denial  
(C) complexity (D) evil

**Directions :** In the following questions, the sentences have blank spaces followed by four alternative answers. Choose the correct alternative from the given choices. Mark the correct answer in your Answer Sheet.

46. She \_\_\_\_\_ be hungry after all that running.  
(A) need (B) can  
(C) must (D) may
47. Rice and curry \_\_\_\_\_ a tasty dinner.  
(A) are (B) makes  
(C) do make (D) make
48. We \_\_\_\_\_ be considerate towards our neighbours.  
(A) ought to  
(B) dare  
(C) need  
(D) will
49. Wood \_\_\_\_\_ on water.  
(A) float  
(B) floated  
(C) will float  
(D) floats
50. He has \_\_\_\_\_ friends. He is an introvert.  
(A) few  
(B) a few  
(C) several  
(D) many

**PART—B : GENERAL KNOWLEDGE**

( Marks : 50 )

Each question carries 2 marks

51. The first G20 Summit was held in the year  
(A) 2008 at Buenos Aires  
(B) 2009 at Rio de Janeiro  
(C) 2008 at Washington, DC  
(D) 2007 at Berlin
52. In which year was India's first satellite launched?  
(A) 1955 (B) 1972  
(C) 1975 (D) 1999
53. The theme for the World Environment Day, 2023 was  
(A) Only One Earth  
(B) One World One Earth  
(C) Only One Nation  
(D) Solutions to Plastic Pollution
54. Who was the first female Panel Referee to be appointed to the ICC International in 2019?  
(A) Sudha Shah  
(B) Jhulan Goswami  
(C) G. S. Lakshmi  
(D) Diana Edulji
55. 1 kilobyte is equal to how many bytes?  
(A) 1024 bytes  
(B) 8 bytes  
(C) 1010 bytes  
(D) 1042 bytes
56. Who is called as the Father of Modern Computer?  
(A) Alan Turing  
(B) Charles Babbage  
(C) John von Neumann  
(D) J. W. Mauchly
57. Who amongst the following first used the slogan, Jai Hind?  
(A) Mangal Pandey  
(B) Bhagat Singh  
(C) Dr. B. R. Ambedkar  
(D) Subhas Chandra Bose
58. Monkeypox disease's name changed to \_\_\_ by the World Health Organization.  
(A) Mkpox (B) Mpox  
(C) Mky-P (D) Mky-Pox
59. Which of the following is termed as the Tiger State?  
(A) Jammu and Kashmir  
(B) Rajasthan  
(C) Gujarat  
(D) Madhya Pradesh
60. India exploded its first underground nuclear device at  
(A) Kota  
(B) Ranchi  
(C) Jaipur  
(D) Pokhran

61. Match List-I with List-II :

<i>List-I</i>	<i>List-II</i>
a. Troposphere	1. Dust particles
b. Stratosphere	2. Ozone layer
c. Ionosphere	3. Meteors
d. Exosphere	4. Aurora

Select the correct answer using the codes given below.

Codes :

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

62. What is the domain originally meant for non-profitable organization?

- (A) .gov  
(B) .org  
(C) .in  
(D) .net

63. The file extension for Excel Spreadsheet is

- (A) .doc  
(B) .txt  
(C) .xls  
(D) .ppt

64. Which country is known for its frequent earthquakes?

- (A) China  
(B) Japan  
(C) Philippines  
(D) South Korea

65. Tsunami occurs due to

- (A) mild earthquakes and landslides in the oceans  
(B) strong earthquakes and landslides in the oceans  
(C) strong landslides in the oceans  
(D) strong earthquakes in the oceans

66. Which of the following gases are considered for the calculation of 'Air Quality Index'?

1. Carbon dioxide  
2. Carbon monoxide  
3. Nitrogen dioxide  
4. Sulphur dioxide  
5. Methane

Codes :

- (A) 1, 2 and 3  
(B) 2, 3 and 4  
(C) 1, 4 and 5  
(D) 1, 2, 3, 4 and 5

67. 'Green Muffler' is associated with

- (A) water pollution  
(B) noise pollution  
(C) air pollution  
(D) nuclear pollution

68. Name the research station on Antarctica set up by India.

- (A) Dakshin Gangotri  
(B) Dakshin Ganga  
(C) Dakshin Godavari  
(D) None of the above

69. Arrange the following awards in respect of degree of honour.

1. Padma Bhushan
2. Padma Vibhushan
3. Bharat Ratna
4. Padma Shri

Codes :

- (A) 1, 2, 3, 4
- (B) 3, 2, 1, 4
- (C) 4, 3, 2, 1
- (D) 3, 4, 1, 2

70. Who is the Governor of Meghalaya who has been in office since 18th Feb, 2023?

- (A) Satya Pal
- (B) Tathagata Roy
- (C) Phagu Chauhan
- (D) B. D. Mishra

71. The National Girl Child Day is celebrated every year on

- (A) 21st January
- (B) 24th January
- (C) 8th March
- (D) 25th February

72. \_\_\_\_\_ denotes an error in a computer program.

- (A) Bug
- (B) Virus
- (C) Spam
- (D) Bit

73. The full form of IFSC is

- (A) International Fund System Code
- (B) Indian Fund System Code
- (C) Indian Financial System Code
- (D) Indian Fund Security Code

74. The headquarters of UNICEF is situated in

- (A) New York
- (B) Geneva
- (C) Washington
- (D) Brussels

75. The Father of Artificial Intelligence is

- (A) Charles Babbage
- (B) John McCarthy
- (C) Alan Turing
- (D) Elon Musk

**PART—C : CIVIL ENGINEERING**

( Marks : 200 )

Each question carries 2 marks

- 76.** Clay and silt content in a good brick earth must be at least
- (A) 20%
  - (B) 50%
  - (C) 35%
  - (D) 70%
- 77.** Standard size of a masonry brick is
- (A) 18 cm × 8 cm × 8 cm
  - (B) 19 cm × 9 cm × 9 cm
  - (C) 20 cm × 10 cm × 10 cm
  - (D) 21 cm × 11 cm × 11 cm
- 78.** Seasoning of timber is done for removing
- (A) knots from timber
  - (B) sap from timber
  - (C) roughness from timber
  - (D) All of the above
- 79.** Gypsum is added to cement to
- (A) prevent cracks
  - (B) promote  $C_3S$  and  $C_2S$  formation
  - (C) give uniform texture
  - (D) counteract  $C_3A$  formation
- 80.** The commonly used lime for white-washing is
- (A) quick lime
  - (B) fat lime
  - (C) hydraulic lime
  - (D) Any of the above can be used
- 81.** The shrinkage of concrete
- (A) is proportional to water content of the mix
  - (B) is proportional to cement concrete
  - (C) increases with the age of concrete
  - (D) All of the above
- 82.** To hydrate 500 kg cement, water needed is
- (A) 100 kg
  - (B) 110 kg
  - (C) 120 kg
  - (D) 130 kg
- 83.** The bulk density of aggregates **does not** depend upon
- (A) size and shape of aggregates
  - (B) specific gravity of aggregates
  - (C) grading of aggregates
  - (D) size and shape of container

**84.** If 20 kg of coarse aggregate is sieved through 80 mm, 40 mm, 20 mm, 10 mm, 4.75 mm, 2.36 mm, 1.18 mm, 600 micron, 300 micron and 150 micron standard sieves and the weights retained are 0 kg, 2 kg, 8 kg, 6 kg, 4 kg respectively, the fineness modulus of the aggregate lies in the range of

- (A) 6.85-7.10
- (B) 7.20-7.45
- (C) 7.50-7.75
- (D) None of the above

**85.** An aggregate is said to be flaky if its least dimension is less than

- (A) 1/5th of mean dimension
- (B) 2/5th of mean dimension
- (C) 3/5th of mean dimension
- (D) 4/5th of mean dimension

**86.** The whole circle bearing of a line is  $287^\circ 15'$ . The reduced bearing of the line is

- (A)  $S107^\circ 15' W$
- (B)  $S17^\circ 15' W$
- (C)  $N72^\circ 45' W$
- (D)  $S107^\circ 15' E$

**87.** In the prismatic compass

- (A) the graduated ring attached to the compass moves with sights
- (B) usage is not possible without a tripod
- (C) the needle remains stationary when box is rotated
- (D) whole circle bearings are calculated

**88.** The multiplying constant for the tacheometer is generally kept as

- (A) 100
- (B) 20
- (C) 40
- (D) 60

**89.** The correction to be applied to each 30 m chain length for a line measurement along a slope of  $\theta$  is

- (A)  $30(1 - \cos\theta)$
- (B)  $30(1 - \sin\theta)$
- (C)  $30(1 - \tan\theta)$
- (D)  $30(1 - \cot\theta)$

90. The arithmetical check for the computation of RL by 'rise and fall' method is given by

- (A)  $\Sigma FS - \Sigma BS = RL$  of last station point - RL of first station point =  $\Sigma Fall - \Sigma Rise$
- (B)  $\Sigma BS - \Sigma FS = RL$  of first station point + RL of last station point =  $\Sigma Rise - \Sigma Fall$
- (C)  $\Sigma BS - \Sigma FS = RL$  of last station point - RL of first station point =  $\Sigma Rise - \Sigma Fall$
- (D)  $\Sigma BS - \Sigma FS = RL$  of first station point - RL of last station point =  $\Sigma Rise - \Sigma Fall$

91. An inorganic clay of high compressibility is represented by the symbol

- (A) SM  
(B) CH  
(C) ML  
(D) MH

92. A soil sample has a shrinkage limit of 10% and specific gravity of soil solids as 2.7. The porosity of the soil at shrinkage limit is

- (A) 21.2%  
(B) 27%  
(C) 73%  
(D) 78.8%

93. Consider the following statements in relation to the given table :

Volume (cc)	Content	Weight (gm)
0.2	Air	0
0.3	Water	0.3
0.5	Solids	1.0

- Soil is partially saturated at degree of saturation = 60%
- Void ratio = 40%
- Water content = 30%
- Saturated unit weight = 1.5 gm/cc

Which of the above statements is correct?

- (A) 1, 2 and 3  
(B) 1, 3 and 4  
(C) 2, 3 and 4  
(D) 1, 2 and 4

94. In a permeability test conducted on a soil with  $e = 0.50$ , the discharge velocity was found to be  $2.4 \times 10^{-1} \text{ cm/s}$ . The seepage velocity is

- (A)  $7.2 \times 10^{-1} \text{ cm/s}$   
(B)  $4.8 \times 10^{-1} \text{ cm/s}$   
(C)  $3.6 \times 10^{-1} \text{ cm/s}$   
(D)  $1.6 \times 10^{-1} \text{ cm/s}$

95. Terzaghi's equation of ultimate bearing capacity for a footing may be used for square footing resting on pure clay soil with the correction factor

- (A) 0.4  
(B) 0.6  
(C) 1.2  
(D) 1.3

96. If  $D_1$  = inside diameter of cutting edge or drive shoe,  $D_2$  = maximum outside diameter of the cutting edge,  $D_3$  = inside diameter of a soil sample tube,  $D_4$  = outside diameter of sampler tube, the 'area ratio' of samples will be

(A)  $\left( \frac{D_2^2 - D_1^2}{D_1^2} \right)$

(B)  $\left( \frac{D_2 - D_1}{D_4} \right)$

(C)  $\left( \frac{D_2 - D_4}{D_4} \right)$

(D)  $\left( \frac{D_4^2 - D_3^2}{D_2^2} \right)$

97. Westergaard's analysis for stress distribution beneath loaded areas is applicable to

- (A) sandy soil
- (B) clayey soil
- (C) stratified soil
- (D) silty soil

98. For a granular soil with increasing void ratio, the critical hydraulic gradient

- (A) decreases
- (B) increases
- (C) remains constant
- (D) is zero

99. The ratio of volume of voids to the total volume of soil mass is called

- (A) air content
- (B) porosity
- (C) void ratio
- (D) All of the above

100. Clay is an example of

- (A) aquifer
- (B) aquitard
- (C) aquifuge
- (D) aquiclude

101. What is caused by the addition of coarser particles like sand or silt to clay?

- (A) Decrease in liquid limit and increase in plasticity index
- (B) Decrease in liquid limit and no change in plasticity index
- (C) Decrease in both liquid limit and plasticity index
- (D) Increase in both liquid limit and plasticity index

102. The saturated unit weight of a soil is  $20 \text{ kN/m}^3$  and the unit weight of water is  $10 \text{ kN/m}^3$ . If the groundwater table is at the surface of soil and lateral earth pressure coefficient of soil is 0.4, then effective lateral stress at 10 m depth will be

- (A) -20 kPa
- (B) 40 kPa
- (C) 80 kPa
- (D) 180 kPa



- 103.** For a fluid, the shear stress was found to be directly proportional to the rate of angular deformation. The fluid is classified as
- (A) non-Newtonian fluid  
 (B) ideal fluid  
 (C) Newtonian fluid  
 (D) thixotropic fluid
- 104.** The Pitot tube is used to measure
- (A) velocity at stagnation point  
 (B) stagnation pressure  
 (C) static pressure  
 (D) dynamic pressure
- 105.** In a free vortex, velocity
- (A) decreases with radius  
 (B) increases with radius  
 (C) is constant  
 (D) varies inversely as the square of the radius
- 106.** The dimensions of Chezy's  $C$  is
- (A) non-dimensional  
 (B)  $\frac{L}{T}$   
 (C)  $LT$   
 (D)  $\left[\frac{L}{T^2}\right]^{1/2}$
- 107.** If  $\phi = 3xy$ , then  $x$  and  $y$  components of velocity at the point (1, 3) will be
- (A)  $u = -9, v = -3$   
 (B)  $u = -3y, v = -3x$   
 (C)  $u = \frac{\partial\phi}{\partial x}, v = \frac{\partial\phi}{\partial y}$   
 (D)  $u = -9, v = -9$
- 108.** A flat plate of  $0.15 \text{ m}^2$  is pulled at  $20 \text{ cm/s}$  relative to another plate, fixed at a distance of  $0.02 \text{ cm}$  from it with a fluid having  $\mu = 0.0014 \text{ Ns/m}^2$  separating them. What is the power required to maintain the motion?
- (A)  $0.014 \text{ W}$   
 (B)  $0.021 \text{ W}$   
 (C)  $0.035 \text{ W}$   
 (D)  $0.042 \text{ W}$
- 109.** An error of  $0.5\%$  in the measurement of head in a V-notch causes an error of
- (A)  $0.5\%$  in the discharge  
 (B)  $1\%$  in the discharge  
 (C)  $1.25\%$  in the discharge  
 (D)  $1.5\%$  in the discharge
- 110.** Two tanks are connected in parallel by two pipes  $A$  and  $B$  of identical factors and lengths. If the size of pipe  $A$  is double that of pipe  $B$ , then their discharge will be in the ratio of
- (A) 2  
 (B) 4  
 (C) 5.66  
 (D) 32

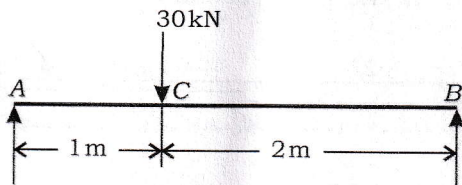
111. The head loss at an orifice ( $C_v = 0.98$ ) discharging under a head of 2 m is
- 0.02 m
  - 0.04 m
  - 0.06 m
  - 0.08 m
112. Which of the following pairs is correctly matched?
- Froude's number—Inertial to surface tension force
  - Mach number—Inertial to elastic force
  - Euler number—Inertial to gravity force
  - Reynolds' number—Inertial to pressure force
113. The discharge capacity required at the outlet to irrigate 2600 ha of sugarcane having a kor depth of 17 cm and a kor period of 30 days is
- $2.7 \text{ m}^3/\text{s}$
  - $1.17 \text{ m}^3/\text{s}$
  - $14.7 \text{ m}^3/\text{s}$
  - $0.18 \text{ m}^3/\text{s}$
114. The water utilizable by plants is available in the form of
- gravity water
  - hygroscopic water
  - capillary water
  - chemical water
115. The field capacity of a soil is 25%, its permanent wilting point is 15% and specific dry unit weight is 1.5. If the depth of root zone of a crop is 80 cm, then the storage capacity of the soil is
- 8 cm
  - 10 cm
  - 12 cm
  - 14 cm
116. The intensity of irrigation means
- percentage of culturable commanded area to be irrigated annually
  - percentage of gross commanded area to be irrigated annually
  - percentage of the mean of culturable commanded area and the gross commanded area to be irrigated annually
  - total depth of water supplied by the number of waterings
117. The field irrigation requirement is computed as
- consumptive use + field application losses
  - net irrigation requirement + field application losses
  - net irrigation requirement + conveyance losses
  - consumptive use + conveyance losses

- 118.** An accurate estimate of average rainfall in a particular catchment can be obtained by
- (A) arithmetic mean method
  - (B) isohyetal method
  - (C) normal ratio method
  - (D) Thiessen method
- 119.** If the base period of a 6-hr hydrograph in a basin is 84 hours, then 12 hours unit hydrograph derived from this 6 hour unit hydrograph will have a base period of
- (A) 72 hours
  - (B) 78 hours
  - (C) 84 hours
  - (D) 90 hours
- 120.** Probability of a 10-year flood to occur at least once in the next 4 years is
- (A) 25%
  - (B) 35%
  - (C) 50%
  - (D) 65%
- 121.** S-curve hydrograph is the hydrograph
- (A) producing 1 cm of runoff over the basin
  - (B) of flow from a 1 cm intensity rain of infinite duration
  - (C) having a volume of  $1 \text{ cm}^3$
  - (D) of the total storm duration in any single storm rainfall
- 122.** The yield of well depends on the
- (A) permeability of soil
  - (B) area of aquifer opening into the wells
  - (C) actual flow velocity
  - (D) All of the above
- 123.** If a uniform bar is supported at one end in a vertical direction and loaded at the bottom end by a load equal to the weight of the bar, then the strain energy as compared to that due to self-weight will be
- (A) same
  - (B) half
  - (C) twice
  - (D) thrice
- 124.** For a given material, if  $E$ ,  $N$  and  $\frac{1}{m}$  are Young's modulus, modulus of rigidity and Poisson's ratio, then
- (A)  $E = 2N\left(1 + \frac{1}{m}\right)$
  - (B)  $E = 2N\left(1 - \frac{1}{m}\right)$
  - (C)  $E = \frac{2N}{\left(1 + \frac{1}{m}\right)}$
  - (D)  $E = \frac{1}{2N\left(1 + \frac{1}{m}\right)}$
- 125.** The area under stress-strain curve represents the
- (A) breaking strength of material
  - (B) toughness of material
  - (C) hardness of material
  - (D) energy required to cause failure

126. For a beam, the term  $M/EI$  is

- (A) stress
- (B) rigidity
- (C) curvature
- (D) shear force

127. For a simply supported beam shown in the figure below, the magnitude of vertical reaction at B is



- (A) 20 kN
- (B) 18 kN
- (C) 15 kN
- (D) 10 kN

128. Maximum permissible shear stress in a section is  $100 \text{ kg/cm}^2$ . If bar is subjected to tensile force of 5000 kg and if the section is square shaped, what is the dimension of sides of the squares?

- (A) 10 cm
- (B) 5 cm
- (C) 12 cm
- (D)  $\sqrt{2}$  cm

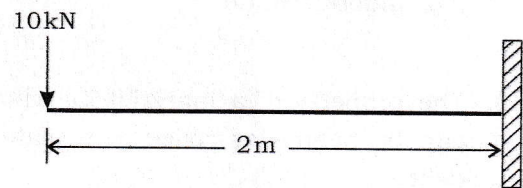
129. The ratio of flexural rigidity of a beam ( $b \times d$ ) to another one ( $b \times 2d$ ) of similar material will be

- (A)  $\frac{1}{2}$
- (B)  $\frac{1}{4}$
- (C)  $\frac{1}{8}$
- (D)  $\frac{1}{18}$

130. Two beams, one of circular cross-section and the other of square cross-section, have equal areas of cross-section. If subjected to bending, then

- (A) both sections are equally economical
- (B) both sections are equally stiff
- (C) circular cross-section is more economical
- (D) square cross-section is more economical

131. A cantilever beam is shown in the figure below :



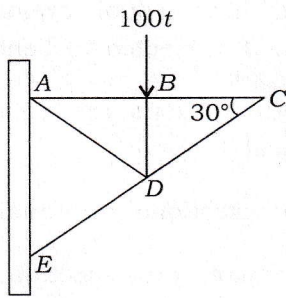
Find the magnitude and direction of moment to be applied at free end for zero vertical deflection.

- (A) 9 kN-m clockwise
- (B) 9 kN-m anticlockwise
- (C) 12 kN-m clockwise
- (D) None of the above

132. The unit of second moment of area is

- (A) mm
- (B)  $\text{mm}^4$
- (C)  $\text{mm}^3$
- (D)  $\text{mm}^2$

133. In the truss shown in the figure below, the force in member  $BC$  is



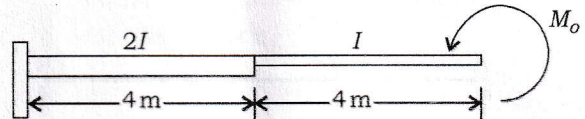
- (A)  $100t$  compressive  
 (B)  $100t$  tensile  
 (C) zero  
 (D) indeterminate
134. The property of a material by which it can be beaten or rolled into plates, is called
- (A) malleability  
 (B) ductility  
 (C) plasticity  
 (D) elasticity
135. A simply supported beam having a span of 3 m and carrying a uniformly distributed load of  $10 \text{ kN/m}$  has a shear force, at mid-span of

- (A) 15 kN  
 (B) 30 kN  
 (C) 7.5 kN  
 (D) zero

136. Shear span is defined as the zone where

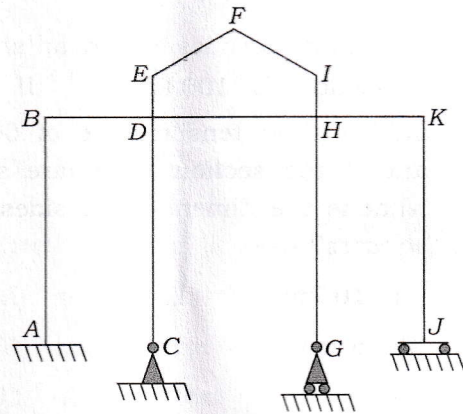
- (A) bending moment is zero  
 (B) shear force is zero  
 (C) shear force is constant  
 (D) bending moment is constant

137. A propped cantilever is acted upon by a moment  $M_o$  at the propped end. What is the prop reaction?



- (A)  $\frac{10M_o}{EI}$       (B)  $\frac{15M_o}{EI}$   
 (C)  $\frac{20M_o}{EI}$       (D)  $\frac{30M_o}{EI}$

- 138.



Neglecting axial deformation, the kinematic indeterminacy of the structure shown above is

- (A) 12  
 (B) 14  
 (C) 20  
 (D) 22

**139.** For which of the following conditions, the virtual work should be zero according to the principle of virtual work?

1. A body moving with constant acceleration
2. A body rotating with constant speed
3. A body in equilibrium
4. A body moving with constant momentum

Select the correct answer using the codes given below.

- (A) 1 only
- (B) 1 and 2
- (C) 3 only
- (D) 4 only

**140.** A beam carries a uniformly distributed load through its length. In which of the following conditions, strain energy is maximum?

- (A) Cantilever
- (B) Simply supported beam
- (C) Propped cantilever
- (D) Fixed beam

**141.** Force method in structural analysis always ensures

- (A) compatibility deformation
- (B) equilibrium of force
- (C) kinematically admissible strains
- (D) overall safety

**142.** Due to some point load anywhere on a fixed beam, the maximum free bending moment is  $M$ . The sum of fixed end moment is

- (A)  $M$
- (B)  $1.5 M$
- (C)  $2 M$
- (D)  $3 M$

**143.** The value of ultimate creep coefficient for concrete

- (A) increases with the age of loading
- (B) decreases with the age of loading
- (C) remains constant
- (D) is taken as 0.0003

**144.** The modulus of elasticity is increased with

- (A) higher water-cement ratio
- (B) shorter curing period
- (C) lesser vibration
- (D) increase in age

**145.** Stress-strain curve of concrete is

- (A) a perfect straight line up to failure
- (B) straight line up to 0.002% strain value and then parabolic up to failure
- (C) nearly parabolic up to 0.002% strain value and then a straight line up to failure
- (D) hyperbolic up to 0.002% strain value and then a straight line up to failure

**146.** The permissible bending compressive strength for M25 grade concrete is  $8.5 \text{ N/mm}^2$ . Its short-term and long-term modular ratio is

- (A) 8 and 11
- (B) 8 and 8
- (C) 11 and 11
- (D) 11 and 6

**147.** The nominal mix of M25 is

- (A) 1 : 2 : 4
- (B) 1 : 1½ : 3
- (C) 1 : 1 : 2
- (D) 1 : 1 : 1

**148.** When HYSD bars are used in place of mild steel bars in a beam, then the bond strength

- (A) remains same
- (B) increases
- (C) decreases
- (D) becomes zero

**149.** Torsion resisting capacity of a given R-C section

- (A) decreases with decrease in stirrups spacing
- (B) decreases with increase in longitudinal bars
- (C) does not depend upon stirrup and longitudinal steels
- (D) increase with the increase in stirrup and longitudinal steels

**150.** Which of the following should be employed to provide lateral support to the beams?

1. Bracing of compression flanges
2. Shear connectors
3. Bracing of tension flanges
4. Embedding compression flanges into RCC slab

Select the correct answer using the codes given below.

- (A) 1 only
- (B) 1 and 4
- (C) 2 and 3
- (D) 1, 2 and 4

151. A reinforced concrete slab is 75 mm thick. The maximum size of reinforcement bar that can be used is
- (A) 6 mm diameter
  - (B) 8 mm diameter
  - (C) 10 mm diameter
  - (D) 12 mm diameter
152. In a singly reinforced beam, if the concrete is stressed to its allowable limit earlier than steel, the section is said to be
- (A) economical section
  - (B) over-reinforced section
  - (C) balanced section
  - (D) under-reinforced section
153. The minimum clear cover (in mm) for the main reinforcement in column, according to IS 456-2000 is
- (A) 20
  - (B) 25
  - (C) 40
  - (D) 50
154. An RCC column is regarded as long column if the ratio of its unsupported length between end restraints to least lateral dimension is more than
- (A) 25
  - (B) 150
  - (C) 125
  - (D) 60
155. The maximum permissible limit for fluoride in drinking water is
- (A) 0.1 mg/L
  - (B) 1.5 mg/L
  - (C) 5 mg/L
  - (D) 10 mg/L
156. The product of  $H^+$  ions and  $OH^-$  ions in a strong alkali at 25 °C is
- (A) 0
  - (B) 1
  - (C)  $10^{-1}$
  - (D)  $10^{-14}$
157. If the total hardness and alkalinity of a sample of water are 300 mg/L and 100 mg/L ( $CaCO_3$  scale) respectively, then its carbonate and non-carbonate hardness (in units of mg/L) will be respectively
- (A) 100 and 200
  - (B) 400 and 300
  - (C) 100 and 400
  - (D) 400 and zero
158. Air-binding in rapid sand filter is encountered when
- (A) there is excessive negative head
  - (B) the water is subjected to prolonged aeration
  - (C) the raw water contains dissolved oxygen
  - (D) the filter bed comprises largely of coarse sand



159. Which pair is not correctly matched?

- (A) BOD : Strength of sewage
- (B) Methane : Product of anaerobic decomposition
- (C) COD : Biodegradability of wastewater
- (D) Nitrate : Methemoglobinemia

160. A certain waste has a BOD of 162 mg/L and its flow value is 1000 cubic meter per day. If the domestic BOD is 80 gram per capita, then the population equivalent of the waste would be

- (A) 20.25
- (B) 1296
- (C) 2025
- (D) 12960

161. A sample of sewage is estimated to have a 5 day 20 °C BOD of 250 mg/L. If the test temperature be 30 °C, then in how many days will the same value of BOD be obtained?

- (A) 1.5 days
- (B) 2.5 days
- (C) 3.3 days
- (D) 7.5 days

162. Self-purification of running stream may be due to

- (A) sedimentation, oxidation, coagulation
- (B) dilution, sedimentation, oxidation
- (C) dilution, sedimentation, coagulation
- (D) dilution, oxidation, coagulation

163. Self-cleaning velocity is

- (A) the minimum velocity of flow required to maintain a certain amount of solids in the flow
- (B) the maximum velocity of flow required to maintain a certain amount of solids in the flow
- (C) such flow velocity as would be sufficient to flush out any deposited solids in the sewer
- (D) such flow velocity as would be sufficient to ensure that sewage does not remain in the sewer

164. Fresh sludge has moisture content of 99% and after thickening, its moisture content is reduced to 96%. The reduction in volume of sludge is

- (A) 3%
- (B) 5%
- (C) 75%
- (D) 97.5%

**165.** The function of algae in oxidation pond is

- (A) to provide a mat over the surface of oxidation pond so as to prevent evaporation of water
- (B) to provide oxygen for bacteria to degrade organic matter
- (C) to provide a greenish appearance to the pond
- (D) to prevent the odour nuisance

**166.** The sludge volume index for mixed liquor having suspended solids concentration of 2000 mg/L and showing a settled volume of 200 mL from a one-litre sample would be

- (A) 0.1
- (B) 1000
- (C) 100
- (D) 10

**167.** Consider the following treatment steps in a conventional wastewater treatment plant :

1. Primary sedimentation
2. Grit removal
3. Disinfection
4. Secondary sedimentation
5. Screening
6. Secondary treatment unit

The correct sequence of these steps is

- (A) 5, 2, 1, 6, 4, 3
- (B) 1, 2, 4, 5, 3, 6
- (C) 2, 3, 4, 5, 6, 1
- (D) 6, 5, 4, 3, 2, 1

**168.** An ascending gradient of 1 in 100 meets a descending gradient of 1 in 50. The length of summit curve required to provide overtaking sight distance of 500 m will be

- (A) 938 m
- (B) 781 m
- (C) 470 m
- (D) 170 m

**169.** For a given road, safe stopping sight distance is 80 m and passing sight distance is 300 m. What is the intermediate sight distance?

- (A) 220 m
- (B) 190 m
- (C) 160 m
- (D) 150 m

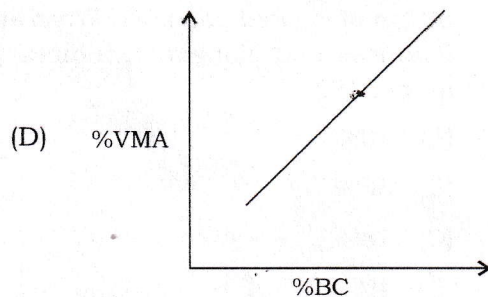
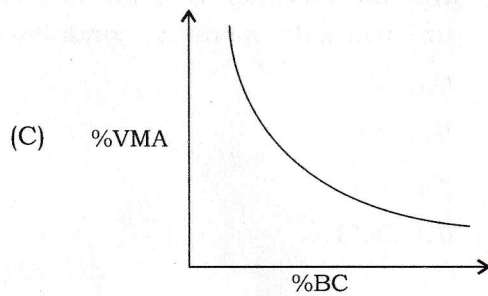
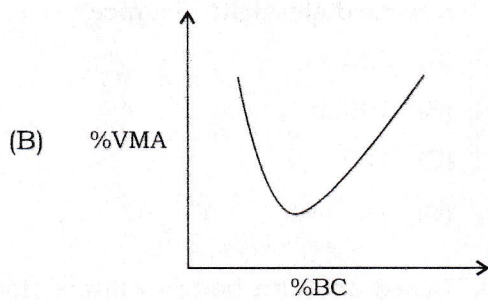
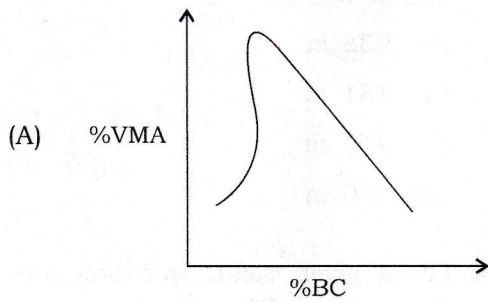
**170.** Based on '30th hourly volume', for how much percent time during the year can the designer willingly tolerate the unfavourable operating conditions?

- (A) 30
- (B) 29
- (C) 2.5
- (D) 0.33

**171.** In 500 gm sample of coarse aggregate, there are 100 gm flaky particles and 80 gm elongated particles. What are the flakiness and elongation indices (total) as per IS?

- (A) 40%
- (B) 36%
- (C) 18%
- (D) 4%

172. Which of the following diagrams illustrates the relationship between VMA and % bitumen content (BC) in Marshall test?



173. The design speed of a traffic lane is 70 kmph. What is the theoretical capacity per hour taking the total reaction time to be 2 sec and average length of vehicle as 8 m?

- (A) 828
- (B) 728
- (C) 628
- (D) 428

174. The shape of the STOP sign according to IRC : 67-2001 is

- (A) circular
- (B) triangular
- (C) rectangular
- (D) octagonal

175. Traffic capacity is

- (A) ability of roadway to accommodate traffic volume in km/hr
- (B) number of vehicles occupying a unit length of roadway at given instant expressed as vehicles/km
- (C) capacity of lane to accommodate the vehicle widthwise
- (D) maximum attainable speed of vehicle under free traffic condition