Question Booklet Series: A

Candidate must fill the above number correctly, in the OMR Sheet

DO NOT OPEN THIS BOOKLET UNTIL TOLD TO DO SO

Time Allowed: 90 Minutes
Total No. Questions: 120

Code- MDF21JECLX6S02 (P-I)

Roll No. :
OMR Answer Sheet No. :

Name of the Candidate (in capital letters):

Candidate’s Signature
Invigilator’s Signature

IMPORTANT:— Read the following instructions carefully. Do not mark answers on the question booklet, otherwise you may be debarred from the selection process.

1. Before commencing to answer, check that the Question Booklet has 120 questions. Each Question Booklet will be in different series (combination of booklet code no. and series). You must write correct Booklet Code No. and Question Booklet Series on your OMR Answer Sheet. Further check that there is no misprinting, overprinting and/or any other shortcoming in it. If there is any shortcoming in the question booklet, intimate the same to your room invigilator and take a fresh question booklet. No complaint in this regard shall be entertained at any later stage.

2. There shall be negative marking. 1/3 mark will be deducted for wrong answer. Each question carries equal mark. Also refer OMR Sheet for detailed instruction.

3. Ask invigilator to sign on your admit card. If the same is not got signed by you, your candidature shall be liable to be rejected.

4. This is an objective type test in which each objective question is followed by four responses serialled (1) to (4). Your task is to choose the correct/best response and mark your response in the OMR Answer Sheet only as per the instructions given and NOT in the Question Booklet.

5. Use Blue/Black Ball Point Pen for all your work on the OMR Answer Sheet. The ovals on the OMR Answer Sheet are to be completely filled by Blue/Black Ball Point Pen only. ANSWERS ONCE GIVEN CAN NOT BE CHANGED.

6. DO NOT scribble or do rough work or make any stray marks on the Answer Sheet. DO NOT wrinkle or fold or staple it.

7. Use of Calculators, Slide rules, Mobiles, calculator watches or any such devices and any other study/reference material is NOT allowed inside the examination hall.

8. Rough Work is to be done in the blank space provided in the Question Booklet, not on the OMR Answer Sheet. No other paper will be allowed/provided for rough work.

9. Return the complete Question Booklet and OMR Answer Sheet to the invigilator on completion of the test. Do not take this Question Booklet or any part thereof or OMR Answer Sheet outside the examination room. Doing so is a punishable offence.

10. Take care that you mark only one answer for each question. If more than one answer is given by you for any question, the same will not be evaluated. Cutting/overwriting the answers are not allowed. Further question paper is bilingual (Hindi/English). In case of any variation in Hindi version, English version will be taken as final for evaluation purposes.
APITUDE

DIRECTIONS: (Question no. 1 to 3) Read the following passage carefully and answer the questions given below.

A group of seven friends Anil, Vinod, Sumit, Dilip, Indra, Firoz and Gaurav work as Engineer, Accountant, IT Officer, Technician, Clerk, Physiotherapist and Research Analyst for companies L, M, N, P, Q, R and S but not necessarily in the same order. Sumit works for company ‘N’ and is neither an Accountant nor a Clerk. Indra is an IT officer and works for company ‘Q’. Gaurav works for company L or Q. The one who is an Accountant works for company ‘R’. Anil works as Physiotherapist and does not work for Research Analyst nor a Clerk. Firoz works for company Q as Research Analyst. Dilip is not an Accountant.

1. Who amongst the following works as accountant?
   (1) Vinod
   (2) Anil
   (3) Firoz
   (4) Dilip

2. What is the profession of Sumit?
   (1) Technician
   (2) Clerk
   (3) Engineer
   (4) None of these

3. Which of the following combinations of person, profession and company is correct?
   (1) Anil –Physiotherapist –M
   (2) Firoz –Clerk –Q
   (3) Vinod –Accountant – R
   (4) None of these

4. In a group of 36 persons, a total of 16 take cold drink while 9 take cold drink but not ice-cream. How many persons in this group take ice-cream but not cold drink?
   (1) 27
   (2) 20
   (3) 11
   (4) 23

5. Match the pair correctly.

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6. Article 243 B(r) of the constitution provides for constitution of Panchayat in every state. The level of Panchayat is referred under this is:
   (1) Village and District level
   (2) Village, intermediate and District Level
   (3) Village level only
   (4) District level only

7. Jaggery is the main source of:
   (1) Protein
   (2) Carbohydrate
   (3) Fat
   (4) None of these

8. The black hole theory was discovered by:
   (1) Hargobind Khurana
   (2) C.V. Raman
   (3) S. Ramnijan
   (4) S. Chandrashankar

9. What is the profession of Sumit?
   (1) Technician
   (2) Clerk
   (3) Engineer
   (4) None of these

10. What is the profession of Sumit?
    (1) Technician
    (2) Clerk
    (3) Engineer
    (4) None of these

11. Who amongst the following works as accountant?
    (1) Vinod
    (2) Anil
    (3) Firoz
    (4) Dilip

12. What is the profession of Sumit?
    (1) Technician
    (2) Clerk
    (3) Engineer
    (4) None of these

13. Which of the following combinations of person, profession and company is correct?
    (1) Anil –Physiotherapist –M
    (2) Firoz –Clerk –Q
    (3) Vinod –Accountant – R
    (4) None of these

14. In a group of 36 persons, a total of 16 take cold drink while 9 take cold drink but not ice-cream. How many persons in this group take ice-cream but not cold drink?
    (1) 27
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21. Jaggery is the main source of:
    (1) Protein
    (2) Carbohydrate
    (3) Fat
    (4) None of these

22. The black hole theory was discovered by:
    (1) Hargobind Khurana
    (2) C.V. Raman
    (3) S. Ramnijan
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DIRECTIONS: The Venn diagram given below shows the estimated readership of 3 daily newspapers (H.T, TOI & Statesman) in Delhi. The total readership and advertising cost for each of these papers is as below:

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The total population of the city is approximately 14 million. The common readership (in lakhs) indicated in the Venn diagram is 9. The number of people (in lakhs) who read at least one newspaper is:

(1) 4.7 (2) 23.4 (3) 17.4 (4) None of these

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10. In a high flying aeroplane, the ink of the fountain pen leaks out because:

(1) Atmospheric pressure increases
(2) Atmospheric pressure reduces
(3) Atmospheric temperature increases
(4) Atmospheric temperature reduces

11. Match the following:

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(1) A3, B4, C1, D2 (2) A3, B1, C2, D4 (3) A1, B4, C3, D2 (4) A2, B4, C1, D3

12. During whose reign did Hiuen Tsang visit the Chalukya Kingdom?

(1) Pulakesin I (2) Kirtivarman (3) Vinayaditya  (4) Pulakesin II

13. The capital of world youngest nation South Sudan is:

(1) Juba (2) Rumbek (3) Malakal (4) Wau

14. The equator does not pass through which of the following countries:

(1) Kenya (2) Mexico (3) Indonesia (4) Brazil

15. Number of diagonals in a 30 sided convex polygon will be:

(1) 405 (2) 955 (3) 818 (4) 378

16. The total readership and advertising cost for each of these papers is as below:

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DIRECTIONS: In the following number series only one number is wrong. If the wrong number is corrected, the series gets established following a certain logic. Below the series a number is given followed by (a), (b), (c), (d), (e) and (f). You have to complete the series following the same logic as in the given series after correcting the wrong number. Now answer the following questions giving the correct values for the letter in the questions.

16. 2 14 18 46 82 176 338
   4 (a) (b) (c) (d) (e) (f)
What will come in place of (e)?
   (1) 238  (2) 338  (3) 218  (4) None of these

17. What is the “Motto” of Olympics 2020:
   (1) Live your passion  (2) One world, One Dream
   (3) Inspire a Generation  (4) Discover Tomorrow

18. ‘C’ is a place which is located 2 km away in the north-west direction from the capital Z. R is another place that is located 2 km away in the south-west direction from ‘C’. ‘M’ is another place and that is located 2 km away in the north-west direction from ‘R’. ‘T’ is yet another place that is located 2 km away in the south-west direction from ‘M’. In which direction is ‘T’ located in relation to ‘Z’?
   (1) South-West  (2) West  (3) North  (4) None of these

19. Find the odd one out?
   (1) FIFA World Cup  (2) Ryder Cup  (3) Walker Cup  (4) Solheim cup

20. The grant of Diwani of Bengal, Bihar and Orissa is associated with:
   (1) Shah Alam II  (2) Bahadur Shah
   (3) Nawab Asif-ud-Daula  (4) Nawab Shuja-ud-Daula

21. Union Government appointed four brand Ambassadors for Digital India Programme recently. Who among these is an author and ethical hacker?
   (1) Pranav Mistry  (2) Satwat Jagwani
   (3) Kriti Tiwari  (4) Ankit Fadia

22. What is the chronological (first published first and so on) correct sequence of the following books?
   1. Richard Attenborough – In search of Gandhi
   2. Louis Fischer – The life of Mahatama Gandhi
   3. E.H. Erikson – Gandhi’s truth
   4. J. Eaton – Gandhi, Fighter without a sword

   Select the correct answers from the codes given below.
   (1) 4, 2, 3, 1  (2) 4, 3, 1, 2
   (3) 2, 4, 3, 1  (4) 1, 2, 4, 3

23. In a code ‘Mumbai’ is written as ‘Sostpk’ and ‘Chennai’ is written as ‘dcfmmmpk’, then “bench” will be written as:
   (1) mfmdc  (2) tfmdc  (3) tfmdc  (4) tfmdc
DIRECTIONS: To answer the following question, use the information given below.

i. There are six persons A, B, C, D, E, and F in a family.
ii. There are two couples in the group.
iii. A is the father of C who is a doctor.
iv. E is the son of C.
v. F is the grand daughter of D.
vi. The father of F is B, who is a professor.
vii. E and F are unmarried.

24. Who is the grandmother of E?
   (1) C  (2) D  (3) B  (4) None of these

25. Arrange the following rational members in ascending order:
   \(-7, \frac{5}{10}, 2, \frac{-2}{3}, -\frac{5}{10}, -3\)

26. Given that in a standard code pattern
   ABCD is coded as EFGH
   JKL M is coded as NOPQ
   then RSTU is coded as:
   (1) W V Y X  (2) Q P U V  (3) V W X Y  (4) V W Y X

27. In a certain code, ‘TEAMWORK’ is written as ‘NBFUJQNV’ and ‘SOME’ is written as ‘PTDL’. How is ‘PERSON’ written in that code?
   (1) SQFNMR  (2) SFQMNR  (3) SFQNMR  (4) SQMFNR

28. How many triangles are there in the following figure?

29. A sphere of radius x is melted and its volume is divided into two equal parts. One part is cast into a cylinder of height 10 cm. and second a cone of the same height. The ratio of the radius of cylinder to the cone radius is:
   (1) 1 : \sqrt{3}  (2) 1 : 3  (3) \sqrt{3} : 2  (4) None of these

30. Sukriti and Saloni are athletes. Sukriti covers a distance of 1 km in 5 minutes and 50 seconds, while Saloni covers the same distance in 6 minutes and 4 seconds. If both them start together and run at uniform speed, by what approximate distance will Sukriti win a 5 km mini marathon?
   (1) 200 m  (2) 225 m  (3) 250 m  (4) 275 m
31. One side of a right-angled triangle is 126 cm. The difference between the hypotenuse and the other side is 42 cm. The length of the hypotenuse is:
   (1) 168 cm
   (2) 189 cm
   (3) 210 cm
   (4) None of these

32. Three wheels make 60, 36 and 24 revolutions per minute. Each has a red spot on its rim, which is at the lowest position at time zero. The red spot will all be at this position again after:
   (1) 2 seconds
   (2) 5 seconds
   (3) 4 seconds
   (4) None of these

33. A train can travel 50% faster than a car. Both start from point A at the same time and reach point B 75 kms away from A at the same time. On the way, however, the train lost about 12.5 minutes while stopping at the stations. The speed of the car is:
   (1) 100 km/h.
   (2) 110 km/h.
   (3) 120 km/h.
   (4) 130 km/h.

34. An empty tank is connected with pipes A, B and C. A and B are inlet pipes and they fill the tank in 6 hours and 8 hours respectively, while C is an outlet pipe and it empties the completely filled tank in 5 hours. Find the time in which the tank will be completely filled if all the pipes are opened together.
   (1) \( \frac{9}{11} \) hours
   (2) \( \frac{9}{11} \) hours
   (3) \( \frac{10}{11} \) hours
   (4) \( \frac{10}{11} \) hours

35. Probability of getting a multiple of 2 on one dice and a multiple of 3 on the other dice, when both dice are thrown simultaneously is:
   (1) \( \frac{1}{6} \)
   (2) \( \frac{5}{12} \)
   (3) \( \frac{11}{36} \)
   (4) \( \frac{5}{36} \)

36. Mid points of the side of an equilateral triangle of side 18 cm are joined to form another triangle, whose mid points are further joined to form a different triangle and this process is repeated indefinitely. The sum of the perimeters of all the triangles will be:
   (1) 72 cm
   (2) 108 cm
   (3) 144 cm
   (4) 172 cm

37. If the radius of a right circular cylinder is decreased by 50% and its height is increased by 60%, its volume will be decreased by:
   (1) 30%
   (2) 40%
   (3) 60%
   (4) 70%

38. A hall 50 m long and 45 m broad is to be paved with square tiles. Find the largest tile as well as its number in the given options so that the tiles exactly fit in the hall?
   (1) 36 sq m and 80 tiles
   (2) 16 sq m and 80 tiles
   (3) 25 sq m and 90 tiles
   (4) 36 sq m and 90 tiles

31. सम्पूर्ण विभाजन की एक 126 सेमी. है। विभाजन और दूसरी विभाजन के अन्तर 42 सेमी. है। विभाजन की लंबाई है:
   (1) 168 सेमी.
   (2) 189 सेमी.
   (3) 210 सेमी.
   (4) इनमें से कोई नहीं

32. तीन चक्कों 60, 36 और 24 चक्र प्रतिनिधित्व करते हैं। प्रत्येक चक्र पर एक लाल दांपत्र है। जो कि बुध चक्र पर निम्नतम स्थिति पर है।
   लल दांपत्र पुनः उसी स्थिति पर होता तितल संख्या प्राप्त है:
   (1) 2 लकड़ीं
   (2) 5 लकड़ीं
   (3) 4 लकड़ीं
   (4) इनमें से कोई नहीं

33. एक रेलवे एक कार से 50% तीव्र रूप करता है। दोनों एक ही समय, ‘A’ बिंदु से बल्क आरंभ करता है और बिंदु ‘B’ पर जो कि ‘A’ बिंदु से 75 किमी. की दूरी पर 6 एक ही समय पर पहुँचती है।
   रास्ते में, रेलवे के विशेषता स्थल पर लगा 12.5 मिनट लगाए। कार की गति है:
   (1) 100 किमी./घं.
   (2) 110 किमी./घं.
   (3) 120 किमी./घं.
   (4) 130 किमी./घं.

34. एक बाली टॉयर का पास्ता A, B और C के साथ जोड़ लिया जाता है। A और B सामान पास्ता हैं और दोनों पास्ता टॉयर को क्रमांक: 6 टॉयर और 8 टॉयर में प्रति है। जब C एक निर्देश लागू करता है जो कि दूरी जाती है दोनों की 5 टॉयर में बाली कर देता है। बले तीनों पास्ता को एक साथ बाली लिया जाता है जो टॉयर को पूरा भरते में कितना समय लगता:
   (1) \( \frac{10}{9} \) घं.
   (2) \( \frac{9}{11} \) घं.
   (3) \( \frac{10}{11} \) घं.
   (4) \( \frac{10}{11} \) घं.

35. एक पास्ता पर 2 का गुणन एवं इससे पासे पर 3 के गुणन पासे जाने की संभावना का योग होगा:
   (1) \( \frac{1}{6} \)
   (2) \( \frac{5}{12} \)
   (3) \( \frac{11}{36} \)
   (4) \( \frac{5}{36} \)

36. इंसान अनेक नियुक्त की जुगाड़ के मध्य क्षुद्रों को जोड़कर एक बुधराना नियुक्त कर दी जाती है। जिसके मध्य क्षुद्रों को पुनः जोड़कर एक बुधराना नियुक्त कर दी जाती है। यह प्रक्रिया कारक अन्तर से बिताई जाती है। सभी नियुक्तों के परिप्रेक्ष्य का योग होगा:
   (1) 72 cm
   (2) 108 cm
   (3) 144 cm
   (4) 172 cm

37. यदि एक समकोणीय क्षैतिज बेलनकार की किस्म 50 प्रतिशत कम कर दी जाती है और इसकी ऊँचाई में 60 प्रतिशत की वृद्धि कर दी जाती है, तो इसके आयाम में कितने प्रतिशत की होगी?
   (1) 30%
   (2) 40%
   (3) 60%
   (4) 70%

38. एक 50 मलबे 45 मलें चौड़ी लंबाई में लगाई गई नजदीकी ग्रामीणों की अवधि 50 प्रतिशत कम कर दी जाती है और इसकी ऊँचाई में 60 प्रतिशत की वृद्धि कर दी जाती है। इसके आयाम में कितने प्रतिशत की होगी?
   (1) 30%
   (2) 40%
   (3) 60%
   (4) 70%
39. Number of students in different specialisations in an institute

<table>
<thead>
<tr>
<th>Specialisation</th>
<th>No. of Students</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>II</td>
<td>230</td>
<td>3/3</td>
</tr>
<tr>
<td>III</td>
<td>210</td>
<td>3/3</td>
</tr>
<tr>
<td>IV</td>
<td>200</td>
<td>3/4</td>
</tr>
<tr>
<td>V</td>
<td>180</td>
<td>3/5</td>
</tr>
<tr>
<td>VI</td>
<td>170</td>
<td>3/6</td>
</tr>
</tbody>
</table>

Number of students in specialisation II is what percent of the total number of students in the institute.

(1) 23/3 (2) 23/3 (3) 22/3 (4) 20%

40. The perimeter of a rhombus is 40 cm and the measure of an angle is 60°, then the area of it is–

(1) 100 \(\sqrt{3}\) cm² (2) 75 \(\sqrt{3}\) cm² (3) 180 \(\sqrt{3}\) cm² (4) 50 \(\sqrt{3}\) cm²

41. The difference between the compound interest and the simple interest on a certain sum of money at 12% per annum for 2 years is Rs 1800. Find the principal sum when the interest is compounded annually:

(1) Rs 1,20,000 (2) Rs 1,25,000 (3) Rs 1,28,000 (4) None of these

42. Ritu had 400 mangoes. She sold 60 mangoes at 25% gain, 80 mangoes 20% gain, 120 mangoes at 10% gain and 140 mangoes at 20% loss. Her net gain/loss percent is:

(1) 7\(\frac{1}{2}\)% gain (2) 4\(\frac{3}{4}\)% loss (3) 3\(\frac{3}{4}\)% gain (4) None of these

43. Match the personalities with the state to which they belong.

<table>
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<tr>
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<tbody>
<tr>
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44. A man buys milk at a certain price per Kg. and after mixing it with water sells it again at the same price. How many grams of water he mixes in every Kg. of milk if he makes a profit of 25%:

(1) 250g (2) 200g (3) 150g (4) 30g

45. When three coins are tossed together, the probability that all coins have the same face is:

(1) 1/4 (2) 1/6 (3) 1/3 (4) None of these

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45. When three coins are tossed together, the probability that all coins have the same face is:

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46. The allowable stress to which a structural member can be subjected, is called:
(1) Working stress (2) Permissible stress (3) Tensile stress (4) Either (1) or (2)

47. The rise and fall method of reduction of levels is the method used:
(1) Back sights (2) Fore sights (3) Intermediate sights (4) None of these

48. A structural member subjected to compressive force in a direction parallel to its longitudinal axis is called:
(1) Column (2) Post (3) Stanchion (4) Any one of above

49. The process of mixing some mortar in the mixer for the beginning of the first batch mixing is called:
(1) Buttering (2) Borrowing (3) Initiating (4) None of these

50. In a Tee-Beam the breadth of the rib is equal to the:
(1) Total thickness of slab including cover (2) Width of beam in compression zone (3) Width of beam in tensile zone (4) None of these

51. A tape of length \( l \) and weight \( w \) kg/m is suspended at its ends with a pull of \( p \) kg, the sag correction is:
(1) \( \frac{\pi^2 w^2}{24p} \) (2) \( \frac{\pi^2 w^3}{24p^2} \) (3) \( \frac{\pi w^2}{24p} \) (4) \( \frac{\pi^2 w^2}{24p^3} \)

52. The rise and fall method of reduction of levels provides a check on:
(1) Back sights (2) Fore sights (3) Intermediate sights (4) All of these

53. The mixing of some mortar in the mixer at the beginning of the first batch concrete mixing is called:
(1) Buttering (2) Borrowing (3) Initiating (4) None of these

54. In the design of purlins, depth of angle section should not be less than:
(1) \( L/45 \) (2) \( L/60 \) (3) \( L/50 \) (4) No relationship

55. The units of viscosity are:
(1) kg sec/ m² (2) N sec/ m² (3) N sec²/ m³ (4) m³/ sec

56. Hydraulic radius is equal to:
(1) Area divided by the square of the wetted perimeter (2) Area divided by the wetted perimeter (3) Wetted perimeter divided by area (4) Square root of the area
57. The first stage of natural process of sludge digestion is:
   (1) Acid fermentation  (2) Acid regression
   (3) Alkaline fermentation  (4) None of these

58. On wetting, cohesive soils:
   (1) Loose permeability  (2) Gain shear strength
   (3) Loose elasticity  (4) Decrease their shear strength

59. Setting of Laminscate transition curve is done with:
   (1) Perpendicular offsets  (2) Radial offsets
   (3) Gauge  (4) Polar deflection angles

60. A row of rivets parallel to the direction of force is called:
   (1) Pitch  (2) Gauge distance
   (3) Gauge  (4) Edge line

61. The effective depth of T-beam is the distance between the:
   (1) Centre of flange to the top of tensile reinforcement
   (2) Top of flange to the centre of tensile reinforcement
   (3) Bottom of flange to centre of tensile reinforcement
   (4) Top of flange to bottom tensile reinforcement

62. According to Rankines formula the minimum depth of foundation should be:
   \[ \frac{W}{P} \left( \frac{1 + \sin \theta}{1 - \sin \theta} \right)^2 \]

63. The most economical section of a trapezoidal channel is one which has hydraulic mean depth equal to:
   (1) \( \frac{1}{2} \) depth
   (2) \( \frac{1}{2} \) breadth
   (3) \( \frac{1}{2} \) depth x breadth
   (4) \( \frac{1}{2} \) depth and breadth

64. A line joining some fixed stations on main survey lines is:
   (1) Check line  (2) Base line
   (3) Tie line  (4) Cross line

65. Which of the following instruments is used for spot speed measurement of a vehicle?
   (1) Microscope  (2) Enoscope
   (3) Stethoscope  (4) Stereoscope

66. In which of the following, kerosene oil is used for its preparation?
   (1) Emulsion  (2) Slow curing cutback
   (3) Medium curing cutback  (4) Rapid curing cutback

67. Which of the following is measured in a CBR test on soils:
   (1) Flow value
   (2) Shear strength
   (3) Tensile strength
   (4) Compressive strength

68. The most economical section of a trapezoidal channel is:
   (1) \( \frac{1}{2} \) depth
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   (4) \( \frac{1}{2} \) depth and breadth

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<table>
<thead>
<tr>
<th>List I</th>
<th>List II</th>
</tr>
</thead>
<tbody>
<tr>
<td>A. Abrasion test</td>
<td>1. Durability</td>
</tr>
<tr>
<td>B. Crushing strength test</td>
<td>2. Toughness</td>
</tr>
<tr>
<td>C. Impact Test</td>
<td>3. Hardness</td>
</tr>
<tr>
<td>D. Soundness Test</td>
<td>4. Compressive strength</td>
</tr>
</tbody>
</table>

Codes:
(1) A-3, B-4, C-2, D-1
(2) A-4, B-3, C-2, D-1
(3) A-3, B-2, C-4, D-1
(4) None of these

69. A short column 300 mm x 300 mm is reinforced with 4 bars of 20mm dia. (Fe–415 grade). If concrete is M-20 grade, the max. axial load \( P \) (kN) allowed on it is:

- (1) 1059.0
- (2) 1159.0
- (3) 1173.0
- (4) None of these

70. The height of instrument (HI) is equal to:

- (1) R.L. of BM + BS
- (2) R.L. of BM + FS
- (3) R.L. of BM + IS
- (4) BS + FS

71. A vertical member of frame, which is employed to subdivide a window or door vertically is:

- (1) Jamb
- (2) Panel
- (3) Mullion
- (4) Transoms

72. The modulus of elasticity \( E \) of concrete is given by:

- (1) \( E = 1000 \text{fck} \)
- (2) \( E = 5700 \text{mg} \)
- (3) \( E = 5700 \sqrt{\text{fck}} \)
- (4) \( E = 1000 \sqrt{\text{fck}} \)

73. A given material has young's modulus \( E \), modulus of rigidity \( G \) and passion's ratio 0.25. The ratio of young's modulus to modulus of rigidity of this material is:

- (1) 3.75
- (2) 3
- (3) 2.5
- (4) 1.5

74. A block is subjected to normal stresses \( \sigma_x \) and \( \sigma_y \) and shear stresses \( \tau \) along two planes at right angles. This principal Planes inclined \( \theta \) to \( \sigma_x \) axis will be such as:

- (1) \( \tan 2\phi = \frac{-2\tau}{\sigma_y - \sigma_x} \)
- (2) \( \tan 2\phi = \frac{-2\tau}{\sigma_x - \sigma_y} \)
- (3) \( \tan 2\phi = \frac{-2\tau}{\sigma_y - \sigma_x} \)
- (4) None of these

75. The greatest eccentricity which a load can have without producing tension in a short hollow circular column producing of outside diameter 'D' and inside diameter 'd' is:

- (1) \( \frac{D^2 - d^2}{8D} \)
- (2) \( \frac{D^2 + d^2}{8D} \)
- (3) \( \frac{D^2 + d^2}{4D} \)
- (4) \( \frac{D^2 - d^2}{4D} \)

76. Mostly used coagulant in treatment of water is:

- (1) Chlorine
- (2) Alum
- (3) Lime
- (4) Bleaching powder

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<tr>
<td>A. Plain sedimentation test</td>
<td>1. Hydraulic loading ruse</td>
</tr>
<tr>
<td>B. Floc- exchange</td>
<td>2. Exhaust of bed</td>
</tr>
<tr>
<td>C. Flocculator</td>
<td>3. Settling velocity</td>
</tr>
<tr>
<td>D. Rapid sand filter</td>
<td>4. Velocity gradient</td>
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(1) A-1, B-4, C-2, D-3  (2) A-2, B-1, C-3, D-4  (3) A-3, B-2, C-4, D-1  (4) None of these

78. The main object of providing a camber is:
(1) To make the road surface impervious  (2) To make the road surface durable  (3) To make the road free of stagnant water  (4) All of these

79. The ratio of ultimate creep strain to elastic strain is known as:
(1) Creep modulus  (2) Creep coefficient  (3) Creep–strain ratio  (4) Tertiary creep

80. The settlement of coarse aggregate towards bottom with scum rising towards the surface is known as:
(1) Bleeding  (2) Capillarity  (3) Laitance  (4) Permeability

81. The forces which meet at one point, but their line of action do not lie in a plane, are called:
(1) Coplaner non–concurrent forces  (2) Non–coplaner concurrent forces  (3) Non–coplaner non–concurrent forces  (4) Intersecting forces

82. Chromatic aberration in a telescope is reduced by using:
(1) A convex lens  (2) Compound lens convex and concave lenses  (3) A concave lenses  (4) Two convex lenses

83. The outer axis of a theodolite is:
(1) The axis of the altitude level  (2) The trunnion axis  (3) The axis passing through the centre of the horizontal graduated circle  (4) The line of collimation of the theodolite

84. To determine the whole volume formed by given sections over a given length, the prismoidal formula can be applied:
(1) Only when the number of sectional areas is odd  (2) Only when the number of sectional areas is even  (3) Irrespective of the number of sectional areas being odd or even  (4) Only for three sections at a time

85. A unit working purely on anaerobiosis is:
(1) Septic tanks  (2) Trickling filter  (3) Contact bed  (4) Activated sludge process
86. A contour line:

(1) Can not split and continue in different directions.
(2) Can split and continue in different directions.
(3) Can split but continue in two directions only.
(4) Can split but has to return to meet again.

87. A pile is embedded quite deep is a clay stratum. The clay has a cohesion of 3.5t/m². The ultimate point resistance of the pile will be:

(1) 19.6 t/m²  
(2) 24.5 t/m²  
(3) 20.0 t/m²  
(4) None of these

88. Match List I with List II and select the correct answer using the codes given below the:

(1) 1 to 2 mg/litre
(2) Not more than 1 mg/litre
(3) 10 to 20 mg/litre
(4) Not more than 250 mg/litre

89. Bearings are provided in bridges, in order to:

1. Distribute the load from susperstructure on a large areas and to transfer to piers
2. Allow the grid order of the bridge to taken a free movement of girders due to temperature variations.
3. Prevent excessive damage to the bridge if any pier sink slightly

Of these the correct utilities are

(1) 1, 2 and 3
(2) 1, 2
(3) 2, 3 and 4
(4) None of these

90. A CPM network is to be drawn considering:

(1) Activity sequencing without resource availability
(2) Least direct cost durations for activities
(3) Least total cost duration for activities
(4) Activities sequencing considered resource availability for each individual activity separately

91. The minimum ratio of thickness of elements in compression, in terms of their outstanding length has been specified to prevent:

(1) Fracture
(2) Bearing failure
(3) Tension failure
(4) Local buckling

92. The weight of a rail and its section is decided on the basis of:

(1) Heaviest axle load
(2) Maximum permissible speed
(3) Depth of Ballast
(4) All of these

93. Concentration of fluorides desirable in water is:

(1) 1 to 2 mg/litre
(2) Not more than 1 mg/litre
(3) 10 to 20 mg/litre
(4) Not more than 250 mg/litre
94. The water content in the soil is:
   (1) Ratio of volume of water to volume of soil
   (2) Ratio of volume of water to volume of solids
   (3) Ratio of weight of water to volume of soil
   (4) Ratio of weight of water to weight of solids

95. Moment Distribution method of Structural analysis is applicable to:
   (1) Stable but statically indeterminate structures
   (2) Stable but statically determinate structures
   (3) Unstable but statically indeterminate structures
   (4) Unstable but statically determinate structures

96. In a CBR test, if the CBR value at 5 mm is greater than that at 2.5 mm:
   (1) The higher value should be chosen
   (2) The test should be repeated
   (3) Average value of the two should be used
   (4) None of these

97. The ratio of the total elongation of a bar of uniform circular cross-section produced under its own weight to the elongation produced by an external load equal to the weight of the bar is:
   (1) 2
   (2) 1
   (3) 0.5
   (4) None of these

98. The ratio of the total elongation of a bar of uniform cross-section produced under its own weight to the elongation produced by an external load equal to the weight of the bar is:
   (1) 2
   (2) 1
   (3) \frac{1}{2}
   (4) \frac{1}{4}

99. In a restrained rectangular slab subjected to a uniformly distributed load, the yield lines form first:
   (1) Along the shorter span on the loaded face of the slab
   (2) Along the longer span on the loaded face of the slab
   (3) At the intersection of shorter and longer sides
   (4) Along the centre line of the unloaded face of the slab

100. The propagation of a shear crack is a prestressed concrete member depends on:
      (1) Tensile reinforcement
      (2) Compressive reinforcement
      (3) Shear reinforcement
      (4) Shape of the cross section of beam

101. In a plate girder design, the rivets connecting the flange angles and the flange plates have to be designed for:
      (1) Bending stress
      (2) Single shear
      (3) Double shear
      (4) Bending and shear

102. Plain cement concrete is strong in taking:
      (1) Tensile stresses
      (2) Compressive stresses
      (3) Shear stresses
      (4) Tear stresses

95. CBR परीक्षा में परी CBR का मान 5 मि.म पर, 2.5 मि.म से अधिक होता है:
   (1) ऊँचा मान लेना चाहिए
   (2) परीक्षा धुरार तथा करना चाहिए
   (3) दोनों मानों का औसत लेना चाहिए
   (4) इनमें से कोई नहीं

96. छड़ के भार के बराबर के बायाँभार के द्वारा उत्पन्न दीर्घकरण के प्रकार घिरने अनुसार भार के बराबर एक समान व्यापक कट तय से मुख एक छड़ के द्वारा दीर्घकरण का अंतर होता है:
   (1) 2
   (2) 1
   (3) \frac{1}{2}
   (4) \frac{1}{4}

97. समान स्तर से विषाट भार के अनुसार उत्पन्न समान व्यापक कट खंड को एक छड़ के द्वारा दीर्घकरण से छड़ के भार के बराबर एक व्यापक भार के द्वारा उत्पन्न दीर्घकरण का अंतर होता है:
   (1) 2
   (2) 1
   (3) \frac{1}{2}
   (4) \frac{1}{4}

100. समान स्तर से विषाट भार के अनुसार एक निरोक आयातक स्लेट में पराभव रखा जाता है लाभ:
      (1) स्लेट के भार के अनुसार अग्रवाल पर सम्पूर्ण विस्तृति के साथ
      (2) स्लेट के भार के अनुसार अग्रवाल पर परिवर्तन सम्पूर्ण तथा विस्तृति के साथ
      (3) सम्पूर्ण और धीरे-धीरे साधन के प्रत्येक प्रकार
      (4) स्लेट के अनुसार अग्रवाल की अंत लाइन के साथ

101. एक लोट गहर अभिलक्ष में पत्तन कोणों और पत्तन पोल्ट को जोड़ने वाली रिबेटों की अभिलक्ष करने पड़ता है:
      (1) बंबन प्रतिवर्तन के लिए
      (2) एकल अपस्पर के लिए
      (3) दोहरे अपस्पर के लिए
      (4) बंबन और अपस्पर के लिए
103. The type of surveying in which the curvature of the earth is taken into account is called:
   (1) Geodetic surveying  (2) Plane surveying  (3) Preliminary surveying  (4) Topographical surveying

104. A simply supported beam of span ‘L’ carries a concentrated load ‘W’ at mid-span. If the width ‘b’ of the beam is constant and its depth is varying through out the span, then what would be its mid-span depth when design stress is ‘f’?
   (1) \( \frac{6WL}{bf} \)  (2) \( \frac{6WL}{bf} \)  (3) \( \frac{3WL}{2bf} \)  (4) \( \frac{3WL}{2bf} \)

105. A column hinged at both ends has a crippling load P. If the central deflection is made zero by providing suitable support, the crippling load will be:
   (1) 16 P  (2) 4 P  (3) 1/4 P  (4) 1/6 P

106. The thicsotropy of soil is the phenomenon of:
   (1) Thickening of soil particles with water  (2) Cohesion of soil particles in optimum moisture  (3) Rotation of soil particles into a more stable state which occurs in the remoulding process  (4) None of these

107. The impact of a sewage outfall into a river can be assessed by monitoring:
   (1) Ammonical nitrogen, phosphorus, fluoride & hardness  (2) DO, BOD, Coliform MPN & nitrate – N  (3) Chloride, alkalinity, hardness & sulphate  (4) pH, turbidity, conductivity and colour

108. In a broad-crested weir, the discharge is maximum if the head of water on the downstream side of weir is ......... the head of water on the upstream side of weir:
   (1) Equal to  (2) One third  (3) Two third  (4) Three- fourth

109. A beam of length (l+2a) has supports ‘l’aparts with an overhang ‘a’ on each side. The beam carries a concentrated load ‘W’ at each end. The shear force between the two supports is given by:
   (1) Zero  (2) 0.5W  (3) W  (4) 2W

110. A point load of 20 kN acting at the quarter span point of a simply supported beam produces a central deflection of 2 mm. For a central load of 40 kN, the deflection at the quarter span point will be:
   (1) 4 mm  (2) 8 mm  (3) 2 mm  (4) 1 mm

111. Mohr’s circle for a direct shear test could be drawn:
   (1) At the beginning of the test  (2) At the intermediate state of test  (3) At the failure state of test  (4) At no stage of test
112. If levelling staff is held inclined at a staff station, the reduced level calculated from observation would be:

(1) True R.L.  (2) More than true R.L.
(3) Less than true R.L.  (4) Equal to R.L. of Bench mark

113. A steel beam supporting load from the floor slab as well as from wall is termed as:

(1) Stringer beam  (2) Lintel beam
(3) Spandrel beam  (4) Header beam

114. Rivet value is equal to:

(1) Strength of a rivet in shearing  (2) Strength of a rivet in bearing
(3) Minimum of (1) and (2)  (4) Maximum of (1) and (2)

115. A foundation consisting of thick R.C.C. slab covering the entire area of the bottom of structure is known as:

(1) Pile foundation  (2) Pier foundation
(3) Raft foundation  (4) Machine foundation

116. In singly reinforced beams, steel reinforcement is provided in:

(1) Tensile zone  (2) Compressive zone
(3) Neutral zone  (4) Both tensile and compressive zone

117. In roof trusses, the most frequently used section is:

(1) Two-angle sections placed back to back
(2) Two-channel sections placed back to back
(3) Two-channel sections placed wide apart
(4) Four-angle sections

118. A hydraulic jump in a controlled water will be formed above the control, if its original:

(1) Depth is more than critical depth  (2) Depth is less than critical depth
(3) Depth is equal to critical depth  (4) None of these

19. Consider, during compaction:

1. A constant value of air voids is reached at optimum water content and hence the density is maximum at that water content.
2. The air voids increase due to any further increase of water content and hence the density decreases there after

Of these statement
(1) is true and 2 is false  (2) 1 is false and 2 is true
(3) Both are true  (4) Both are false

20. In the theory of bending, the assumptions that plane sections before bending will remain plane after bending is made to ensure that:

(1) Strain is proportional to the distance from the neutral axis
(2) Stress is proportional to the distance from the neutral axis
(3) Moment is proportional to the distance from the neutral axis
(4) Strain is zero across the cross-section.
1. अपना उत्तर लिखना प्रारम्भ करने से पहले अपनी प्रश्न-पुस्तिका की भूमि-माति ऑंस कर ले, देखें ले कि इसमें 120 प्रश्न है। प्रत्येक प्रश्न पुस्तिका की लिपिबद्ध प्रश्न होगी (प्रश्न-पुस्तिका कोड संख्या एवं प्रश्न-पुस्तिका संख्या के संयोजन)। आपको OMR उत्तर पंक्ति पर सही प्रश्न-पुस्तिका सीरीज एवं प्रश्न-पुस्तिका कोड संख्या लिखना है। पुनः: यह भी पर्यंत से कि इसमें त्रिटिंग संबंधी अवधा अन्य विषय की कोई कमी नहीं है। यदि किसी प्रश्न की कोई कमी हो तो परीक्षाकर्ता को सुधार करने और प्रश्न-पुस्तिका बदलने के तरीके विकल्पों पर बाद में उसे प्रश्न किया जाएगा।

2. गलत उत्तर के लिए 1/3 रेप्लायर अंक दिखेगा। प्रत्येक प्रश्न के अंत में है, विवरण आंकनरेखा के लिए उत्तर प्रकरण के अनलोकन करें।

3. कवर-परीक्षा से अपने प्रेक्षा-पत्र पर हस्ताक्षर अवश्य करें। पर्यंत अपने हस्ताक्षर नहीं करने तो उपलब्धता रख कर दी जाएगी।

4. यदि एक वस्तुतर विषय की भूमि है जिसमें प्रश्न-पुस्तिका के नीचे कोड (1) से (4) तक चल प्रश्नात्मक उत्तर दिये है। आपके विकार में जो भी उत्तर लिखी/लिखित है उसको ओ.एम.ए.उर्जा पत्र में दिखे निदेश के अनुसार लिखित किया/एं। अपने उत्तर प्रश्न पुस्तिका में न लगाएं।

5. ओ.एम.ए.अर्ज उत्तर पंक्ति पर सभी प्रश्न के लिए नीले/काले बैंक पाइप पेंस में लिखिए। ओ.एम.एअर्ज उत्तर पंक्ति पर ओम्बर की पूर्ण रूप से केवल नीले/काले बैंक पाइप पेंस से भरें। एक बार लिख कर उत्तर की अवलोकन नहीं या सकता।

6. उत्तर-पत्र पर न लो राज करें न ही और किसी प्रकार का निश्चय आदि लगाएं या इत्यादि।

7. कंप्यूटर, सिलिक्स, मेथिल, केंडिजर भीड़ियाँ या एक प्रश्न की कोई भी सुविधा एवं किसी भी अभ्यास/संदर्भ आदि के प्रभाव परिस्थित अंक में प्रकट नहीं है।

8. ऐसा कार्य पुस्तिका में किसी भी खास स्थान में किया जाना चाहिए, ओ.एम.एअर्ज उपर पंक्ति पर कोई भी ऐसा कार्य न करें। किसी अन्य कार्य पर इसे करने की अनुमति नहीं है।

9. पत्रिका की सामग्री के परमाट्री अपनी पुस्तिका तथा उत्तर-पंक्ति परीक्षक को ध्यान कर है। पुस्तिका अथवा उसके किसी भी अभ्यास OMR उत्तर पंक्ति को परीक्षक का भाग बना है। पहले जाना जाना चाहिए ऐसा कार्य जस्ता आणि आपसी अर्थ है।

10. हर एक प्रश्न के लिए केवल एक ही उत्तर ही स्थांति करें। एक से अधिक उत्तर देने पर प्रश्न कोई भी अंक नहीं दिया जाएगा। उत्तर में कोई भी किरदार या असहूःस्थिति गलत नहीं होगी। पुनः प्रश्न पत्र विभागाधि (हिंदी एवं अंग्रेजी) में है। हिंदी संस्करण में हिंदी भी लिखित होने पर समस्या के लिए अंग्रेजी संस्करण को अपनाएं।