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LA 2012

PAPER - I (QUANTITATIVE ABILITIES)

Test Form No.

टेस्ट फॉर्म सं.

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प्रश्न पत्र - I (परिमाणात्मक अभिरुचि)

Time Allowed : 2 Hours (For VII Candidates : 2 hr. 40 min.)

निर्धारित समय : 2 घंटे (दृष्टिबाधित उम्मीदवारों के लिए : 2 घंटे 40 मिनट)

Maximum Marks : 200

अधिकतम अंक : 200

Read the following instructions carefully before you begin to answer the questions. This booklet contains questions in English as well as in Hindi.
प्रश्नों के उत्तर देने से पहले नीचे लिखे अनुदेशों को ध्यान से पढ़ें। इस पुस्तिका में प्रश्न अंग्रेजी तथा हिन्दी दोनों में दिये गये हैं।

INSTRUCTIONS TO CANDIDATES

- This Booklet contains 100 questions.
- In questions set bilingually in English and Hindi, in case of discrepancy, the English version will prevail.
- All questions are compulsory and carry equal marks.
- The paper carries negative marking. 0.50 mark will be deducted for each wrong answer.
- Before you start to answer the questions you must check up this Booklet and ensure that it contains all the pages (1-16) and see that no page is missing or repeated. If you find any defect in this Booklet, you must get it replaced immediately.
- You will be supplied the Answer-Sheet separately by the Invigilator. You must complete and code the details of Name, Roll Number, Ticket Number and Test Form Number on Side-I of the Answer-Sheet carefully. You must also put your signature and Left-Hand thumb impression on the Answer-Sheet at the prescribed place before you actually start answering the questions. These instructions must be fully complied with, failing which, your Answer-Sheet will not be evaluated and you will be awarded 'ZERO' mark. (VII candidates will have to ensure that these details are filled in by the scribe. However all VII candidates must put their left-hand thumb impression at the space provided in the Answer-Sheet. Those VII candidates who can sign should also put their signatures in addition to thumb impression.)
- Answers must be shown by completely blackening the corresponding ovals on Side-II of the Answer-Sheet against the relevant question number by Black/Blue Ball-point Pen only. Answers which are not shown by Black/Blue Ball-Point Pen will not be awarded any mark.
- A machine will read the coded information in the OMR Answer-Sheet. In case the information is incomplete or different from the information given in the application form, such candidate will be awarded 'zero' mark.
- The Answer-Sheet must be handed over to the Invigilator before you leave the Examination Hall.
- Failure to comply with any of the above instructions will render a candidate liable to such action/penalty as may be deemed fit.
- The manner in which the different questions are to be answered has been explained at the back of this Booklet (Page No. 16), which you should read carefully before actually answering the questions.
- 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 question.
- In lieu of Questions No. 96 to 100 relating to figural portions, alternate questions have been provided to be attempted by VII candidates only.
- No rough work is to be done on the Answer-Sheet. Space for rough work has been provided below the questions.
- "Mobile phones and wireless communication devices are completely banned in the examination halls/rooms. Candidates are advised not to keep mobile phones/any other wireless communication devices with them even switching it off, in their own interest. Failing to comply with this provision will be considered as using unfair means in the examination and action will be taken against them including cancellation of their candidature."

उम्मीदवारों के लिए अनुदेश

- इस पुस्तिका में कुल 100 प्रश्न हैं।
- अंग्रेजी और हिन्दी भाषा में तैयार किए गए द्विभाषी प्रश्नों में कोई विरोधाभास होने की स्थिति में अंग्रेजी विवरण मान्य होगा।
- सभी प्रश्न अनिवार्य हैं तथा सबके बराबर अंक हैं।
- प्रश्न पत्र में नकारात्मक अंकन होगा। हर गलत उत्तर के लिए 0.50 अंक कटवा जाएगा।
- प्रश्नों के उत्तर देने से पहले आप इस पुस्तिका की जाँच करके देख लें कि इसमें पूरे पृष्ठ (1-16) हैं तथा कोई पृष्ठ कम या दुबारा तो नहीं आ गया है। यदि आप इस पुस्तिका में कोई त्रुटि पाएँ, तो तत्काल इसके बदले दूसरी पुस्तिका ले लें।
- निरीक्षक द्वारा आपको उत्तर-पत्रिका अलग से दी जाएगी। उत्तर-पत्रिका के Side-I में ध्यानपूर्वक अपना नाम, रोल नम्बर, टिकट नम्बर और टेस्ट फॉर्म संख्या उचित रूप से लिखें। प्रश्नों के उत्तर वास्तव में शुरू करने से पहले उत्तर-पत्रिका पर निर्धारित स्थान में आप अपने हस्ताक्षर एवं बाएँ हाथ के अंगूठे का निशान भी अवश्य लगाएँ। उपर्युक्त अनुदेशों का पूरी तरह अनुपालन किया जाए, अन्यथा आपकी उत्तर-पत्रिका को जाँचा नहीं जाएगा और शून्य अंक दिया जाएगा। (दृष्टिबाधित उम्मीदवार सुनिश्चित करें कि यह विवरण लिपिक द्वारा भरा जाए। परन्तु सभी दृष्टिबाधित उम्मीदवार उत्तर-पत्रिका में निर्धारित स्थान पर अपने बाएँ हाथ के अंगूठे का निशान अवश्य लगाएँ। जो दृष्टिबाधित उम्मीदवार हस्ताक्षर कर सकते हैं, वे अंगूठे के निशान के अलावा अपने हस्ताक्षर भी कर दें।)
- उत्तर-पत्रिका में सभी उत्तर Side-II में प्रश्न संख्या के सामने दिये गये सम्बन्धित अण्डाकार खानों को केवल काला/नीला बॉल-पॉइंट पेन से पूरी तरह काला करके दियाएँ। जो अण्डाकार खाने काला/नीला बॉल-पॉइंट पेन से नहीं भरे जाएँगे, उनके लिए कोई अंक नहीं दिया जाएगा।
- ओ.एम.आर. उत्तर-पत्रिका में भरी गई कूट सूचना को एक मशीन पढ़ेगी। यदि सूचना अपूर्ण है अथवा आवेदन पत्र में दी गई सूचना से भिन्न है, तो ऐसे अभ्यर्थी को शून्य अंक दिया जाएगा।
- परीक्षा-भवन छोड़ने से पहले परीक्षार्थी को उत्तर-पत्रिका निरीक्षक के हवाले कर देनी चाहिए।
- ऊपर के अनुदेशों में से किसी एक का भी पालन न करने पर उम्मीदवार पर विवेकानुसार कार्यवाही की जा सकती है या दण्ड दिया जा सकता है।
- विभिन्न प्रश्नों के उत्तर देने की विधि इस पुस्तिका के पीछे (पृष्ठ संख्या 16) में छपे हुए निर्देशों में दे दी गई है। इसे आप प्रश्नों के उत्तर देने से पहले ध्यानपूर्वक पढ़ लें।
- प्रश्नों के उत्तर जितनी जल्दी हो सके तथा ध्यानपूर्वक दें। कुछ प्रश्न आसान तथा कुछ कठिन हैं। किसी एक प्रश्न पर बहुत अधिक समय न लगाएँ।
- आकृति से सम्बन्धित प्रश्न संख्या 96 से 100 के बदले में केवल दृष्टिबाधित उम्मीदवारों द्वारा हल किए जाने के लिए वैकल्पिक प्रश्न दिए गए हैं।
- कोई रफ कार्य उत्तर-पत्रिका पर नहीं करना है। रफ कार्य के लिए स्थान प्रश्नों के नीचे दिया गया है।
- "परीक्षा हॉल/कक्षों में मोबाइल फोन तथा बेतार संचार साधन पूरी तरह निषिद्ध हैं। प्रत्याशियों को उनके अपने हित में सलाह दी जाती है कि मोबाइल फोन/किसी अन्य बेतार संचार साधन को स्विच ऑफ करके भी अपने पास न रखें। इस प्रावधान का अनुपालन न करने को परीक्षा में अनुचित उपायों का प्रयोग माना जाएगा और उनके विरुद्ध कार्रवाई की जाएगी, उनकी अर्थापेक्षा रह कर देने सहित।"

PAPER - I : QUANTITATIVE ABILITIES

Handwritten notes at the top of the page include mathematical expressions such as $4-3=1$, 96 , $2(6,8)$, $5(1,2)$, $3(1,2)$, $6-1$, $3(1,2)$, and $6-1$.

Handwritten calculations on the left margin: $4-3=1$, 96 , $2(6,8)$, $5(1,2)$, $3(1,2)$, $6-1$.

Handwritten calculations on the left margin: $4-3=1$, 96 , $2(6,8)$, $5(1,2)$, $3(1,2)$, $6-1$.

Handwritten calculations on the left margin: $3, 4, 5, 6, 8$, $3, 2, 5, 3, 4$, $3, 1, 5, 3, 2$, $1, 1, 5, 1, 2$.

1. $\sqrt{\frac{0.000729}{0.085184}} = ?$
- (A) $\frac{27}{44}$ (B) $\frac{9}{44}$
- (C) $\frac{44}{9}$ (D) $\frac{27}{42}$

2. Complete the series :
7, 26, 63, 124, 215, 342, ?
- (A) 481 (B) 511
- (C) 391 (D) 421

3. A woman sells to the first customer half her stock of apples and half an apple, to the second customer half an apple and half of her remaining stock and so also to a third and to a fourth customer. She finds that she has now 15 apples left. How many had she at first?
- (A) 250 (B) 155
- (C) 125 (D) 255

4. There are 200 questions on a 3 hour examination. Among 200 questions, 50 are from Maths, 100 are in G.K. and 50 are in Science. He spent twice as much time on each Mathematics question as for each other question. How many minutes did he spend on Mathematics questions?
- (A) 36 (B) 72
- (C) 100 (D) 60

5. The remainder when $9^{19} + 6$ is divided by 8 is
- (A) 2 (B) 3
- (C) 5 (D) 7

6. The least five-digit perfect square number which is divisible by 3, 4, 5, 6, and 8 is
- (A) 14400 (B) 32400
- (C) 10800 (D) 10201

7. Which of the following numbers does not fit into the series?
14, 19, 29, 40, 44, 51, 59, 73
- (A) 59 (B) 51
- (C) 44 (D) 29

8. What will be the remainder when 19^{100} is divided by 20?
- (A) 19 (B) 20
- (C) 3 (D) 1

9. A toy factory manufactured a batch of electronic toys. If the toys were packed in boxes of 115 each, 13 boxes would not be filled completely. If the toys were packed in boxes of 65 each, 22 such boxes would not be enough to pack all of them. Coincidentally, in the end, the toys were packed in n boxes containing n toys each, without any remainder. The total number of toys was
- (A) 1424 (B) 1434
- (C) 1444 (D) 1454

10. A and B started a business with ₹ 20,000 and ₹ 35,000 respectively. They agreed to share the profit in the ratio of their capital. C joins the partnership with the condition that A, B and C will share profit equally and pays ₹ 2,20,000 as premium for this, to be shared between A and B. This is to be divided between A and B in the ratio of
- (A) 10 : 1 (B) 1 : 10
- (C) 9 : 10 (D) 10 : 9

11. A can complete a work in 20 days and B in 30 days. A worked alone for 4 days and then B completed the remaining work along with C in 18 days. In how many days can C working alone complete the work?
- (A) 12 (B) 68
- (C) 72 (D) 90

12. A pipe can fill a cistern in 12 minutes and another pipe can fill it in 15 minutes, but a third pipe can empty it in 6 minutes. The first two pipes are kept open for 5 minutes in the beginning and then the third pipe is also opened. Number of minutes taken to empty the cistern is
- (A) 38 (B) 22
- (C) 42 (D) 45

13. A and B can complete a job in 24 days working together. A alone can complete it in 32 days. Both of them worked together for 8 days and then A left. The number of days B will take to complete the remaining job is
- (A) 16 (B) 32
- (C) 64 (D) 128

14. In a factory, there are equal number of women and children. Women work for 6 hours a day and children for 4 hours a day. During festival time, the work load goes up by 50%. The government rule does not allow children to work for more than 6 hours a day. If they are equally efficient and the extra work is done by women, then extra hours of work put in by women every day are
- (A) 5 (B) 3
- (C) 4 (D) 9

15. A and B each working alone can do a work in 15 days and 25 days respectively. They started the work together, but B left after some time and A finished the remaining work in 7 days. After how many days from the start did B leave?
- (A) 3 (B) 5
- (C) 7 (D) 9

Handwritten rough work at the bottom of the page includes calculations like 215 , 124 , 191 , 63 , 124 , 215 , 342 , and 91 .

16. A and B undertake to do a piece of work for ₹ 1,200. A alone can do it in 8 days, while B can do it in 6 days. With the help of C, they complete it in 3 days. Find C's share.
 (A) ₹ 450 (B) ₹ 300
 (C) ₹ 150 (D) ₹ 100
17. By selling an article at 80% of its marked price, a trader makes a loss of 10%. What will be the profit percentage if he sells it at 95% of its marked price?
 (A) 6.9 (B) 5
 (C) 5.9 (D) 12.5
18. By selling an umbrella for ₹ 30, a shopkeeper gains 20%. During a clearance sale, the shopkeeper allows a discount of 10% of the marked price. His gain percent during the sale season is
 (A) 7 (B) 7.5
 (C) 8 (D) -9
19. What is the maximum percentage discount (approximately) that a merchant can offer on his marked price so that he ends up selling at no profit or loss, if he initially marked his goods up by 40%?
 (A) 60% (B) No discount
 (C) 33.5% (D) 28.5%
20. A shopkeeper marks the prices at 15% higher than the original price. Due to increase in demand, he further increases the price by 10%. How much percentage profit will he get?
 (A) 25 (B) 26.5
 (C) 20 (D) 24.5
21. From a vessel containing 100 l of wine, 10 l are drawn out and an equal amount of water is added. From the mixture, 10 l is again drawn out and same quantity of water is added. What is the final ratio of wine and water?
 (A) 80 : 20 (B) 90 : 10
 (C) 91 : 9 (D) 81 : 19
22. From each of two given numbers, half the smaller number is subtracted. After such subtraction, the larger number is 4 times as large as the smaller number. What is the ratio of the numbers?
 (A) 5 : 2 (B) 1 : 4
 (C) 4 : 1 (D) 4 : 5
23. Men, women and children are employed to do a work in the proportion of 3 : 2 : 1 and their wages as 5 : 3 : 2. When 90 men are employed, total daily wages of all amounts to ₹ 10,350. Find the daily wage of a man.
 (A) ₹ 45 (B) ₹ 57.50
 (C) ₹ 115 (D) ₹ 75
24. Brothers A and B had some savings in the ratio 4 : 5. They decided to buy a gift for their sister, sharing the cost in the ratio 3 : 4. After they bought, A spent two-third of his amount while B is left with ₹ 145. Then the value of the gift is
 (A) ₹ 70 (B) ₹ 105
 (C) ₹ 140 (D) ₹ 175
25. The taxi charges in a city contain fixed charges and additional charge/km. The fixed charge is for a distance of upto 5 km and additional charge/km thereafter. The charge for a distance of 10 km is ₹ 350 and for 25 km is ₹ 800. The charge for a distance of 30 km is
 (A) ₹ 800 (B) ₹ 750
 (C) ₹ 900 (D) ₹ 950
26. The marks of 3 students A, B and C are in the ratio 10 : 12 : 15. If the maximum marks of the paper are 100, then the marks of B cannot be in the range of
 (A) 20 - 30 (B) 40 - 50
 (C) 70 - 80 (D) 80 - 90
27. The average of the test scores of a class of 'm' students is 70 and that of 'n' students is 91. When the scores of both the classes are combined, the average is 80. What is n/m?
 (A) 11/10 (B) 13/10
 (C) 10/13 (D) 10/11
28. The average salary per head of all workers of an institution is ₹ 60. The average salary per head of 12 officers is ₹ 400. The average salary per head of the rest is ₹ 56. Then the total number of workers in the institution is
 (A) 1030 (B) 1032
 (C) 1062 (D) 1060
29. A cricketer played 80 innings and scored an average of 99 runs. His score in the last inning is zero run. To have an average of 100 at the end, his score in the last innings should have been
 (A) 10 runs (B) 1 run
 (C) 60 runs (D) 80 runs
30. A man spends an average of ₹ 1,694.70 per month for the first 7 months and ₹ 1,810.50 per month for the next 5 months. His monthly salary if he saves ₹ 3,084.60 during the whole year is
 (A) ₹ 2,400 (B) ₹ 3,000
 (C) ₹ 1,000 (D) ₹ 2,000

45. A man can row at 10 kmph in still water. If it takes a total of 5 hours for him to go to a place 24 km away and return, then the speed of the water current is.

- (A) 2 kmph (B) 3 kmph
(C) $\frac{1}{2}$ kmph (D) 1 kmph

46. A man started 20 minutes late and travelling at a speed of $1\frac{1}{2}$ times of his usual speed reaches his office in time. The time taken by the man to reach his office at his usual speed is

- (A) 40 minutes (B) 1 hr 20 minutes
(C) 1 hour (D) 30 minutes

47. Divide ₹ 15,494 between A and B so that A's share at the end of 9 years may be equal to B's share at the end of 11 years, compound interest being 20% per annum. Then A's share is

- (A) ₹ 8,000 (B) ₹ 9,140
(C) ₹ 9,144 (D) ₹ 9,414

48. The principal amount which yields a compound interest of ₹ 208 in the second year at 4% is

- (A) ₹ 5,000 (B) ₹ 10,000
(C) ₹ 13,000 (D) ₹ 6,500

49. An amount is invested in a bank at compound rate of interest. The total amount, including interest, after first and third year is ₹ 1,200 and ₹ 1,587 respectively. What is the rate of interest?

- (A) 10% (B) 3.9%
(C) 12% (D) 15%

50. The difference between compound and simple rates of interest on ₹ 10,000 for 3 years at 5% p.a. is

- (A) ₹ 76.25 (B) ₹ 76.75
(C) ₹ 76.50 (D) ₹ 76

51. A solid consists of a circular cylinder with exact fitting right circular cone placed on the top. The height of the cone is h. If total volume of the solid is three times the volume of the cone, then the height of the circular cylinder is

- (A) 2h (B) $\frac{2h}{3}$
(C) 4h (D) $\frac{3h}{2}$

52. Water flows at a rate of 10 metres per minute from a cylindrical pipe 5 mm in diameter. How long will it take to fill up a conical vessel whose diameter at the base is 40 cm and depth is 24 cm?

- (A) 51 mins 12 secs
(B) 52 mins 1 sec
(C) 48 mins 15 secs
(D) 55 mins

53. The three perpendicular distances of three sides of an equilateral triangle from a point which lies inside that triangle are 6 cm, 9 cm and 12 cm respectively. The perimeter of the triangle is

- (A) $42\sqrt{2}$ cm (B) $45\sqrt{3}$ cm
(C) $52\sqrt{2}$ cm (D) $54\sqrt{3}$ cm

54. The area of a right-angled triangle is 24 cm^2 and one of the sides containing the right angle is 6 cm. The altitude on the hypotenuse is

- (A) 3.6 cm (B) 4.8 cm
(C) 5.2 cm (D) 12 cm

55. A cost of cultivating a square field at a rate of ₹ 135 per hectare is ₹ 1,215. The cost of putting a fence around it at the rate of 75 paise per metre would be

- (A) ₹ 360 (B) ₹ 810
(C) ₹ 900 (D) ₹ 1,800

56. The area of a trapezium is 384 cm^2 . If its parallel sides are in the ratio 3 : 5 and the perpendicular distance between them is 12 cm, the smaller of the parallel sides is

- (A) 20 cm (B) 24 cm
(C) 30 cm (D) 36 cm

57. The perimeter of the triangular base of a right prism is 60 cm and the sides of the base are in the ratio 5 : 12 : 13. Then its volume will be (height of the prism being 50 cm)

- (A) 6000 cm^3 (B) 6600 cm^3
(C) 5400 cm^3 (D) 9600 cm^3

58. If the length of a rectangular parallelepiped is 3 times of its breadth and 5 times of its height and its volume is 14400 cu.cm , then area of the total surface will be

- (A) 2420 sq. cm (B) 3320 sq. cm
(C) 4320 sq. cm (D) 5320 sq. cm

59. The capacities of two hemispherical bowls are 6.4 litres and 21.6 litres respectively. Then the ratio of their internal curved surface areas will be

- (A) 4 : 9 (B) 2 : 3
(C) $\sqrt{2} : \sqrt{3}$ (D) 16 : 81

$\frac{274}{24} = 11\frac{1}{6}$ $\frac{271044}{24} = 11293.5$ $204 = 120$ $Y = 6$

$\frac{40 \times 24}{50} = \frac{96}{5} = 19\frac{1}{5}$

Speed = $\frac{1587 - 1200}{3} = 129$

$\frac{175}{2} = 87.5$

60. Let A and B be two solid spheres such that the surface area of B is 300% higher than the surface area of A. The volume of A is found to be k% lower than the volume of B. The value of k must be

- (A) 85.5 (B) 92.5
(C) 90.5 (D) 87.5

61. The ratio of the areas of the circumcircle and the incircle of a square is

- (A) 2 : 1 (B) 1 : 2
(C) $\sqrt{2} : 1$ (D) $1 : \sqrt{2}$



62. From a circular sheet of paper of radius 10 cm, a sector of area 40% is removed. If the remaining part is used to make a conical surface, then the ratio of the radius and the height of the cone is

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

63. If the area of the circular shell having inner and outer radii of 8 cm and 12 cm respectively is equal to the total surface area of a cylinder of radius R_1 and height h, then h, in terms of R_1 will be

- (A) $\frac{3R_1^2 - 30}{7R_1}$ (B) $\frac{R_1^2 - 40}{R_1^2}$
(C) $\frac{30 - R_1}{R_1^2}$ (D) $\frac{40 - R_1^2}{R_1}$

64. A well of radius 3.5 m is dug 16 m deep. The earth removed is spread over an area of 400 m^2 to form a platform. Height of the platform is

- (A) 1.54 m (B) 154 m
(C) 7.7 m (D) 77 m

65. The ratio of the number of sides of two regular polygons is 1 : 2. If each interior angle of the first polygon is 120° , then the measure of each interior angle of the second polygon is

- (A) 140° (B) 135°
(C) 150° (D) 160°

66. If $x = \frac{\sqrt{5+1}}{\sqrt{5-1}}$, then $x^2 - x - 1$ is equal to

- (A) 0 (B) 1
(C) 2 (D) 5

67. If $x = \frac{\sqrt{3}}{2}$, then the value of

$$\frac{1+x}{1+\sqrt{1+x}} + \frac{1-x}{1-\sqrt{1-x}}$$
 is equal to

- (A) 0 (B) 1
(C) $\frac{\sqrt{3}}{2}$ (D) $\sqrt{3}$

68. The area of the region bounded by $y = |x| - 5$ with the co-ordinate axes is

- (A) 25 sq. units (B) 52 sq. units
(C) 50 sq. units (D) 20 sq. units

69. The real value of x, that satisfies the equation $\sqrt{4x-9} + \sqrt{4x+9} = 5 + \sqrt{7}$ is

- (A) $\sqrt{5}$ (B) $2\sqrt{3}$
(C) $\frac{3}{\sqrt{7}}$ (D) 4

70. Find the value of $a^3 + b^3 + c^3 - 3abc$ when $a = 225, b = 226, c = 227$.

- (A) 2304 (B) 2430
(C) 2034 (D) 2340

71. Number of solutions of the equation $\sqrt{x^2 - x + 1} + \frac{1}{\sqrt{x^2 - x + 1}} = 2 - x^2$ is

- (A) 0 (B) 1
(C) 2 (D) 4

72. If $x + \frac{a}{x} = 1$, then the value of $\frac{x^2 + x + a}{x^3 - x^2}$ is

- (A) -2 (B) $-\frac{a}{2}$
(C) $\frac{2}{a}$ (D) $-\frac{2}{a}$

73. If $\sqrt{28 - 6\sqrt{3}} = \sqrt{3}a + b$, (where a, b are rationals), value of $(a - b)$ is

- (A) -2 (B) 2
(C) 1 (D) -1

74. $2^{32} - (2 + 1)(2^2 + 1)(2^4 + 1)(2^8 + 1)(2^{16} + 1)$ is equal to

- (A) 0 (B) 1
(C) 2 (D) 2^{16}

75. If the expression $x + 809436 \times 809438$ be a perfect square, then the value of x is

- (A) 0 (B) 1
(C) 809436 (D) 809438

76. If O is the orthocentre of the ΔABC and $\angle BAC = 80^\circ$, then measure of $\angle BOC$ is

- (A) 80° (B) 100°
(C) 120° (D) 90°

$$\frac{\sqrt{5+1}}{\sqrt{5-1}} = \frac{\sqrt{5+1} \cdot \sqrt{5-1}}{\sqrt{5-1} \cdot \sqrt{5-1}} = \frac{\sqrt{5^2-1^2}}{5-1} = \frac{\sqrt{24}}{4} = \frac{2\sqrt{6}}{4} = \frac{\sqrt{6}}{2}$$

$$x^2 - x - 1 = \left(\frac{\sqrt{6}}{2}\right)^2 - \frac{\sqrt{6}}{2} - 1 = \frac{6}{4} - \frac{\sqrt{6}}{2} - 1 = \frac{3}{2} - \frac{\sqrt{6}}{2} - 1 = \frac{1 - \sqrt{6}}{2}$$

77. Two chords of a circle, of lengths $2a$ and $2b$ are mutually perpendicular. If the distance of the point, at which the chords intersect, from the centre of the circle is c ($c <$ radius of the circle), then the radius of the circle is
- (A) $a + b - c$ (B) $\frac{\sqrt{a^2 + b^2 - c^2}}{2}$
 (C) $\frac{\sqrt{a^2 + b^2 + c^2}}{2}$ (D) $\frac{\sqrt{ab}}{c}$
78. Two concentric circles having common centre 'O' and chord AB of the outer circle intersect the inner circle at points C and D. If distance of chord from the centre is 3 cm, outer radius is 13 cm and inner radius is 7 cm, then length of AC in cm is
- (A) $8\sqrt{10}$ (B) $6\sqrt{10}$
 (C) $4\sqrt{10}$ (D) $2\sqrt{10}$
79. If PT is a tangent and AB is a chord of a circle and they intersect at the point P externally and $PT = 2AP$ and $AB = 18$ units, then $\overline{PT} = ?$
- (A) 6 units (B) 9 units
 (C) 12 units (D) 15 units
80. In ΔABC , $DE \parallel BC$ where DE intersects AB and AC at the points D and E respectively. If $AD = 6$ cm, $DB = 12x - 6$ cm, $AE = 2x$ cm and $CE = 16 - 2x$ cm, then the value of x is
- (A) 6 (B) 4
 (C) 2 (D) 8
81. If the sides of a quadrilateral ABCD touch a circle and $AB = 6$ cm, $CD = 5$ cm, $BC = 7$ cm, then the length of AD in cm is
- (A) 4 (B) 6
 (C) 8 (D) 9
82. AB is the diameter of a circle with centre O and P is a point on it. If $\angle POA = 120^\circ$, then the value of $\angle PBO$ is
- (A) 30° (B) 50°
 (C) 60° (D) 40°
83. From the circumcentre I of the triangle ABC, perpendicular ID is drawn on BC. If $\angle BAC = 60^\circ$, then the value of $\angle BID$ is
- (A) 75° (B) 60°
 (C) 45° (D) 80°
84. PQ is a chord of length 6 cm of a circle of radius 5 cm. Tangents to the circle at P and Q meet at T. Length of TP is
- (A) 4.75 cm (B) 2.75 cm
 (C) 3.75 cm (D) 4.25 cm
85. O is the centre of a circle. AC and BD are two chords of the circle intersecting each other at P. If $\angle AOB = 15^\circ$ and $\angle APB = 30^\circ$, then $\tan^2 \angle APB + \cot^2 \angle COD$ is equal to
- (A) $\frac{1}{3}$ (B) $\frac{2}{3}$
 (C) $\frac{4}{3}$ (D) $\frac{10}{3}$
86. ΔABC is a right-angled triangle, where $\angle ABC = 90^\circ$. If $AC = 2\sqrt{5}$ and $AB - AC = 2$, then the value of $\cos^2 A - \cos^2 C$ is
- (A) $\frac{1}{\sqrt{6}}$ (B) $\frac{\sqrt{6}}{6}$
 (C) $\frac{1}{2}$ (D) $\frac{3}{5}$
87. At the foot of a mountain, the elevation of its summit is 45° . After ascending 2 km towards the mountain upon an incline of 30° , the elevation changes to 60° . The height of the mountain is
- (A) $(\sqrt{3} - 1)$ km (B) $(\sqrt{3} + 1)$ km
 (C) $(\sqrt{3} - 2)$ km (D) $(\sqrt{3} + 2)$ km
88. The maximum value of $\sin^8 \theta + \cos^{14} \theta$, for all real values of θ is
- (A) 1 (B) $\sqrt{2}$
 (C) $\frac{1}{\sqrt{2}}$ (D) 0
89. If $l \cos^2 \theta + m \sin^2 \theta = \frac{\cos^2 \theta (\operatorname{cosec}^2 \theta + 1)}{\operatorname{cosec}^2 \theta - 1}$, $0^\circ < \theta < 90^\circ$, then $\tan \theta =$
- (A) $\sqrt{\frac{l-2}{1-m}}$ (B) $\sqrt{\frac{2-l}{1-m}}$
 (C) $\sqrt{\frac{l-2}{m-1}}$ (D) $\sqrt{\frac{l-1}{2-m}}$
90. If $\sin(10^\circ 6' 32'') = a$, then the value of $\cos(79^\circ 53' 28'') + \tan(10^\circ 6' 32'')$ is
- (A) $\frac{a(1 + \sqrt{1-a^2})}{\sqrt{1-a^2}}$ (B) $\frac{1 + \sqrt{1-a^2}}{\sqrt{1-a^2}}$
 (C) $\frac{\sqrt{1-a^2} + a}{\sqrt{1-a^2}}$ (D) $\frac{a\sqrt{1-a^2} + 1}{\sqrt{1-a^2}}$
91. If $\sin \theta + \operatorname{cosec} \theta = 2$, the value of $\sin^7 \theta + \operatorname{cosec}^7 \theta$ is
- (A) 1 (B) $1/2$
 (C) 2 (D) 0

92. $\tan \frac{\pi}{8} \tan \frac{\pi}{12} \tan \frac{3\pi}{8} \tan \frac{5\pi}{12} - \sin^2 \frac{\pi}{6} =$

- (A) $\frac{1}{2}$ (B) $\frac{2-\sqrt{3}}{2}$
 (C) $\frac{1}{4}$ (D) $\frac{3}{4}$

93. If $x \sin^3 \alpha + y \cos^3 \alpha = \sin \alpha \cos \alpha \neq 0$ and $x \sin \alpha - y \cos \alpha = 0$, then the value of $x^2 + y^2$ is

- (A) 1 (B) 2
 (C) 4 (D) 9

94. Number of integral values of x for which

$\sin \theta = \frac{4x-3}{9}$, where $0^\circ \leq \theta \leq 90^\circ$, is

- (A) 5 (B) 4
 (C) 3 (D) 2

95. If $x = \sin \theta + \cos \theta$ and $y = \sec \theta + \operatorname{cosec} \theta$, find y in terms of x .

- (A) $\frac{x}{x^2+1}$ (B) $\frac{x}{x^2-1}$
 (C) $\frac{2x}{x^2-1}$ (D) $\frac{2x}{x^2+1}$

Directions : The following pie chart shows the details of 1500 employees working in a company in various scales and also the break-up of 800 male employees across the scales. Study the graphs and answer questions 96 – 100.

Break-up of 1500 employees across the scales



Break-up of 800 male employees across the scales



96. How many females are working in scale V ?

- (A) 180 (B) 144
 (C) 96 (D) 84

97. The male-female ratio working in scale VII is

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

98. The scales in which the number of working females is the same are

- (A) I and VI (B) I and III
 (C) III and VI (D) only III

99. The number of scales in which the female workforce is less than the average female workforce working in any scale is

- (A) 5 (B) 2
 (C) 3 (D) None of these

100. Had the total number of employees working in the company been 1600 (800 male, 800 female) and pie charts of break-up across the scales the same, the percentage increase or decrease of female workforce in scale VII is

- (A) 10% decrease (B) 15% increase
 (C) 20% decrease (D) 20% increase

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96. The HCF of $\left(\frac{5}{4}, \frac{15}{8}, \frac{25}{12}\right)$ is

- (A) $\frac{5}{24}$ (B) $\frac{5}{4}$
 (C) $\frac{5}{96}$ (D) $\frac{5}{384}$

97. If the rate of compound interest for the first, second and third year be 4%, 5% and 6% respectively, then the amount a man will receive after 3 years, investing ₹ 30,000, is

- (A) ₹ 32,525.75 (B) ₹ 33,625.60
 (C) ₹ 35,225.60 (D) ₹ 34,725.60

98. Coefficient of x^3 in $(x-1)(x+2)(x-3)(x+4)$ is

- (A) 1 (B) 24
 (C) 10 (D) 2

99. The marked price of a motorcycle is ₹ 25,000. It is available with 2 successive discounts of 20% and 5%. Ajit buys it and spends ₹ 1,000 on its repairs and sells it for ₹ 25,000. His gain % is

- (A) 0 (B) 31.5
 (C) 25 (D) 20

100. A man decided to make a 160 km trip, travelling at 80 km/hr. On his return trip he travelled at 48 km/hr. What was the average speed ?

- (A) 60 km/hr (B) 64 km/hr
 (C) 8 km/hr (D) 16 km/hr

Handwritten notes: $\frac{13}{25}$, $\frac{3}{25}$, $\frac{10}{25}$

Handwritten note: $\tan 22.5^\circ \tan 15^\circ \tan \frac{15^\circ}{2} = \sin^2 \theta$

Handwritten calculations: $1500 \times 12 = 18000$, $18000 \div 100 = 180$, $180 \times 14 = 2520$, $2520 \div 100 = 25.2$, $25.2 \times 30 = 756$, $756 \div 100 = 7.56$, $7.56 \times 100 = 756$

Handwritten calculations: $80 \times 2 = 160$, $160 \div 80 = 2$, $160 \div 48 = 3 \frac{1}{3}$, $2 + 3 \frac{1}{3} = 5 \frac{1}{3}$, $160 \div 5 \frac{1}{3} = 30$