

NOTE : DO NOT BREAK THE SEAL UNTIL YOU GO THROUGH THE FOLLOWING INSTRUCTIONS

QUESTION BOOKLET

Diploma Polytechnic Entrance Test – 2010

Paper - II (MATHEMATICS)

Roll No.

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(Enter your Roll Number in the above space)

Series

Booklet No.

D

204396

Time Allowed : 1.30 Hours

Max. Marks : 70

INSTRUCTIONS :

1. Use only BLACK or BLUE Ball Pen.
2. All questions are COMPULSORY.
3. Check the BOOKLET thoroughly.

IN CASE OF ANY DEFECT – MISPRINTS, MISSING QUESTION/S OR DUPLICATION OF QUESTION/S, GET THE BOOKLET CHANGED WITH THE BOOKLET OF THE SAME SERIES. NO COMPLAINT SHALL BE ENTERTAINED AFTER THE ENTRANCE TEST.

4. Before you mark the answer, fill in the particulars in the ANSWER SHEET carefully and correctly. Incomplete and incorrect particulars may result in the non-evaluation of your answer sheet by the technology.
5. Write the SERIES and BOOKLET NO. given at the TOP RIGHT HAND SIDE of the question booklet in the space provided in the answer sheet by darkening the corresponding circles.
6. Do not use any eraser, fluid pens etc., otherwise your answer sheet is likely to be rejected.
7. After completing the test, handover the ANSWER SHEET to the Invigilator.

Code No. 02

SEAL

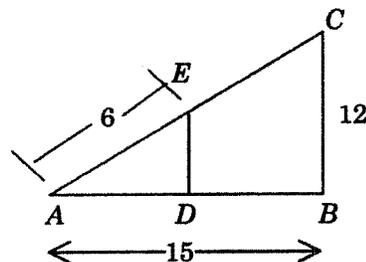
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PAPER - II
MATHEMATICS

1. At 2.15 pm, the hour and minute hands of a clock form an angle of :
- (1) 5° (2) $22\frac{1}{2}^\circ$
(3) 28° (4) 30°
2. A large field of 700 hectares is divided into two parts. The difference of the areas of the two parts is one fifth of the average of the two areas. What is the area of the smaller area in hectares?
- (1) 225 (2) 280
(3) 300 (4) 315
3. The percentage increase in the area of a rectangle, if each of its sides is increased by 20 % is :
- (1) 40 % (2) 42 % (3) 44 % (4) 46 %
4. In the equation $cx + bx + ax^2 = 0$, if $a \neq 0$ and $b = 0$ then the roots are :
- (1) equal
(2) equal in magnitude but opposite in sign
(3) reciprocal to each other
(4) reciprocal to each other but have the same sign
5. An equilateral triangle, a square and a circle have equal perimeters. If T denotes the area of the triangle, S , the area of the square and C , the area of the circle, then :
- (1) $S < T < C$ (2) $T < C < S$
(3) $T < S < C$ (4) $C < S < T$
6. The curved surface of a right circular cone of height 15 cm and base diameter 16 cm is :
- (1) $60 \pi \text{ cm}^2$ (2) $68 \pi \text{ cm}^2$
(3) $120 \pi \text{ cm}^2$ (4) none of the above
7. If each edge of a cube is doubled then its volume :
- (1) is doubled (2) becomes 4 times
(3) becomes 8 times (4) becomes 6 times

8. The graph of a linear equation for real value is :
- (1) a point (2) perpendicular
(3) straight line (4) parabola
9. If sum and product of the equation $-6a + 2x + ax^2$ are equal, what will be the value of a ?
- (1) $1/2$ (2) $1/3$
(3) $-1/3$ (4) $-1/2$
10. The solution of the equation $\sqrt{x} + 2x = 1$ is :
- (1) $1/2$ and $1/4$ (2) 1 and $1/4$
(3) 2 and 3 (4) -2 and 3
11. A fraction becomes $4/5$ if 1 is added to both numerator and denominator. The fraction becomes $1/2$ if 5 is subtracted from numerator and denominator both. The fraction is :
- (1) $2/3$ (2) $5/7$
(3) $3/8$ (4) $7/9$
12. If α and β are roots of the equation $c + bx + ax^2 = 0$, then the equation whose roots are $\frac{1}{\alpha + \beta}$, $\frac{1}{\alpha} + \frac{1}{\beta}$ is :
- (1) $acx^2 + (a^2 + bc)x + bc = 0$ (2) $bcx^2 + (b^2 + ac)x + ab = 0$
(3) $abx^2 + (c^2 + ab)x + ca = 0$ (4) None of these



13. A group of 10 items has mean 6. If the mean of 4 of these items is 7.5, then the mean of the remaining items is :
- (1) 6.5 (2) 5.5 (3) 4.5 (4) 5.0
14. The angle in the major segment of a circle is always :
- (1) acute (2) right
(3) obtuse (4) none of the above
15. A car completes the first half of its journey with a velocity v_1 and the rest half with a velocity v_2 . Then the average velocity of the car for the whole journey is :
- (1) $\frac{v_1 + v_2}{2}$ (2) $\sqrt{v_1 v_2}$
(3) $\frac{2v_1 v_2}{v_1 + v_2}$ (4) none of the above
16. The difference between the greatest and least value of observation is :
- (1) range (2) mean deviation
(3) standard deviation (4) variance
17. In the figure below if $AD = 5$ cm, $AE = 6$ cm, $BC = 12$ cm and $AB = 15$ cm.



Then AC and DE are :

- (1) 4, 18 cm (2) 18, 4 cm
(3) 12, 4 cm (4) none of the above

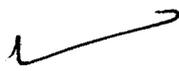


18. If $\sin x + \sin^2 x = 1$, then $\cos^2 x + \cos^4 x$ is equal to :
- (1) 1 (2) -1
(3) 0 (4) 2
19. The value of $\frac{\cos A}{\sec A} + \frac{\sin A}{\operatorname{cosec} A}$ is :
- (1) $\sec^2 A + \tan^2 A$ (2) $\sec^2 A - \tan^2 A$
(3) $\cot^2 A - \operatorname{cosec}^2 A$ (4) $\operatorname{cosec}^2 A + \cot^2 A$
20. If m and n are roots of the equation $2x^2 - 3x + 1 = 0$ then the equation which has roots $\frac{m}{n}$ and $\frac{n}{m}$?
- (1) $2x^2 - 5x + 12 = 0$ (2) $2x^2 + 5x + 2 = 0$
(3) $2x^2 - 5x + 2 = 0$ (4) $x^2 - 5x - 2 = 0$
21. If $\operatorname{cosec} A + \cot A = 11/2$, then $\tan A$ is :
- (1) $21/22$ (2) $15/16$
(3) $44/117$ (4) $117/43$
22. The maximum value of $\sin x$ is :
- (1) $1/2$ (2) 2
(3) -1 (4) 1
23. If 25% of a number is subtracted from a second number, the second number reduces to its five sixth. What is the ratio of the first number to second number?
- (1) 1 : 3 (2) 2 : 3
(3) 3 : 2 (4) Data inadequate

24. If $2^{x-1} + 2^{x+1} = 1280$, then the value of x is :
- (1) 10 (2) 8
(3) 9 (4) 2
25. A man goes 150 m due east and 200 m due north. How far is he from the starting point?
- (1) 250 m (2) 300 m
(3) 350 m (4) 225 m
26. $\frac{x}{a} \cos \theta + \frac{y}{b} \sin \theta = 1$ and $\frac{x}{a} \sin \theta - \frac{y}{b} \cos \theta = -1$, then $\frac{x^2}{a^2} + \frac{y^2}{b^2}$ is equal :
- (1) 0 (2) 2
(3) -1 (4) 1
27. The system of equations $8x + 5y = 9$ and $3x + 2y = 4$ has :
- (1) unique solution (2) no solution
(3) infinite solutions (4) inconsistent
28. The GCD of the polynomials $3 + 13x - 30x^2$ and $9 - 30x + 25x^2$ is :
- (1) $-6x - 1$ (2) $5x + 3$
(3) $(5x - 3)^2$ (4) None of the above



29. If the volumes of two cubes are in ratio $27 : 1$, the ratio of their edges is :
- (1) $1 : 3$ (2) $1 : 27$ (3) $3 : 1$ (4) $27 : 1$
30. The diameter of a sphere is 8 cm. It is melted and drawn into a wire of diameter 3 mm. The length of the wire is :
- (1) 36.9 m (2) 37.9 m (3) 38.9 m (4) 39.9 m
31. The arithmetic mean of a set of 40 values is 65. If each value is increased by 5, what will be the mean of the set of new values?
- (1) 80 (2) 75
(3) 70 (4) none of the above
32. If diameter of a circle is BC with centre O and OD is perpendicular to AB . Then the length of AC is :
- (1) OD^2 (2) $2 OD$
(3) $3 OD$ (4) none of the above
33. The average marks obtained by 25 students are 45. It was found later that a score 36 was missed as 66. The correct mean score is :
- (1) 44.8 (2) 43.8 (3) 34.8 (4) 40
34. A hollow garden roller 63 cm wide with a girth of 440 cm is made of iron 4 cm thick. The volume of iron used is :
- (1) 54982 cm^3 (2) 56372 cm^3
(3) 57636 cm^3 (4) 58752 cm^3



35. The graph of the equation $y = x$ is in the shape of 'V' which is :
- (1) open upward (2) open downward
(3) open right (4) open left
36. The LCM of $12a^2b, 18a^2b^3, 24ab^2c$ is :
- (1) $72a^2b^2c$ (2) $24a^2b^3c$
(3) $72a^2b^3c$ (4) None of the above
37. If the roots of the equation $-q + px + x^2 = 0$ differ by 1, then :
- (1) $p^2 = 4q$ (2) $p^2 = 4q + 1$
(3) $p^2 = 4q - 1$ (4) None of these
38. If the height of a pole is $2\sqrt{3}$ m meters and the length of its shadow is 2 m. The angle of elevation of sun is :
- (1) 60° (2) 30°
(3) 45° (4) None of the above
39. An observer 1.6 m tall is $20\sqrt{3}$ m away from a tower. The angle of elevation from his eye to the top of the tower is 30° . Height of the tower is :
- (1) 23.2 m (2) 21.6 m
(3) 24.72 m (4) Can't be determined
40. The consecutive positive even integer whose squares have the sum 340 is :
- (1) 10, 12 (2) 12, 14
(3) 8, 10 (4) None of these



41. Find the median of the following data :

5, 12, 13, 2, 4, 29, 21, 1, 8

- (1) 5 (2) 8 (3) 4 (4) 29

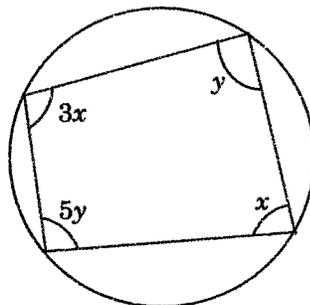
42. The perimeters of two similar triangles are 24 m and 28 m respectively. If one side of the first triangle is 8 cm, the corresponding side of the second triangle is :

- (1) 8 cm (2) 6 cm
(3) 16 cm (4) none of the above

43. If two medians of a triangle are equal, then the triangle is :

- (1) similar (2) equilateral (3) right (4) isosceles

44. See the figure given below



The values of x and y are :

- (1) $45^\circ, 30^\circ$ (2) $50^\circ, 30^\circ$ (3) $60^\circ, 20^\circ$ (4) $75^\circ, 15^\circ$

45. A triangle is inscribed in a circle such that each of its vertices is equidistant from the centre. What type of triangle it is?

- (1) equilateral (2) isosceles
(3) obtuse angled (4) right angled

46. The mean of 29, 73, 84, x , 42 and 49 is 53. The value of x is :

- (1) 41 (2) 51 (3) 52 (4) 42



47. If $1 + \sin x + \sin^2 x + \sin^3 x + \dots \infty$ is equal to $4 + 2\sqrt{3}$, $0 < x < \pi$, then x is :
- (1) $\pi/6$ (2) $\pi/4$
(3) $\pi/3$ or $\pi/6$ (4) $\pi/3$ or $2\pi/3$
48. A's marks in Biology are 20 less than 25% of the total marks obtained by him in Biology, Maths and Drawing. If his marks in Drawing be 50, what are his marks in Maths?
- (1) 40 (2) 45
(3) 50 (4) Data inadequate
49. $\frac{\tan 59^\circ}{\cot 31^\circ} = :$
- (1) 2 (2) $\frac{1}{2}$
(3) 1 (4) $\frac{2}{3}$
50. The value of $\frac{6^{\frac{2}{3}} \times \sqrt[3]{6^7}}{\sqrt[3]{6^6}}$ is :
- (1) 6 (2) 36
(3) $\frac{1}{6}$ (4) None of the above
51. A number consists of 3 digits whose sum is 10. The middle digit is equal to the sum of the other two and the number will be increased by 99 if its digits are reversed. The number is :
- (1) 145 (2) 253
(3) 370 (4) 352



57. A farmer wishes to start a 100 sq.m rectangular vegetable garden. Since he has only 30 m barbed wire, he fences three sides of the garden letting his house compound wall act as the fourth side fencing. The dimension of the garden in meters is :

- (1) 15×6.67 (2) 20×5 (3) 30×3.33 (4) 40×2.5

58. Height of 50 persons is given below

Height in cm (x) :	159	160	151	155	175
No. of persons (f) :	5	13	23	6	3

The mean height of the group is :

- (1) 159.1 cm (2) 153 cm (3) 154 cm (4) 156.06 cm

59. The mean of first three terms is 14 and mean of next two terms is 18. The mean of all five terms is :

- (1) 14.5 (2) 15 (3) 15.2 (4) 15.6

60. Sides of various triangles are given below. Which one of them is not a right triangle?

- (1) 3, 4, 5 (2) 8, 6, 10 (3) 6, 12, 16 (4) 15, 20, 25

61. The line segment joining the midpoints of two sides of a triangle is always parallel to the third side and its length is equal to :

- (1) Double the length of the third side
(2) $1/3$ of the length of the third side
(3) Equal to the length of the third side
(4) Half of the length of the third side

62. If the mean of 1, 2, 3, ..., n is $6n/11$, then n is :

- (1) 10 (2) 12 (3) 11 (4) 13



63. Solution of the equation $3x + 2y = 11$, $2x + 3y = 4$ is :
- (1) $x = 5, y = -2$ (2) $x = -2, y = 5$
(3) inconsistent (4) infinite solutions
64. Two ships are sailing in the sea on the two sides of a lighthouse. The angles of elevation of the top of the lighthouse as observed from the two ships are 30° and 45° respectively. If the lighthouse is 100 m high the distance between the two ships is :
- (1) 173 m (2) 200 m (3) 273 m (4) 300 m
65. $\tan^2 \theta - \cot^2 \theta = :$
- (1) $\sec^2 \theta - 1$ (2) $\operatorname{cosec}^2 \theta - \frac{1}{\tan^2 \theta}$
(3) $\sec^2 \theta - \operatorname{cosec}^2 \theta$ (4) $\tan^2 \theta - \frac{1}{\operatorname{cosec}^2 \theta}$
66. Four equal sized maximum circular plates are cut off from a square paper sheet of area 784 cm^2 . The circumference of each plate is :
- (1) 22 cm (2) 44 m (3) 66 cm (4) 44 cm
67. $(\cos \theta - \sin \theta)^2 + (\cos \theta + \sin \theta)^2 = :$
- (1) 1 (2) $\frac{1}{2}$ (3) $\frac{3}{2}$ (4) 2
68. The area of an isosceles triangle with base 10 cm and vertical angle 51° is :
- (1) 46.05 cm^2 (2) 40.65 cm^2
(3) 36.32 cm^2 (4) None of the above
69. If $\sin x = \frac{3}{4}$ and $\tan x = \frac{9}{2}$, then $\cos x$ is :
- (1) $\frac{1}{6}$ (2) $\frac{8}{27}$ (3) $\frac{27}{8}$ (4) $\frac{15}{4}$
70. The roots of the equation $c + bx + ax^2 = 0$ will be reciprocal to each other if :
- (1) $a = \frac{1}{c}$ (2) $a = c$ (3) $b = ac$ (4) $a = b$

Space For Rough Work

Space For Rough Work

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