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

QUESTION BOOKLET

Diploma Polytechnic Entrance Test – 2011

Paper - II (MATHEMATICS)

Booklet No.

Roll No. | | | | | | |

Series C 200967

(Enter your Roll Number in the above space)

Time Allowed : 1.30 Hours **Max. Marks : 70**

SEAL

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

PAPER – II

MATHEMATICS

1. The equation $2x^2 + kx + 3 = 0$ will have real roots if the value of k is

(1) $k \geq \sqrt{24}$ (2) $k \leq \sqrt{24}$

(3) Both (1) and (2) (4) None of the above

2. If $\sqrt{x-1} - \sqrt{x+1} + 1 = 0$, then $4x$ equals

(1) 2 (2) 3 (3) 4 (4) 5

3. If α and β are the two roots of the equation $ax^2 + bx + c = 0$, then $\alpha^2 + \beta^2 = ?$

(1) $\frac{b^2 - 4ac}{2a}$ (2) $\frac{b^2 - 2ac}{a}$

(3) $\frac{b^2 - 2ac}{a^2}$ (4) $\frac{b^2 + 2ac}{a}$

4. The area of an equilateral triangle whose side is $6a$ cm is

(1) $9a^2\sqrt{3}$ (2) $3a\sqrt{3}$

(3) $a\sqrt{3}$ (4) $9a\sqrt{3}$

5. Diagonals of a trapezium divide each other

(1) diagonally (2) proportionally

(3) equally (4) at right angle

6. If a line divides any two sides of a triangle in the same ratio, then the line must be

(1) Perpendicular on the base

(2) Parallel to the third side

(3) Intersecting the third line in the same ratio

(4) None of these

7. The distance between the lines $4x + 3y = 11$ and $8x + 6y = 15$ is :

(1) $\frac{7}{2}$ (2) $\frac{7}{3}$

(3) $\frac{7}{5}$ (4) $\frac{7}{10}$

8. The ratio in which the line segment joining $(3,4)$ and $(-2,1)$ is divided by the y – axis is :

(1) 1 : 2 (2) 1 : 3

(3) 3 : 2 (4) None of these

9. If $\tan\theta = \frac{12}{5}$ then the value of $\sin\theta$ is :

(1) $\frac{12}{13}$ (2) $\frac{13}{12}$

(3) $\frac{5}{12}$ (4) $\frac{5}{13}$

10. The value of $\tan\theta = \sqrt{2} - 1$, then the value of the expression $\frac{\tan\theta}{1 + \tan^2\theta}$ is :

(1) $\frac{\sqrt{2}}{4}$ (2) $\frac{1}{4}$

(3) $\sqrt{2}$ (4) $\frac{1}{\sqrt{2}}$

11. The values of $\tan\theta$ and $\cot\theta$ are equal when :

(1) $\theta = 30^\circ$ (2) $\theta = 45^\circ$

(3) $\theta = 90^\circ$ (4) $\theta = 0^\circ$

12. The total surface area of a hemisphere of radius r is given by :

(1) $2\pi r^2$ (2) πr^2

(3) $3\pi r^2$ (4) $4\pi r^2$

13. The probability of getting heads in both trials when a balanced coin is tossed twice will be :

(1) $\frac{1}{4}$ (2) $\frac{1}{2}$

(3) 1 (4) $\frac{3}{4}$

14. A single letter is selected at random from the word, "PROBABILITY" the probability that it is vowel is :

(1) $\frac{3}{11}$ (2) $\frac{4}{11}$

(3) $\frac{2}{11}$ (4) 0

15. A chance of throwing an ace first only of two successive throws with an ordinary die is :

(1) $1/36$ (2) $5/36$

(3) $25/36$ (4) $1/6$

16. A bag contains 4 tickets numbered 1, 2, 3, 4 and another bag contains 6 tickets numbered 1, 2, 4, 6, 8, 9. One bag is chosen and ticket is drawn, the probability that the ticket bears the number 4 is

(1) $\frac{1}{48}$ (2) $\frac{1}{8}$

(3) $\frac{5}{24}$ (4) $\frac{2}{24}$

17. Find the value of k if the equation $2x^2 + kx + 1 = 0$ has a coincident root?

(1) $2\sqrt{2}$ (2) $3\sqrt{2}$

(3) $\sqrt{2}$ (4) $\frac{1}{\sqrt{2}}$

18. Which type of roots the equation $3x^2 - 2x - 3 = 0$ will have?

(1) Real (2) Coincident

(3) No root (4) None of these

19. Find the roots of the equation $3x^2 + 11x + 10 = 0$

(1) $\frac{5}{3}$ and 2 (2) $-\frac{5}{3}$ and -2

(3) -3 and 2 (4) 2 and 7

20. If the quadratic equation $3x^2 + px - 5 = 0$ has sum of the roots $-\frac{2}{3}$, the value of p is

(1) 2 (2) 3 (3) 4 (4) -4

21. If the roots of $px^2 + qx + 3 = 0$ are reciprocal to each other then

(1) $q = 3$ (2) $p = 3$

(3) $p - q = 0$ (4) $p = 0$

22. If the sum of roots of a quadratic equation is 4 and one root is $2 - \frac{\sqrt{7}}{3}$, the other root is

(1) $1 + \frac{\sqrt{7}}{3}$ (2) 2

(3) $2 + \frac{\sqrt{7}}{3}$ (4) $3 - \frac{\sqrt{7}}{2}$

23. AB and CD are two perpendicular diameters of a circle with centre O. The chord AC is equal to :

(1) $\frac{1}{\sqrt{2}}AB$ (2) $\frac{1}{2}AB$

(3) AB (4) $\frac{1}{2}\sqrt{AB \times CD}$

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

(1) Equilateral triangle (2) Isosceles triangle

(3) Obtuse angle triangle (4) Right angle triangle

25. A line passes through $(2, 2)$ and is perpendicular to the line $3x + y = 3$ its y intercept is :

(1) $\frac{1}{3}$ (2) $\frac{2}{3}$ (3) 1 (4) $\frac{4}{3}$

26. The area of a triangle with vertices at $(-4,1)$, $(1, 2)$, $(4,-3)$ is :

(1) 14 (2) 16 (3) 15 (4) 19

27. The points $A(12,8)$, $B(-2,6)$ and $C(6,0)$ are vertices of :

(1) right angled triangle (2) isosceles triangle

(3) equilateral triangle (4) none of these

28. The area of the triangle with vertices points $(a,b+c)$, $(b,c+a)$, $(c,a+b)$ is :

(1) 0 (2) $a+b+c$

(3) $ab+bc+ca$ (4) $a^2+b^2+c^2$

29. A wire in the form of a circle of radius 28 cm, then the side of the square into which it can be bent is :

(1) $\pi/2$ cm (2) 2π cm

(3) 44 cm (4) $(\pi + 28)$ cm

30. The number of vertices in a cube is :

(1) 6 (2) 10 (3) 8 (4) 12

31. The difference between the circumference and radius of a circle is 37 cms, then its diameter is :

(1) 28 cm (2) 14 cm

(3) 42 cm (4) 56 cm

32. A metal pipe has an external radius of 4 cm and an internal radius of 3 cm. The volume of the metal of length 10 cm is :

(1) 120 cm^2 (2) 220 cm^2

(3) 440 cm^2 (4) 225 cm^2

33. The volume of a solid cubical box whose surface area is 600 cm^2 is :

(1) 1000 cm^3 (2) 1200 cm^3

(3) 1100 cm^3 (4) 900 cm^3

34. The curved surface area of a right circular cone of height 84 cm and diameter 70 cm is :

(1) 10010 cm^2 (2) 100000 cm^2

(3) 10020 cm^2 (4) 11000 cm^2

35. The price of two chairs and 5 tables is Rs. 680. If the price of a table exceeds that of a chair by Rs. 80. Find the price of a table

(1) Rs. 80 (2) Rs. 130

(3) Rs. 120 (4) Rs. 95

36. Find the value of k if the system of equations $2x - y = 1$ and $3x - ky = -1$ has a unique solution

(1) $\frac{2}{3}$ (2) $\frac{3}{2}$

(3) $-\frac{2}{3}$ (4) All except $-\frac{3}{2}$

37. The equations $3x + 5y = 0$, $5x - 3y = 0$ will have

(1) no solution (2) many solutions

(3) a solution $x = 0$ and $y = 0$ (4) inconsistency in the system

38. If the difference and sum of the two whole numbers are 3 and 39 respectively, find the number

(1) 22, 25 (2) 18, 21

(3) 13, 16 (4) 10, 12

39. If the expression $x^3 - px^2 + 11x - 6$ is divisible by $(x - 1)$, find the value of p

(1) 5 (2) 6 (3) 3 (4) 0

40. Which of the following is the zero of the polynomial $x^2 + 2x - 3$?

(1) –1 and 3 (2) 1 and –3

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

41. Find the side of the square whose area is $49x^2 + 28x + 4$

(1) $7x + 2$ (2) $7x - 2$

(3) $6x + 4$ (4) $9x + 3$

42. In a circle of radius 5 cm. What is the distance of 6 cm chord from the centre?

(1) 4 cm (2) 3.5 cm

(3) 3 cm (4) 3.6 cm

43. The tangent lines at the end points of a diameter of a circle are

(1) Parallel (2) Non collinear

(3) Smaller than the diameter (4) None of these

44. How many common tangents can be drawn if two circles touches externally?

(1) One (2) Two

(3) Four (4) Three

45. The radii of two circles are 8 cm and 10 cm. If the length of its common chord is 12 cm. The distance between the centres of these two circles is

(1) 13.2 cm (2) 11.7 cm (3) 12.9 cm (4) 14.1 cm

46. How many tangents can be drawn from a single point on the circle?

(1) One (2) Two (3) Three (4) Infinite

47. The angle in the major segment of a circle is always

(1) An acute angle (2) Right angle

(3) An obtuse angle (4) None of these

48. An angle subtended by a minor arc of a circle in the alternate segment is

(1) An acute angle (2) An obtuse angle

(3) Right angle (4) None of these

49. If $\cos\theta - \sin\theta = \sqrt{2}\sin\theta$, then $\cos\theta + \sin\theta$ is :

(1) $\sqrt{2}\cos\theta$ (2) $\sqrt{2}\sin\theta$

(3) 0 (4) 1

50. Two poles of height 8 m and 13 m stand on a ground. If the distance between their feet is 12 m, the distance between their tops is :

(1) 13 m (2) 26 m

(3) 10 m (4) 12 m

51. A vertical stick 15 cm long casts a shadow of 10 cm on the ground. A pole casts a shadow of 60 cm at the same time. The length of the pole is :

(1) 80 cm (2) 90 cm

(3) 100 cm (4) 105 cm

52. The length of a rectangle is 1 cm more than its width and its perimeter is 14 cms. then the area of the rectangle is :

(1) 16 cm^2 (2) 14 cm^2

(3) 12 cm^2 (4) 10 cm^2

53. Two cubes have volumes in the ratio 1 : 27, then the ratio of the area of the face of one to that of the other is :

(1) 1 : 3 (2) 1 : 6

(3) 1 : 9 (4) 1 : 18

54. Choose the rational number which does not lie between rational numbers $\frac{3}{5}$ and $\frac{2}{3}$

(1) $\frac{46}{75}$ (2) $\frac{47}{75}$ (3) $\frac{49}{75}$ (4) $\frac{50}{75}$

55. If $\frac{\sqrt{3}-1}{\sqrt{3}+1} = a + b\sqrt{3}$ then the value of 'a' and 'b' is

(1) $a = 2, b = -1$ (2) $a = 2, b = 1$

(3) $a = -2, b = 1$ (4) $a = -2, b = -1$

56. If in an A.P. 3rd term is 18 and 7th term is 30. The sum of its seventeen terms is

(1) 600 (2) 612

(3) 624 (4) None of these

57. Let S_n denote the sum of first n terms of an A.P. If $S_{2n} = 3S_n$, then the ratio $\frac{S_{3n}}{S_n}$ is equal to

(1) 4 (2) 6 (3) 8 (4) 10

58. The system of equations $a_1x + b_1y + c_1 = 0$ and $a_2x + b_2y + c_2 = 0$ will have many solutions if

(1) $\frac{a_1}{a_2} = \frac{b_1}{b_2}$ (2) $\frac{a_1}{a_2} = \frac{b_1}{b_2} = \frac{c_1}{c_2}$

(3) $\frac{a_1}{a_2} \neq \frac{b_1}{b_2} = \frac{c_1}{c_2}$ (4) None of these

59. Two similar triangles have

(1) same shape but not necessarily the same size

(2) same ratio of lengths of any two corresponding sides

(3) both (1) and (2)

(4) neither of these

60. A man goes 150 metres due east and 200 metres due north. How far is he from his starting point?

(1) 250 m (2) 300 m (3) 350 m (4) 225 m

61. If all the three sides of a triangle are $\sin\theta$, $\cos\theta$ and 1, the triangle is

(1) right triangle (2) isosceles triangle

(3) equilateral triangle (4) none of these

62. Corresponding angles are equal only when

(1) Transversals intersect each other

(2) Transversals intersect two parallel lines

(3) Transversals intersect two equal lines

(4) None of these

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

(1) similar (2) equilateral

(3) right (4) isosceles

64. If a ray has its initial point on a line, then the sum of two adjacent angles is

(1) 90° always (2) 180° always

(3) 360° always (4) Not definite

65. The value of $\sin B \cos(90^\circ - B) + \cos B \sin(90^\circ - B)$ is :

(1) 0 (2) 1

(3) $\sin B \cos B$ (4) $2\sin^2 B$

66. If $\sec\beta = x + \frac{1}{4x}$, then the value of $\sec\beta + \tan\beta$ is equal to :

(1) $2x$ (2) $\frac{x}{2}$

(3) $3x$ (4) $\frac{x}{3}$

67. If θ increases from 0° to 90°, then the value of $\cos\theta$:

(1) decreases (2) increases

(3) neither increases nor decreases (4) none

68. The greatest value of $(\sin\alpha \cos\alpha)$ is :

(1) 1 (2) $\frac{1}{2}$

(3) $\frac{1}{4}$ (4) 2

69. The value of $\sin^2\alpha + \text{cosec}^2\alpha$ is always :

(1) greater than 1 (2) less than 1

(3) greater than or equal to 2 (4) equal to 2

70. The value of $\sin\theta \cdot \cos\theta$ has maximum value when θ is :

(1) 30° (2) 45°

(3) 60° (4) 90°

Space For Rough Work

Space For Rough Work

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