विद्या ददाति विनयम्
Knowledge is Discipline
BJNP
Learning with the Speed of Mumbai and the Tradition of Kota

Max Marks: 100 **Date: 06.11.2022**

ARJUNA BATCH
MATHEMATICS : REVISION TEST-1 (SET A)
Topic: Trigonometry II + Straight Lines + Circle

1. In a ΔPQR, if $3\sin P + 4\cos Q = 6$ and $4\sin Q + 3\cos P = 1$, then the angle R is equal to

(a) $\frac{5\pi}{6}$ (b) $\frac{\pi}{6}$ (c) $\frac{\pi}{4}$ (d) $\frac{3\pi}{4}$

2. If $(3, -2)$ is the midpoint of the chord AB of the circle $x^2 + y^2 - 4x + 6y - 5 = 0$ then AB =

(a) 4 (b) 8 (c) 12 (d) 16

3. $\sin^2 5° + \sin^2 10° + \sin^2 15° + \ldots. + \sin^2 85°$

(a) $7\frac{1}{2}$ (b) $8\frac{1}{2}$ (c) 9 (d) $9\frac{1}{2}$

4. The line $y = x + a\sqrt{2}$ touchses the circle $x^2 + y^2 = a^2$ at the point

(a) $\left(-\frac{a}{\sqrt{2}}, \frac{a}{\sqrt{2}}\right)$ (b) $\left(\frac{a}{\sqrt{2}}, \frac{a}{\sqrt{2}}\right)$ (c) $\left(\frac{a}{\sqrt{2}}, -\frac{a}{\sqrt{2}}\right)$ (d) $\left(-\frac{a}{\sqrt{2}}, -\frac{a}{\sqrt{2}}\right)$

5. The area of the parallelogram formed by the lines $2x - 3y + a = 0$, $3x - 2y - a = 0$, $2x - 3y + 3a = 0$ and $3x - 2y - 2a = 0$ in square units, is

(a) $\frac{a^2}{5}$ (b) $\frac{2a^2}{5}$ (c) $\frac{3a^2}{5}$ (d) None of these

6. If $(-2, 6)$ is the image of the point $(4, 2)$ with respect to the line $L = 0$, then L =

(a) $3x - 2y + 5$ (b) $3x - 2y + 10$ (c) $2x + 2y - 5$ (d) $6x - 4y - 7$

7. If $\cos\theta + \sin\theta = \sqrt{2}\cos\theta$ then $\cos\theta - \sin\theta$ =

(a) $\sqrt{2}\cos\theta$ (b) $\sqrt{2}\sin\theta$ (c) $-\sqrt{2}\cos\theta$ (d) $-\sqrt{2}\sin\theta$

Space for Rough Work

8. A line meets the coordinate axes in A and B. A circle is circumscribed about the triangle OAB. If m and n are distances of tangent to circle at origin from the points A and B respectively then diameter of the circle is

(a) m + n (b) m – n (c) mn (d) m/n

9. The length of the common chord of two circles of radii 15 and 20 and whose centres are 25 units apart is

(a) 24 (b) 25 (c) 15 (d) 20

10. If $(\sin\ \alpha\ + \text{cosec}\ \alpha\ )^2 + (\sec\ \alpha\ + \cos\ \alpha\ )^2 = k + \tan^2\ \alpha\ + \cos^2\ \alpha$ then k =

(a) 9 (b) 7 (c) 5 (d) 3

11. The angle between the tangents from the origin to the circle $(x - 7)^2 + (y + 1)^2 = 25$ is

(a) $\frac{\pi}{3}$ (b) $\frac{\pi}{6}$ (c) $\frac{\pi}{2}$ (d) $\frac{\pi}{8}$

12. A straight line is such that its distance of 5 units from the origin and its inclination is 135°, the intercepts of the line on the co-ordinate axes are

(a) 5, 5 (b) $\sqrt{2}, \sqrt{2}$ (c) $5\sqrt{2}, 5\sqrt{2}$ (d) $\frac{5}{\sqrt{2}}, \frac{5}{\sqrt{2}}$

13. The chord of contact of the pair of tangents drawn from each point on the line 2x + y = 4 to the circle $x^2 + y^2 = 1$ passes through the point

(a) (1, 2) (b) $\left(\frac{1}{2}, \frac{1}{4}\right)$ (c) (2, 4) (d) None of these

14. The vertices of a triangle are (2, 1), (5, 2) and (3, 4) respectively, then the circumcentre is

(a) $\left(\frac{13}{4}, \frac{-9}{4}\right)$ (b) $\left(\frac{-13}{4}, \frac{9}{4}\right)$ (c) $\left(\frac{-13}{4}, \frac{-9}{4}\right)$ (d) $\left(\frac{13}{4}, \frac{9}{4}\right)$

15. The equation k cos x – 3 sin x = k + 1 is solvable only if k belongs to the interval

(a) $[4, \infty)$ (b) $[-4, 4]$ (c) $(-\infty, 4]$ (d) $(-\infty, 4)$

16. The distance of the point (2, 3) from the line 2x – 3y + 9 = 0 measured along the line x – y + 1 = 0 is

(a) $4\sqrt{2}$ (b) $2\sqrt{2}$ (c) $\sqrt{2}$ (d) $1 / \sqrt{2}$

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17. If the distance between the points P(a cos 48°, 0) and Q(0, a cos 12°) is d, then $d^2 - a^2$ =

(a) $\frac{a^2}{4}(\sqrt{5}-1)$ (b) $\frac{a^2}{4}(\sqrt{5}+1)$ (c) $\frac{a^2}{8}(\sqrt{5}-1)$ (d) $\frac{a^2}{8}(\sqrt{5}+1)$

18. If $\frac{x}{a}\cos\theta + \frac{y}{b}\sin\theta = 1$ and $\frac{x}{a}\sin\theta - \frac{y}{b}\cos\theta = 1$, then $\frac{x^2}{a^2} + \frac{y^2}{b^2}$ =

(a) 1 (b) –1 (c) 2 (d) 3

19. If the pair of lines xy – x – y + 1 = 0 and the line ax + 2y – 3 = 0 are concurrent then a =

(a) –1 (b) 0 (c) 3 (d) 1

20. The value of $2(\sin^6\theta + \cos^6\theta) - 3(\sin^4\theta + \cos^4\theta) + 1$ is

(a) 2 (b) 0 (c) 4 (d) 6

21. If $a\cos\theta + b\sin\theta = p$ and $a\sin\theta - b\cos\theta = q$ then

(a) $a^2 - b^2 = p^2 - q^2$ (b) $a^2 + b^2 = p^2 + q^2$ (c) a + b = p + q (d) a – b = p – q

22. A circle of radius 2 units lies in the first quadrant touching both the axes. Then the equation of the circle with centre (6, 5) and touching the above circle externally is

(a) $x^2 + y^2 - 12x - 10y + 12 = 0$ (b) $x^2 + y^2 - 12x - 10y + 32 = 0$

(c) $x^2 + y^2 - 12x - 10y + 52 = 0$ (d) $x^2 + y^2 - 12x - 10y + 10 = 0$

23. The orthocentre of the triangle formed by A(1, 2), B(–2, 2), C(1, 5) is

(a) (1, 5) (b) (–2, 2) (c) (0, 3) (d) (1, 2)

24. The line y = x + 3 meets the circle $x^2 + y^2 = a^2$ at A and B then the equation of the circle on AB as diameter is

(a) $x^2 + y^2 + 3x - 3y - a^2 + 9 = 0$ (b) $x^2 + y^2 + 3x + 3y - a^2 + 9 = 0$

(c) $x^2 + y^2 - 3x + 3y - a^2 + 9 = 0$ (d) $x^2 + y^2 - 3x - 3y - a^2 + 9 = 0$

25. The length of the chord joining the points $(4\cos\theta, 4\sin\theta)$ and $(4\cos(\theta + 60°), 4\sin(\theta + 60°))$ of the circle $x^2 + y^2 = 16$ is

(a) 16 (b) 2 (c) 4 (d) 8

Space for Rough Work

26. If $p_n = \cos^n \theta + \sin^n \theta$, then $2p_6 - 3p_4 + 1 =$

(a) 2 (b) 3 (c) 0 (d) 1

27. A circle passes through the origin and has its centre on y = x. If it cuts $x^2 + y^2 - 4x - 6y + 10 = 0$ orthogonally, its equation is

(a) $x^2 + y^2 - x - y = 0$ (b) $x^2 + y^2 - 6x + 4y = 0$

(c) $x^2 + y^2 - 2x - 2y = 0$ (d) $x^2 + y^2 + 2x + 2y = 0$

28. The general solution of $\tan\theta = \frac{1}{\sqrt{3}}$ and $\cos\theta = \frac{-\sqrt{3}}{2}$ is $\theta =$

(a) $n\pi + \frac{7\pi}{6}$ (b) $2n\pi + \frac{\pi}{2}$ (c) $2n\pi + \frac{7\pi}{6}$ (d) $n\pi + \frac{\pi}{6}$

29. The equation of the circle touching the y-axis at the origin and passing though (b, c) is

(a) $b(x^2 - y^2) = x(b^2 - c^2)$ (b) $b(x^2 - y^2) = x(b^2 + c^2)$

(c) $b(x^2 + y^2) = x(b^2 + c^2)$ (d) $b(x^2 + y^2) = x(b^2 - c^2)$

30. If $\cot\theta + \tan\theta = 2\operatorname{cosec}\theta$ then the general value of $\theta =$

(a) $2n\pi \pm \frac{\pi}{3}$ (b) $2n\pi \pm \frac{\pi}{6}$ (c) $n\pi \pm \frac{\pi}{3}$ (d) $n\pi \pm \frac{\pi}{6}$

31. If the coordinates of the middle point of the portion of a line intercepted between the coordinates axes is (3, 2), then the equation of the line will be

(a) 2x + 3y = 12 (b) 3x + 2y = 12 (c) 4x – 3y = 12 (d) 5x – 2y = 10

32. The greatest distance of the point (10, 7) from the circle $x^2 + y^2 - 4x - 2y - 20 = 0$ is

(a) 10 (b) 15 (c) 5 (d) 0

33. The midpoint of (–5, 12) and (9, –2) divides the join of the points (–8, –5), (7, 10) in the ratio

(a) 2 : 1 (b) 3 : 2 (c) 1 : 3 (d) 4 : 3

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34. If A(2, –1) and B(6, 5) are two pints. The ratio in which the foot of the perpendicular from (4, 1) to AB divides it is

(a) 8 : 15 (b) 5 : 8 (c) –5 : 8 (d) – 8 : 5

35. The value of $\cos\frac{\pi}{7}+\cos\frac{2\pi}{7}+\cos\frac{3\pi}{7}+\cos\frac{4\pi}{7}+\cos\frac{5\pi}{7}+\cos\frac{6\pi}{7}+\cos\frac{7\pi}{7}$ is

(a) 1 (b) –1 (c) 0 (d) None of these

36. If $2x + y – 4 = 0$ is a bisector of angles between the lines $a(x – 1) + b(y – 2) = 0$, $c(x – 1) + d(y – 2) = 0$ the other angular bisector is

(a) $x – 2y + 1 = 0$ (b) $x – 2y – 3 = 0$ (c) $x – 2y + 3 = 0$ (d) $x + 2y – 5 = 0$

37. The transformed equation of $x^2 + 6xy + 8y^2 = 10$ when the axes are rotated through an angle $\frac{\pi}{4}$ is

(a) $15x^2 – 14xy + 3y^2 = 20$ (b) $15x^2 + 14xy – 3y^2 = 20$
(c) $15x^2 + 14xy + 3y^2 = 20$ (d) $15x^2 – 14xy – 3y^2 = 20$

38. The points (0, 0), (1, 0), (0, 1) and (t, t) are concyclic then t =

(a) –1 (b) 1 (c) 2 (d) –2

39. Given that for the circle $x^2 – y^2 – 4x + 6y + 1 = 0$ the line with equation $3x – y = 1$ is a chord. The midpoint of the chord is

(a) $\left(\frac{2}{5},\frac{11}{5}\right)$ (b) $\left(-\frac{2}{5},\frac{11}{5}\right)$ (c) $\left(-\frac{2}{5},-\frac{11}{5}\right)$ (d) $\left(\frac{2}{5},-\frac{11}{5}\right)$

40. The common chord of $x^2 + y^2 = 16$ and $x^2 + y^2 – 4x – 4y = 0$ subtends at the origin an angle equal to

(a) $\frac{\pi}{6}$ (b) $\frac{\pi}{4}$ (c) $\frac{\pi}{3}$ (d) $\frac{\pi}{2}$

41. The centre of the circle circumscribing the square whose four sides are $3x + y = 22$, $x – 3y = 14$, $3x + y = 62$ and $x – 3y = 4$ is

(a) $\left(\frac{3}{2},\frac{27}{2}\right)$ (b) $\left(\frac{27}{2},\frac{3}{2}\right)$ (c) (27, 3) (d) $\left(1,\frac{2}{3}\right)$

42. If the circles $x^2 + y^2 – 6x – 8y + c = 0$ and $x^2 + y^2 = 9$ have three common tangents then c =

(a) 18 (b) 19 (c) 20 (d) 21

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43. The maximum value of $(\cos\ \alpha_1)\ (\cos\ \alpha_2)\ \ldots.\ (\cos\ \alpha_n)$ under the condition $0 \le \alpha_1, \alpha_2, \ldots., \alpha_n \le \frac{\pi}{2}$ and $(\cos\ \alpha_1)(\cot\ \alpha_2)\ \ldots.\ (\cot\ \alpha_n) = 1$ is

(a) $\frac{1}{2^{n/2}}$ (b) $\frac{1}{2^n}$ (c) $-\frac{1}{2^n}$ (d) 1

44. A straight rod of length 9 units slides with its ends A, B always on the X and Y axis respectively. Then the locus of the centroid of the triangle OAB is

(a) $x^2 + y^2 = 3$ (b) $x^2 + y^2 = 9$ (c) $x^2 + y^2 = 1$ (d) $x^2 + y^2 = 81$

45. A(–1, 1), B(5, 3) are opposite vertices of a square. The equation of the other diagonal (not passing through A, B) of the square is

(a) $2x - 3y + 4 = 0$ (b) $2x - y + 3 = 0$ (c) $y + 3x - 8 = 0$ (d) $x + 2y - 1 = 0$

46. The general solution of $\text{cosec}^2\ \theta = \frac{4}{3}$ is $\theta =$

(a) $n\pi \pm \frac{\pi}{4}$ (b) $n\pi \pm \frac{\pi}{3}$ (c) $n\pi \pm \frac{\pi}{6}$ (d) $n\pi \pm \frac{\pi}{2}$

47. If $\tan 25° = x$ then $\frac{\tan 155° - \tan 115°}{1 + \tan 155°.\tan 115°} =$

(a) $\frac{1+x^2}{2x}$ (b) $\frac{1+x^2}{1-x^2}$ (c) $\frac{1-x^2}{2x}$ (d) $\frac{1-x^2}{1+x^2}$

48. The general solution of x satisfying $\sin^2 x\ .\ \sec x + \sqrt{3}\ \tan x = 0$ is given by

(a) $x = \frac{n\pi}{2}$ (b) $x = \frac{n\pi}{3}$ (c) $x = n\pi$ (d) $x = 2n\pi$

49. The angles between the lines $2x - y + 3 = 0$ and $x + 2y + 3 = 0$ is

(a) 90° (b) 60° (c) 45° (d) 30°

50. A circle having $2x + 3y - 5 = 0$ as a diameter cuts $x^2 + y^2 + 2x + 17y + 5 = 0$ and $x^2 + y^2 + 7x + 6y + 11 = 0$ orthogonally. Then its centre is

(a) (4, –1) (b) (–5, 5) (c) (1, –1) (d) (1, 1)

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ARJUNA BATCH
MATHEMATICS : REVISION TEST-1 (SET A) ANSWER KEY
Topic: Trigonometry II + Straight Lines + Circle

1.	(a)	2.	(b)	3.	(b)	4.	(a)	5.	(b)
6.	(a)	7.	(b)	8.	(a)	9.	(a)	10.	(b)
11.	(c)	12.	(c)	13.	(b)	14.	(d)	15.	(c)
16.	(a)	17.	(d)	18.	(c)	19.	(d)	20.	(b)
21.	(b)	22.	(c)	23.	(d)	24.	(a)	25.	(c)
26.	(c)	27.	(c)	28.	(c)	29.	(c)	30.	(a)
31.	(a)	32.	(b)	33.	(a)	34.	(b)	35.	(b)
36.	(c)	37.	(a)	38.	(b)	39.	(c)	40.	(d)
41.	(b)	42.	(d)	43.	(a)	44.	(b)	45.	(c)
46.	(b)	47.	(c)	48.	(c)	49.	(a)	50.	(d)