**Properties and Solution of Triangles**

**Type – 1**

**Choose the most appropriate option (a, b, c or d).**

Q 1. In a ΔABC, .tan is equal to

(a)  (b)  (c)  (d) none of these

Q 2. If the area of a ΔABC be L then a2+ sin 2B + b2 sin 2A is equal to

(a) 2λ (b) λ (c) 4λ (d) none of these

Q 3. If k be the perimeter of the ΔABC then b cos2+ ccos2 is equal to

(a) k (b) 2k (c)  (d) none of these

Q 4. If R denotes circumradius then in ΔABC, is equal to

(a) cos(B – C) (b) sin (B – C) (c) cos B – cos C (d) none of these

Q 5. In a ΔABC, cot is equal to

(a)  (b)  (c)  (d) none of these

Q 6. In a ΔABC, (c + a + b) (a + b − c) = ab. The measure of ∠C is

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

Q 7. In a ΔABC, A : B : C = 3 : 5 : 4. Then a + b cis equal to

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

Q 8. The equation ax2 + bx + c = 0, where a,b,c are the sides of aΔABC, and the equation x2 + x + 1 = 0 have a common root. The measure of ∠C is

(a) 90° (b) 45° (c) 60° (d) none of these

Q 9. If in a ΔABC, a2 cos2 A = b2 + c2 then

(a) A <  (b)  (c)  (d) 

Q 10. If in a ΔABC, tan and tan satisfy 6x2 – 5x + 1 = 0. Then

(a) a2 + b2 > c2 (b) a2 − b2 = c2 (c) a2 + b2 = c2 (d) none of these

Q 11. Two sides of a triangle are given by the roots of the equation x2 – 2x + 2 = 0. The angle between the side is π/3. The perimeter of the triangle is

1.  (b)  (c)  (d) none of these

Q 12. The side of a ΔABC are and CA = 7 cm. Then sin θ, where θ is the smallest angle of the triangle, is equal to

(a)  (b)  (c)  (d) none of these

Q 13. Two sides of a triangle are cm and cm and the angle opposite to the shorter side of the two is π/4. The largest possible length of the third side is

(a)  (b)  (c)  (d) none of these

Q 14. In a αABC, a = 8, b = 10 and c = 12. The C is equal to

(a)  (b) 2A (c) 3A (d) none of these

Q 15. In ΔABC, if tan and tan then

(a) 2a = b + c (b) a > b > c (c) 2c = a + b (d) none of these

Q 16. In a ΔABC, a = 2b and |A – B| = . The measure of ∠C is

(a)  (b)  (c)  (d) none of these

Q 17. In a ΔABC, the tangent of half the difference of two angles is one–third the tangent of half the sum of the two angles. The ratio of sides opposite the angles is

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

Q 18. In a ΔABC,A =,b − c = 3cm and ar(ΔABC)= cm2. Then a is

(a)  (b) 9cm (c) 18cm (d) none of these

Q 19. The are of a ΔABC is a2 – (b –c)2. Then tan A is equal to

(a)  (b)  (c)  (d) none of these

Q 20. In a ΔABC, B = 90°, AC = h and the length of the perpendicular from B to AC is p such that h = 4p. If AB < BC then ∠C has the measure

(a)  (b)  (c)  (d) none of these

Q 21. In a ΔABC, a = 5, b = 4 and tan . The side c is

(a) 6 (b) 3 (c) 2 (d) none of these

Q 22. If in a ΔABC,AC = 12, BC = 13 and AB = 5, then the distance of A from BC is

(a)  (b)  (c)  (d) none of these

Q 23. In a ΔABC, cosA = and cos B = . The value of cos C can be

(a)  (b)  (c)  (d) none of these

Q 24. In a ΔABC, B = and C = . The altitude from A to the side BC is

(a)  (b) 2a (c)  (d) none of these

Q 25. Two angles of a triangle are , and the length of the included side is cm. The are of the triangle is

(a)  (b)  (c)  (d) none of these

Q 26. If in a ΔABC, sin3A + sin3B + sin3C = 3sin A. sinC, then the value of the value of determinant

is

(a) 0 (b) (a + b + c)3 (c) (a + b + c)(ab + bc + ca) (d) none of these

Q 27. In a ΔABC, A = 90°. Then tan−1is equal to

(a)  (b)  (c)  (d) none of these

Q 28. If in a ΔABC, the values of cot A, cot B, cot C are in AB, then

(a) a, b, c are in AP (b) a2, b2, c2 are in AP (c) cos A, cos B, cos C are in AP (d) none of these

Q 29. If in a ΔABC, ,then

(a) 2sinAsin B sin C = 1 (b) sin2A + sin2B = sin2C (c) 2sin A cos B = sin C (d) none of these

Q 30. If the sides of a triangle are in GP and the largest angle is twice the smallest angle then the common ratio, which is greater than 1, lies in the interval

(a) (1, ) (b) (1, ) (c)  (d) none of these

Q 31. In a ΔABC, the sides a,b and c are such that they are the roots of x3 – 11x2 + 38x – 40 = 0. Then is equal to

(a)  (b) 1 (c)  (d) none of these

Q 32. If cos A + cos B + 2 cos C = 2 then the sides of the ΔABC are in

(a) AP (b) GP (c) HP (d) none of these

Q 33. If in the ΔABC, the incentre is the middle point of the median AD then cos A has the value

(a)  (b)  (c)  (d) 

Q 34. If in a ΔABC, 3a = b + c then tan . Tan is equal to

(a)  (b) 1 (c) 2 (d) none of these

Q 35. If in a ΔABC, 2cos A sin C = sin B then the triangle is

(a) equilateral (b) isosceles (b) right angled (d) none of these

Q 36. In a ΔABC, a = 1 and the perimeter is six times the AM of the sines of the angle. The measure of ∠A is

(a)  (b)  (c)  (d) 

Q 37. In a ΔABC, ∠A> <B. If sin A and sin B satisfy the equation 3sin x – 4sin3x – k =- 0, 0 < k < 1, then ∠C is

(a)  (b)  (c)  (d) 

Q 38. In a ΔABC the side a, b and c are in AP. Then is

(a) 3 : 2 (b) 1 : 2 (c) 3 : 4 (d) none of these

Q 39. If the sides of a triangle are proportional to the cosines of the opposite angles then the triangle is

(a) right angled (b) equilateral (c) obtuse angled (d) none of these

Q 40. If in a ΔABC, cos2+ a cos2, then a, b, c are in

(a) GP (b) HP (c) AP (d) none of these

Q 41. The side of a triangle are in AP and its are is x(area of an equilateral triangle of the same perimeter). Then the ratio of the sides of

(a) 1 : 2 : 3 (b) 3 : 5 : 7 (c) 3 : 4 (d) none of these

Q 42. If BD, BE and CF are the medians of a ΔABC then

(a) 1 : 2 : 3 (b) 3 : 5 : 7 (c) 1 : 3 : 5 (d) none of these

Q 43. sin A, sin B sin C are in AP for the ΔABC Then

(a) the altitudes are in AP (b) the altitudes are in HP

(c) The medians are in GP (d) the medians are in AP

Q 44. AD is median of the ΔABC. If AE and AF are medians of the triangles ABD and ADC respectively, and AD = m1, AE = m2, AF = m3, then is

(a)  (b)  (c)  (d) none of these

Q 45. The ratio of the distance of the orthocenter of an acute–angled ΔABC from the sides BC, AC and AB is

(a) cos A : cos B : cos C (b) sin A : sin B : sin C (c) sec A : sec B : sec C (d) none of these

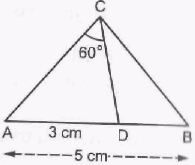
Q 46. In a ΔABC, I is the incentre. The ratio IA : IB : IC is equal to

(a)  (b) 

(c)  (d) none of these

Q 47. In the figure, ABC is a triangle in which C = 90° and AB = 5 cm.

D is a point on AB such that AD = 3 cm and ∠ACD = =60°. Then the length of AC is



(a)  (b)  (c)  (d) none of these

Q 48. If α, β, γ are the altitudes of ΔABC and 2s denotes its perimeter then α–1 + β–1 + γ–1 is equal to

(a)  (b)  (c) s.Δ (d) none of these

Q 49. In a ΔABC, the sides are in the ratio 4 : 5 : 6. The ratio of the circumradius and the inradius is

(a) 8 : 7 (b) 3 : 2 (c) 7 : 3 (d) 16 : 7

Q 50. In a ΔABC, R = circumradius and r = inradius. The value of is equal to 

(a)  (b)  (c)  (d) 

Q 51. In a ΔABC, 2s = perimeter and R = circumradius. Then s/R is equal to

(a) sin A + sin B + sin C (b) cos A + cos B + cos C

(c)  (d) none of these

Q 52. The ratio of the circumradius and inradius of an equilateral triangle is

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

Q 53. If in a ΔABC, a2 + b2 + c2 = 8R2, where R = circumradius, then the triangle is

(a) equilateral (b) isosceles (c) right angled (d) none of these

Q 54. In an equilateral triangle, (circumradius): (inradius): (exradius) is equal to

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

Q 55. The diameter of the circumcircle of a triangle with sides 5 cm, 6 cm and 7 cm is

(a) cm (b) 2 cm (c)  cm (d) none of these

Q 56. If in a triangle, R and r are the circumradius and inradius respectively then the HM of the exradii of the triangle is

(a) 3r (b) 2R (c) R + r (d) none of these

Q 57. The angles of a right-triangle are in AP. The ratio of the inradius and the perimeter is

(a)  (b)  (c)  (d) none of these

Q 58. A ΔABC is right angled at B. Then the diameter of the incircle of the triangle is

(a) 2(c + a − b) (b) c + a – 2b (c) c + a – b (d) none of these

Q 59. If the exradii of a triangle are in HP then corresponding sides are in

(a) AP (b) GP (c) HP (d) none of these

Q 60. In a ΔABC, the inradius and three exradii are r, r1, r2 and r3 respectively In usual notations the value of r : r1. r2. r3 is equal to

(a) 2Δ (b) Δ2 (c)  (d) none of these

Q 61. In a ΔABC, the perimeter = 2s and the exradii are r1, r2 and r3. Then r1r2 + r2r3 + r3r1 is equal to

(a) s2 (b) 2s2 (c) 3s2 (d) 4s2

Q 62. In a ΔABC, tan A.tan B. tan C = 9. For such triangles, if then tan2 A + tan2 B + tan+2 C = k

(a)  (b)  (c)  (d) 

Q 63. If the ΔABC is acute angled at C then

(a) cos 2A + cos 2B − cos 2C < 1 (b) cos 2A + cos 2B + cos 2C < 1

(c) cos2 A + cos2B + cos2 C < 1 (d) none of these

Q 64. If for a ΔABC, cot A . cot B. cot C > 0 then the triangle is

(a) right angled (b) acute angled (c) obtuse angled (d) all these potions are possible

Q 65. In a ΔABC, cos B. cos C + sin B. sin B. sin C. sin2 A = 1. Then the triangle is

(a) right–angled isosceles (b) isosceles whose equal angle are greater than π/4

(c) equilateral (d) none of these

Q 66. In a ΔABC, the angles A and B are two values of θ satisfying cos θ + sin θ = k, k|k| < 2. The triangle

(a) is acute angled (b) is right angled (c) is obtuse angled (d) has one angle = π/3

Q 67. If in an obtuse−angled triangle the obtuse angle is 3π/4 and the other two angles are equal to two values of θ satisfying atan θ + bsec θ = c, where |b| ≤ ,then a2 – c2 is equal to

(a) ac (b) 2ac (c) a/c (d) none of these

Q 68. Let A0, A1, A2, A3, A4 and A5 be the consecutive vertices of a regular hexagon inscribed in a unit circle. The product of the lengths of A0A1, A0A2 and A0A4 is

(a)  (b)  (c) 3 (d) 

Q 69. The area of a circle is A1 and the area of a regular pentagon inscribed in the circle is A2. Then A1 : A2 is

(a)  (b)  (c)  (d) none of these

Q 70. The are of a cyclic quadrilateral ABCD is (3)/4. The radius of the circle circumscribing it is 1. If AB = 1, BD = then BC. CD is equal to

(a) 2 (b)  (c)  (d) none of these

**Type 2**

**Choose the correct options. One or more options may be correct.**

Q 71. lf in aAABC, a = 6, b = 3 and cos(A - B)=  then

(a) C = (b) A = sin-1  (c) ar(ΔABC) = 9 (d) none of these

Q 72. The number of possible triangles ABC in which BC = cm, CA =  cm and A = 60° is

(a) 0 (b) 1 (c) 2 (d) none of these

Q 73. In a ΔABC, A = and b : c = 2 :3. If tan α = ,0 < α = , then

(a) B = 60° + α (b) C-60° + α (c) B = 60°- α (d) C = 60°- α

Q 74. In a triangle the cosines of two angles are inversely proportional to the sides opposite the angles. The triangle is

(a) isosceles (b) equilateral (c) right angled (d) none of these

Q 75. In a ΔABC, the line segments AD, BE and CF are three altitudes. If R is the circumradius of the ΔABC, a side of the ΔDEF will be

(a) Rsin 2A (b) ccos B (c) asin A (d) bcos B

Q 76. In a ΔABC, tan A and tan B are the roots of the equation ab(x2 +1) = c2x, where a, b and c are the sides of the triangle. Then

(a) tan(A - B) = (b) cot C = 0 (c) sin2A + sin.2 B = 1 (d) none of these

Q 77. The distances of the circumcentre of the acute-angled ΔABC fromthe sides BC, CA and AB are in the ratio

(a) asin A : bsinB: Ccsin,C (b) cosA : cos B: cos C

(c) acot A: bcot B:ccotC (d) none of these

Q 78. In any ΔABC, Σa3 sin(B - C) is equaI to

(a) Σa(sinB - sin C) (b) Σa 2(cos2B - cos 2C) (c) 0 (d) none of these

Q 79. In aΔABC,2cos. Then

(a) B =  (b) B = C (c) A,B,C are in AP (d) B + C = A

Q 80. Let Lsin 0 = 10 + log sin 0. The number of triangles ABC such that log b + 10 = log c + Lsin B is

(a) one (b) two (c) infinite (d) none of these

Q 81. In any triangle ABC, sin  is

(a) less than  (b) less than or equal to

(c) greater than (d) none of these

Q 82. In a ΔABC, tan C < 0. Then

(a) tan A . tan B < 1 (b) tan A tan B > 1

(c) tan A + tan B + tanC < 0 (d) tan A + tan B + tan C > 0

Q 83. In a ΔABC, tan A and tan B satisfy the inequation 3x2 - 4x + 3 < 0 Then

(a) a2 + b2 + ab > c2 (b) a2 + b2 - ab < c2 (c) a2 + b2 > c2 (d) none of these

Q 84. In a ΔABC, cosA + cos B + cosC > 1 only if the triangle is

(a) acute angled

(b) obtuse angled

(c) right angled

(d) the nature of the triangle caanot be detemined

**Answers**

1a 2c 3c 4b 5a 6c 7c 8b 9c 10c

11b 12b 13a 14b 15b 16b 17c 18b 19c 20c

21a 22b 23c 24a 25c 26a 27a 28b 29c 30b

31c 32a 33b 34d 35b 36c 37c 38d 39b 50c

41b 42c 43b 44a 45c 46a 47a 48b 49d 50c

51a 52d 53c 54c 55d 56a 57a 58c 59a 60b

61a 62b 63a 64b 65a 66c 67b 68c 69b 70a

71b,c 72c 73b,c 74a,c 75a,d 76a,b,c 77b,c 78a,b,c 79a,c 80a

81b 82a,c 83a,b 84d