PROPERTIES OF TRIANGLES

SYNOPSIS

NOTATION: (i) In triangle ABC the sides BC, CA, AB are denoted by a, b, c respectively. The angles BAC,CBA, ACB are denoted by A,B,C respectively. The semi perimeter of the triangle is denoted by 's'. The area of a triangle is denoted by Δ.

(ii) $s = \dfrac{a+b+c}{2}$

CIRCUMCIRCLE: The point of concurrence of the perpendicular bisectors of the sides of a triangle ABC is called the circumcentre and is denoted by 'S'. It is equidistant from the three vertices of the triangle i.e. SA = SB = SC = R.

The circle with centre S and radius R passes through the three vertices of the triangle is called the circumcircle, S is called circumcentre and R is called circumradius.

INCIRCLE: The point of concurrence of the internal bisectors of the angles of a triangle is called the incentre and is denoted by I. It is equidistant from the sides. The circle with centre I and the length of the perpendicular from I to any side of the triangle as radius touches the sides of the triangle internally and this circle is known as Incircle. The radius of the incircle is called inradius and is denoted by 'r'.

EX-CIRCLES: The point of concurrence of internal bisector of the angle A and external bisectors of the angles B and C is called the excentre opposite to A and is denoted by 'I_1'. The circle with centre I_1 and the perpendicular distance r_1 from I_1 to any one of the three sides as radius is called the excircle oppsite to A. Its radius r_1 is called the ex-radius.

The Centres of the remaining two excircles opposite to B and C are denoted by I_2, I_3 and their radii are denoted by r_2, r_3.

- **Sine Rule :**

$$\frac{a}{Sin A} = \frac{b}{Sin B} = \frac{c}{Sin C} = 2R$$

a = 2R Sin A, b = 2R Sin B, c = 2R Sin C

- **Cosine Rule :**

$a^2 = b^2 + c^2 - 2bc \text{ Cos } A$

$b^2 = c^2 + a^2 - 2ca \text{ Cos } B$

$c^2 = a^2 + b^2 - 2ab \text{ Cos } C$

$$\text{Cos } A = \frac{b^2+c^2-a^2}{2bc},$$

$$\text{Cos } B = \frac{c^2+a^2-b^2}{2ca}$$

$$\text{Cos } C = \frac{a^2+b^2-c^2}{2ab}$$

- **Projection formulae :**

a = b Cos C + c Cos B

b = c Cos A + a Cos C

c = a Cos B + b Cos A

- $\Delta = \dfrac{1}{2} bc \text{ Sin } A = \dfrac{1}{2} ca \text{ Sin } B$

$= \dfrac{1}{2} ab \text{ Sin } C$

$= \sqrt{s(s-a)(s-b)(s-c)}$

$= 2R^2 \text{ Sin A Sin B Sin C} = \dfrac{abc}{4R}$

- $\text{Sin } A = \dfrac{2\Delta}{bc} = \dfrac{2}{bc}\sqrt{s(s-a)(s-b)(s-c)}$

$\text{Sin } B = \dfrac{2\Delta}{ca} = \dfrac{2}{ca}\sqrt{s(s-a)(s-b)(s-c)}$

$\text{Sin } C = \dfrac{2\Delta}{ab} = \dfrac{2}{ab}\sqrt{s(s-a)(s-b)(s-c)}$

- $\text{Sin } \dfrac{A}{2} = \sqrt{\dfrac{(s-b)(s-c)}{bc}}$

$\sin \dfrac{B}{2} = \sqrt{\dfrac{(s-c)(s-a)}{ca}}$

$\sin \dfrac{C}{2} = \sqrt{\dfrac{(s-a)(s-b)}{ab}}$

- $\text{Cos } \dfrac{A}{2} = \sqrt{\dfrac{s(s-a)}{bc}}$, $\text{Cos } \dfrac{B}{2} = \sqrt{\dfrac{s(s-b)}{ca}}$

$\text{Cos } \dfrac{C}{2} = \sqrt{\dfrac{s(s-c)}{ab}}$

- $\tan \dfrac{A}{2} = \sqrt{\dfrac{(s-b)(s-c)}{s(s-a)}} = \dfrac{(s-b)(s-c)}{\Delta}$

$= \dfrac{\Delta}{s(s-a)} = \sqrt{\dfrac{rr_1}{r_2r_3}} = \sqrt{\dfrac{r_1-r}{r_2+r_3}}$

$\tan \dfrac{B}{2} = \sqrt{\dfrac{(s-c)(s-a)}{s(s-b)}} = \dfrac{(s-c)(s-a)}{\Delta}$

$= \dfrac{\Delta}{s(s-b)} = \sqrt{\dfrac{rr_2}{r_1r_3}} = \sqrt{\dfrac{r_2-r}{r_1+r_3}}$

$$\tan\frac{C}{2}=\sqrt{\frac{(s-a)(s-b)}{s(s-c)}}=\frac{(s-a)(s-b)}{\Delta}$$

$$=\frac{\Delta}{s(s-c)}=\sqrt{\frac{rr_3}{r_1r_2}}=\sqrt{\frac{r_3-r}{r_1+r_2}}$$

- $\mathrm{Cot}\frac{A}{2}=\frac{s(s-a)}{\Delta},\mathrm{Cot}\frac{B}{2}=\frac{s(s-b)}{\Delta}$

  $Cot\frac{C}{2}=\frac{s(s-c)}{\Delta}$

- **Napier's Formulae : Tangent ruel**

$$\tan\left(\frac{B-C}{2}\right)=\left(\frac{b-c}{b+c}\right)\cot\frac{A}{2}=\left(\frac{b-c}{b+c}\right)\tan\left(\frac{B+C}{2}\right)$$

$$\tan\left(\frac{C-A}{2}\right)=\left(\frac{c-a}{c+a}\right)\cot\frac{B}{2}=\left(\frac{c-a}{c+a}\right)\tan\left(\frac{C+A}{2}\right)$$

$$\tan\left(\frac{A-B}{2}\right)=\left(\frac{a-b}{a+b}\right)\cot\frac{C}{2}=\left(\frac{a-b}{a+b}\right)\tan\left(\frac{A+B}{2}\right)$$

- **Mollweide formulae:**

$$\frac{b-c}{a}=\frac{\sin\left(\frac{B-C}{2}\right)}{\cos\frac{A}{2}};\frac{b+c}{a}=\frac{\cos\left(\frac{B-C}{2}\right)}{\sin\frac{A}{2}}$$

$$\frac{c-a}{b}=\frac{Sin\left(\frac{C-A}{2}\right)}{Cos\frac{B}{2}};\frac{c+a}{b}=\frac{Cos\left(\frac{C-A}{2}\right)}{Sin\frac{B}{2}}$$

$$\frac{a-b}{c}=\frac{\sin\left(\frac{A-B}{2}\right)}{\cos\left(\frac{C}{2}\right)};\quad\frac{a+b}{c}=\frac{\cos\left(\frac{A-B}{2}\right)}{\sin\left(\frac{C}{2}\right)}$$

- $\mathrm{CotA}=\frac{b^2+c^2-a^2}{4\Delta},\mathrm{CotB}=\frac{c^2+a^2-b^2}{4\Delta}$

  $CotC=\frac{a^2+b^2-c^2}{4\Delta}$

- Cot A + Cot B + Cot C = $\frac{a^2+b^2+c^2}{4\Delta}$
- If Cot $\frac{A}{2},Cot\frac{B}{2},Cot\frac{C}{2}$ are in A.P. then a,b,c are also in A.P.
- If Cot A, cot B, cot C are in A.P. then a^2,b^2,c^2 are also in A.P.
- If $\sin^2\frac{A}{2},\sin^2\frac{B}{2},\sin^2\frac{C}{2}$ are in H.P. then a,b,c are also in H.P.

- $r=\frac{\Delta}{s}=(s-a)\tan\frac{A}{2}=(s-b)\tan\frac{B}{2}=(s-c)\tan\frac{C}{2}$

  $=\frac{a}{Cot\frac{B}{2}+\cot\frac{C}{2}}=\frac{b}{Cot\frac{C}{2}+Cot\frac{A}{2}}=$

  $=\frac{c}{Cot\frac{A}{2}+Cot\frac{B}{2}}=4R\sin\frac{A}{2}\sin\frac{B}{2}\sin\frac{C}{2}$

- $r_1=\frac{\Delta}{s-a}=s\tan\frac{A}{2}=(s-b)Cot\frac{C}{2}$

  $=(s-c)Cot\frac{B}{2}$

  $=\frac{a}{\tan\frac{B}{2}+\tan\frac{C}{2}}=4R\,Sin\frac{A}{2}Cos\frac{B}{2}Cos\frac{C}{2}$

- $r_2=\frac{\Delta}{s-b}=s\tan\frac{B}{2}=(s-c)Cot\frac{A}{2}$

  $=(s-a)Cot\frac{C}{2}$

  $=\frac{b}{\tan\frac{C}{2}+\tan\frac{A}{2}}=4R\,Cos\frac{A}{2}Sin\frac{B}{2}Cos\frac{C}{2}$

- $r_3=\frac{\Delta}{s-c}=s\tan\frac{C}{2}=(s-a)Cot\frac{B}{2}$

  $=(s-b)Cot\frac{A}{2}$

  $=\frac{c}{\tan\frac{A}{2}+\tan\frac{B}{2}}=4R\cos\frac{A}{2}\cos\frac{B}{2}\sin\frac{C}{2}$

- $\frac{1}{r_1}+\frac{1}{r_2}+\frac{1}{r_3}=\frac{1}{r}$
- $rr_1r_2r_3=\Delta^2$
- $r_1r_2+r_2r_3+r_3r_1=s^2$
- $r(r_1+r_2+r_3)=ab+bc+ca-s^2$
- (i) $r_1+r_2+r_3-r=4R$

  $r_1-r=4R\sin^2\frac{A}{2}$, $r_2+r_3=4R\cos^2\frac{A}{2}$;

  $r_2-r=4R\,Sin^2 B/2$, $r_1+r_3=4R\,Cos^2B/2$

  $r_3-r=4R\,Sin^2 C/2$, $r_1+r_2=4R\,Cos^2C/2$
- $r-r_1+r_2+r_3=4R\cos A$

  $r+r_1-r_2+r_3=4R\cos B$

  $r+r_1+r_2-r_3=4R\cos C$
- (i) In a triangle ABC

  $\cos A+\cos B+\cos C=1+\frac{r}{R}$

  (ii) $\sin A+sinB+\sin C=\frac{s}{R}$

- (i) If the sides of the triangle x, y and included angle is 60^0 then 3rd side is $\sqrt{x^2+y^2-xy}$
  (ii) If the sides of triangle are x, y and included angle is 120^0 then 3rd side is $\sqrt{x^2+y^2+xy}$
- (i) The perpendicular AD, BE, CF drawn from vertices A, B, C of triangle ABC meet at point 'O' called orthocentre. The triangle DEF formed by joining the feet of the perpendicular is called pedal triangle of triangle ABC.
  (ii) Circumradius of pedal triangle is R/2
  (iii) The area of pedal triangle is $2\Delta\cos A\cos B\cos C$
  (iv) The orthocentre of the triangel ABC is the incentre of its pedal triangle.
- If S is the circumcentre O is orthocentre, I is incentre, I_1, I_2, I_3 are the ex-centres of triangle ABC then
  i) $AI = r\text{cosec}(A/2)$; $BI = r\text{cosec}(B/2)$; $CI = r\text{cosec}(C/2)$
  ii) $AI_1 = r_1\text{cosec}A/2$; $BI_2 = r_2\text{cosec}(B/2)$; $CI_3 = r_3\text{cosec}(C/2)$
  iii) $II_1 = a\sec(A/2)$; $II_2 = b\sec(B/2)$; $II_3 = c\sec(C/2)$
  iv) $I_2I_3 = a\,\text{cosec}(A/2)$; $I_3I_1 = b\,\text{cosec}(B/2)$; $I_1I_2 = c\,\text{cosec}(C/2)$
- If $\cot\frac{A}{2}:\cot\frac{B}{2}:\cot\frac{C}{2} = k:l:m$ then $a:b:c = l+m:m+k:k+l$
- If $kr_1 = lr_2 = mr_3$ then $a:b:c = l+m:m+k:k+l$
- In triangle ABC if 'AD' is internal angular bisetor of angle 'A' meet BC at D, then $AD = \frac{2bc}{b+c}\cos\frac{A}{2}$

LEVEL - I

1. $\Sigma(b+c)\cos A =$
   1) s 2) 2s 3) 2(s-a) 4) 4 s
2. $\Sigma\frac{\sin(B-C)}{bc} =$
   1) Δ 2) s 3) 0 4) s^2
3. $\Sigma\frac{(b^2-c^2)}{a}\cos A =$
   1) s 2) 0 3) Δ 4) 2Δ
4. $\Sigma a\cos A =$
   1) 4R cos A cos B cos C
   2) 4R sin A sin B sin C
   3) 2R sin A sin B sin C
   4) 2R cos A cos B cos C
5. $\frac{\cos A}{c\,Sin\,B}+\frac{\cos B}{a\sin C}+\frac{\cos C}{b\sin A} =$
   1) $\frac{1}{R}$ 2) $\frac{\Delta}{R}$ 3) $\frac{s}{R}$ 4) $\frac{3}{R}$
6. $\Sigma a^3\cos(B-C) =$
   1) abc 2) 2abc 3) 3abc 4) 0
7. $b^2\sin 2C + c^2\sin 2B =$
   1) Δ 2) 2Δ 3) 4Δ 4) $\Delta/2$
8. $4R\cos\frac{A}{2}\cos\frac{B}{2}\cos\frac{C}{2} =$
   1) Δ 2) s 3) r 4) 2s
9. $4Rs\sin\frac{A}{2}\sin\frac{B}{2}\sin\frac{C}{2} =$
   1) Δ 2) 2Δ 3) r 4) 2r
10. $s^2\tan\frac{A}{2}\tan\frac{B}{2}\tan\frac{C}{2}$
    1) Δ 2) 2Δ 3) R 4) 4R
11. $\frac{b-c}{a}\cos^2\frac{A}{2}+\frac{c-a}{b}\cos^2\frac{B}{2}+\frac{a-b}{c}\cos^2\frac{C}{2} =$
    1) R 2) s 3) r 4) 0
12. $\Sigma\frac{1}{a}\cos^2\frac{A}{2} =$
    1) 0 2) $\frac{s^2}{abc}$ 3) Δ 4) 3s
13. cot A + cot B + cot C
    1) $\frac{a+b+c}{4\Delta}$ 2) $\frac{a^2+b^2+c^2}{4\Delta}$ 3) $\frac{(a+b+c)^2}{4\Delta}$ 4) $\frac{1}{\Delta}$
14. $\cot\frac{A}{2}+\cot\frac{B}{2}+\cot\frac{C}{2} =$
    1) $\frac{a+b+c}{4\Delta}$ 2) $\frac{a^2+b^2+c^2}{4\Delta}$ 3) $\frac{(a+b+c)^2}{4\Delta}$ 4) $\frac{(a+b+c)^2}{2\Delta}$
15. $a^2\cot A+b^2\cot B+c^2\cot C =$
    1) Δ 2) 2Δ 3) 3Δ 4) 4Δ
16. In ΔABC, abc $\sin\frac{A}{2}\sin\frac{B}{2}\sin\frac{C}{2} =$
    1) Δ^2 2) $\frac{\Delta^2}{s}$ 3) $\Delta^2 s$ 4) $\frac{s}{\Delta^2}$

17. In ΔABC, $\sum a\sin(B-C)=$
1) abc 2) 2abc 3) 3abc 4) 0

18. In ΔABC, $\sum \frac{a^2\sin(B-C)}{\sin A}=$
1) a^2b^2 2) b^2c^2 3) c^2a^2 4) 0

19. In ΔABC, $\sum \frac{a^2 Sin(B-C)}{\sin B+\sin C}$
1) a + b 2) b + c 3) c + a 4) 0

20. In Δ ABC, $\sum \frac{b^2-c^2}{a^2}\sin 2A=$
1) 0 2) a^2+b^2 3) b^2+c^2 4) c^2+a^2

21. In ΔABC, $\sum a^3\sin(B-C)=$
1) $a^3b^3c^3$ 2) 3abc 3) $3a^2b^2c^2$ 4) 0

22. In ΔABC, $\frac{1}{2}a^2\frac{\sin B\ \sin C}{\sin\ A}=$
1) Δ 2) 2Δ 3) 3Δ 4) 4Δ

23. In ΔABC, $\Sigma\left(\frac{b-c}{a}\right)\cos^2\frac{A}{2}=$
1) abc 2) $a^3b^3c^3$ 3) 3abc 4) 0

24. In ΔABC if a cos A + b cos B + c cos C = $\frac{2\Delta}{k}$
then k =
1) r 2) R 3) s 4) R^2

25. In ΔABC
(b-c) cot $\frac{A}{2}+(c-a)\cot\frac{B}{2}+(a-b)\cot\frac{C}{2}$
1) abc 2) ab - bc - ca
3) 3 abc 4) 0

26. $\Sigma a^2(\cos^2 B-\cos^2 C)=$
1) 0 2) 1 3) 2 4) 3

27. $\frac{\sin A\,(a-b\cos C)}{\sin C\,(c-b\cos A)}=$
1) -2 2) -1 3) 0 4) 1

28. (a + b + c) $\left(\tan\frac{A}{2}+\tan\frac{B}{2}\right)\tan\frac{C}{2}=$
1) c 2) c/2 3) 2c 4) 3c

29. $(a-b)^2\cos^2\frac{C}{2}+(a+b)^2\sin^2\frac{C}{2}=$ [EAMCET-04]
1) c 2) c/2 3) 2c 4) c^2

30. If a (b cos C + c cos B) = $2ka^2$, then k =
1) 0 2) 1 3) ½ 4) 2

31. If $A=60^0$, then the value of
$\left(1+\frac{a}{c}+\frac{b}{c}\right)\left(1+\frac{c}{b}-\frac{a}{b}\right)=$
1) 3 2) 2 3) 1 4) 4

32. $\frac{b-c}{a}\sin\left(\frac{B+C}{2}\right)=$
1) $\cos\left(\frac{B-C}{2}\right)$ 2) $\sin\left(\frac{B-C}{2}\right)$
3) $\sin\left(\frac{A-B}{2}\right)$ 4) $\cos\left(\frac{A-B}{2}\right)$

33. $(b+c)\sin\frac{A}{2}$
1) $a\cos\left(\frac{B+C}{2}\right)$ 2) $a\sin\left(\frac{B+C}{2}\right)$
3) $a\cos\left(\frac{B-C}{2}\right)$ 4) $a\sin\left(\frac{A}{2}+B\right)$

34. $\frac{b+c}{a}\sin\frac{A}{2}$
1) $\cos\left(\frac{B+C}{2}\right)$ 2) $\sin\left(\frac{B+C}{2}\right)$
3) $\cos\left(\frac{B-C}{2}\right)$ 4) $\sin\left(\frac{B-C}{2}\right)$

35. $b\cos^2\frac{C}{2}+c\cos^2\frac{B}{2}=$
1) s 2) s - a 3) s - b 4) s - c

36. a (cos C - cos B) =
1) $2(a-b)\cos^2\frac{C}{2}$ 2) $2(a+b)\cos^2\frac{C}{2}$
3) $2(b-c)\cos^2\frac{A}{2}$ 4) $2(b+c)\cos^2\frac{A}{2}$

37. $a\sin^2\frac{C}{2}+c\sin^2\frac{A}{2}=$
1) s 2) s - a 3) s - b 4) s - c

38. $\frac{a(\cos B+\cos C)}{2\,(b+c)}$
1) $\cos^2\frac{A}{2}$ 2) $\sin^2\frac{A}{2}$
3) $\tan^2\frac{A}{2}$ 4) $\cot^2\frac{A}{2}$

39. $(a+b+c)\left(\tan\frac{A}{2}+\tan\frac{B}{2}\right)=$

1) $2c\cot\frac{A}{2}$ 2) $2c\cot\frac{B}{2}$

3) $2c\cot\frac{C}{2}$ 4) $2c\tan\frac{C}{2}$

40. If $\frac{b}{c+a}+\frac{c}{a+b}=1$, then

1) $A=60^0$ 2) $B=60^0$

3) $C=60^0$ 4) $A=90^o$

41. If $\frac{b}{c^2-a^2}+\frac{a}{c^2-b^2}=0$, then

1) $A=60^0$ 2) $B=60^0$

3) $C=60^0$ 4) $C=90^o$

42. A triangle ABC is such that aCosA=bCosB, then the triangle is

1) right angled

2) isosceles

3) right angled or isosceles

4) equilateral

43. If $Sin^2A+Sin^2B=Sin^2C$, then the triangle is

1) isosceles 2) right angled

3) equilateral 4) scalene

44. If the cosines of angles of a triangle are proportional to opposite sides, then the triangle is

1) isosceles 2) right angled

3) equilateral

4) isosceles or right angled

45. In triangle ABC, if $r.r_1=r_2.r_3$, then the triangle is

1) equilateral 2) isosceles

3) right angled 4) scalene

46. In ΔABC, if bCosA=aCosB then the triangle is

1) right angled 2) isosceles

3) equilateral 4) scalene

47. If the circumcentre of a triangle lies inside the triangle then the triangle is

1) right angled 2) acute angled

3) obtuse angled 4) scalene

48. If a, b, c are in A.P., then $Cot\frac{A}{2}, Cot\frac{B}{2}, Cot\frac{C}{2}$ are in

1) A.P. 2) G.P. 3) H.P. 4) A.G.P

49. If the angles of the Δ ABC are in A.P., then $a^2+c^2-ac=$

1) bc 2) b^2c 3) abc 4) b^2

50. If a, b, c are in A.P. then $Cot\frac{A}{2}Cot\frac{C}{2}=$

1) 1 2) 2 3) 3 4) 4

51. If a = 5 , b = 6, sin A = 5/6, then B =

1) π 2) $\pi/2$ 3) $\pi/3$ 4) $\pi/4$

52. If $a=\sqrt{3}+1$, b = 2, B = 45°, then A =

1) 30° 2) 60° 3) 75° 4) 45°

53. If $a=\sqrt{3}+1$, B = 30°, C = 45°, then c=

1) 2 2) 3 3) 4 4) 1

54. If A = 30°, b = 8, a = 6, $B=Sin^{-1}x$, then x =

1) 1/2 2) 1/3 3) 2/3 4) 1

55. If a = 10, R = 5, then A =

1) π 2) $\pi/2$ 3) $\pi/3$ 4) $\pi/4$

56. If a = 4, b = 5, C = 60° , then c =

1) $2\sqrt{3}$ 2) $\sqrt{21}$ 3) 8 4) 14

57. If a = 4cm, b = 5 cm, c = 7 cm, then $\cos\frac{A}{2}=$

1) $1/\sqrt{5}$ 2) $1/\sqrt{2}$

3) $\sqrt{32/35}$ 4) 2/3

58. If a = 4 cm, b = 7 cm , c = 9 cm, then $\tan\frac{A}{2}=$

1) $1/\sqrt{5}$ 2) $1/\sqrt{20}$ 3) $\sqrt{20}$ 4) 2/3

59. If a = 13 cm, b = 12 cm, c = 5 cm, then $\sin\frac{A}{2}=$

1) $1/\sqrt{5}$ 2) $1/\sqrt{2}$ 3) $\sqrt{32/35}$ 4) 2/3

60. If a=13 cm, b=14 cm, c=15 cm, then tan(C/2)=

1) $1/\sqrt{5}$ 2) $1/\sqrt{2}$ 3) $\sqrt{32/35}$ 4) 2/3

61. If a =7, $b=7\sqrt{3}$ and right angled at C, then c =

1) $2\sqrt{3}$ 2) $\sqrt{21}$ 3) 8 4) 14

62. If the angles of a triangle are 30°, 45° and the included side is $\sqrt{3}+1$, then the remaining sides can be

1) $2,\sqrt{2}$ 2) $2,2\sqrt{3}$ 3) $\sqrt{2},4$ 4) $2,4\sqrt{3}$

63. If 4,5 are two sides of a triangle and the included angle is 60°, then its area is

1) 3 2) 5 3) $5\sqrt{3}$ 4) $3\sqrt{3}$

64. Two straight roads intersect at an angle of 60°. A bus on one road is 2 km. away from the intersection and a car on the other road is 3 km. away from the intersection. Then the direct distance between the two vehicles is

1) 1 km 2) $\sqrt{2}$ km 3) 4 km 4) $\sqrt{7}$ km

65. If the length of each side of an equilateral triangle is 10 cm, then its circumradius is

1) $10\sqrt{3}$ 2) $3\sqrt{10}$ 3) $3/\sqrt{10}$ 4) $10/\sqrt{3}$

66. If the sides of a triangle are 8,15,17, then the radius of its circumcircle is
1) 15/2 2) 13/2 3) 5/2 4) 17/2

67. If the sides of a triangle are 5,7,8, then its area is
1) $10\sqrt{3}$ 2) $3\sqrt{10}$ 3) $3/\sqrt{10}$ 4) $10/\sqrt{3}$

68. If the sides of a triangle are in the ratio x : y : $\sqrt{x^2+xy+y^2}$, then the greatest angle is
1) 90^o 2) 120^o 3) $Cos^{-1}\left(\frac{x+y}{x-y}\right)$ 4) 30^o

69. If the angles of a triangle are in the ratio 2 : 3 :5, then the ratio of the greatest side to the least side is
1) $2 : \sqrt{10-2\sqrt{5}}$ 2) $4 : \sqrt{10-2\sqrt{5}}$
3) $2 : \sqrt{10+2\sqrt{5}}$ 4) $7\ 4 : \sqrt{10+2\sqrt{5}}$

70. In a triangle ABC tan A + tan B+ tan C = $3\sqrt{3}$, then the triangle is
1) isosceles 2) right angled
3) equilateral 4) scalene

71. The radius of the circumcircle of an isosceles triangle PQR is equal to PQ (=PR), then the angle P is
1) $\pi/6$ 2) $\pi/3$ 3) $\pi/2$ 4) $2\pi/3$

72. In a right angled Δ ABC, $\sin^2 A+\sin^2 B+\sin^2 C=$
1) 0 2) 1 3) -1 4) 2

73. If two sides of a triangle are 3 feet and 12 feet and included angle is 150^o then the area of the triangle in square feet is
1) 36 2) 24 3) 72 4) 9

74. If b + c = 3a then $\text{Tan}\frac{B}{2}\text{Tan}\frac{C}{2}=$
1) 1/2 2) 1/3 3) 1/4 4) 1/5

75. In Δ ABC if
(SinA+SinB+SinC) (SinA+SinB-SinC)
= 3SinASinB then C=
1) 30^0 2) 45^0 3) 60^0 4) 120^0

76. In Δ ABC if a=30, b=24, c=18 then Δ=
1) 16 2) 216 3) $\sqrt{216}$ 4) 17

77. If the sides of a triangle are 4 cm, 5 cm, 6 cm then ratio of the least and greatest angles is
1) 1 : 2 2) 2 : 1 3) 3 : 4 4) 5 : 6

78. If 7, $4\sqrt{3}$, $\sqrt{13}$ are the sides of Δ ABC then least angle is
1) 45^0 2) 60^0 3) 90^0 4) 30^0

79. If the sides of a triangle are 17 cm, 8 cm, 15 cm then its circumradius in cm is
1) 17 2) 7.5 3) 8.5 4) 4

80. If $3+\sqrt{3}$ cm; $3-\sqrt{3}$ cm and 60° are two sides of a triangle and included angle respectively then its third side in cm is
1) 3 2) $3\sqrt{2}$ 3) $\sqrt{6}$ 4) $4\sqrt{2}$

81. If the sides of Δ ABC are 56 cm, 65 cm, 33 cm then its greatest angle is
1) 60^0 2) 120^0 3) 90^0 4) 30^0

82. In Δ ABC if b=$\sqrt{3}$, c=1, A=30^0 then C=
1) 30^0 2) 45^0 3) 60^0 4) 90^0

83. If the two sides of a triangle and included angle are a=$(1+\sqrt{3})$ cm, b=2 cm and C=60^0 respectively then A=
1) 60^0 2) 120^0 3) 75^0 4) 45^0

84. If two angles of a triangle are 30^0 and 45^0 and included side is $\sqrt{3}+1$ cm then the area of the triangle is
1) $\frac{\sqrt{3}+1}{2}$ 2) $\frac{\sqrt{3}-1}{2}$ 3) $\frac{\sqrt{3}+1}{2\sqrt{2}}$ 4) $\frac{\sqrt{3}-1}{2\sqrt{2}}$

85. $\frac{1}{r_1}+\frac{1}{r_2}+\frac{1}{r_3}=$
1) $\frac{1}{r}$ 2) $\frac{2}{r}$ 3) $\frac{3}{r}$ 4) $\frac{4}{r}$

86. $\frac{1}{r_1^2}+\frac{1}{r_2^2}+\frac{1}{r_3^2}+\frac{1}{r^2}=$
1) $\frac{a+b+c}{\Delta}$ 2) $\frac{a^2+b^2+c^2}{\Delta^2}$
3) $\frac{a^2+b^2+c^2}{\Delta}$ 4) $\frac{a\ +b\ +c}{\Delta^2}$

87. $a\cot A+b\cot B+c\cot C=$
1) r + R 2) 2 (r + R)
3) r - R 4) 2 (r - R)

88. $\sin^2\frac{A}{2}+\sin^2\frac{B}{2}+\sin^2\frac{C}{2}=$
1) $2+\frac{r}{2R}$ 2) $2-\frac{r}{2R}$
3) $1-\frac{r}{2R}$ 4) $\frac{r}{4R}$

89. $r^2\cot\frac{A}{2}\cot\frac{B}{2}\cot\frac{C}{2} =$

1) Δ 2) 2Δ 3) 4Δ 4) $\frac{\Delta}{2}$

90. $r\left(\cot\frac{A}{2}+\cot\frac{B}{2}+\cot\frac{C}{2}\right) =$

1) Δ 2) s 3) 2s 4) 2Δ

91. $r_1\tan\frac{C}{2}+r_2\tan\frac{A}{2}+r_3\tan\frac{B}{2} =$

1) s 2) Δ 3) r 4) R

92. $(r+r_1)\tan\frac{B-C}{2}+(r+r_2)\tan\frac{C-A}{2}+(r+r_3)\tan\frac{A-B}{2} =$

1) 2s 2) s 3) Δ 4) 0

93. $(r_1 - r)(r_2 - r)(r_3 - r) =$

1) 4Rr 2) 4Rs 3) $4R\Delta$ 4) $4Rr^2$

94. $r_1r_2 + r_2r_3 + r_3r_1 =$

1) s 2) Δ^2 3) s^2 4) $2\Delta^2$

95. $\frac{1}{bc}+\frac{1}{ca}+\frac{1}{ab} =$

1) $\frac{1}{2R\Delta}$ 2) $\frac{1}{2Rr}$ 3) 2Rr 4) $2R\Delta$

96. $\frac{r_1}{(s-b)(s-c)}+\frac{r_2}{(s-c)(s-a)}+\frac{r_3}{(s-a)(s-\mathbf{b})} =$

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

97. $\frac{r_1}{bc}+\frac{r_2}{ca}+\frac{r_3}{ab} =$

1) $\frac{1}{r}+\frac{1}{2R}$ 2) $\frac{1}{r}+\frac{1}{R}$

3) $\frac{1}{r}-\frac{1}{R}$ 4) $\frac{1}{r}-\frac{1}{2R}$

98. $\frac{a\cos A + b\cos B + c\cos C}{a+b+c} =$

1) $\frac{r}{2R}$ 2) $\frac{r}{R}$ 3) $\frac{2r}{R}$ 4) $\frac{R}{r}$

99. If p_1, p_2, p_3 are respectively the perpendiculars from the vertices of ΔABC to the opposite sides, then

i. $\frac{1}{p_1}+\frac{1}{p_2}+\frac{1}{p_3} =$

1) $\frac{1}{r}$ 2) $\frac{1}{r_1}$ 3) $\frac{1}{r_2}$ 4) $\frac{1}{r_3}$

ii. $\frac{1}{p_1}+\frac{1}{p_2}-\frac{1}{p_3} =$

1) $\frac{1}{r}$ 2) $\frac{1}{r_1}$ 3) $\frac{1}{r_2}$ 4) $\frac{1}{r_3}$

iii. $\frac{\cos A}{p_1}+\frac{\cos B}{p_2}+\frac{\cos C}{p_3} =$

1) $\frac{1}{r}$ 2) $\frac{1}{R}$ 3) $\frac{1}{r_1}$ 4) $\frac{1}{r_3}$

iv. $p_1p_2p_3 =$

1) $\frac{abc}{8R^2}$ 2) $\frac{a^2b^2c^2}{8R^2}$ 3) $\frac{a^2b^2c^2}{8R^3}$ 4) $\frac{a^3b^3c^3}{8R^2}$

v. $\frac{bp_1}{c}+\frac{cp_2}{a}+\frac{ap_3}{b} =$

1) $\frac{a+b+c}{2R}$ 2) $\frac{a^2+b^2+c^2}{2R}$

3) $\frac{a^2+b^2+c^2}{2R^2}$ 4) $\frac{a+b+c}{4R}$

100. $a^2\cot A+b^2\cot B+c^2\cot C =$

1) Δ 2) 2Δ 3) 3Δ 4) 4Δ

101. In ΔABC if $(r_1 + r_2)(r_2 + r_3)(r_3 + r_1) = 4RK$ then K=

1) s 2) Δ 3) Δ^2 4) s^2

102. In ΔABC if $r_1 r_2 r_3 = \frac{K}{r}$ then K =

1) s 2) s^2 3) Δ 4) Δ^2

103. In ΔABC, $\frac{ab - r_1r_2}{r_3} =$

1) r 2) r^2 3) R 4) R^2

104. In ΔABC $(r_2 + r_3)\sec^2\frac{A}{2} =$

1) R 2) 2R 3) 3R 4) 4R

105. $r_1 r_2 r_3 =$
1) 4 R 2) r - s 3) $r s^2$ 4) R

106. $4 (r_1 r_2 + r_2 r_3 + r_3 r_1)$
1) a+b+c 2) $(a+b+c)^2$ 3) 2 / r 4) 3 /r

107. $\frac{r_1 - r}{a} + \frac{r_2 - r}{b} + \frac{r_3 - r}{c}$
1) $\frac{r_1 + r_2 + r_3}{3}$ 2) $r_1 + r_2 + r_3$
3) $\frac{r_1 + r_2 + r_3}{2}$ 4) $\frac{r_1 + r_2 + r_3}{s}$

108. $r r_1 \cot \frac{A}{2} =$
1) Δ 2) $\tan \frac{A}{2}$ 3) $\cot \frac{C}{2}$ 4) $\sin \frac{B}{2}$

109. $r_2 r_3 \tan \frac{A}{2} =$
1) a 2) b 3) c 4) Δ

110. $(r_1 + r_2) \tan \frac{C}{2} =$
1) a 2) b 3) c 4) 0

111. $(r_3 - r) \cot \frac{C}{2} =$
1) a 2) b 3) c 4) 0

112. $(r_1 + r_2) \sec^2 \frac{C}{2} =$
1) $(r_2 + r_3) \sec^2 \frac{A}{2}$ 2) $r_1 r_2 r_3$
3) Δ 4) s

113. $r^3 \cot^2 \frac{A}{2} . \cot^2 \frac{B}{2} . \cot^2 \frac{C}{2} =$
1) $(r_2 + r_3) \sec^2 \frac{A}{2}$ 2) $r_1 r_2 r_3$
3) Δ 4) s

114. $4 R r \cos \frac{A}{2} \cos \frac{B}{2} \cos \frac{C}{2} =$
1) $(r_2 + r_3) \sec^2 \frac{A}{2}$ 2) $r_1 r_2 r_3$
3) Δ 4) s

115. $r^2 \cot \frac{A}{2} . \cot \frac{B}{2} . \cot \frac{C}{2} =$
1. $(r_2 + r_3) \sec^2 \frac{A}{2}$ 2. $r_1 r_2 r_3$
3. Δ 4. s

116. c(acosB - b cos A) =
1) $a^2 - b^2$ 2) $a^2 + b^2$
3) $b^2 - c^2$ 4) $b^2 + c^2$

117. $\frac{r r_1}{r_2 r_3} =$
1) $\tan^2 (A/2)$ 2) $\tan^2 (B/2)$
3) $\tan^2(C/2)$ 4) $\cot^2 (A/2)$

118. $(r_1 - r) (r_2 + r_3) =$
1) a^2 2) b^2 3) c^2 4) a^2b^2

119. $r r_1 + r_2 r_3 =$
1) ab 2) bc 3) ac 4) a/bc

120. $r\left(\cot \frac{B}{2} + \cot \frac{C}{2}\right) =$
1) a 2) b 3) c 4) Δ

121. In a ΔABC, if a, b, c are in A.P. then r_1, r_2, r_3 are in
1) A.P. 2) G.P. 3) H.P. 4) A.G.P

122. In ΔABC if $r_1 = 8, r_2 = 12, r_3 = 24$ then r =
1) 2 2) 4 3) 5 4) 6

123. If a^2, b^2, c^2 are in A.P. then CotA, CotB, CotC are in
1) A.P. 2) G.P. 3) H.P. 4) A.G.P

124. In ΔABC, the tangent of half of the difference of two angles is 1/3 the tangent of half of the sum of two angles. The ratio of the sides opposite to these angles is
1) 1:2 2) 2:1 3) 1:3 4) 3:1

125. If in ΔABC, $b - c = 3\sqrt{3}$, $A = 120^0$ and the area of $\Delta ABC = \frac{9\sqrt{3}}{2}$ sq.cm, then a =
1) 6 2) 8 3) 9 4) 7

126. In a triangle, if the sum of two sides is x and their product is y such that (x +z) (x - z) = y where z is the third side then the triangle is
1) obtuse angled 2) right angled
3) isosceles 4) equilateral

127. In a ΔABC, $2ac \sin \frac{A - B + C}{2} =$ [AIEEE-02]
1) $a^2 + b^2 - c^2$ 2) $c^2 + a^2 - b^2$
3) $b^2 - c^2 - a^2$ 4) $c^2 - a^2 - b^2$

128. In a triangle ABC, A : B : C = 3:5:4 then $a + b + c\sqrt{2} =$ [AIEEE 2002]
1) 3a 2) 3c 3) 3b 4) 2c

129. If in a triangle ABC, $\cos 3A + \cos 3B + \cos 3C = 1$, then one angle must be
1) 30^0 2) 60^0 3) 90^0 4) 120^0

130. If the radius of the incircle of a triangle with its sides 5k, 6k and 5k is 6, then k is equal to
1) 3 2) 4 3) 5 4) 6

131. If d_1, d_2, d_3 are the diameters of three ex-circles of a triangle then $d_1 d_2 + d_2 d_3 + d_3 d_1 =$
1) Δ^2 2) $4s^2$
3) $4\Delta^2$ 4. $ab + bc + ca$

LEVEL - I : KEY

1) 2	2)3	3)2	4)2	5)1	6)3
7)3	8)2	9)1	10)1	11)4	12)2
13)2	14)3	15)4	16)2	17)4	18)4
19)4	20)1	21)4	22)1	23)4	24)2
25)4	26)1	27)4	28)3	29)4	30)3
31)1	32)2	33)3	34)3	35)1	36)3
37)3	38)2	39)3	40)1	41)3	42)3
43)2	44)3	45)3	46)2	47)2	48)1
49)4	50)3	51)2	52)3	53)1	54)3
55)2	56)2	57)3	58)2	59)2	60)4
61)4	62)1	63)3	64)4	65)4	66)4
67)1	68)2	69)2	70)3	71)4	72)4
73)4	74)1	75)3	76)2	77)1	78)4
79)3	80)2	81)3	82)1	83)3	84)1
85)1	86)2	87)2	88)3	89)1	90)2
91)1	92)4	93)4	94)3	95)2	96)3
97)4	98)2	99)i-I,ii-4,iii-2,iv-3,v-2		100)4	101)4
102)4	103)1	104)4	105)3	106)2	107)4
108)1	109)4	110)3	111)3	112)1	113)2
114)3	115)3	116)1	117)1	118)1	119)2
120)1	121)3	122)2	123)1	124)2	125)3
126)1	127)2	128)3	129)4	130)2	131)2

LEVEL-II

1. If α, β, γ are the altitudes of a ΔABC, then $\dfrac{\alpha^{-2}+\beta^{-2}+\gamma^{-2}}{\cot A+\cot B+\cot C}=$

   1) $\dfrac{1}{\Delta}$ 2) Δ 3) $\dfrac{1}{\Delta^2}$ 4) Δ^2

2. $\dfrac{bc\cos A+ca\cos B+ab\cos C}{\cot A+\cot B+\cot C}=$

   1) Δ 2) 2Δ 3) $\dfrac{1}{2}\Delta$ 4) Δ^2

3. $\dfrac{\cot(A/2)+\cot(B/2)+\cot(C/2)}{\cot A+\cot B+\cot C}=$

   1) $\dfrac{(a+b+c)^2}{a^2+b^2+c^2}$ 2) $\dfrac{a^2+b^2+c^2}{(a+b+c)^2}$

   3) s 4) Δ

4. If α,β,γ are the lengths of the altitudes of ΔABC, then $\dfrac{\cos A}{\alpha}+\dfrac{\cos B}{\beta}+\dfrac{\cos C}{\gamma}=$

   1 Δ 2) $1/\Delta$ 3) R 4) 1 / R

5. If α,β,γ are the lengths of the altitudes of ΔABC, then

   $\dfrac{1}{\alpha}+\dfrac{1}{\beta}-\dfrac{1}{\gamma} - \dfrac{2ab}{(a+b+c)\Delta}\cos^2\dfrac{C}{2}=$

   1) 0 2) 1 3) 2s 4) Δ

6. $\dfrac{\sqrt{r r_1 r_2 r_3}}{2Rr(\sin A+\sin B+\sin C)}=$

   1) 1 2) 1 / 3 3) 1 / 4 4) 1 / 2

7. $a(rr_1+r_2r_3)=$

   1) $\dfrac{ca-r_3r_1}{r_2}$ 2) $\dfrac{r_3r+r_1r_2}{ab}$

   3) $\dfrac{r_3^{\,2}}{4R-r_1-r_2}$ 4) abc

8. $\dfrac{\Delta^2}{a^2+b^2+c^2}\left\{\dfrac{1}{r_1^2}+\dfrac{1}{r_2^2}+\dfrac{1}{r_3^2}+\dfrac{1}{r^2}\right\}=$

   1) 1 2) 0 3) $4Rr^2$ 4) 1 / r

9. $r_1^2+r_2^2+r_3^2+r^2=$

   1) $16R^2-(a^2+b^2+c^2)$ 2) $16R^2-(a^2+b^2-c^2)$

   3) $16R^2-(a^2-b^2+c^2)$ 4) $16R^2-(a^2-b^2-c^2)$

10. $\dfrac{r_1-r}{a}+\dfrac{r_2-r}{b}=$

    1) a/r_3 2) b/r_3 3) c/r_3 4) 0

11. If p_1, p_2, p_3 are the lengths of the altitudes from the vertices of ΔABC to the opposite sides, then

    $\dfrac{a\cot A}{p_1}+\dfrac{b\cot B}{p_2}+\dfrac{c\cot C}{p_3}$

    1. 1 / r 2. 1 / R 3. $1/r^3$ 4. 2

12. If (a + b + c) (b + c - a) = 3 bc, then

    1) $A=60^0$ 2) $B=60^0$

    3) $C=60^0$ 4) $A=90^o$

13. If $\dfrac{1}{a+b}+\dfrac{1}{a+c}=\dfrac{3}{a+b+c}$ then

    1) $A=60^0$ 2) $B=60^0$

    3) $C=60^0$ 4) $A=90^o$

14. If $\dfrac{r}{r_2}=\dfrac{r_1}{r_3}$ then

    1) $A=90^0$ 2) $B=90^0$

    3) $C=90^0$ 4) $C=60^o$

15. $r+r_1+r_2-r_3=$

    1) 4 R sin B 2) 4 R sin C

    3) 4 R cos B 4) 4 R cos C

16. $(r_2 + r_3)\sqrt{\left(\frac{r r_1}{r_2 r_3}\right)} =$

1) a 2) b 3) c 4) bc

17. In ΔABC, if $C = 90^0$, then $R + r =$

1) a+ b 2) $\frac{a+b}{2}$ 3) b + c 4) $\frac{b+c}{2}$

18. $(r_1 + r_2)\tan\frac{C}{2} =$

1) a 2) b 3) c 4) ab

19. If $2R + r = r_1$, then

1) $A = 90^0$ 2) $B = 90^0$
3) $C = 90^0$ 4) $A = 60^o$

20. In ΔABC if $r_1 - r = r_2 + r_3$, then

1) $A = 90^0$ 2) $B = 90^0$
3) $C = 90^0$ 4) $A = 45^o$

21. The expression

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

is equal to

1) $\cos^2 A$ 2) $\sin^2 A$
3) cos A cos B cos C 4) sin A

22. In ΔABC $\frac{r_1(r_2+r_3)}{\sqrt{r_1r_2+r_2r_3+r_3r_1}} =$

1) a 2) b 3) c 4) a^2

23. If $SinC = \frac{SinA}{2CosB}$, then the triangle is

1) right angled 2) isosceles
3) right angled isosceles 4) scalene

24. For a Δ ABC it is given that

$CosA+CosB+CosC=\frac{3}{2}$ then the triangle is

1) isosceles 2) equilateral
3) right angled 4) scalene

25. If $Sin^2A+Cos^2B+Sin^2C=1$, then the triangle ABC is

1) isosceles 2) equilateral
3) right angled 4) scalene

26. If CotA + CotB + CotC = $\sqrt{3}$, then the triangle ABC is

1) isosceles 2) equilateral
3) right angled 4) scalene

27. If in a triangle ABC, TanA+TanB+TanC = 6 and $\frac{a-b}{c} = \frac{\sin\left(\frac{A-B}{2}\right)}{\cos\left(\frac{C}{2}\right)}$; $\frac{a+b}{c} = \frac{\cos\left(\frac{A-B}{2}\right)}{\sin\left(\frac{C}{2}\right)}$

TanA TanB=2, then the triangle is

1) right angled 2) obtuse angled
3) acute angled 4) isosceles

28. If one angle of a triangle is 30^0 and the lengths of the sides adjacent to it are 40 and 40 $\sqrt{3}$, then the triangle is

1) equilateral 2) right angled
3) isosceles 4) scalene

29. If one side of a triangle is double that of another and the angles opposite to these sides differ by 60^0, then the triangle is

1) isosceles 2) right angled
3) equilateral 4) right angled isosceles

30. If the diameter of any escribed circle of a triangle is equal to its perimeter, then the triangle is

1) equilateral 2) isosceles
3) right angled 4) scalene

31. In Δ ABC if CosA=SinB-CosC then the triangle is

1) equilateral 2) isosceles
3) right angled 4) scalene

32. In ΔABC, $\frac{b^2+c^2}{b^2-c^2} = \frac{Sin(B+C)}{Sin(B-C)}$ then the triangle is

1) right angled 2) isosceles
3) right angled or isosceles 4) scalene

33. In ΔABC if $\frac{SinB}{SinC}$=2CosA then the triangle is

1) right angled 2) isosceles
3) equilateral 4) scalene

34. In ΔABC, if $a^2 + b^2 + c^2 = 8R^2$ then the triangle is

1) right angled 2) isosceles
3) equilateral 4) scalene

35. In ΔABC, if $\sqrt{3}r + a = \sqrt{3}r + b = s$ then the triangle is

1) right angled 2) isosceles
3) equilateral 4) scalene

36. In ΔABC, if $2Sin^2B + 2Sin^2C + Cos2A = 1$ then the triangle is

1) right angled 2) isosceles
3) equilateral 4) right angled and isosceles

37. If a, b, c are in H.P., then $Sin^2\frac{A}{2}$, $Sin^2\frac{B}{2}$, $Sin^2\frac{C}{2}$ are in

1) A.P. 2) G.P. 3) H.P. 4) A.G.P.

38. If $\frac{SinA}{SinC} = \frac{Sin(A-B)}{Sin(B-C)}$ then a^2, b^2, c^2 are in

1) A.P. 2) G.P. 3) H.P. 4) A.G.P.

39. If $a\cos^2\frac{C}{2}+c\cos^2\frac{A}{2}=\frac{3b}{2}$, then a, b, c are in

[AIEEE - 2003]

1) A.P. 2) G.P. 3) H.P. 4) A.G.P.

40. If (a-b)(s-c)=(b-c)(s-a) then r_1, r_2, r_3 are in
1) A.P. 2) G.P. 3) H.P. 4) A.G.P.

41. If a, b, c are in A.P. then $\frac{2\sin\frac{A}{2}\sin\frac{C}{2}}{\sin\frac{B}{2}}=$

1) 1 2) 2 3) 3 4) 4

42. If the angles of a right angled triangle are in A.P., then ratio of its sides is

1) 3 : 4 : 5 2) $1:1:\sqrt{2}$

3) $2:3:\sqrt{13}$ 4) 1 : 2 :3

43. If aSecA, bSecB, cSecC are in H.P. then a^2, b^2, c^2 are in
1) A.P. 2) G.P. 3) H.P. 4) A.G.P.

44. If the perimetre of a triangle is six times the arithmetic mean of the sine angles and the side 'a' is unity, then A =

1) $\frac{\pi}{6}$ 2) $\frac{\pi}{4}$ 3) $\frac{\pi}{3}$ 4) $\frac{\pi}{2}$

45. If a = 13, b = 14, c = 15 then area of incircle is

1) $\frac{99}{7}$ 2) $\frac{7}{99}$ 3) $\frac{352}{7}$ 4) $\frac{4}{7}$

46. If twice the square of the radius of a circle is equal to half the sum of the squares of the sides of inscribed triangle ABC, then
$\sin^2A+\sin^2B+\sin^2C=$
1) 1 2) 2 3) 4 4) 8

47. If $C=90^o$ then $\frac{a^2+b^2}{a^2-b^2}\sin(A-B)=$

1. 1 2. 2 3. 3 4. 4

48. If a:b:c = 3:4:5, then sin A : sin B : sin C =
1) 3: 4 : 5 2) 9 : 16 : 25
3) 9 : 8 : 7 4) 7 : 9 : 8

49. If a: b: c = 7 : 8 : 9, then cos A : cos B : cos C =
1) 7 : 9 : 11 2) 14 : 11 : 6
3) 7 : 19 : 25 4) 8 : 6 : 5

50. If b + c : c + a : a + b = 11 : 12 : 13, then cos A : cos B : cos C =
1) 7 : 9 : 11 2) 14 : 11 : 6
3) 7 : 6 : 5 4) 8 : 6 : 5

51. If $\cot\frac{A}{2}:\cot\frac{B}{2}:\cot\frac{C}{2}=3:7:9$, then a:b:c =
1) 7 : 9 : 11 2) 14 : 11 : 6
3) 7 : 19 : 25 4) 8 : 6 : 5

52. If tan A : tan B : tan C = 1 : 2 : 3, then sin A : sin B : sin C =

1) $\sqrt{5}:3:2\sqrt{2}$ 2) $3:2\sqrt{2}:\sqrt{5}$

3) $\sqrt{5}:2\sqrt{2}:3$ 4) 1 : 2 :3

53. If a = 100, c= $100\sqrt{2}$ and A = 30^o then the angle B =
1) 105^o or 15^o 2) 45^o or 135^o
3) 60^o or 120^o 4) 30^o or 60^o

54. If $r : R : r_1 = 2: 5 : 12$, then A =
1) 45^o 2) 60^o 3) 30^o 4) 90^o

55. If D is the middle point of the side BC of a triangle ABC and AD is perpendicular to AC, then
1) $3b^2 = a^2 - c^2$ 2) $3a^2 = b^2 - 3c^2$
3) $b^2 = a^2 - c^2$ 4) $a^2 + b^2 = 5c^2$

56. The area Δ of a triangle ABC is given by

$\Delta = a^2 - (b - c)^2$ then $\tan\frac{A}{2}=$

1) -1 2) 0 3) 1/4 4) 1/2

57. If the median AD of a triangle ABC makes an angle α with AB, then Sin(A-α) is equal to

1) $\frac{b\sin\alpha}{c}$ 2) $\frac{c\sin\alpha}{b}$ 3) $\frac{b}{c\sin\alpha}$ 4) $\frac{c}{b\sin\alpha}$

58. If the bisector of the angle A makes an angle θ with BC, then Sinθ =

1) $\cos\left(\frac{B-C}{2}\right)$ 2) $\sin\left(\frac{B-C}{2}\right)$

3) $\sin\left(B-\frac{A}{2}\right)$ 4) $\sin\left(C-\frac{A}{2}\right)$

59. There exists a triangle ABC satisfying
1) TanA + TanB + TanC = 0

2) $\frac{\sin A}{2}=\frac{\sin B}{3}=\frac{\sin C}{7}$

3) $(a + b)^2 = c^2 + ab$ and $\sqrt{2}$(SinA+CosA)= $\sqrt{3}$
4) a + b = c

60. There exists ΔABC satisfying the conditions

1) bSinA=a; $A<\frac{\pi}{2}$ 2) bSinA>a; $A>\frac{\pi}{2}$

2) bSinA>a; $A>\frac{\pi}{2}$ 4) bSinA<a; $A>\frac{\pi}{2}$; b=a

61. If the area of a triangle is 96 and the radii of the escribed circles are 8, 12, 24, then the greatest side of the triangle is
1) 18 2) 20 3) 16 4) 30

62. If a = 7, b = 8, c = 9 then the length of the line joining B to the midpoint of AC is
1) 5 2) 8 3) 7 4) 10

63. In a triangle ABC, angle A is greater than angle B. If the measures of angles A and B satisfy the equation $3\text{Sin}x - 4\text{Sin}^3x - k = 0$, $0<k<1$, then the measure of angle C is
1) $\frac{\pi}{3}$ 2) $\frac{\pi}{2}$ 3) $\frac{2\pi}{3}$ 4) $\frac{5\pi}{6}$

64. If A_1, A_2, A_3, A are respectively the areas of the ex-circles and in-circle of the ΔABC, then $\frac{1}{\sqrt{A_1}}+\frac{1}{\sqrt{A_2}}+\frac{1}{\sqrt{A_3}}=$
1) $\frac{2}{\sqrt{A}}$ 2) $\frac{1}{\sqrt{A}}$ 3) $\frac{1}{2\sqrt{A}}$ 4) $\sqrt{A}$

65. If the length of the side of an equilateral triangle is $2\sqrt{3}$ cm then its circumradius in cm is
1) 1 2) 2 3) 3 4) 4

66. If AD is perpendicular to BC of ΔABC such that BD : CD : AD = 2 : 3 : 6 then A=
1) 45^0 2) 60^0 3) 30^0 4) 90^0

67. In ΔABC if Cos3A+Cos3B+Cos3C=1 then one angle of the triangle is
1) 60^0 2) 90^0 3) 120^0 4) 135^0

68. If $\frac{2}{5}\frac{y}{z}+\frac{2}{5}\frac{z}{x}, \frac{2}{5}\frac{z}{x}+\frac{2}{5}\frac{x}{y}, \frac{2}{5}\frac{x}{y}+\frac{2}{5}\frac{y}{z}$ are the sides of a triangle then its area is
1) $\frac{4}{25}\sqrt{\frac{x}{y}+\frac{y}{z}+\frac{z}{x}}$ 2) xyz
3) 1 4) x + y + z

69. If 6, 10, 14 are the sides of a triangle then its obtuse angle is
1) 110^0 2) 120^0 3) 135^0 4) 115^0

70. In Δ ABC if a=13, b=14, c=15 then $\text{Tan}\frac{B}{2}=$
1) $\frac{3}{7}$ 2) $\frac{16}{49}$ 3) $\frac{4}{7}$ 4) $\frac{2}{\sqrt{7}}$

71. In Δ ABC if $a^2 = bc$ then CosA+Cos2A+Cos(B-C)=
1) 1 2) 2 3) 1/2 4) 0

72. In ΔABC if a=(b-c)Secθ then $\frac{2\sqrt{bc}}{b-c}\text{Sin}\frac{A}{2}=$
1) Cosθ 2) Secθ 3) Tanθ 4) Cotθ

73. In Δ ABC if CosACosB+SinASinBSinC=1 then a : b : c=
1) 1 : 1 : 2 2) 1 : 1 : $\sqrt{2}$
3) 1 : $\sqrt{2}$: 1 4) $\sqrt{2}$: 1 : 2

74. In ΔABC, r=1, R=4, Δ=8 then the value of ab+bc+ca=
1) 18 2) 81 3) 72 4) 27

75. If O is the orthocentre of ΔABC then OA=
1) RCosA 2) 2RCosA
3) 2RCotA 4) RCotA

76. If O is the orthocentre of ΔABC then the distance of O from the side BC is
1) 2R CosB CosC 2) 2R CosC CosA
3) 2R CosA CosB 4) R CosB CosC

77. In ΔABC, area of incircle : area of ΔABC =
1) $\pi : \text{Tan}\frac{A}{2}\ \text{Tan}\frac{B}{2}\ \text{Tan}\frac{C}{2}$
2) $\pi : \text{Cot}\frac{A}{2}\ \text{Cot}\frac{B}{2}\ \text{Cot}\frac{C}{2}$
3) 1 : 1
4) π : r

78. If I is the incentre of Δ ABC then AI=
1) $R\sin\frac{B}{2}\sin\frac{C}{2}$ 2) $\text{cos ec}\frac{A}{2}$
3) $4R\sin\frac{A}{2}\sin\frac{C}{2}$ 4) $4R\sin\frac{B}{2}\sin\frac{C}{2}$

79. ABC is a triangle in which B=45^0, C=120^0. If a=40 then the length of the perpendicular from A on BC produced is
1) $20(3+\sqrt{3})$ 2) $20(3-\sqrt{3})$
3) $20\sqrt{3}$ 4) $10(3+\sqrt{3})$

80. ABC is a right angled triangle of which A is the right angle BD is drawn perpendicular to BC and meets CA produced in D. If AB=12, AC=16, BC=20 then BD=
1) 15 2) 25 3) 10 4) 225

81. In Δ ABC if r_1=4, r_2=4, r_3=6 then the triangle is
1) right angled 2) equilateral
3) isosceles 4) scalene

82. If the sides of a triangle are $\sqrt{2}$, $\sqrt{6}$, $\sqrt{8}$ then the angles of the triangle are
1) $30^0, 75^0, 75^0$ 2) $45^0, 45^0, 90^0$
3) $30^0, 60^0, 90^0$ 4) $60^0, 60^0, 60^0$

83. In ΔABC if the angle A, B, C are in A.P. then $\frac{a+c}{\sqrt{a^2-ac+c^2}}=$

1) $\text{Cos}\left(\frac{A-C}{2}\right)$ 2) $2\text{Cos}\left(\frac{A-C}{2}\right)$

3) $2\text{Sin}\left(\frac{A-C}{2}\right)$ 4) $2\text{Cos}\left(\frac{A+C}{2}\right)$

84. If the median of Δ ABC through A is perpendicular to AB then TanA+2TanB=

1) 1 2) -1 3) 2 4) 0

85. In a triangle , a=26; b=30 and cos C = $\frac{63}{65}$. Then $r_2 =$

1) 3 2) 4 3) 16 4)48

86. If $c^2 = a^2 + b^2$ and 2s= a + b + c, then the value of 4s(s-a) (s-b) (s-c) is

1) s^4 2) b^2c^2 3) c^2a^2 4) a^2b^2

87. If the sides of a triangle are x^2+x+1, $2x+1$ and x^2-1, then the greatest angle is

1) 75^0 2) 90^0 3) 105^0 4) 120^0

88. If in a triangle ABC, 3 sin A=6 sin B= $2\sqrt{3}$ sin C, then the angle A is

1) 30^0 2) 45^0 3) 60^0 4) 90^0

89. In any triangle ABC, $1-\tan\left(\frac{A}{2}\right)\tan\left(\frac{B}{2}\right)=$

1) $\frac{2a}{a+b+c}$ 2) $\frac{2b}{a+b+c}$

3) $\frac{2c}{a+b+c}$ 4) a+b

90. In triangle ABC, the length of the altitude drawn from A to BC is

1) $\frac{a\sin B\sin C}{\sin A}$ 2) $\frac{b\sin C\sin A}{\sin B}$

3) $\frac{c\sin A\sin B}{\sin C}$ 4) $\frac{a\cos B\sin C}{\sin A}$

91. In triangle ABC, $\frac{1+Cos(A-B)\cos C}{1+\cos(A-C)\cos B}=$

1) $\frac{a^2+b^2}{b^2+c^2}$ 2) $\frac{a^2+b^2}{a^2+c^2}$

3) $\frac{a^2-b^2}{b^2-c^2}$ 4) $\frac{a^2-b^2}{a^2-c^2}$

92. If in a triangle ABC, in the usual notation, $2a\cos\left(\frac{B-C}{2}\right)=b+c$ and $B\neq C$, then the measure of the angle A is

1) $\frac{\pi}{3}$ 2) $\frac{\pi}{4}$ 3) $\frac{\pi}{6}$ 4) $\frac{\pi}{2}$

93. If in a triangle ABC, $a^2+b^2+c^2=ca+ab\sqrt{3}$, then the triangle is

1) equilateral

2) right angled and isosceles

3) right angled with one of the acute angles measuring $\frac{\pi}{3}$

4) obtuse angled

94. In triangle ABC, a=4, b=3 and $\angle A = 60^0$. Then c is a root of the equation [AIEEE - 2002]

1) $c^2-3c+7=0$ 2) $c^2+3c-7=0$

3) $c^2+3c+7=0$ 4) $c^2-3c-7=0$

95. If in triangle ABC, $\begin{vmatrix} a & b & c \\ b & c & a \\ c & a & b \end{vmatrix}=0$, then cotA+cotB+cotC=

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

96. The ratio between the circumradius and inradius of a right angled isosceles triangle is

1) 2:1 2) $(\sqrt{2}+1):1$

3) 1: $(\sqrt{2}-1)$ 4) $(\sqrt{2}+1):\sqrt{2}$

97. In triangle ABC, $r=\frac{R}{6}$ and $r_1 = 7r$. Then the measure of angle A=

1) $\frac{\pi}{12}$ 2) $\frac{\pi}{6}$ 3) $\frac{\pi}{4}$ 4) $\frac{\pi}{3}$

98. The radius of the excircle opposite to any vertex of an equilateral triangle of side 'a' is

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

99. The sides of a triangle are integers. The cosines of its angles are

1) integers 2) rational numbers

3) irrational numbers

4) either rational or irrational

100. If in triangle ABC, $\frac{2\cos A}{a}+\frac{\cos B}{b}+\frac{2\cos C}{c}=\frac{a}{bc}+\frac{b}{ca}$, then the value of the angle A, in degrees is

1) 30 2) 60 3) 90 4) 120

101. If a=7, b=8, c=9, then $\frac{\tan C}{\tan A}=$

1) 1 2) 2 3) 3 4) $\frac{5}{4}$

102. If A= 60^0 , $\Delta = 10\sqrt{3}$, s=10, then a=
1)1 2)3 3)5 4)7

103. In a triangle ABC, B= 90^0 , then the value of tan $\frac{A}{2}$ =

1) $\sqrt{\frac{b+c}{b-c}}$ 2) $\sqrt{\frac{b-c}{b+c}}$ 3) $\sqrt{\frac{a+c}{a-c}}$ 4) $\sqrt{\frac{a-c}{a+c}}$

104. If 3R=4r, then cos A+cos B+cos C=

1)4 2)7 3)1 4) $\frac{7}{4}$

105. If $r_1 = 8$, $r_2 = 12, r_3 = 24$, then C=

1) $\frac{\pi}{4}$ 2) $\frac{\pi}{6}$ 3) $\frac{\pi}{3}$ 4) $\frac{\pi}{2}$

106. In the triangle right angled at A, $\cos^{-1}\left(\frac{R}{r_2+r_3}\right)$ is

1) 30^0 2) 60^0 3) 90^0 4) 45^0

107. If $C = 90^0$, 1+ sin A - sin B =

1) $\frac{r}{2R}$ 2) $\frac{2r}{R}$ 3) $\frac{2r_1}{R}$ 4) $\frac{r_1}{R}$

108. If in ΔABC , A=B-C= 60^0 , then $\frac{b-c}{b+c}$ =

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

109. $\frac{b\cos C + c\cos B}{\cos A}$ =

1) $\frac{2abc}{a^2+b^2+c^2}$ 2) $\frac{abc}{b^2+c^2-a^2}$

3) $\frac{abc}{b^2+c^2+a^2}$ 4) $\frac{2abc}{b^2+c^2-a^2}$

110. If Δ is the area of triangle whose sides are a,b,c then the area of the triangle with 2a,2b,2c as the sides is
1) 2Δ 2) 4Δ 3) 8Δ 4) 16Δ

111. In ΔABC, $r : R : r_1 = 2 : 5 : 12$. Then A=
1) 30^0 2) 45^0 3) 60^0 4) 90^0

112. In ΔABC , the sides are in the ratio 7:5:4. Then r:R=
1) 35:12 2) 35:16 3) 12:35 4) 16:35

113. In ΔABC , 4 sinA cosB=1 and tanB=3tanA. Then sinC=

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

114. If in ΔABC , A=3C, then $\frac{a-c}{2c}$ =

1) $\sin\frac{B}{2}$ 2) $\sin\frac{C}{2}$ 3) $\cos\frac{B}{2}$ 4) $\cos\frac{C}{2}$

115. The perimeter of a right angled triangle is six times the smallest side. If α is the smallest angle, then tan α =

1) $\frac{5}{12}$ 2) $\frac{3}{4}$ 3) $\frac{12}{5}$ 4) $\frac{4}{3}$

116. ABC, A'B'C' are two triangles such that A+A'= 180^0 , B=B'. Then
1) aa'=bb'+cc' 2) ab'=ba'+cc'
3) a'b=b'c+c'a 4) bc'=b'c+ba'

117. Sin A and Sin B are the roots of the equation $c^2x^2 - c(a+b)x + ab = 0$. Then Sin C=

1) 0 2) $\frac{1}{2}$ 3) $\frac{1}{\sqrt{2}}$ 4) 1

118. The roots of $x^2 - 2\sqrt{3}x + 2 = 0$ represent two sides of a triangle. If the angle between them is $\frac{\Pi}{3}$, then the perimeter of the triangle is
1) $2\sqrt{3}+6$ 2) $2\sqrt{3}+\sqrt{6}$
3) $3\sqrt{2}+6$ 4) $3\sqrt{2}+\sqrt{6}$

119. The base of a triangle is 80 and one of the base angles is 60^0 . If the sum of the lengths of the other two sides is 90, then the shortest side is
1) 15 2) 17 3) 19 4) 21

120. In ΔABC , if sin A+sin B+sin C= $\sqrt{2}+1$ and cos A+Cos B+cos C= $\sqrt{2}$ the triangle is
1) equilateral 2) right angled
3) isosceles 4) right angled isosceles

121. In any $\Delta ABC, \sum\left(\frac{\sin^2 A + \sin A + 1}{\sin A}\right)$ is always greater than

1) 9 2) 3 3) 27 4) $\frac{1}{3}$

122. In any ΔABC , $\Pi\left(\frac{\sin^2 A + \sin A + 1}{\sin A}\right)$ is always greater than
1) 9 2) 3 3) 27 4) 81

123. If a,b,c are in A.P and the greatest angle is A, and the least angle is C, then $4(1-CosA)(1-CosB)=$
1) Cos A-CosC 2) Sin A-Sin C
3) Sin A+SinC 4) Cos A+Cos C

124. If A,B,C are the angles of a triangle be in A.P and satisfy the relation
$Sin(2A+B) = Sin(C-A) = Sin(B+2C) = 1/2$
then the values of A,B,C respectively
1) $45^0, 75^0, 60^0$ 2) $75^0, 60^0, 45^0$
3) $60^0, 60^0, 60^0$ 4) $45^0, 60^0, 75^0$

125. In ΔABC, Δ =
1) r_1 (s-b) 2) r_2 (s-c) 3) r_3 (s-a) 4) r_3 (s-c)

126. In ΔABC
$\cos^2 A + \cos^2 B + \cos^2 C =$
$\cos A \cos B + \cos B \cos C + \cos C \cos A$
then the triangle is:
1) equilateral 2) acute angled
3) isosceles 4) right angled

127. The sides of a triangle are in ratio $1 : \sqrt{3} : 2$, then angles of the triangle are in the ratio
1) 1:2:3 2) 1:3:5
3) 2:3:4 4) 3:2:1

128. In a triangle ABC, $(a+b+c)(b+c-a) = \lambda bc$ if
1) $\lambda < 0$ 2) $\lambda > 0$ 3) $0 < \lambda < 4$ 4) $\lambda > 4$

129. $\frac{\cos 2A}{a^2} - \frac{\cos 2B}{b^2} =$
1) $\frac{1}{a^2} - \frac{1}{b^2}$ 2) $\frac{1}{a^2} + \frac{1}{b^2}$
3) $\frac{2}{a^2} - \frac{2}{b^2}$ 4) $\frac{2}{a^2} + \frac{2}{b^2}$

130. If a=6, b=8 and c=10 then cos4C+sin4C=
1) $\frac{4}{5}$ 2) $\frac{2}{3}$ 3) 1 4) $\frac{3}{5}$

131. If $3Tan\frac{A}{2}.Tan\frac{C}{2} = 1$ then a,b,c are in
1) A.P 2) G.P 3) H.P 4) A.G.P.

132. If $Cos\alpha = \frac{a}{b+c}, Cos\beta = \frac{b}{c+a}$
$Cos\gamma = \frac{c}{a+b}$ then
$Tan^2\frac{\alpha}{2} + Tan^2\frac{\beta}{2} + Tan^2\frac{\gamma}{2} =$
1) 3 2) 2 3) 1 4) 0

133. In a triangle two sides are of length 20 and 21 and the sine of angle between them is equal to 0.6 then the third side is equal to
1) 13 or $\sqrt{1513}$ 2) 14 or $\sqrt{1315}$
3) 15 or $\sqrt{1531}$ 4) 17 or $\sqrt{1531}$

134. $\sum \frac{b \sec B + c \sec C}{\tan B + \tan C} =$
1) 2R 2) 4R 3) 6R 4) 8R

135. The sides of a triangle are in A.P and its area is $(3/5) \times$ (area of an equilateral triangle of the same perimeter) then the area of the Δ le is
1) $\frac{\sqrt{3}}{20}b^2$ 2) $\frac{3\sqrt{3}}{20}b^2$
3) $\frac{3\sqrt{3}}{20}\left(\frac{a+b}{3}\right)^2$ 4) $\frac{3\sqrt{3}}{20}a^2$

136. In a triangle ABC if tan C< 0 then C is
1) Acute 2) Obtuse
3) Right angle 4) Acute or obtuse

137. If the sides of a triangle are in A.P and difference between the greatest and least angles is $\frac{\pi}{2}$, then
$\text{Sin}\left(\frac{B}{2}\right) =$
1) $\frac{1}{2}$ 2) $\frac{1}{2\sqrt{2}}$ 3) $\frac{1}{\sqrt{2}}$ 4) $\frac{\sqrt{3}}{2}$

138. If $\frac{b+c-a}{4} = \frac{c+a-b}{3} = \frac{a+b-c}{2}$, then Cos A=
1) $\frac{5}{7}$ 2) $\frac{3}{7}$ 3) $\frac{2}{7}$ 4) $\frac{1}{7}$

139. If 'S' is the circumcentre of a triangle ABC and $\angle SAB = \angle SBC = \angle SCA = \theta$, then $\sin\theta$=
1) 1 2) $\frac{1}{2}$ 3) $\frac{1}{\sqrt{2}}$ 4) $\frac{\sqrt{3}}{2}$

140. If a circle is inscribed in a right angled triangle having right angle at B, then diameter of the circle is
1) AB+BC-AC 2) BC+CA-AB
3) AC+AB-BC 4) AB+BC+CA

141. If a:b:c=3:4:5, then $r_1 : r_2 : r_3$ =
1) 5:6:7 2) 1:2:3 3) 2:3:6 4) 4:5:6

142. In a ΔABC, r =
1) $4R \sin\frac{A}{2}\sin\frac{B}{2}\cos\frac{C}{2}$ 2) $r_1 + r_2 + r_3$
3) 4R cos A 4) $\frac{a}{\cot\frac{B}{2} + \cot\frac{C}{2}}$

143. In a triangle ABC if $C = 90^\circ$ then
$\left[\frac{a^2+b^2}{a^2-b^2}\right]\sin(A-B) =$
1) 1 2) 2 3) 3 4) 4

144. In a triangle ABC if $2a = \sqrt{3}b + c$ then
1) $c^2 = a^2 + b^2 - ab$
2) $a^2 = b^2 + c^2$
3) $b^2 = a^2 + c^2 - ac\sqrt{3}$
4) a = b = c

145. In ΔABC, $\frac{\cos B+\cos C}{1-\cos A}=$

1) $\frac{b+c}{1-a}$ 2) $\frac{bc}{1-a}$ 3) $\frac{b+c}{a}$ 4) $\frac{a}{b+c}$

146. In ΔABC if $\cot\frac{A}{2}.\cot\frac{B}{2}=c;\cot\frac{B}{2}\cot\frac{C}{2}=a$;

and $\cot\frac{C}{2}\cot\frac{A}{2}=b$ then $\frac{1}{s-a}+\frac{1}{s-b}+\frac{1}{s-c}=$

1) -1 2) 0 3) 1 4) 2

147. In ΔABC, $(a^2-b^2-c^2)\tan A+(a^2-b^2+c^2)\tan B$

1) $(a^2+b^2-c^2)\tan C$ 2) $(a^2+b^2+c^2)\tan C$
3) 0 4) $(a^2-b^2-c^2)\tan C$

148. In ΔPQR as shown in the figure given that $x:y:z=2:3:6$ then $\angle QPR=$

1) $\pi/6$ 2) $\pi/4$ 3) $\pi/3$ 4) $\pi/12$

149. In ΔABC, if $a=5$; $b=4$, $A=\pi/2+B$ then $\tan C=$

1) 9/40 2) 1/40 3) 1/9 4) 8/31

150. If r_1, r_2, r_3 are the radii of the escribed circles of a ΔABC and if r is the radius of its incircle then $r_1 r_2 r_3 - r(r_1 r_2 + r_2 r_3 + r_3 r_1) =$

1) 0 2) 1 3) 2 4) 3

151. If in a triangle, R and r are the circumradius and inradius respectively then the hormonic mean of the exradii of the triangle is

1) 3r 2) 2R 3) R + r 4) 1/2 R

152. In a ΔABC; $A=\pi/3$ and $b:c=2:3$. If $\tan\theta=\frac{\sqrt{3}}{5}$; $0<\theta<\pi/2$ then

1) $B=60^0+\theta$ 2) $C=60^0+\theta$
3) $B=90^0-\theta$ 4) $C=60^0-\theta$

153. If the length of the sides AB and AC of a ΔABC are 3 cm and 6 cm respectively and if cosine of angle BAC is 1/8, then length of the angle bisector of angle BAC is

1) 3 cm 2) 2.5 cm 3) 3.5 cm 4) 4 cm

154. If two sides a, b and angle A be such that two triangles are formed, then the sum of two values of the third side is

1) 2b sinA 2) 2bcosA
3) b/a cosA 4) (c + b)cosA

155. In ΔABC, $\sin\frac{A}{2}.\cos\frac{B}{2}=\frac{a+c-b}{2c}k$ then k =

1) cos(A/2) 2) sin(B/2)
3) sin(C/2) 4) cos(C/2)

156. The sides of a triangle are in the ratio 5:8:11. If 'θ' denotes the angle opposite to the largest side of the triangle, then $\tan^2\frac{\theta}{2}=$

1) $\frac{1}{21}$ 2) $\frac{7}{48}$ 3) $\frac{7}{3}$ 4) $\frac{7}{12}$

157. In a ΔABC, the median AD is perpendicular to AC. If b = 5 and c = 11 then a =

1) 10 2) 12 3) 14 4) $\sqrt{221}$

158. In a ΔABC, if $A=18^0$, b - a = 2, ab = 4, then the triangle is

1) right angled 2) isoscles
3) acute angled 4) obtuse - angled

159. In ΔABC; AD, BE and CF are the altitudes and R is the circumradius then the radius of the circle through DEF is

1) 2R 2) R 3) R/2 4) 3R/2

160. If in a ΔABC; $\frac{\cos A}{7}=\frac{\cos B}{19}=\frac{\cos C}{25}=k$ then

$$\begin{vmatrix}-1/K & 25 & 19\\ 25 & -1/K & 7\\ 19 & 7 & -1/K\end{vmatrix}=$$

1) -1 2) 1 3) 2 4) 0

161. If $\cot\frac{A}{2}:\cot\frac{B}{2}:\cot\frac{C}{2}=1:4:15$ then the greatest angle of triangle is

1) 60^0 2) 90^0 3) 120^0 4) 135^0

162. In ΔABC, if AD, BE, CF are internal bisectors of A, B, C then

$$\frac{1}{AD}.\cos\frac{A}{2}+\frac{1}{BE}\cos\frac{B}{2}+\frac{1}{CF}\cos\frac{C}{2}=$$

1) $\frac{1}{abc}$ 2) $\frac{1}{ab}+\frac{1}{bc}+\frac{1}{ca}$
3) $\frac{1}{a}+\frac{1}{b}+\frac{1}{c}$ 4) $\frac{2}{abc}$

163. In ΔABC if $\tan\frac{A}{2}\tan\frac{B}{2}+\tan\frac{B}{2}\tan\frac{C}{2}=\frac{2}{3}$ then a + c

1) 3b 2) 2b 3) 3b/2 4) 4b

164. If the sides of ΔABC are in A.P and a is the smallest side, then cosA =

1) $\frac{3c-4b}{2c}$ 2) $\frac{3c-4b}{2b}$
3) $\frac{4c-3b}{2c}$ 4) $\frac{a}{c}$

LEVEL - II : KEY

1)1	2)2	3)1	4)4	5)1	6)4
7)4	8)1	9)1	10)3	11)4	12)1
13)1	14)3	15)4	16)1	17)2	18)3
19)1	20)1	21)2	22)1	23)2	24)2
25)3	26)2	27)3	28)3	29)2	30)3
31)3	32)1	33)2	34)1	35)3	36)1
37)3	38)1	39)1	40)1	41)1	42)1
43)1	44)1	45)3	46)1	47)1	48)1
49)2	50)3	51)4	52)3	53)1	54)4
55)1	56)3	57)2	58)1	59)3	60)1
61)2	62)3	63)3	64)2	65)2	66)1
67)3	68)1	69)2	70)3	71)1	72)3
73)2	74)2	75)2	76)1	77)2	78)4
79)1	80)1	81)3	82)3	83)2	84)4
85)4	86)4	87)4	88)4	89)3	90)1
91)2	92)1	93)3	94)4	95)2	96)2
97)4	98)3	99)2	100)3	101)3	102)4
103)2	104)4	105)4	106)2	107)4	108)3
109)4	110)2	111)4	112)3	113)4	114)1
115)1	116)1	117)4	118)2	119)2	120)4
121)1	122)3	123)3	124)4	125)4	126)1
127)1	128)3	129)1	130)3	131)1	132)3
133)1	134)3	135)2	136)2	137)2	138)1
139)2	140)1	141)3	142)4	143)1	144)2
145)3	146)4	147)3	148)2	149)1	150)1
151)1	152)2	153)1	154)2	155)4	156)3
157)3	158)4	159)3	160)4	161)3	162)3
163)2	164)3				

LEVEL - III

1. If CosACot$\frac{A}{2}$, CosBCot$\frac{B}{2}$, CosC Cot$\frac{C}{2}$ are in A.P. then a, b, c are in
   1) A.P. 2) G.P. 3) H.P. 4) A.G.P.

2. In Δ ABC if Tan$\frac{A}{2}=\frac{5}{6}$ and Tan$\frac{B}{2}=\frac{20}{37}$ then the sides are in
   1) A.P. 2) G.P. 3) H.P. 4) A.G.P.

3. If $\frac{Sin3B}{SinB}=\left(\frac{a^2-c^2}{2ac}\right)^2$ then a^2, b^2, c^2 are in
   1) A.P. 2) G.P. 3) H.P. 4) A.G.P.

4. If C = A - B = 60^o, then the value of $\frac{a-b}{c}=$
   1) $1/\sqrt{3}$ 2) 2 3) 3 4) 4

5. If the sides of a triangle are x,y, $\sqrt{(x^2+y^2+xy)}$, then the greatest angle is
   1) 90^0 2) 120^0
   3) $\cos^{-1}\left(\frac{x-y}{x+y}\right)$ 4) 30^o

6. A triangle ABC has side c=$2\sqrt{2}$ and $\angle A=30^0$. If the radius of its circumcircle is 2, then
   1) $a=2\sqrt{2}, C=60^0$ 2) $a=2, C=45^0$
   3) a=2, C=135^0 4) a=2, C=$45^0 or 135^0$

7. If b=3, c=4 and B=$\frac{\pi}{3}$ then the number of triangles that can be constructed is
   1) zero 2) one
   3) two 4) infinitely many

8. In triangle ABC, $\frac{a}{b}=2+\sqrt{3}$ and C=60^0.Then the measure of angle A=
   1) 15^0 2) 60^0 3) 105^0 4) 90^0

9. The set of all real numbers a such that $a^2+2a, 2a+3$ and a^2+3a+8 are the sides of a triangle is
   1) $\left(\frac{-11}{3},\infty\right)$ 2) $(-\infty,\infty)$
   3) $(5,\infty)$ 4) $(-\infty,5)$

10. In a triangle ABC, $\angle B=\frac{\pi}{3}, \angle C=\frac{\pi}{4}$ and D divides BC internally in the ratio 1:3. Then $\frac{\sin\angle BAD}{\sin\angle CAD}$ is equal to
    1) $\frac{1}{\sqrt{6}}$ 2) $\frac{1}{3}$ 3) $\frac{1}{\sqrt{3}}$ 4) $\sqrt{\frac{2}{3}}$

11. If in a triangle PQR; sin P, sin Q, sin R are in A.P; then
    1) the altitudes are in A.P
    2) the altitudes are in H.P
    3) the altitudes are in G.P
    4) the medians are in A.P

12. In a triangle PQR, $\angle R=\frac{\pi}{2}$. If tan$\left(\frac{P}{2}\right)$ and tan $\left(\frac{Q}{2}\right)$ are the roots of the equation $ax^2+bx+c=0(a\neq 0)$, then [AIEEE - 2005]
    1) a+b=c 2) b+c=a 3) c+a=b 4) b=c

13. A triangle ABC, A=$22\frac{1^0}{2}$, B= $112\frac{1^0}{2}$. Then the length of the perpendicular from C on AB is
    1) c 2) 2c 3) c/2 4) c/4

14. In an equilateral triangle the ratio of the side of given triangle and the side of the triangle formed by excentres is

1)2:3 2)3:2 3)1:2 4)2:1

15. In a triangle ABC, the sides a,b,c are such that they are the roots of $x^3-11x^2+38x-40=0$ then $\frac{\cos A}{a}+\frac{\cos B}{b}+\frac{\cos C}{c}=$

1) 1 2) $\frac{3}{4}$ 3) $\frac{9}{16}$ 4) $\frac{1}{2}$

16. In a triangle ABC if tanA satisfy the inequation $\sqrt{3}x^2-4x+\sqrt{3}<0$ then

1) $0^0<A<30^0$ 2) $30^0<A<45^0$

3) $30^0<A<60^0$ 4) $45^0<A<90^0$

17. If $a^2+b^2+c^2=9R^2$ then the triangle is

1) Isosceles 2)Right angled

3) Isosceles right angled 4) Equilateral

18. If 3, 10 and 15 are the altitudes of a triangle then area of incircle is

1)2 π 2)9 π 3)4 π 4)16 π

19. If the length of tangents from vertices to Incircle are in H.P then r_1, r_2, r_3 are in

1)A.P 2)G.P 3)H.P 4)A.G.P

20. $a^2-b^2=bc \Rightarrow A/B=$

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

21. If Δ is the area and 2s is the perimeter of a triangle then

1) $\Delta>\frac{S^2}{\sqrt{3}}$ $\Delta>\frac{S^2}{\sqrt{3}}$ 2) $\Delta\le\frac{S^2}{3\sqrt{3}}$ $\Delta\le\frac{S^2}{3\sqrt{3}}$

3) $\Delta\le\frac{S^2}{2}$ $\Delta\le\frac{S^2}{2}$ 4) $\Delta\ge\frac{S^2}{3\sqrt{3}}$ $\Delta\ge\frac{S^2}{3\sqrt{3}}$

22. In ΔABC, if $c^4-2(a^2+b^2)c^2+a^4+a^2b^2+b^4=0$ then $\underline{|C}=$

1) 30^0 2) 45^0 3) 60^0 4) 75^0

23. In $\Delta ABC, \underline{|B}=90^0$ and $s-a=3$ and $s-c=2$ then $(a,c)=$

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

24. In ΔABC, if $a^4+b^4+c^4=2c^2(a^2+b^2)$ then $\underline{|C}=$

1) $\frac{\pi}{8}$ or $\frac{3\pi}{8}$ 2) $\frac{\pi}{12}$ or $\frac{5\pi}{12}$

3) $\frac{\pi}{4}$ or $\frac{3\pi}{4}$ 4) $\frac{\pi}{2}$

25. In a right angled triangle, the hypotenuse is $2\sqrt{2}$ times the length of the perpendicular drawn from the opposite vertex on the hypotenuse then the acute angles of the triangle .

1) $\frac{\pi}{3},\frac{\pi}{6}$ 2) $\frac{\pi}{4},\frac{\pi}{4}$ 3) $\frac{\pi}{8},\frac{3\pi}{8}$ 4) $\frac{\pi}{12},\frac{\pi}{12}$

26. The equation whose roots are radii of escribed circle is

1) $x^3-2x^2(r+R)+s^2x-s^2r=0$

2) $x^3-x^2(r+4R)+s^2x-s^2r=0$

3) $x^3-x^2(r+4R)+s^2x-\Delta^2s=0$

4) $x^3-4Rrx^2+s^2x-sr=0$

27. In Δ ABC if the median and altitude through A divide $\underline{|A}$ into 3 equal parts then $\underline{|A}=$

1) $\frac{2\pi}{3}$ 2) $\frac{\pi}{3}$ 3) $\frac{5\pi}{6}$ 4) $\frac{\pi}{2}$

LEVEL - III : KEY

1)1	2)1	3)1	4)1	5)2	6)4
7)1	8)3	9)3	10)1	11)2	12)1
13)3	14)3	15)3	16)3	17)4	18)3
19)1	20)1	21)2	22)3	23)2	24)3
25)3	26)2	27)4			

NEW MODEL QUESTIONS

1. Assertion (A): The set of all real numbers a such that a^2+2a, $2a+3$ and a^2+3a+8 are the sides of a triangle is $(5, \infty)$

Reason (R): Since in a triangle sum of two sides is greater than the other and also sides are always positive

1) both A and R are true and R is the correct explanation of A

2) both A and R are true and R is not the correct explanation of A

3) A is true but R is false

4) A is false but R is true

2. Assertion (A) : It is given to construct a triangle ABC is a = 5, b = 7, sin(A) = 3/4 then it is possible to construct only one triangle

Reason (R): Given data does not satisfy sine rule

1) A correct R wrong

2) A wrong R correct

3) A and R are correct

4) A and R are wrong

3. In a triangle ABC a = 7, b = 8, c = 9 BD is the median and BE is the altitude from the vertex B then

LIST-I	LIST-II
A) BD	1. 7
B) BE	2. 2
C) ED	3. $\sqrt{35}$
	4. $\sqrt{45}$

The correct match for LIST-I FROM LIST-II

	A	B	C		A	B	C
1.	2	1	4	2.	3	4	2
3.	1	3	2	4.	1	4	2

4. In the triangle ABC if A, B, C are in A.P and $b:c=\sqrt{3}:\sqrt{2}$ then

LIST-I	*LIST-II*
a) cos(A-C)	1) sin(B/4)
b) sin(A-C)	2) sin(B/2)
c) sin(A+C)	3) sin (2B)
d) sin(2C - A)	4) sin(B)
	5) sin(B/6)

5. The correct match for LIST-I from LIST-II

The area of a triangle ABC is $400\sqrt{3}$

LIST-I	*LIST-II*
a) $s=20(2+\sqrt{3})$	1. R = 40
b) s - a = $20\sqrt{3}$	2. $r=20(2\sqrt{3}-3)$
c) $a+b-c=40(2-\sqrt{3})$	3. $r_3=20(2+\sqrt{3})\sqrt{3}$
d) abc = 64000 $\sqrt{3}$	4. $r_1=20$

The correct match for LIST-I from LIST-II

1. a-2	b-4	c-3	d-1
2. a-4	b-1	c-3	d-2
3.a-1	b-2	c-4	d-3
4.a-3	b-1	c-2	d-4

6. Which of the following statements is true

I : If (a + b + c) (a + b - c) = ab then $\angle C=60^0$

II. If $\sin^2A+\sin^2B+\sin^2C=2$ in a ΔABC then it is right angled

1) only I 2) only II
3) both I and II 4) neither I nor II

7. Which of the following statements is true

I : In a ΔABC if

$\frac{a}{\cos A}=\frac{b}{\cos B}=\frac{c}{\cos C}$ then the triangle is equilateral

II. In a ΔABC, $\Delta=\frac{a^2\sin B\sin C}{2\sin(B+C)}$

1) only I 2) only II
3) both I and II 4) heither I nor II

8. Which of the following statements is true

I. In a ΔABC having a =3, b = 4, $\angle A=30^0$ the number of possible triangles is 2

II. In a ΔABC the value of

$$\frac{(a+b)\cos C+(b+c)\cos A+(c+a)\cos B}{\sin A+\sin B+\sin C}$$

is R

1) only I 2) only II
3) both I and II 4) neither I nor II

9. Which of the following statements is true :

I : In a ΔABC if a = R tanA then $b^2+c^2=bc+a^2$

II. In a ΔABC if asinA = ccosB + bcosC then the triangle is right angled

1) only I 2) only II
3) both I and II 4) neither I nor II

10. Which of the following statements is true

I : If the sides of a triangle are 5, 12, 13 then its in radius is 4

II : The area of the triangle is 6 square units and its inradius is 2 units.

Then its perimeter is 3 units

1) only I 2) only II
3) both I and II 4) neither I nor II

11. Which of the following statements is true

I. If C = A - B = 60^0 then the value of $\frac{a-b}{c}=\sqrt{3}$

II. If $3\tan\left(\frac{A}{2}\right)\tan\left(\frac{C}{2}\right)=1$ then a, b, c are in A.P

1) only I 2) only II
3) both I and II 4) neither I nor II

12. Which of the following statements is true

I : In a ΔABC if $4s(s-a)(s-b)(s-c)=a^2b^2$ then it is right angled triangle

II : In a ΔABC the expression sinA + sinB + sinC is maximum then the triangle is equilateral

1) only I 2) only II
3) both I and II 4) neither I nor II

13. In a ΔABC $\cot\frac{A}{2}=30,\ \cot\frac{B}{2}=50,\ \cot\frac{C}{2}=70$ then put the sides a, b, c in ascending order

1) a, b, c 2) a, c, b
3) b, a, c 4) c, b, a

14. If the sides a, b, c of ΔABC, are $\sqrt{2},\ \sqrt{6},\ \sqrt{8}$ and if $\alpha=A+B,\ \beta=B+C,\ \gamma=C+A$ then the ascending order of α, β, γ is

1) α, β, γ 2) α, γ, β
3) β, γ, α 4) γ, β, α

15. In a ΔABC if a = 18, b = 24, c = 30 and if $l=r_2-r_1$, $m=r_3-r_2$, $n=r_3-r_1$ then descending order of *l*, m, n is

1) n, m, *l* 2) *l*, m, n
3) *l*, n, m 4) n, *l*, m

16. In a ΔABC, if

$P = b^2\sin 2C + c^2 \sin 2B$ $q = \dfrac{(a^2 - b^2)\sin A \sin B}{\sin(A-B)}$

$r = \dfrac{s^2}{\cot\frac{A}{2} + \cot\frac{B}{2} + \cot\frac{C}{2}}$ then ascending order of the values of p, q, r, is

1) r, q, p 2) r, p, q 3) q, r, p 4) q, p, r

17. In a ΔABC, A > C and A - C = 90^0 and $a + c = 2b$ and if

$p = \sin\frac{B}{2}, \ q = \cos\frac{B}{2}, \ r = \tan\frac{B}{2}$

then ascending order of p, q, r is

1) p, q, r 2) p, r, q
3) r, p, q 4) q, p, r

18. If $(a + b)^2 = c^2 + ab$ in a ΔABC and if $\sqrt{2}(\sin A + \cos A) = \sqrt{3}$ then ascending order of angles A, B, C is

1) A, B, C 2) A, C, B
3) B, A, C 4) C, B, A

NEW MODEL EAMCET : KEY

1)1	2)2	3)4	4)1	5)1	6)2
7)3	8)1	9)3	10)4	11)2	12)3
13)4	14)2	15)1	16)1	17)2	18)1

PREVIOUS EAMCET QUESTIONS

1. If a = 2, b= 3, c = 4, then cos A= [EAMCET-85]

1) 7/8 2) 5/7 3) 6/7 4) 5/8

2. The smallest angle of the triangle whose sides are $6 + \sqrt{12}, \sqrt{48}, \sqrt{24}$ is [EAMCET-85]

1) $\pi/3$ 2) $\pi/4$ 3) $\pi/6$ 4) $2\pi/3$

3. If $c^2 = a^2 + b^2, 2s = a + b + c$, then 4s (s -a) (s- b) (s - c) [EAMCET-86]

1) s^4 2) b^2c^2 3) c^2a^2 4) a^2b^2

4. In an equilateral triangle r : R: r_1 is [EAMCET-86]

1) 1 : 1 :1 2) 1 : $\sqrt{2}$: 3
3) 1 : 2 : 3 4) 2 : $\sqrt{3}$: $\sqrt{3}$

5. If $x^2 + x + 1, 2x + 1, x^2 - 1$ are the sides of a triangle, then its largest angle is [EAMCET-87]

1) $\pi/3$ 2) $\pi/4$ 3) $\pi/6$ 4) $2\pi/3$

6. The diameter of the circumcircle of the triangle whose sides 61,60,11 is [EAMCET- 88]

1) 61 2) 60 3) 11 4) 50

7. $\sum a^3 \cos(B - C) =$ [EAMCET-89]

1) 0 2) abc 3) 3abc 4) 1

8. If $a^2 + b^2 + c^2 = 8R^2$, then the triangle is [EAMCET-90]

1) right angled 2) isosceles
3) equilateral 4) none

9. If a =2, B = 120^o , C = 30^o, then the area of the triangle is [EAMCET-90]

1) $2\sqrt{3}$ 2) $\sqrt{3}$ 3) $\sqrt{3}/2$ 4) $4\sqrt{3}$

10. If $a = \sqrt{3} + 1, B = 30^o, C = 45^o$, then c = [EAMCET-91]

1) 2 2) 3 3) 4 4) 1

11. If a,b,c are in A.P., then r_1 , r_2, r_3 are in [EAMCET-93]

1) A.P. 2) G.P. 3) H.P. 4) none

12. If $x = \tan\left(\frac{B-C}{2}\right)\tan\frac{A}{2}$, $y = \tan\left(\frac{C-A}{2}\right)\tan\frac{B}{2}$, $z = \tan\left(\frac{A-B}{2}\right)\tan\frac{C}{2}$, then x + y + z (in terms of x, y, z only) is [EAMCET-93]

1) xyz 2) 2xyz 3) -xyz 4) $\frac{1}{2}$ xyz

13. If th line joining the circumcentre 'O' and the incentre I is parallel to BC, then cosB + cosC = [EAMCET-94]

1) 3/2 2) 1 3) 3/4 4) 2

14. r = [EAMCET-94]

1) (s-a) tan (B/2) 2) (s-b) tan (B/2)
3) (s-b)tan (C/2) 4) (s- a) tan (C/2)

15. If $\tan\frac{A}{2} = \frac{5}{6}, \tan\frac{C}{2} = \frac{2}{5}$ then [EAMCET-94]

1) a,c,b are in A.P. 2) a,b,c are in A.P.
3) b,a,c are in A.P. 4) a,b,c are in G.P.

16. If $\cot\frac{A}{2} = \frac{b+c}{a}$, then the triangle is [EAMCET-94]

1) isosceles 2) equilateral
3) right angled 4) none

17. $\sum a^2(\cos^2 B - \cos^2 C) =$ [EAMCET-95]

1) 0 2) 1 3) 2 4) 3

18. $\frac{1}{r_1} + \frac{1}{r_2} + \frac{1}{r_3} =$ [EAMCET-95]

1) Δ/s 2) 1/r 3) 2/r 4) 3/r

19. $r_1 \cot\frac{A}{2} + r_2 \cot\frac{B}{2} + r_3 \cot\frac{C}{2} =$ [EAMCET-95]

1) s 2) 2s 3) 3s 4) 4s

20. If the sides of a triangle are 13,14,15, then the radius of the incircle is [EAMCET-95,90,87]

1) 65/8 2) 65/4 3) 4 4) 24

21. If $A = 60^o$ then $\frac{b}{c+a} + \frac{c}{a+b} =$ [EAMCET-97]

1) 1 2) 2 3) 3 4) 4

22. If the sides of a triangle ABC are 6,8,10 unit, then the radius of its circumcircle is [EAMCET-97]

1) 4 2) 3 3) 6 4) 5

23. If $C = 60^o$ then $\frac{a}{b+c} + \frac{b}{c+a} =$ [EAMCET-98]

1) 2 2) 4 3) 3. 4) 1

24. $r\left(\cot\frac{B}{2} + \cot\frac{C}{2}\right) =$ [EAMCET-99]

1) a 2) b 3) c 4) 0

25. cos A + cos B + cos C= [EAMCET-2000]

1) $1+\frac{r}{R}$ 2) $1-\frac{r}{R}$ 3) $1-\frac{R}{r}$ 4) $1+\frac{R}{r}$

26. $r + r_3 + r_1 - r_2 =$ [EAMCET-2000]

1) 4R cos A 2) 4R cos B
3) 4R cos C 4) 4R

27. If a,b,c are in A.P., then $\tan\frac{A}{2}\tan\frac{C}{2} =$ [EAMCET-2000]

1) 1/4 2) 1/3 3) 3 4) 4

28. $\frac{a}{b^2-c^2} + \frac{c}{b^2-a^2} = 0$ then B= [EAMCET-2001]

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

29. $\frac{\cos C + \cos A}{c+a} + \frac{\cos B}{b} =$ [EAMCET-2001]

1) $\frac{1}{a}$ 2) $\frac{1}{b}$ 3) $\frac{1}{c}$ 4) $\frac{c+a}{b}$

30. $a^2\sin 2C + c^2\sin 2A =$ [EAMCET-2001]

1) Δ 2) 2Δ 3) 3Δ 4) 4Δ

31. The perimetre of a triangle is 16 cm. One of the sides is of length 6 cm. If the area of the triangle is 12 sq. cm, then the triangle is [EAMCET -2002]

1) Right angled 2) Isosceles
3) Equilateral 4) Scalene

32. The altitudes of a triangle are in arithmetic progression, then the sides of the triangle are in [EAMCET -2002]

1) AP 2) HP 3) GP 4) AGP

33. If ΔABC is right angled at A then $r_2 + r_3 =$ [EAMCET -2002]

1) $r_1 - r$ 2) $r_1 + r$ 3) $r - r_1$ 4) R

34. In ΔABC, if b = 20, c = 21 and sinA = 3/5 then a = [EAMCET - 2003]

1) 12 2) 13 3) 14 4) 15

35. In ΔABC, if b + c = 3a then $\cot\frac{B}{2}.\cot\frac{C}{2} =$ [EAMCET - 2003]

1) 1 2) 2 3) 3 4) 4

36. In ΔABC, if $r_1 < r_2 < r_3$ then [EAMCET - 2003]

1) a < b < c 2) a > b > c
3) b < a < c 4) a < c < b

37. In a ΔABC, a = 2b and $|A - B| = \frac{\pi}{3}$, then $\angle C$ is

1) $\frac{\pi}{6}$ 2) $\frac{\pi}{4}$ 3) $\frac{\pi}{2}$ 4) $\frac{\pi}{3}$

38. In ΔABC, the correct formulae among the following are [EAMCET - 2004]

I. $r = 4R\sin\frac{A}{2}\sin\frac{B}{2}\sin\frac{C}{2}$

II. $r_1 = (s-a)\tan\frac{A}{2}$

III. $r_3 = \frac{\Delta}{s-c}$

1) only I, II 2) only II, III
3) only I, III 4) I, II, III

39. If, in an ΔABC, $r_3 = r_1 + r_2 + r$, then $\angle A + \angle B =$ [EAMCET - 2004]

1) 120^0 2) 100^0 3) 90^0 4) 80^0

40. In a ΔABC, [EAMCET - 2005]

$a(\cos^2 B + \cos^2 C) + \cos A(c\cos C + b\cos B)$

1) a 2) b 2) c 4) a + b + c

41. In a ΔABC, $\sum(b+c)\tan\frac{A}{2}\tan\left(\frac{B-C}{2}\right) =$ [EAMCET - 2005]

1) a 2) b 2) c 4) 0

42. Two sides of a triangle are given by the roots of the equation $x^2 - 5x + 6 = 0$ and the angle between the sides is $\pi/3$. Then the perimeter of the triangle is [EAMCET - 2005]

1) $5+\sqrt{2}$ 2) $5+\sqrt{3}$
3) $5+\sqrt{5}$ 4) $5+\sqrt{7}$

PREVIOUS EAMCET : KEY

1)1	2)3	3)4	4)3	5)4	6)1
7)3	8)1	9)2	10)1	11)3	12)3
13)2	14)2	15)2	16)3	17)1	18)2
19)3	20)3	21)1	22)4	23)4	24)1
25)1	26)2	27)2	28)4	29)2	30)4
31)2	32)2	33)1	34)2	35)2	36)1
37)4	38)3	39)3	40)1	41)4	42)4