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III ఇంటర్ ఎగ్జామ్స్ ప్రత్యేకం
గురువారం 28 ఏప్రిల్ 2022

నైట్రోజన్‌ను గాలి నుంచి తయారు చేసే పద్ధతి?
అంశిక స్వేదనం

మన శరీరంలో అతి తక్కువగా ఉన్న మూలకం ఏది?
మాంగనీస్

సాధారణ నీటిలో కాల్షియం, మెగ్నీషియం లవణాల వల్ల ఏర్పడేది?
కఠినత్వం

పదార్థాలను గాలిలో మండించడాన్ని ఏమంటారు?
భర్జనం

టెలిఫోన్‌లో ఉపయోగించేది?

విద్యుదయస్కాంతం

ఆస్తమా రోగులకు శ్వాస ఆడటానికి ఏ వాయువును ఉపయోగిస్తారు?
ఆక్సిజన్

Find the range of 7cos*x*-24sin*x*+5sin2A

18వ తేదీ తరువాయి

7. Find the equation of the plane through the point (3, -2, and 1) and perpendicular to the vector (4, 7, and 4).
8. Find the area of the parallelogram for which the vectors $a = 2i - 3j$ and $b = 3i - k$ are adjacent sides.
9. Find the area of the parallelogram having $a = 2j - k$ and $b = -i + k$ as adjacent sides.
10. Find the area of the triangle whose vertices are A(1, 2, 3), B(2, 3, 1) and C(3, 1, 2).
11. Find the volume of the parallelepiped having coterminous edges $i + j + k$, $i - j$ and $i + 2j - k$.
12. Find the volume of the tetrahedron having the edges $i + j - k$, $i - j$ and $i + 2j + k$.

SAQ(2X4=8)

13. Let $a = 4i + 5j - k$, $b = i - 4j + 5k$ and $c = 3i + j - k$. Find vector α which is perpendicular to both a and b and $\alpha.c = 21$.
14. If $a = 2i + j - k$, $b = -i + 2j - 4k$ and $c = i + j + k$, then find $(a \times b).(b \times c)$.
15. Let a and b be vectors, satisfying $|a| = |b| = 5$ and $(a, b) = 45^0$. Find the area of the triangle having $a - 2b$ and $3a + 2b$ as two of its sides.
16. Find the vector having magnitude $\sqrt{6}$ units and perpendicular to both $2i - k$ and $3j - i - k$.
17. Find a unit vector perpendicular to the plane determined by the points $P(1, -1, 2)$, $Q(2, 0, -1)$ and $R(0, 2, 1)$
18. If $|a| = 13, |b| = 5$ and $a.b = 60$, then find $|a \times b|$.
19. If a = i + 2j − 3k , b = 3i − j + 2k, then show that a + b and a − b are perpendicular to each other.
20. Find the area of the triangle whose vertices are A(1, 2, 3), B(2, 3, 1) and C(3, 1, 2).
21. Prove that the angle θ between any two diagonals of a cube is cosθ = 1/3
22. A line makes angles $\theta_1, \theta_2, \theta_3$ and θ_4 with the diagonals of a cube. Show that $\cos^2\theta_1 + \cos^2\theta_2 + \cos^2\theta_3 + \cos^2\theta_4 = \frac{4}{3}$.
23. If $a = 2i + 3j + 4k$, $b = i + j - k$ and $c = i - j + k$, then compute $a \times (b \times c)$ and verify that it is perpendicular to a.
24. If a, b and c are non-coplanar vectors, then prove that the four points with position vectors $2a + 3b - c$, $a - 2b + 3c$, $3a + 4b - 2c$ and $a - 6b + 6c$ are coplanar.
25. If $a = i - 2j + 3k$, $b = 2i + j + k$, $c = i + j + 2k$ then find $(a \times b) \times c$ and $(a \times b) \times c$ and $|a \times (b \times c)|$.

TRIGONOMETRY UPTO TRANSFORMATIONS

VSAQ (2x2=4)

1. If $\cos\theta + \sin\theta = \sqrt{2}\cos\theta$, prove that $\cos\theta - \sin\theta = \sqrt{2}\sin\theta$.
2. Prove that $\frac{(\tan\theta + \sec\theta - 1)}{(\tan\theta - \sec\theta + 1)} = \frac{1 + \sin\theta}{\cos\theta}$.

3. Eliminate θ from the, $x = a\cos^3\theta$; $y = b\sin^3\theta$.
4. Find the periods for the given functions.

(i) $\cos\left(\frac{4x+9}{5}\right)$

(ii) Find a sine function whose period is $\frac{2}{3}$.

5. If A+B=π/4 then P.T(1+tanA)(1+tanB)=2
6. Evaluate: (i) $\sin^2 82\frac{1}{2}^0 - \sin^2 22\frac{1}{2}^0$

   (ii) $\sin^2\left(\frac{\pi}{8} + \frac{A}{2}\right) - \sin^2\left(\frac{\pi}{8} - \frac{A}{2}\right)$
7. Find the range of $7\cos x - 24\sin x + 5$. $\sin 2A$.
9. Prove that $\cos 55^0 + \cos 65^0 + \cos 175^0 = 0$.
10. Prove that $\cos 48^0.\cos 12^0 = \frac{3 + \sqrt{5}}{8}$.

SAQ's(2x4=8)

11. If $\cos\alpha = \frac{-3}{5}$ and $\sin\beta = \frac{7}{25}$, where $\frac{\pi}{2} < \alpha < \pi$ and $0 < \beta < \frac{\pi}{2}$, then find the value of $\tan(\alpha + \beta)$ and $\sin(\alpha + \beta)$.
12. In a ΔABC, A is obtuse. If sin A = $\frac{3}{5}$ and sin B = $\frac{5}{13}$, then show that sin C = $\frac{16}{65}$.
13. Prove that $\sin^4\frac{\pi}{8} + \sin^4\frac{3\pi}{8} + \sin^4\frac{5\pi}{8} + \sin^4\frac{7\pi}{8} = \frac{3}{2}$.
14. If A + B, A are acute angles such that sin (A + B) = $\frac{24}{25}$ and tan A = $\frac{3}{4}$, then find the value of cos B.
15. $\cos A\cos\left(\frac{\pi}{3} + A\right)\cos\left(\frac{\pi}{3} - A\right) = \frac{1}{4}\cos 3A$ Hence deduce that $\cos\frac{\pi}{9}\cos\frac{2\pi}{9}\cos\frac{3\pi}{9}\cos\frac{4\pi}{9} = \frac{1}{16}$.

LAQ(7M)

16. If A, B, C are the angles of a triangle, prove that

    (i) $\sin 2A + \sin 2B + \sin 2C = 4\sin A\sin B\sin C$.

    (ii) $\sin 2A + \sin 2B - \sin 2C = 4\cos A\cos B\sin C$.
17. If *A, B, C* are angles of a triangle, prove that $\cos 2A + \cos 2B - \cos 2C = 1 - 4\sin A\sin B\cos$
18. If *A, B, C* are angles in a triangle, then prove that $\sin A + \sin B + \sin C = 4\cos\frac{A}{2}\cos\frac{B}{2}\cos\frac{C}{2}$.
19. If A, B, C are angles in a triangle, then prove that $\cos 2A - \cos 2B + \cos 2C = 1 - 4\sin A\cos B\sin C$.
20. If A, B, C are angles in a triangle, then prove that $\cos^2 A + \cos^2 B - \cos^2 C = 1 - 2\sin A\sin B\cos C$.
21. In triangle ABC, prove that $\cos\frac{A}{2} + \cos\frac{B}{2} + \cos\frac{C}{2} = 4\cos\frac{\pi - A}{4}\cos\frac{\pi - B}{4}\cos\frac{\pi - C}{4}$

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HYPER BOLIC FUNCTIONS

VSAQ&SAQ(2+2+4=8M)

1. sinh x =3/4 , then find Cosh(2x), Sinh(2x)
2. For any $x \in \mathbf{R}$, prove that $\cosh^4 x - \sinh^4 x = \cosh(2x)$.
3. If $u = \log_e\left(\tan\left(\frac{\pi}{4} + \frac{\theta}{2}\right)\right)$ and if $\cos\theta > 0$, then prove that $\cosh u = \sec\theta$.
4. Show that: $(\cosh x + \sinh x)^n = \cosh(nx) + \sinh(nx)$ for any $n \in R$.

5. If $\cosh x = \frac{5}{2}$ then find the values of $\cosh(2x), \sinh(2x)$.
6. P.T Sinh(x + y) = Sinhx Coshy + Coshx Sinhy

PROPERTIES OF TRIANGLES

SAQ(2X4=8)

1. Show that $a^2\cot A + b^2\cot B + c^2\cot C = \frac{abc}{R}$.
2. In ΔABC, if $\frac{1}{a+c} + \frac{1}{b+c} = \frac{3}{a+b+c}$, show that $C = 60^0$.
3. Prove that $\cot A + \cot B + \cot C = \frac{a^2 + b^2 + c^2}{4\Delta}$.
4. If $\cot\frac{A}{2} : \cot\frac{B}{2} : \cot\frac{C}{2} = 3 : 5 : 7$, show that $a : b : c = 6 : 5 : 4$.
5. Show that $a\cos^2\frac{A}{2} + b\cos^2\frac{B}{2} + c\cos^2\frac{C}{2} = s + \frac{\Delta}{R}$.
6. If $a = (b + c)\cos\theta$, then prove that $\sin\theta = \frac{2\sqrt{bc}}{b+c}\cos\frac{A}{2}$.
7. Prove that $\cot\frac{A}{2} + \cot\frac{B}{2} + \cot\frac{C}{2} = \frac{s^2}{\Delta}$.
8. Show that $\frac{1}{r^2} + \frac{1}{r_1^2} + \frac{1}{r_2^2} + \frac{1}{r_3^2} = \frac{a^2 + b^2 + c^2}{\Delta^2}$.
9. Show that $r + r_3 + r_1 - r_2 = 4R\cos B$.
10. In ΔABC, prove that $r + r_1 + r_2 - r_3 = 4R\cos C$.

LAQ's

11. In ΔABC, if AD, BE, CF are the perpendiculars drawn from the vertices A, B, C to the opposite sides, show that (i) $\frac{1}{AD} + \frac{1}{BE} + \frac{1}{CF} = \frac{1}{r}$ and

    (ii) $AD.BE.CF = \frac{(abc)^2}{8R^3}$.
12. In ΔABC, if $r_1 = 8, r_2 = 12, r_3 = 24$, find *a, b, c*.
13. Prove that $\left(\frac{1}{r} - \frac{1}{r_1}\right)\left(\frac{1}{r} - \frac{1}{r_2}\right)\left(\frac{1}{r} - \frac{1}{r_3}\right) = \frac{abc}{\Delta^3} = \frac{4R}{r^2s^2}$.
14. Show that $\cos^2\frac{A}{2} + \cos^2\frac{B}{2} + \cos^2\frac{C}{2} = 2 + \frac{r}{2R}$.
15. If p_1, p_2, p_3 are altitudes drawn from vertices A, B, C to the opposite sides of a triangle respectively, then show that: (i) $\frac{1}{p_1} + \frac{1}{p_2} + \frac{1}{p_3}$ (ii) $\frac{1}{p_1} + \frac{1}{p_2} - \frac{1}{p_3} = \frac{1}{r_3}$

    (iii) $p_1 p_2 p_3 = \frac{(abc)^2}{8R^3} = \frac{8\Delta^3}{abc}$
16. If $a = 13, b = 14, c = 15$, show that $R = \frac{65}{8}, r = 4, r_1 = \frac{21}{2}, r_2 = 12$ and $r_3 = 14$.

V .DURGA PRASAD
Senior Maths faculty
Nano junior college
Madhapur, Hyd.
9701105881.