MATHEMATICS

Sample Paper-1

GUJCET

Time : 1:00 Hr.] **STD : XII** **[Total Marks : 40**

1. If P(x, y) is a point equidistance from point (4, –3) and y-axis then the locus of the point P is _____ .

   (A) $x^2 - 8x - 6y + 25 = 0$ (B) $y^2 - 8x - 6y + 25 = 0$

   (C) $x^2 + 8x - 6y + 25 = 0$ (D) $y^2 - 8x + 6y + 25 = 0$

2. If A (1, –1), B(1, 3) and C(4, –1) are the vertices of a Δ ABC then sinA = _____ .

   (A) 0 (B) –1

   (C) 1 (D) Not possible

3. l is any line in R^2. $A(x_1, y_1)$, $B(x_2, y_2) \in l$. $A \neq B$. The line l, that is $\perp r$ to neither axes. If l makes an angle of measure θ with the +ve direction of x-axis with $\frac{\pi}{2} < \theta < \pi$ then find $\tan\theta$.

   (A) $\frac{y_1 - y_2}{x_1 - x_2}$ (B) $\frac{y_2 - y_1}{x_1 - x_2}$

   (C) $\frac{x_1 - x_2}{y_1 - y_2}$ (D) $\frac{x_1 - x_2}{y_2 - y_1}$

4. Obtain the angle between $y = 8$ and $\sqrt{3}x - 3y + 4 = 0$

   (A) $\frac{\pi}{3}$ (B) $\frac{\pi}{6}$

   (C) $-\frac{\pi}{6}$ (D) $\frac{5\pi}{6}$

5. If $a^{-1} + b^{-1} = 2$ then for any value of a and b line $bx + ay - ab = 0$ will pass through which fixed point ?

   (A) $\left(\frac{1}{2}, -\frac{1}{2}\right)$ (B) (1, 1)

   (C) $\left(\frac{1}{2}, \frac{1}{2}\right)$ (D) None of these

6. The radii of the circle $x^2 + y^2 = 1$, $x^2 + y^2 = 4$ and $x^2 + y^2 = 16$ are in which progression ?

   (A) Arithmetic (B) Geometric

   (C) Harmonic (D) None of these

7. If the tangent at point (2, –3) to the circle $x^2 + y^2 = 13$ passes through the point (2k – 4, 5) then find K.

(A) -9 (B) $\frac{5}{2}$

(C) 9 (D) Not possible

8. If $x - 18y + 54 = 0$ is tangent to $3y^2 = 2x$ then find tangent point.

(A) (54, 6) (B) (6, 54)

(C) (6, 6) (D) None

9. Find the parametric equation of $3x^2 = 5y$.

(A) $x = \frac{5}{12}t^2,\ y = \frac{5}{12}t,\ t \in R$ (B) $x = \frac{5}{12}t^2,\ y = \frac{5}{6}t,\ t \in R$

(C) $x = \frac{5}{6}t,\ y = \frac{5}{12}t^2,\ t \in R$ (D) None

10. Find the end point of latus rectrum of $\frac{x^2}{a^2}+\frac{y^2}{b^2} = 1,\ a < b$.

(A) $\left(\pm\frac{a^2}{b}, be\right)$ (B) $\left(\pm\frac{b^2}{a}, be\right)$

(C) $\left(ae, \pm\frac{b^2}{a}\right)$ (D) $\left(be, \pm\frac{a^2}{b}\right)$

11. Find equation of tangent to $\frac{x^2}{25}-\frac{y^2}{16} = 1$ at $(5\sqrt{2}, 4)$

(A) $x + y = 4$ (B) $x = 4$

(C) $y = -4$ (D) None

12. Condition for $y = mx + 3$ being tangent $\frac{x^2}{16}-\frac{y^2}{25} = -1$ then find m.

(A) $\frac{4}{5}$ (B) 1

(C) $\frac{5}{4}$ (D) None

13. If $\bar{a} + \bar{b} + \bar{c} = \bar{0}$ and $|\bar{a}| = 3,\ |\bar{b}| = 5,\ |\bar{c}| = 7$ then find the angle between $\bar{a}$ and $\bar{b}$.

(A) $\frac{\pi}{2}$ (B) $\frac{\pi}{3}$

(C) $\frac{\pi}{4}$ (D) $\frac{\pi}{6}$

14. If for vectors $\bar{a}$ and $\bar{b}$ $\bar{a} \cdot \bar{b} < 0$ and $|\bar{a} \cdot \bar{b}| = |\bar{a} \times \bar{b}|$ then find $(\bar{a}, \bar{b})$.

(A) π (B) $\frac{7\pi}{4}$

(C) $\frac{\pi}{4}$ (D) $\frac{3\pi}{4}$

15. If $\bar{x} \cdot \bar{y} = 0$ and $\bar{x} \times \bar{y} = \bar{0}$ then _____ .

(A) $\bar{x} \parallel \bar{y}$ (B) $\bar{x} \perp \bar{y}$

(C) $\bar{x}$ or $\bar{y}$ is a null vector (D) None of these

16. If G is the centroid of Δ ABC then $\vec{GA} + \vec{GB} + \vec{GC}$ = _____ .

(A) $\bar{0}$ (B) $3\vec{GA}$

(C) $3\vec{GB}$ (D) $3\vec{GC}$

17. If $\bar{a} = (1, 2, 1)$, $\bar{b} = (2, 2, 1)$ then find the projection of $\bar{b}$ in the direction of $\bar{a}$.

(A) $\frac{7}{6}\bar{b}$ (B) $\frac{7}{6}\bar{a}$

(C) $\frac{7}{9}\bar{b}$ (D) $\frac{7}{3}$

18. Find the shortest distance between the lines $x + 3 = 2y = -12z$ and $x = y + 6 = 6z - 18$

(A) 18 (B) 9

(C) 6 (D) 1

19. Find direction of the line $x = ay + b$; $z = cy + d$

(A) (a, 1, c) (B) (a, 0, c)

(C) (a, –1, c) (D) (a, b, c)

20. What can be said for the line $\bar{r} = (2, 3, 4) + k(3, 4, 5)$, $k \in R$ and plane.

$2x + y - 2z = 3$?

(A) parallel (B) intersecting

(C) perpendicular (D) None of these

21. Find the equation of a plane parallel to x-axis and having y and z intercepts resply 2 and 3.

(A) $2x + 3y = 6$ (B) $3y + 2z = 6$

(C) $3y + z = 6$ (D) $3x + 2y = 6$

22. Find a point of intersection of the sphere $x^2 + y^2 + z^2 - 2x - 2y - 2z = 0$ with the z axis.

(A) (2, 0, 0) (B) (0, 2, 0)

(C) (0, 0, 2) (D) (0, 0, –2)

23. $\lim_{n \to \infty} \frac{n! + 2n^n}{n^n} =$ _____ .

(A) 0 (B) 1

(C) 2 (D) 3

24. $\lim_{x \to -8_-} \left[\sqrt[3]{x}\right] =$ _____ .

(A) 2 (B) –2

(C) –3 (D) 3

25. $x \in N^*(4, \delta) \Rightarrow f(x) \in N(14, 0.003)$, where $f(x) = 3x + 2$ then find the maximum value of δ.

(A) 0.1 (B) 0.01

(C) 0.001 (D) 0.001

26. If $y = 3^{3^x}$ then $\frac{dy}{dx} =$ _____ .

(A) $y \cdot (\log 2)^2$ (B) $y \cdot \log 3$

(C) $y \cdot 3^x \cdot (\log 3)^2$ (D) $y \cdot (\log 3)^2$

27. $\frac{d}{dx}[\tan^{-1}(\cot x) + \cot^{-1}(\tan x)] =$ _____ .

(A) 0 (B) 1

(C) –1 (D) –2

28. If $f(x) = 3^x$ then $f'(0) =$ _____ .

(A) $\log_e 3$ (B) 1

(C) 0 (D) None of these

29. If $f(x) = e^x(\sin x - \cos x)$, $x \in \left[\frac{\pi}{4}, \frac{5\pi}{4}\right]$ satisfies Rolle's thm then c = _____ .

(A) $-\pi$ (B) 2π

(C) -2π (D) π

30. Find a point on parabola $y^2 = 8x$ so that $\frac{dx}{dy} = \frac{dy}{dx}$.

(A) (2, 4) (B) (4, 2)

(C) (–2, 4) (D) (2, 3)

31. Obtain maximum value of x^{-x}:

(A) e (B) $\frac{1}{e^e}$

(C) $\left(\frac{1}{e}\right)e$ (D) e^e

32. $\int e^{x \log a} \cdot e^x \, dx =$ _____ .

(A) $a^x \cdot e^x$ (B) $\frac{(ae)^x}{(1+\log a)}$

(C) $\frac{(e)^x}{\log(ae)}$ (D) None

33. $\int \frac{1}{(\sin x)^{2/5} \cdot (\cos x)^{8/5}} dx =$ _____ .

(A) $\frac{5}{7}(\tan x)^{7/5} + c$ (B) $\frac{3}{5}(\cot x)^{3/5} + c$

(C) $\frac{5}{3}(\tan x)^{3/5} + c$ (D) None

34. $\int x^{4x}(1+\log x)dx =$ _____ .

(A) $\frac{x^{4x}}{4} + c$ (B) $x^x (1 + \log x) + c$

(C) $x^2 \log x + c$ (D) $\frac{1}{4}(1 + \log x)^4 + c$

35. If $n \in Z$ then $\int_0^{\pi} e^{\sin^2 x} \cdot \cos^3(2n+1)\, x dx =$ _____ .

(A) –1 (B) 0

(C) 1 (D) π

36. $\int_{-\frac{\pi}{2}}^{\frac{\pi}{2}} |\sin x| dx$ = _____ .

(A) 1 (B) 0

(C) 2 (D) None

37. $\int_0^{\infty} \frac{dx}{1+x^2}$ = _____ .

(A) π (B) $\frac{\pi}{2}$

(C) $\frac{\pi}{4}$ (D) $\frac{\pi}{8}$

38. Differential equation of $y = a\cos(x + b)$ is _____ .

(A) $y_2 + y = 0$ (B) $y_2 - y = 0$

(C) $y_2 + 2y = 0$ (D) None

39. Find the differential equation of the family of all the circles passing through (0, 0) and having centre on x-axis.

(A) $(2xy)y_1 = x^2 + y^2$ (B) $(2xy)y_1 = y^2 - x^2$

(C) $(2xy)y_1 = -(x^2 + y^2)$ (D) $2xy_1 = x^2 + y^2$

40. If maximum height and horiziotal range are equal for a projectile then find angle of projection.

(A) 30° (B) $\tan^{-1}{}_4$

(C) 60° (D) 75°

MATHEMATICS

Sample Paper-2

GUJCET

Time : 1:00 Hr.] **STD : XII** **[Total Marks : 40**

1. For P (3, 4), Q (7, 7) and R (x, y), P–Q–R and PR = 10 then (x, y) = _____.

   (A) (10, 11) (B) (11, 10)

   (C) $\left(5, \frac{11}{2}\right)$ (D) None

2. A (0, 0), B (3, 4), C (7, 7) and D (4, 3) are vertices of a quadrilateral then ABCD is which type of quadrilateral ?

   (A) parallelogram (B) rectangle

   (C) square (D) rhombus

3. If the distance of a line from origin is 5 and if the ray from the origin $\perp$r to the line intersects the unit circle at $P\left(\frac{-5\pi}{6}\right)$ then find equation of the line.

   (A) $\sqrt{3}x + y + 10 = 0$ (B) $\sqrt{3}x - y - 10 = 0$

   (C) $x - \sqrt{3}y + 10 = 0$ (D) $x - \sqrt{3}y - 10 = 0$

4. Find the equations of a lines whose distance from the point (3, 5) is 4 unit, and parallel to the y-axis.

   (A) $x - 1 = 0, y - 7 = 0$ (B) $x + 1 = 0, y - 7 = 0$

   (C) $x + 1 = 0, x - 7 = 0$ (D) $x - 1 = 0, x - 7 = 0$

5. If the point $\left(\frac{4}{5}, \frac{-2}{5}\right)$ is orthocentre of the triangle formed by the lines, $x + y - 6 = 0$, $x - 3y - 2 = 0$ and $y = 2 - kx$, then find k.

   (A) -3 (B) 3

   (C) $\frac{1}{3}$ (D) $-\frac{1}{3}$

6. Find the equation of circle concentric with the circle $x^2 + y^2 - 3x + 4y = k$ and passing through (–1, –2).

   (A) $x^2 + y^2 - 3x + 4y = 1$ (B) $x^2 + y^2 - 3x + 4y = 0$

   (C) $x^2 + y^2 - 3x + 4y + 2 = 0$ (D) None of these

7. Find the radius of circle which touches y-axis at (0, 3) and cuts an intercept of length 8 on x-axis.

   (A) 3 (B) 2

   (C) 5 (D) 8

8. Obtain equation of tangent at $\left(\frac{3}{2}, 5\right)$ to the parabola $y^2 = 6x$.

(A) $6x - 2y + 1 = 0$ (B) $2x - 2y + 1 = 0$

(C) $6x - 6y + 1 = 0$ (D) $6x + 2y - 1 = 0$

9. Obtain equation of tangent whose x-int is -2 to parabola $y^2 = 8x$.

(A) $y - x - 2 = 0$ (B) $x + y - 2 = 0$

(C) $x - y - 2 = 0$ (D) None of these

10. Obtain equation of directrix of $\frac{x^2}{16} + \frac{y^2}{25} = 1$.

(A) $y = \pm\frac{5}{3}$ (B) $x = \pm\frac{25}{3}$

(C) $y = \pm\frac{25}{3}$ (D) $x = \pm\frac{5}{3}$

11. Find length of transverse axis of $16x^2 - 9y^2 = 144$.

(A) 2 (B) 6

(C) 4 (D) None

12. Find locus of the point of intersection of tangent which intersect right angle to hyperbola $\frac{x^2}{144} - \frac{y^2}{36} = 1$ is :

(A) $x^2 + y^2 = 180$ (B) $x^2 - y^2 = 108$

(C) $x^2 + y^2 = 108$ (D) $x^2 - y^2 = 180$

13. Vectors $(1, 1, -1)$, $(1, -1, 1)$ and $(-1, 1, 1)$ are _____ .

(A) Coplanar (B) Skew

(C) Co-llinear (D) None of these

14. If $\bar{x} \neq \bar{0}$, $\bar{y} \neq \bar{0}$, $\bar{x} = k\bar{y}$, $k < 0$ then find $\bar{x} \cdot \bar{y}$.

(A) $= |\bar{x} + \bar{y}|$ (B) $= |\bar{x}||\bar{y}|$

(C) $> |\bar{x}||\bar{y}|$ (D) $< |\bar{x}||\bar{y}|$

15. If a vector $\bar{r}$ make an angle α, β and γ with x, y and z axis resly then $\cos2\alpha + \cos2\beta + \cos2\gamma =$ _____ .

(A) 1 (B) -1

(C) 2 (D) 3

16. Force $\overline{F}$ = (1, 1, 1) is applied at A (–1, 1, 1). Find the torque around B (2, 1, 2).

(A) (–1, –2, 3) (B) (1, 2, –3)

(C) (1, –2, –3) (D) (2, 1, 3)

17. A handcart covers a horizontal distance of 40m under the action of 20 Newton Force. The force is applied through a handle that is inclined to the horizontal at an angle of 60°. Evalute the work done.

(A) 800 (B) $\frac{800}{\sqrt{3}}$

(C) 400 (D) $200\sqrt{3}$

18. Pair of lines

{(1, 3, 5) + k(–1, 2, 3)/ k ∈ R} and {(1, 3, 1) + k(1, –2, –3)/ K ∈ R} is _____.

(A) parallel (B) skew

(C) identical (D) intersecting

19. Intersection point of $\frac{x-4}{5} = \frac{y-1}{2} = \frac{z}{1}$ and $\frac{x-1}{2} = \frac{y-2}{3} = \frac{z-3}{4}$ is _____.

(A) (–1, –1, –1) (B) (1, –1, –1)

(C) (–1, –1, 1) (D) (–1, 1, –1)

20. Obtain the angle between the line $\bar{r}$ = (–1, 1, 2) + k(3, 2, 4), k ∈ R and plane 2x + y – 3z + 4 = 0.

(A) $\sin^{-1}\left(\frac{4}{\sqrt{406}}\right)$ (B) $\cos^{-1}\left(\frac{4}{\sqrt{406}}\right)$

(C) $\cos^{-1}\left(\frac{1}{3}\right)$ (D) $\sin^{-1}\left(\frac{4}{9}\right)$

21. If the normal drawn from the origin to the plane make an equal angle with the +ve direction of x, y and z axis resly and length of $\perp r$ is $\frac{1}{\sqrt{3}}$ then equation of plane is _____.

(A) x + y + z = $\sqrt{3}$ (B) x + y + z = 3

(C) x + y + z = 1 (D) x + y + z = 0

22. If the end point of diameter of a sphere are (1, –1, 1) and (–1, 1, 1) then find radius of sphere.

(A) $\sqrt{2}$ (B) 2

(C) $2\sqrt{2}$ (D) 1

23. Find $\lim_{n \to \infty}$ Sn for $\frac{1^3}{1 \cdot 2 \cdot 3}, \frac{2^3}{4 \cdot 5 \cdot 5}, \frac{3^3}{7 \cdot 8 \cdot 7}, \_\_\_\_\_$

(A) $\frac{1}{18}$ (B) $\frac{1}{6}$

(C) $\frac{1}{9}$ (D) $\frac{1}{3}$

24. Find $\lim_{n \to \infty} (-1)^n \frac{n}{n+1}$

(A) 0 (B) 1

(C) –1 (D) Not possible

25. Find $\lim_{x \to k} (x - k) \cos\left(\frac{1}{x-k}\right)$

(A) 0 (B) k

(C) cosk (D) Not possible

26. Which function is not differentiable at x = 0 ?

(A) $x|x|$ (B) x^3

(C) e^{-x} (D) $x + |x|$

27. $\frac{d}{dx}(\sin x°) =$ _____ .

(A) $\frac{\pi}{180}\cos x$ (B) $\cos x°$

(C) $\frac{\pi}{180}\cos x°$ (D) None

28. If $y = \sin^{-1}\frac{x}{a}$, $a > 0$, find $\frac{dy}{dx}$.

(A) $\frac{1}{\sqrt{a^2 - x^2}}$ (B) $\frac{1}{\sqrt{x^2 - a^2}}$

(C) $\frac{-1}{|x|\sqrt{a^2 - x^2}}$ (D) $\frac{-a}{|x|\sqrt{x^2 - a^2}}$

29. If $f(x) = \cos x - 2Kx$ is strictly decreasing then _____

(A) $k > \frac{1}{2}$ (B) $k < \frac{1}{2}$

(C) $k < 2$ (D) $k > 2$

30. $f(b) - f(a) = (b - a)\, f'(x)$ where $a < x < b$. If $f(x) = \frac{1}{x}$ then $x =$ _____ .

(A) $\sqrt{ab}$ (B) $\frac{a+b}{2}$

(C) $\frac{2ab}{a+b}$ (D) $\frac{b-a}{b+a}$

31. If $a^2 + b^2 = 1$ then maximum value of $a + b =$ _____ .

(A) 1 (B) 2

(C) $\sqrt{2}$ (D) $\frac{1}{\sqrt{2}}$

32. $\int \frac{x}{x^4-1}\, dx =$ _____ .

(A) $\frac{1}{2} \log\left(\frac{x^2-1}{x^2+1}\right) + c$ (B) $\frac{1}{2} \log\left(\frac{x^2+1}{x^2-1}\right) + c$

(C) $\frac{1}{4} \log\left(\frac{x^2+1}{x^2-1}\right) + c$ (D) $\frac{1}{4} \log\left(\frac{x^2-1}{x^2+1}\right) + c$

33. $\int \frac{dx}{x(x^4+1)} =$ _____ $+ c$

(A) $\log|x| + \tan^{-1}x^2$ (B) $\log|x| + \log|x^4 + 1|$

(C) $\tan^{-1}x^2 + \frac{1}{x}$ (D) $\frac{1}{4} \log \frac{x^4}{x^4+1}$

34. $\int \frac{\log x - 1}{(\log x)^2}\, dx =$ _____ $+ c$

(A) $\frac{x}{\log x}$ (B) $\frac{\log x}{x}$

(C) $\frac{1}{\log x}$ (D) $\frac{1}{(\log x)^2}$

35. If $\frac{d}{dx} F(x) = G(x)$ then $\int_a^b F(x)\, G(x)\, dx =$ _____ .

(A) $F(b) - F(a)$ (B) $G(b) - G(a)$

(C) $\frac{1}{2}[(G(b))^2 - (G(a))^2]$ (D) $\frac{1}{2}[(F(b))^2 - (F(a))^2]$

36. $\int_{-1}^{1} \log\left(x + \sqrt{x^2 + 1}\right) dx =$ _____ .

(A) 0 (B) log2

(C) – log2 (D) None

37. Obtain the area covered by $y^2 = 4x$, $x = 0$ and $y = 3$.

(A) 2 (B) $\frac{9}{4}$

(C) $\frac{7}{3}$ (D) 3

38. Find the differential equation of parabolas whose axes are parallel to y-axis.

(A) $y_3 + y_2 = 0$ (B) $y_3 = 0$

(C) $y_3 = 2y_1$ (D) None of these

39. A man can throw a stone up to a distance of 196 m. Find the greatest height attained by this stone.

(A) 50 m (B) 49 m

(C) 60 m (D) 48 m

40. A man is walking with 3 km/hr speed. If he observes that the rain is falling vertically with velocity $3\sqrt{3}$ km/hr then, find the actual direction of the rain with vertical.

(A) 15° (B) 30°

(C) 45° (D) 60°

MATHEMATICS

Sample Paper-3

GUJCET

Time : 1:00 Hr.] **STD : XII** **[Total Marks : 40**

1. If the area of the triangle with vertices (b, 5), (5, 2), (3, 2) is 3 then set containing all possible values of b is :

   (A) ϕ (B) R–{0}

   (C) R (D) {5}

2. In a ΔABC $AC^2 = AB^2 + BC^2$, B(5,1) and its centroid is G (3, 3) then circumcentre of ΔABC is :

   (A) (4, 2) (B) (2, 4)

   (C) (–2, 4) (D) (–4, –2)

3. Equation $(\lambda-1)\,x + (2\lambda + 1)\,y - 12 = 0$ represents lines for all real value of λ passes through a fixed point :

   (A) (4, –8) (B) (8, –4)

   (C) (–4, 8) (D) (–8, 4)

4. What is the sum of entercepts made by line represented by $\{(2t + 1, t) \mid t \in R\}$ on the axes is :

   (A) 0 (B) $\frac{2}{3}$

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

5. It the line passing through A (3, –1) and B (0, 3) then $\overleftrightarrow{AB} - \overline{AB}$ is :

   (A) $\{(3 - 3t, 4t - 1) / t \in R - (0, 1)\}$

   (B) $\{(3 - 3t, 4t - 1) / t \in R - [0, 1]\}$

   (C) $\{(3 + 3t, 4t + 1) / t \in R - [0, 1]\}$

   (D) $\{(3 + 3t, 4t + 1) / t \in R - (0, 1)\}$

6. If point (2, 1) is one end point of Diameter of the circle $x^2 + y^2 - 2y - 3 = 0$ than find other end point of diameter.

   (A) (–2, 1) (B) (1, –2)

   (C) (1, 1) (D) (–1, –1)

7. The lines $2x - 3y + 5 = 0$ and $3x - 4y - 7 = 0$ are diameters of a circle of area 154 sq. units, then the equation of the circle is : (where $\pi = \frac{22}{7}$)

   (A) $x^2 + y^2 + 2x - 2y - 62 = 0$ (B) $x^2 + y^2 + 2x - 2y - 47 = 0$

   (C) $x^2 + y^2 - 2x + 2y - 47 = 0$ (D) $x^2 + y^2 - 2x + 2y - 62 = 0$

8. $\lim_{x \to \infty} \left(\frac{2x+3}{2x+1}\right)^{x+1} = ?$

(A) $e^{3/2}$ (B) e^{-1}

(C) e (D) None of these

9. One end point of focal chord of parabola $y^2 = 4x$ is (4, 4) then find other end point of focal chord.

(A) $\left(\frac{1}{4}, \frac{-1}{4}\right)$ (B) $\left(\frac{1}{4}, -1\right)$

(C) $\left(-\frac{1}{4}, 1\right)$ (D) (–1, 1)

10. If the line $y = x + \sqrt{\frac{7}{12}}$, touches the ellipse $3x^2 + 4y^2 = 1$ then point of contact co-ordinates are :

(A) $\left(\frac{2}{\sqrt{21}}, \frac{1}{2}\sqrt{\frac{3}{7}}\right)$ (B) $\left(\frac{-2}{\sqrt{21}}, \frac{1}{2}\sqrt{\frac{3}{7}}\right)$

(C) $\left(\frac{2}{\sqrt{21}}, \frac{1}{2}\sqrt{\frac{7}{3}}\right)$ (D) $\left(\frac{-2}{\sqrt{21}}, \frac{1}{2}\sqrt{\frac{7}{3}}\right)$

11. Area of triangle formed by Asymtotes of Hyperbola $x^2 - y^2 = 1$ and line $x = 1$ is :

(A) $\sqrt{2}$ (B) $\frac{1}{2}$

(C) 2 (D) 1

12. Find the local maximum value of $\sqrt{3} \sin x + \cos x$. (where $x \in (0, \pi/2)$)

(A) $3\sqrt{2}$ (B) $2\sqrt{3}$

(C) $3\sqrt{3}$ (D) $\sqrt{3}$

13. Modulus of sum of three mutually perpendicular unit vectors is :

(A) $\sqrt{3}$ (B) 3

(C) $3\sqrt{3}$ (D) None of these

14. $\lim_{x \to 1} (2-x)^{(x-1)^{-1}} = ?$

(A) e (B) e^2

(C) 1 (D) $\frac{1}{e}$

15. If A (3, –1), B (2, –3) and C (5, 1) are the vertices of ΔABC then $m\angle A$ is :

(A) $\cos^{-1}\frac{11}{5\sqrt{5}}$ (B) $\pi-\cos^{-1}\frac{7}{5\sqrt{2}}$

(C) $\cos^{-1}\frac{3}{\sqrt{10}}$ (D) $\pi-\cos^{-1}\frac{3}{\sqrt{10}}$

16. Force $\bar{i}+\bar{j}+\bar{k}$ is applied at B (1, 2, 3) then magnitude of its torque around A (–1, 2, 0) is :

(A) $\sqrt{5}$ (B) $\sqrt{3}$

(C) $\sqrt{14}$ (D) 0

17. Find the perpendicular distance of point P (1, 2, –3) from the line $\frac{x+1}{2}=\frac{y-3}{-2}=\frac{z}{-1}$

(A) 5 (B) $\sqrt{5}$

(C) 25 (D) None of these

18. Angle between the line $\bar{r}=(2\bar{i}-\bar{j}+\bar{k})+k(-\bar{i}+\bar{j}+\bar{k})$ $(k\in R)$ and the plane $\bar{r}\cdot(3\bar{i}+2\bar{j}-\bar{k})=4$ is :

(A) $\cos^{-1}\frac{2}{\sqrt{42}}$ (B) $\cos^{-1}\left(\frac{-2}{\sqrt{42}}\right)$

(C) $\sin^{-1}\left(\frac{2}{\sqrt{42}}\right)$ (D) $\sin^{-1}\left(\frac{1}{\sqrt{42}}\right)$

19. The distance between the line $\bar{r}=(\bar{i}+\bar{j}+2\bar{k})+k(2\bar{i}+5\bar{j}+3\bar{k})$, $k\in R$ and the plane $\bar{r}.(2\bar{i}+\bar{j}-3\bar{k})=5$ is :

(A) $\frac{5}{\sqrt{14}}$ (B) $\frac{6}{\sqrt{14}}$

(C) $\frac{7}{\sqrt{14}}$ (D) $\frac{8}{\sqrt{14}}$

20. Find the equation of sphere whose contre is (2, 3, –4) and which touchers the plane $2x + 6y - 3z + 15 = 0$

(A) $x^2 + y^2 + z^2 - 4x - 6y + 8z - 20 = 0$

(B) $x^2 + y^2 + z^2 + 4x + 6y - 8z - 20 = 0$

(C) $x^2 + y^2 + z^2 + 4x + 6y - 8z + 20 = 0$

(D) $x^2 + y^2 + z^2 - 4x - 6y - 8z - 20 = 0$

21. $\lim_{x \to 0} \frac{\sin(\pi \cos^2 x)}{x^2} = ?$

(A) π (B) $-\pi$

(C) 0 (D) 1

22. Find $\int \{x(\sin x + \cos x) + \cos x\} e^x dx$

(A) $(x \cos x - \sin x)\, e^x + c$ (B) $(x \cos x + \sin x) e^x + c$

(C) $(x \sin x + \cos x)\, e^x + c$ (D) $e^x (\sin x + \cos x) + c$

23. $\lim_{x \to 0} \frac{\sin Kx}{3x} = 7$ then value of k is :

(A) –21 (B) 7

(C) 3 (D) 21

24. $\lim_{n \to \infty} \frac{\sum_{i=1}^{n} (i+n)}{n^2} = ?$

(A) $\frac{3}{2}$ (B) $\frac{2}{3}$

(C) $\frac{5}{2}$ (D) $\frac{7}{2}$

25. If g is an inverse function of f and $f'(x) = \frac{1}{2+x^5}$ then $g'(x)$ is :

(A) $\left(\frac{1}{2+x^5}\right)^{-1}$ (B) $\left(\frac{1}{2+(f(x))^5}\right)^{-1}$

(C) $\left(\frac{1}{2+(g(x))^5}\right)^{-1}$ (D) $\frac{1}{2+g(x^5)}$

26. If f is differentiable function of any order, then $\lim_{h \to 0} \frac{f(a+h)-2f(a)+f(a-h)}{h}$ is :

(A) $2f'(a)$ (B) 0

(C) $f'(a)$ (D) None of these

27. $\frac{d}{dx}$ (tan (tan x^0)) = ?

(A) $\frac{180}{\pi}$ $\sec^2$ (tan x^0). $\sec^2$ x^0 (B) $\sec^2\left(\tan\frac{\pi x}{180}\right)\sec^2 x$

(C) $\frac{\pi}{180}$ $\sec^2$ (tan x^0). $\sec^2$ x^0 (D) None of these

28. If $f(x) = \log_{10}x^{10}$ then find $f'(10)$

(A) $\log_{10}e$ (B) $\log e^{10}$

(C) 10 (D) $\frac{1}{100}\log e^{10}$

29. At which point on the parabola $y^2 = 8x$ we get $\frac{dx}{dt} = \frac{dy}{dt}$.

(A) (4, 2) (B) (2, 4)

(C) $\left(1, 2\sqrt{2}\right)$ (D) (–2, 4)

30. An approximate Value of $2^{3.01}$ is :

(A) $8 + \frac{\log_4 e}{25}$ (B) $8 - \frac{\log_e 4}{25}$

(C) $8 + \frac{\log_e 4}{25}$ (D) $8 - \frac{\log_4 e}{25}$

31. What is the rate of change in a area A of a square with respect to its diagonal length R ?

(A) $\sqrt{R}$ $(unit)^2$ (B) R^2 $(unit)^2$

(C) $\frac{R}{2}$ $(unit)^2$ (D) R $(unit)^2$

32. Find $\int\sqrt{4x^4 - 64x^2}\,dx$, (x > 4)

(A) $\frac{x}{2}\sqrt{x^2-4} + 8\log|x + \sqrt{x^2-4}| + c$

(B) $\frac{x}{2}\sqrt{x^2-4} - 8\log|x + \sqrt{x^2-4}| + c$

(C) $\frac{2}{3}(x^2-16)^{3/2} + C$

(D) None of these

33. Find $\int\left(\frac{x-2}{x^3-8}\right) dx$

(A) $\frac{1}{\sqrt{3}} \tan^{-1}\left(\frac{x+2}{\sqrt{2}}\right) + c$ (B) $\frac{1}{2\sqrt{3}} \tan^{-1}\left(\frac{x+1}{\sqrt{3}}\right) + c$

(C) $\frac{1}{\sqrt{3}} \tan^{-1}\left(\frac{x+1}{\sqrt{3}}\right) + c$ (D) None of these

34. $\int\frac{(\log x^5)^3}{x} dx = ?$

(A) $(31.50) (\log x)^4 + c$ (B) $(30.25) (\log x)^4 + c$

(C) $(31.25) (\log x)^4 + c$ (D) $(31.25) (\log x^4) + c$

35. $\int\frac{(\sin 2x)^{98}}{(\sin^2 x - \cos^2 x)^{100}} dx$ (where $0 < x < \pi/4$)

(A) $\frac{(\sin 2x)^{99}}{198} + c$ (B) $\frac{(\tan 2x)^{99}}{99} + c$

(C) $\frac{(\tan 2x)^{99}}{198} + c$ (D) None of these

36. Area of the region bounded by $y = x^2 - 1$, x-axis and $y = 8$ is :

(A) $\frac{104}{3}$ (B) $\frac{52}{3}$

(C) $\frac{208}{3}$ (D) None of these

37. $\int_0^{\pi/2} \frac{(\tan x)^{99}}{1+(\tan x)^{99}} dx$

(A) $\frac{\pi}{2}$ (B) $\frac{\pi}{4}$

(C) π (D) None of these

38. If f is even function and continuons on $[-\pi, \pi]$ and $\int_{-\pi}^{\pi} f(x)\,dx = 10\pi$ then find $\int_{-\pi}^{0} f(x)\,dx$

(A) 0 (B) 20π

(C) 5π (D) None of these

39. Find the order and degree of the differantial equation $\sqrt{1-y^2}\,dx + \sqrt{1-x^2}\,dy = 0$

(A) Order 2, degree 1 (B) Order and degree are not possible

(C) Oeder 1, degree 1 (D) Order 1, degree 2

40. An object is projected in vertical direction with velocity 98 m|s. Find the distance travelled in the 11^{th} second.

(A) 4.9 m (B) 0.49 m

(C) 9.8 m (D) None of these

MATHEMATICS
GUJCET
STD : XII

Sample Paper-4

Time : 1:00 Hr.] **[Total Marks : 40**

1. If in ΔABC, $m\angle B = \frac{\pi}{2}$ and A (x_1, y_1), C (x_2, y_2), B (5, 1) and circumcentre is at (2, 4) then centroid of ΔABC is :

   (A) (1, 3) (B) (3, 3)

   (C) (–3, 3) (D) $(\frac{9}{2}, \frac{9}{2})$

2. If A $([\sqrt[3]{-8.347}])$ and B $([\sqrt[3]{8.347}])$ then d (A, B) is : (where A, B $\in R^1$)

   (A) 3 (B) 5

   (C) 0 (D) Not possible

3. What is the measure of the angle between the lines x = 2006 and $\sqrt{3}x + 3y - 2006 = 0$?

   (A) $\frac{\pi}{6}$ (B) $\frac{\pi}{3}$

   (C) $\frac{\pi}{4}$ (D) $\frac{\pi}{8}$

4. What is the equation of a line passing through the point of intersection of lines x = 1 and y = 2 and which makes measure of angle $\frac{\pi}{4}$ with is x-axis ?

   (A) $x + 2y - 5 = 0$ (B) $x + y - 3 = 0$

   (C) $x + y + 1 = 0$ (D) $x + y + 3 = 0$

5. Which of the following one contains the parametric equations of the line $2x + y - 1 = 0$?

   (A) $x = 3t + 1, y = 1 - 2t, t \in R$ (B) $x = 1 - 2t, y = t, t \in R$

   (C) $x = t, y = 1 - 2t, t \in R$ (D) Non of these

6. If the line $3x + 4y + 10 = 0$ cut the chord of length 6 units with the circle having its centre at (2, 1) then equation of such circle is :

   (A) $x^2 + y^2 + 4x + 2y - 20 = 0$ (B) $x^2 + y^2 - 4x + 2y + 20 = 0$

   (C) $x^2 + y^2 - 4x - 2y + 25 = 0$ (D) $x^2 + y^2 - 4x - 2y - 20 = 0$

7. It the two circles $(x - 1)^2 + (y - 3)^2 = r^2$ and $x^2 + y^2 - 8x + 2y + 8 = 0$ intersects in two distinct points then :

   (A) $2 < r < 8$ (B) $r < 2$

   (C) $r = 2$ (D) None of these

8. $\lim_{x \to 6} (7 - x)^{(x-6)^{-1}} = ?$

(A) e^6 (B) e

(C) 1 (D) e^{-1}

9. The co-ordinates of points on the parabola $y^2 = 8x$ whose focal distance is 4 unit are :

(A) $\left(\frac{1}{2}, \pm 2\right)$ (B) $(1, \pm 2\sqrt{2})$

(C) $(2, \pm 4)$ (D) None of these

10. Find the rate of changes in area of an equilateral triangle with respect to its perameter while its perimeter is $\sqrt{3}$ cm.

(A) 6 $(cm)^2$ (B) $\frac{1}{6}$ $(cm)^2$

(C) $\frac{1}{2\sqrt{6}}$ $(cm)^2$ (D) None of these

11. Find the equation of director circle of hyperbola $\frac{x^2}{16} - \frac{y^2}{9} = 1$

(A) $x^2 + y^2 = 25$ (B) $x^2 + y^2 - 7 = 0$

(C) $x^2 + y^2 + 7 = 0$ (D) None of these

12. $\int \frac{\left(\sin\frac{2\theta}{3}\right)^6}{\left(\sin^2\frac{\theta}{3} - \cos^2\frac{\theta}{3}\right)^8} d\theta = ?$ Where $\frac{2\theta}{3} \neq (2k + 1)\frac{\pi}{2}$, $k \in Z$

(A) $\frac{7}{3}\left(\tan\frac{2\theta}{3}\right)^7 + c$ (B) $\frac{3}{14}\left(\tan\frac{2\theta}{3}\right)^7 + c$

(C) $\frac{3}{14}\left(\text{Sec}\frac{2\theta}{3}\right)^7 + c$ (D) None of these

13. If S & S' are two foci and $\overline{PQ}$ is a focal chord of an ellipse $\frac{x^2}{9} + \frac{y^2}{4} = 1$ then find the perimeter of $\Delta S'PQ$. (Where $S \in \overline{PQ}$)

(A) 5 (B) 12

(C) 6 (D) None of these

14. If $[\bar{a}\ \bar{b}\ \bar{c}] = 5$ then find the value of $[\bar{a} \times \bar{b}\ \ \bar{b} \times \bar{c}\ \ \bar{c} \times \bar{a}]$

(A) 0 (B) 25

(C) 5 (D) None of these

15. If α, β, γ are the direction angles of a non zero vector $\bar{r}$ then $\cos2\alpha + \cos2\beta + \cos2\gamma = ?$

(A) 1 (B) 2

(C) –1 (D) 0

16. What can we say about the lines L : $\frac{x}{2}=\frac{y}{-3}=\frac{z}{1}$, and M : $\frac{x-3}{3}=\frac{y-1}{5}=\frac{z+3}{2}$?

(A) Parallel (B) Co-incident

(C) Intersecting (D) Skew lines

17. The equation of a plane perpendicular to the line $\bar{r} = (1, 1, 1) + k(1, 1, -2)$, $k \in R$ and line passing through (2, 1, –3) is :

(A) $x + y + 2z = 9$ (B) $x + y - 2z = 9$

(C) $x - y + 2z = 9$ (D) $x + y - 2z = -9$

18. If perpendicular distance of a point (1, 2, –1) from the plane $6x + 2y + 3z + k = 0$ is $\frac{6}{7}$ unit then find the value of k.

(A) –1 (B) 13

(C) 0 (D) None of these

19. Find the radius of the circle that is obtained as the intersection of the plane $x + 2y + 2z = 15$ and the sphere $x^2 + y^2 + z^2 - 2y - 4z - 20 = 0$

(A) 3 (B) 4

(C) 5 (D) None of these

20. If the line $ax + by + 2 = 0$ passes through (2, –1) and perpendicular to the line $2x + y + 4 = 0$ than find the value a + b.

(A) 1 (B) $-\frac{1}{2}$

(C) $\frac{1}{2}$ (D) None of these

21. $\lim\limits_{x \to \infty} \frac{2^x - 3^x}{4^x - 5^x} = ?$

(A) $\log\frac{2}{3} \div \log\frac{4}{5}$ (B) 1

(C) $\log\frac{2}{3} - \log\frac{4}{5}$ (D) – 1

22. $\lim\limits_{\theta \to 0} \frac{(8\sin^3\theta - 6\sin\theta)}{\theta} = ?$

(A) – 3 (B) 3

(C) – 6 (D) None of these

23. $\lim_{x \to 1} \frac{a^x - (a+1)^x + 1}{x-1} = ?$ $(a \in R^+ - \{1\})$

(A) $a\log\left(\frac{1}{a+1}\right) + \log\left(\frac{a}{a+1}\right)$ (B) $a\log\left(\frac{a+1}{a}\right) + \log\left(\frac{1}{a+1}\right)$

(C) $-\left\{a\log\left(\frac{a+1}{a}\right) + \log(a+1)\right\}$ (D) None of these

24. $\lim_{x \to 2} \frac{(x + x^2 + x^3 + x^4) - 30}{x^2 - 4} = ?$

(A) $\frac{49}{8}$ (B) 49

(C) $\frac{49}{4}$ (D) None of these

25. $\frac{d}{dx}(\cos x^2) = ?$

(A) $\sin x^2$ (B) $2x \sin x^2$

(C) $-2x \sin x^2$ (D) None of these

26. Find $\frac{d}{dx}\left[\tan^{-1}\left(\frac{7x}{1+30x^2}\right)\right] = ?$ (Where $0 < x < 1$)

(A) $\frac{10}{1+10x^2} - \frac{3}{1+3x^2}$ (B) $\frac{10}{1+100x^2} + \frac{3}{1+9x^2}$

(C) $\frac{10}{1+100x^2} - \frac{3}{1+9x^2}$ (D) None of these

27. If f is an even and differentiable functionthen $f^1(-x) + f^1(x) = ?$

(Where $f^1(x) \neq 0$)

(A) $2f^1(x)$ (B) $2f(x)$

(C) 0 (D) None of these

28. If $f(x) = e^x$ then $f^1(\log x) = ?$ (Where $x \in R^+ - \{1\}$)

(A) $\frac{1}{e^x}$ (B) $\frac{1}{\log_e x}$

(C) $\log e^x$ (D) None of these

29. The formula connecting the periodic time T and length l of a pendulum is $T = 2\pi\sqrt{l/g}$. If there is an error of 0.1% in measuring the length l, what will be the percentage error arise in T ?

(A) 0.2% (B) 0.5%

(C) 0.05% (D) None of these

30. Which of the point on the line $y = 2x + 3$ is nearest to the origin.

(A) (1, 5) (B) $\left(\frac{6}{5}, -\frac{3}{5}\right)$

(C) $\left(-\frac{6}{5}, \frac{3}{5}\right)$ (D) (0, 3)

31. To the function $f(x) = e^x$ over [0, x], Mean - Value - Theorem is applicable then select the proper inequality from the following :

(A) $0 < \frac{1}{x}\log(e^x - 1) < x$ (B) $0 < \log\left(\frac{e^x - 1}{x}\right) < x$

(C) $x < \log\left(\frac{e^x - 1}{x}\right) < 2x$ (D) $0 < \log\left(\frac{e^x - 1}{x}\right) < e^x$

32. $\int \frac{\cos x - \sin x}{(1 + \sin 2x)}\, dx$ = ? (Where $2x \neq (4k+3)\frac{\pi}{2}, k \in Z$

(A) $\frac{1}{\sin x + \cos x} + c$ (B) $-(\sin x + \cos x)^{-1} + c$

(C) $-(\sin x + \cos x) + c$ (D) None of these

33. Obtain $\int (x^2 + 2006x + 2004)\, e^x\, dx$.

(A) $e^x (x^2 + 2004x) + c$ (B) $e^x (x^2 + 2006x) + c$

(C) $e^x (x^2 + 2008x) + c$ (D) None of these

34. $\int \frac{e^x(1+x)}{1 + x^2e^{2x}}\, dx$ = ?

(A) $\log | 1 + x^2e^2 | + c$ (B) $\tan^{-1} (x^2e^{2x}) + c$

(C) $\tan^{-1} (xe^x) + c$ (D) None of these

35. $\int \frac{dx}{\log x^x}$ = ? (x > 0)

(A) $\frac{(\log x)^2}{2} + c$ (B) $\log | \log x | + c$

(C) $x \log x + c$ (D) $\log | x | + c$

36. Find the area of the region bounded by line, $y = x$, x–axis and the lines $x = -2$, $x = 2$.

(A) 2 (B) 4

(C) 8 (D) 1

37. If $\int_{n}^{n+1} g(x)\,dx = n^3$ then find $\int_{-3}^{3} g(x)\,dx = ?$

(A) – 27 (B) 0

(C) 27 (D) None of these

38. $\int_{0}^{\pi/4} \tan^4 x\,dx + \int_{0}^{\pi/4} \tan^2 x\,dx = ?$

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

(C) $\frac{1}{3}$ (D) None of these

39 Find the order of the following differential equation : $\left(\frac{d^2y}{dx^2}\right)^2 + \left(\frac{dy}{dx}\right)^3 + \log y = 0$

(A) 2 (B) 3

(C) 4 (D) Not possible to obtain.

40. A body is projected in vertical direction attains its maximum height 50 m. What is the velocity of a body at 25 m height

(A) $\sqrt{70}$ m/s (B) $14\sqrt{5}$ m/s

(C) $10\sqrt{7}$ m/s (D) $7\sqrt{10}$ m/s

MATHEMATICS
GUJCET
Sample Paper-5

Time : 1:00 Hr.] **STD : XII** **[Total Marks : 40**

1. For A(1, 2), B(–3, 1) find the point dividing $\overline{AB}$ from B'S side in the radio –1 : 2.
   (A) (7, 0) (B) (0, –7)
   (C) (–7, 0) (D) (0, 7)

2. If in ABC, $m\angle B = \frac{\pi}{2}$ and A (x_1, y_1), C (x_2, y_2), B(5, 1) and circumcenter P is at (2,4) and G is centroid of ΔABC then find BG : BP.
   (A) 1 : 3 (B) 3 : 2
   (C) 2 : 3 (D) None of these

3. If A is (1, 2), B(2, –2), C(8, 2) and D(4, 1) then
   (A) $\overleftrightarrow{AB} \perp \overleftrightarrow{CD}$ (B) $\overleftrightarrow{AB} \parallel \overleftrightarrow{CD}$
   (C) $\overleftrightarrow{AB} = \overleftrightarrow{CD}$ (D) None of these

4. If lines $ax + y + 3 = 0$ and $2x + by - 1 = 0$ interest in a unique point then which of the following value not applicable to ab :
   (A) 0 (B) 3
   (C) 2 (D) None of these

5. Equation of the circle having smallest radius and passing through the points of intersection of circle $x^2 + y^2 - 6x + 2y - 6 = 0$ and line $x + y + 2 = 0$ is
   (A) $x^2 + y^2 - 2x + 6y + 2 = 0$ (B) $x^2 + y^2 + 2x - 6y + 2 = 0$
   (C) $x^2 + y^2 + 4x + 4y - 4 = 0$ (D) None of these

6. If the circle $x^2 + y^2 - ax - 2y + 4 = 0$ touches x-axis then find the value of a
   (A) 12 (B) 16
   (C) $\pm$ 4 (D) None of these

7. Find the limit : $\lim_{x \to 2} \frac{\{1 + (2 + x)^{\frac{1}{2}}\}^{\frac{1}{2}} - 3^{\frac{1}{2}}}{x - 2}$
   (A) $\frac{1}{8\sqrt{3}}$ (B) $\frac{1}{4\sqrt{3}}$
   (C) 0 (D) None of these

8. Angle substended at the origin by latus rectum of $y^2 = 4x$ is :
   (A) $\pi - \tan^{-1}\frac{4}{3}$ (B) $\pi - \tan^{-1}\frac{3}{4}$
   (C) $\tan^{-1}\frac{4}{3}$ (D) None of these

9. For an ellipse $\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1$, length of latus rectume is half of minor axis, then find the value of eccentricity (a > b).

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

(C) $\frac{1}{2}$ (D) None of these

10. Find that which value of following is not the eccentricity of hyperbola.

(A) $\frac{277}{276}$ (B) $\frac{2006}{2007}$

(C) 200 (D) 1.5

11. Find the local maximum value of $3\sin x + \sqrt{3}\cos x$ $\left(\text{where } x \in \left(0, \frac{\pi}{2}\right)\right)$

(A) $2\sqrt{3}$ (B) $3\sqrt{2}$

(C) $3\sqrt{3}$ (D) $\sqrt{3}$

12. $\int \frac{(x - 2008)}{(x - 2007)^2} e^{x+1}\, dx$ = ? (where x > 2008)

(A) $\frac{e^{x+1}}{x - 2008} + c$ (B) $\frac{e^{x+1}}{x - 2007} + c$

(C) $\frac{e^x}{x - 2007} + c$ (D) None of these

13. If $\bar{a} + \bar{b} + \bar{c} = \bar{0}$ and $|\bar{a}| = 3$, $|\bar{b}| = 5$, $|\bar{c}| = 7$ then find $(\bar{a}\hat{},\bar{b})$.

(A) $\frac{\pi}{2}$ (B) $\frac{\pi}{3}$

(C) $\frac{2\pi}{3}$ (D) None of these

14. A (–1, 6, 6), B(–4, 9, 6) and C(0, 7, 10) are three points in a plane represents.

(A) Collinear points (B) Equilateral triangle

(C) Isoscles right angle triangle (D) None of these

15. If A(6, 4, 6), B(12, 4, 0) and C(4, 2, –2) are the vertices of ΔABC then incentre of ΔABC is :

(A) (11, 5, 2) (B) $\left(\frac{22}{3}, \frac{10}{3}, \frac{4}{3}\right)$

(C) $\left(\frac{10}{3}, \frac{22}{3}, \frac{4}{3}\right)$ (D) $\left(\frac{-22}{3}, \frac{-10}{3}, \frac{4}{3}\right)$

16. If A ($\bar{a}$), B ($\bar{b}$), C ($\bar{c}$) are the vertices of ΔABC then length of the altitude from A on $\overleftrightarrow{BC}$ is :

(A) $\dfrac{|\bar{a} \times \bar{b} + \bar{b} \times \bar{c} + \bar{c} \times \bar{a}|}{|\bar{b} - \bar{c}|}$ (B) $\frac{1}{2} \dfrac{|\bar{a} \times \bar{b} + \bar{b} \times \bar{c} + \bar{c} \times \bar{a}|}{|\bar{b} - \bar{c}|}$

(C) $\frac{1}{2} |\bar{a} \times \bar{b}|$ (D) $\frac{1}{2} \dfrac{|\bar{a} \times \bar{b} + \bar{b} \times \bar{c} + \bar{c} \times \bar{a}|}{|\bar{c} - \bar{a}|}$

17. Which one is the equation of the line passing through (1, 2, –4) and perpendiculur to both the lines $\dfrac{x-1}{2} = \dfrac{y+2}{3} = \dfrac{z-4}{4}$ and $\dfrac{x-3}{5} = \dfrac{y+6}{1} = \dfrac{z+10}{2}$

(A) $\dfrac{x-1}{2} = \dfrac{2-y}{16} = \dfrac{z+4}{-13}$ (B) $\dfrac{x-1}{-2} = \dfrac{y-2}{-16} = \dfrac{z+4}{13}$

(C) $\dfrac{x-1}{2} = \dfrac{y-2}{16} = \dfrac{z+4}{-13}$ (D) None of these

18. If line L : (1, 0, 2) + k (2, 3, –1), $k \in R$ and plane π : $2x - y + 5z = 0$ then $L \cap \pi = ?$

(A) {(7, 9, 1)} (B) {(–7, –9, –1)}

(C) {(2, –1, –1)} (D) {(7, 9, –1)}

19. The distance of origin from the point of intersection of the lines $\dfrac{x}{2} = \dfrac{y-2}{3} = \dfrac{z-3}{4}$ and the plane $2x + y = 2$ is :

(A) $\sqrt{120}$ (B) $\sqrt{83}$

(C) $2\sqrt{19}$ (D) $\sqrt{78}$

20. Find the centre of the sphere $|\bar{r}|^2 + \bar{r}.(-2, -4, -6) + 5 = 0$.

(A) (–2, –4, –6) (B) (2, 4, 6)

(C) (–1, –2, –3) (D) None of these

21. Evalute $\lim\limits_{x \to 0} \dfrac{1-\cos(\sin x)}{x^2}$

(A) 2 (B) 0

(C) $\dfrac{1}{2}$ (D) None of these

22. $\lim\limits_{x \to \pi/2} \dfrac{\sin x}{x} = ?$

(A) 1 (B) $\dfrac{2}{\pi}$

(C) $\dfrac{\pi}{2}$ (D) 0

23. $\lim_{x \to \pi/2} (2\cos^2 \frac{x}{2})^{3\sec x} = ?$

(A) e^3 (B) e^{-3}

(C) 3 (D) None of these

24 $\lim_{x \to 1^+} \frac{\sqrt{x-1}}{\sqrt{x^2-1}+\sqrt{x^3-1}} = ?$

(A) $-\left(\sqrt{3}+\sqrt{2}\right)$ (B) $\sqrt{3} + \sqrt{2}$

(C) $\sqrt{2} - \sqrt{3}$ (D) $\sqrt{3} - \sqrt{2}$

25. If $f(x) = 3^x + 3^{x+1} + 3^{x+2} + \ldots\ldots\ldots\ldots + 3^{x+5}$ then value of $f'(3)$ is :

(A) $9828 \log_e 27$ (B) $9828 \log_e 3$

(C) $9828 \log_3 e$ (D) None of these

26. If $|x| = \sqrt{x^2}$ then $\frac{d}{dx}(|x|) = ?$ $(x \neq 0)$

(A) 1 (B) –1

(C) $\frac{x}{|x|}$ (D) $\frac{|x|}{x}$

27. If $f(x) = e^x$ the find $f'(\log_e x)$.

(A) e^x (B) $\log_e e^x$

(C) $\frac{1}{e^x}$ (D) None of these

28. If f(x) is differentiable odd function then $f'(x) - f'(-x)$. (where $f'(x) \neq 0$)

(A) $2f'(x)$ (B) $-2f'(x)$

(C) 0 (D) None of these

29. $f(x) = \left(\frac{\pi}{e}\right)^x$, $x \in R$, is :

(A) Increasing function (B) Decreasing function

(C) Neither increasing nor decreasing (D) Constant function

30. Which of the point on the line $y = 2x - 3$ nearest to the origin.

(A) $\left(\frac{6}{5}, \frac{-3}{5}\right)$ (B) $(0, -3)$

(C) $\left(\frac{3}{2}, 0\right)$ (D) $(1, -1)$

31. If the function $f(x) = \sin x + \cos x - 1$, $x \in \left[0, \frac{\pi}{2}\right]$ Rolle's Theoren is applied then find $c \in \left(0, \frac{\pi}{2}\right)$ such that $f'(c) = 0$

(A) $\frac{\pi}{3}$ (B) $\frac{\pi}{6}$

(C) $\frac{\pi}{8}$ (D) $\frac{\pi}{4}$

32. $\int \log(2x)^{3/x}\, dx = ?$ (where $x \in R^+ - \{1\}$)

(A) $\frac{3}{4}(\log 2x)^2 + c$ (B) $\frac{3}{2}\log(2x)^2 + c$

(C) $\frac{3}{2}(\log 2x)^2 + c$ (D) None of these

33. Find $\int (\tan x)^{10} dx + \int (\tan x)^{12} dx$

(A) $\frac{(\tan x)^{11}}{11} + c$ (B) $\frac{(\tan x)^{13}}{13} + c$

(C) $\frac{(\sec x)^{11}}{11} + c$ (D) None of these

34. Find $\int \sqrt{\cos x} \cdot \sin 2x\, dx$

(A) $\frac{-4}{5}(\sin x)^{5/2} + c$ (B) $\frac{-4}{5}(\cos x)^{5/2} + c$

(C) $\frac{4}{5}(\cos x)^{5/2} + c$ (D) None of these

35. Find $\int \frac{4^x - 1}{4^x + 1}\, dx$

(A) $x - \frac{\log(4^x + 1)}{\log_e^2} + c$ (B) $\frac{\log(x^4 + 1)}{\log_e^2} - x + c$

(C) $\frac{\log(x^4 - 1)}{\log_e^2} - x + c$ (D) $x + \frac{\log(x^4 + 1)}{\log_e^2} + c$

36. Area of region bounded by the curve $xy - 16 = 0$ x-axis and the lines $x = 4$, $x = 8$ is :

(A) $8 \log_e^{16}$ (B) $2 \log_e^{16}$

(C) $4 \log_e^{16}$ (D) None of these

37. $\int_0^4 \frac{(x+5)^{100}}{(x+5)^{100}+(9-x)^{100}}\,dx$ is :

(A) 4 (B) 1

(C) 2 (D) None of these

38. $\int_n^{n+1} f(x)dx = n^3$ then $\int_{-2}^{2} f(x)\,dx = ?$

(A) – 8 (B) –4

(C) 8 (D) None of these

39. Find the equation of a curve passing through origin and having length of its subnormal is $\frac{7}{2}$ unit.

(A) $y^2 = 7x + c$, where $c \neq 0$ (B) $x^2 = 7y$

(C) $y^2 = 7x$ (D) None of these

40. A paricle executing rectilinear motion travels distance x cm. in t seconds where $x = 2t^3 - 9t^2 + 5t + 8$ what is the velocity of a particale while its instantaneous acceleration is zero ?

(A) – 7.5 cm/s (B) – 8 cm/s

(C) – 8.5 cm/s (D) None of these