GGSIPU mathmatics 2008

1. Let $\vec{a}$ and $\vec{b}$ be two equal vectors inclined at an angle θ,then a sin $\frac{\theta}{2}$ is equal to

   a $\frac{|\vec{a}-\vec{b}|}{2}$ b $\frac{|\vec{a}+\vec{b}|}{2}$

   c $|\vec{a}-\vec{b}|$ d $|\vec{a}+\vec{b}|$

2. $\int \frac{dx}{x^2+4x+13}$ is equal to

   a log(x^2+4x+13) +c

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

   c log(2x+4) + c

   d $-\frac{2x+4}{(x^2+4x+13))^2}$ + c

3. The general solution y^2 dx + (x^2-xy+y^2) dy = 0 is

   a $\tan^{-1}(\frac{x}{y})$ - log y + c = 0

   b 2$\tan^{-1}(\frac{x}{y})$ + log x + c = 0

   c log (y+ $\sqrt{x^2+y^2}$) + log y + c = 0

   (d) $\sinh^{-1}\left(\frac{x}{y}\right)$+log y + c = 0

4. $\int_0^{\pi/4}(\cos x - \sin x)dx + \int_{\pi/4}^{5\pi/4}(\sin x - \cos x)dx + \int_{2\pi}^{\pi/4}(\cos x - \sin x)$dx is equal rto

   a $\sqrt{2}$ - 2   b 2 $\sqrt{2}$ - 2

   c 3 $\sqrt{2}$ - 2   d 4 $\sqrt{2}$ - 2

5. Out of 40 consecutive natural numbers ,two are chosen at random.Probability that the sum of the number is odd,is

   a $\frac{14}{29}$ b $\frac{20}{39}$

   c $\frac{1}{2}$ d None of these

6. Equation of tengents to the ellipse $\frac{x^2}{9}+\frac{y^2}{4}$ = 1,which are perpendicular to the line 3x+4y = 7,are

a $4x -3y = \pm\sqrt{20}$ b $4x -3y = \pm\sqrt{12}$

c $4x$ -3y = $\pm\sqrt{1}$ d 4x -3y = ± 1

7. If $\vec{a}$ is perpendicular to $\vec{b}$ and $\vec{c}$, $|\vec{a}| = 2$, $|\vec{b}| = 3$, $|\vec{c}| = 4$ and the angle between $\vec{b}$ and $\vec{c}$ is $\frac{2\pi}{3}$, then $[\vec{a}\,\vec{b}\,\vec{c}]$ is equal to

a $4\sqrt{3}$ b $6\sqrt{3}$

c $12\sqrt{3}$ (d $18\sqrt{3}$

8. The solution of the equation $\frac{d^2y}{dx^2} = e^{-2x}$ is

a $y == \frac{1}{4}e^{-2x} + \frac{cx}{2} + d$

b $y = \frac{1}{4}e^{-2x} + cx + d$

c $y = \frac{1}{4}e^{-2x} + cx^2 + d$

d l) $y = \frac{1}{4}e^{-2x} + cx^3 + d$

9. The value of $\int_2^3 \frac{x+1}{x^2(x-1)}dx$ is

a $\log\frac{16}{9} + \frac{1}{6}$ b $\log\frac{16}{9} - \frac{1}{6}$

c $2\log 2 - \frac{1}{6}$ d $\log\frac{4}{3} - \frac{1}{6}$

10. The length of the chord of the parabola $x^2=4y$ passing through the vertex and having slope $\cot\alpha$ is

a $4\cos\alpha\,\mathrm{cosec}^2\alpha$ b $4\tan\alpha\sec\alpha$

c $4\sin\alpha\sec^2\alpha$ d None of these

11. The records of a hospital show that 10% of the cases of a certain disease,then the probability that only three will die, is

a 8748×10^{-5} b 1458×10^{-5}

c 1458×10^{-6} d 41×10^{-6}

12. From the point P16,7 tangents PQ and PR are drawn to the circle $x^2+y^2-2x-4y-20 = 0$.If c be the centre of the circle,then area of quadrilateral PQCR is

a 450 sq unit b 15 sq unit

c 50 sq unit d 75 sq unit

13. If tan x = $\frac{b}{a}$, then the value of a cos 2x + b sin 2x is

a a b a -b

c a+b d b

14. In a triangle ABC,right angled at C,the value of cot A + cot B is

a $\frac{c^2}{ab}$ b a+a+

c $\frac{a^2}{bc}$ d $\frac{b^2}{ac}$

16. If α,β are roots of the equation $lx^2 + mx + n = 0$,then the equation whose roots are $\alpha^3\beta$ and $\alpha\beta^3$,is

a $l^4x^2 - nlm^2 - 2nlx + n^4 = 0$

b $l^4x^2 + nlm^2 - 2nlx + n^4 = 0$

c $l^4x^2 + nlm^2 - 2nlx - n^4 = 0$

d $l^4x^2 - nlm^2 - 2nlx + n^4 = 0$

17. The value of $2^{1/4} . 4^{1/8} . 8^{1/16} . 16^{1/32} ...$

a 3/2 b 5/2

c 2 d 1

18. $\begin{bmatrix} 1 \\ \frac{-1}{2} \end{bmatrix}$ [2 1 -1] is equal to

a $\begin{bmatrix} 2 \\ -1 \\ -2 \end{bmatrix}$ b $\begin{bmatrix} 2 & -1 & -1 \\ -2 & -1 & 1 \\ 4 & 2 & -2 \end{bmatrix}$

(c) [-1] d not defined

19. $\lim_{x\to\infty}\frac{(2x-3)(3x-4)}{(4x-5)(5x-6)}$ is equal to

a $\frac{1}{10}$ b 0

c $\frac{1}{5}$ (c $\frac{3}{10}$

20. Function f(x = $\begin{cases} x-1, & x<2 \\ 2x-3, & x\geq 2 \end{cases}$ is a continuous function

a for x = 2 only

b for all real values of x such that x $\neq 2$

c for all real values of x

d for all integgral values of x only

21. Differential coefficient of $\sqrt{\sec\sqrt{x}}$ is

a $\frac{1}{4\sqrt{x}}$ sec $\sqrt{x}$ sin $\sqrt{x}$

b $\frac{1}{4\sqrt{x}}$ (ec $\sqrt{x})^{3/2}$ .sin$\sqrt{x}$

c $\frac{1}{2}\sqrt{x}$ sec $\sqrt{x}$ sin $\sqrt{x}$

d $\frac{1}{2}\sqrt{x}$ sec $\sqrt{x}$ $^{3/2}$. sin $\sqrt{x}$

22. The function x^5-$5x^4$+5x-1 is

a neither maximum nor minimum at x = 0

b maximum at x=0

c maximum at x=1 and minimum at x=3

(d)minimmn at x=0

23. If x= y $\sqrt{1-y^2}$,then $\frac{dy}{dx}$ is equal to

a x x) $\frac{\sqrt{1-y^2}}{1+2y^2}$

c $\frac{\sqrt{1-y^2}}{1-2y^2}$ d 0

24. If the planes x+2y+kz = 0 and 2x+y-2z = 0,are at the right angles,then the value of k is

a ! b -2

c $\frac{1}{2}$ d -$\frac{1}{2}$

25. The ratio in which the line joining 2,4,5, 3,5, -4 is divided by the yz plane is

a 2:3 b 3:2

c - 2:3 d 4: -3

26. If the lines 3x+4y+1 = 0,5x+λy+3 = 0 and 2x+y-1=0 are concurrent, then λ is equal to

a -8 (b) 8 c 4 d -4

27. The value of $\int_0^1 \frac{x^4+1}{x^2+1}$ dx is

a $\frac{1}{6}$3 -4π b $\frac{1}{6}$3 π+4

c $\frac{1}{6}$3+4 π d $\frac{1}{6}$3 π-4

28. The solution of the differential equation

$\frac{dy}{dx}$ = y tan x – 2 sin x,is

a Y sin x = c+sin 2x

b Y cos x = c+$\frac{1}{2}$sin 2x

c Y cos x = c-sin 2x

d Y cos x = c+$\frac{1}{2}$cos 2x

29. The value of 1- log 2 + $\frac{\log 2)^2}{2!} - \frac{(\log 2)^3}{3!}$ + ... Is

a log 3 b log 2

c $\frac{1}{2}$ d None of these

30. The maximum value of f(x = $\frac{x}{4+x+x^2}$ on [-1,1] is

a $\frac{1}{3}$ b -$\frac{1}{4}$

c $\frac{1}{5}$ d $\frac{1}{6}$

31. If the redius of a circle be increasing at auniform rate of 2 cm/s.The area of increasing of area of circle,at the instant when the redius is 20 cm,is

a 70 π cm^2 / s b 70 cm ^{2} / s

c 80 π cm^2 / s d 80 cm^2 / s

32. If PA = PB =3x and PA ($\cap$B=PA' $\cap$B' = $\frac{1}{3}$,then x is equal to

a $\frac{1}{2}$ b $\frac{1}{3}$

c $\frac{1}{4}$ d $\frac{1}{6}$

33. The focus of the parabola y^2-x-2y+2 = 0 is

a $(\frac{1}{4}, 0$ b 1,[illegible]

c $\frac{5}{4}, 1$ d $\frac{3}{4}, \frac{5}{2}$

34. The equation of normal at the point 0,3 of the ellipse $9x^2+5y^2 = 45$ is

a x -axis b y -axis

c y+3=0 d y -3=0

35. The equation of the tengent parallel to y-x+5=0 drawn to $\frac{x^2}{3} - \frac{y^2}{2} = 1$ is

a x -y+1=0 b x -y+2=0

c x+y-1 = 0 d [illegible]+y-2 0

36. Let the functions f,g,h are defined from the set of real numbers R to R such that f(x = x^2-1, gx = $\sqrt{(x^2 - 1}$ and hx = $\begin{cases} 0, & if\ x < 0 \\ x, & if\ x \geq 0 \end{cases}$,

Then hofog x is defined by

a X
b X^2
c 0
d None of these

37. The angle of elevation of the sum,If the length of the shadow of a tower is $\sqrt{3}$ times the height of the pole,is

a 150^0 b 30^0

c 60^0 d 45^0

38. If sin A = n sin B,then $\frac{n-1}{n+1}$ tan $\frac{A+B}{2}$ is equal to

a sin $\frac{A-B}{2}$ b tan $\frac{A-B}{2}$

c cot $\frac{A-B}{2}$ d None of these

39. 3 $\tan^{-1}$ a is equal to

a $\tan^{-1} \frac{3a+a^3}{1+3a^2}$

b $\tan^{-1}\frac{3a-a^3}{1+3a^2}$

c $\tan^{-1}\frac{3a+a^3}{1-3a^2}$

d $\tan^{-1}\frac{3a-a^3}{1-3a^2}$

40. In which quadrant of the complex plane ,the point $\frac{1+2i}{1-i}$ lies ?

a Fourth b Fir st

c Second d Third

41. If sin α and cos α are the roots of the equation $px^2+qx+r = 0$,then

a $p^2+q^2-2pr = 0$

b $p^2-q^2+2pr = 0$

c $p^2-q^2-2pr = 0$

d $p^2+q^2+2pr = 0$

42. If a,b,c are in the GP,then the equations $ax^2+2bx+c = 0$ and $dx^2+2ex+f = 0$ have a common root,if $\frac{d}{a}$, $\frac{e}{b}$, $\frac{f}{c}$ are in

a AP b GP

c Hp d None of these

43. In the expension of $2x^2 - \frac{1}{x}$ ^{12} , the term independent of x is

a 8^{th} b 7^{th}

c 9^{th} d 10^{th}

44. The general value of θ in the equation $\cos\theta = \frac{1}{\sqrt{2}}$,$\tan\theta = -1$ is

a $2n\pi \pm \frac{\pi}{6}, n \in I$

b $2n\pi + \frac{7\pi}{6}, n \in I$

c $n\pi + (-1)^n \frac{\pi}{3}, n \in I$

d $n\pi + (-1)^n \frac{\pi}{4}, n \in I$

45. If A = $\begin{bmatrix} 1 & 2 \\ 3 & -5 \end{bmatrix}$, then A^{-1} is equal to

a $\begin{bmatrix} -5 & -2 \\ -3 & 1 \end{bmatrix}$

b $\begin{bmatrix} 5/11 & 2/11 \\ 3/11 & -1/11 \end{bmatrix}$

c $\begin{bmatrix} -5/11 & -2/11 \\ -3/11 & -1/11 \end{bmatrix}$

d $\begin{bmatrix} 5 & 2 \\ 3 & -1 \end{bmatrix}$

46. The value of $\lim_{x \to \infty}\left(\frac{x^2+bx+4}{x^2+ax+5}\right)$ is

a $\frac{b}{a}$ b o

c : 1 (d) $\frac{4}{5}$

47. Let f(x = $\begin{cases} \frac{\sin \pi x}{5x} & x \neq 0 \\ k, & x = 0 \end{cases}$ if f(x) is the continuous at x= o ,then k is equal to

a $\frac{\pi}{5}$ b $\frac{5}{\pi}$

c 1 d 0

48. If θ be the angle between the vectors $\vec{a} = 2\hat{i} + 2\hat{j} - \hat{k}$ and $\vec{b} = 6\hat{i} - 3\hat{j} + 2\hat{k}$, then

a $\cos\theta = \frac{4}{21}$

b $\cos\theta = \frac{3}{19}$

c $\cos\theta = \frac{2}{19}$

d $\cos\theta = \frac{5}{21}$

49. Let $\vec{a}, \vec{b}$ and $\vec{c}$ be vectors with magnitudes 3,4 and 5 respectively and $\vec{a}+\vec{b}+\vec{c}=\vec{0}$,then the values of $\vec{a}.\vec{b}+\vec{b}.\vec{c}+\vec{c}.\vec{a}$ is

a 47 b 25

c 50 d -25

50. The maximum value of z= 4x+2y subjected the constrains 2x+3y≤18,x+y≥10,x,y≥0

a 20 b 36

c 40 d None of these