GGSIPU Mathmatics 2004

1. If the angles between the pair of straight lines represented by the equation

$$X^2 - 3xy + \lambda y^2 + 3x - 5y + 2 = 0 \text{ is } \tan^{-1}\frac{1}{3}.$$

Where' λ' is a non-negative real number,then λ is :

a 2 b 0

c 3 d 1

2. The distance of the line 2x-3y = 4 from the point 1,1 measurırd parallel tothe line x+y = 1 is :

a $\sqrt{2}$ b 5/ $\sqrt{2}$

c 1 /$\sqrt{2}$ d 6

3. The equations of bisectors of the angles between the lines | x | = | y | are :

a y= $\pm$x and x=0

b x $=\frac{1}{2}$ and y = $\frac{1}{2}$

c y =0 and x =0

d none of these

4. The base of vertices of an isosceles triangle PQR are Q 1,3 and R -2,7.The vertex p can be :

a 1,6., b $\frac{1}{2}$, 5

c $\frac{5}{6}$, 6 d none of these

5. The normal at the point 3,4 on a circle cuts the circle at the point -1,-2.Then the equation of the circle is :

a $x^2 + y^2 + 2x - 2y - 13 = 0$

b $x^2 + y^2 - 2x - 2y - 11 = 0$

c $x^2 + y^2 - 2x + 2y + 12 = 0$

d $x^2 + y^2 - 2x - 2y + 14 = 0$

6. If cos P = $\frac{1}{7}$ and cos Q = $\frac{13}{14}$, where 'P' and 'Q' both are acute angles. Then the value of P-Q is :

a 30^0 b 60^0

c 45^0 d 75^0

7. The equation 3 cos x + 4 sin x = 6 has …….. solution

a finite b infinite

c one d no

8. If $\sec^{-1} x = \text{cosec}^{-1} y$,then $\cos^{-1}\frac{1}{x} + \cos^{-1}\frac{1}{y}$ is equal to :

a π b $\pi/4$

c $-\pi/2$ d $\pi/2$

9. If ‘n’ be any integer ,then nn+1 2n+1 is :

a odd number b integral multiple of 6

c perfect square d does not necessarily have any of the foregoing proof

10. If $\tan\theta = -\frac{4}{3}$, than the value of $\sin\theta$ is :

a $-\frac{4}{5}$ but $\neq \frac{4}{5}$ b $-\frac{4}{5}$ or $\frac{4}{5}$

($\frac{4}{5}$ but $\neq -\frac{4}{5}$ d $\frac{1}{5}$

11. If $c = 2\cos\theta$,then the value of the determinant $\Delta = \begin{vmatrix} c & 1 & 0 \\ 1 & c & 1 \\ 6 & 1 & c \end{vmatrix}$ is :

a $\frac{\sin 4\theta}{\sin\theta}$ b $\frac{2\sin^2 2\theta}{\sin\theta}$

c $4\cos^2\theta\ 2\cos\theta - 1$ d none of these

12. the set of values of x for which the inequality $|x-1| + |x+1| < 4$ always holds true is :

a -2,2 b $-\infty,2 \cup 2, \infty$

c $-\infty,1] \cup [1,\infty$ d none of these.

13. The equation of the parabola whose vertex is -1,-2, axis is vertical and which passes through the point 3,6,is :

a $x^2 + 2x - 2y - 3 = 0$

b $2x^2 = 3y$

c $x^2 - 2x + 2y - 3 = 0$

d $x^2 - 2x - 2y - 3 = 0$

14. The length of the axis of the conic $9x^2+4y^2-6x+4y+1 = 0$ are :

a $\frac{1}{2}, 9$ b $3, \frac{2}{5}$

(c) , $\frac{2}{3}$ d 3,2

15. If fx = cot $^{-1}\left(\frac{3x-x^3}{1-3x^2}\right)$ and gx = co s$^{-1}\left(\frac{1-x^2}{1+x^2}\right)$, then $\lim_{x\to a}\frac{f(x)-f(a}{g(x)-g(a}$,$0<a<\frac{1}{2}$, is :

a $\frac{3}{2(1+a^2)}$ b $\frac{3}{2(1+x^2)}$

c $\frac{3}{2}$ d $-\frac{3}{2}$

16. If f(x = $\begin{cases} x, & 0 \le x \le 1 \\ 2x-1 & 1<x \end{cases}$ then :

a f is discontinuous at x = 1

b f is differentiable at x = 1

c f is continuous but not differentiable at x = 1

d none of these

17. $\lim_{x\to -2} \frac{\sin^{-1}(x+2)}{x^2+2x}$ is equal to :

a 0 b ∞

c $-\frac{1}{2}$ d none of these

18. Let fx = x ^{p} cos $\frac{1}{x}$, when x $\neq$ 0 and f(x = 0,when x = 0.then f(x will be differentiable at x = 0,if :

a p > 0 b p > 1

c 0 <p < 1 d $\frac{1}{2}$ < p < 1

19. The derivative of f(x = 3 |2+x| atv the point x_0 = -3 is :

a 3 b -3

c 0 d none of these

20. Derivative of the function f(x = $\log 5 (\log 7x)$, x>7 is :

a $\frac{1}{x \log 5)(log 7)(log_7 x)}$

b $\frac{1}{x (\log 5)(log 7)}$

c $\frac{1}{x \log x)}$

d none of these

21. If z = x+iy , $z^{1/3}$ = a – ib,then $\frac{x}{a}$ - $\frac{y}{b}$ = k a ^{2} – b^2, where k is equal to :

a 1 b 2

c 3 d 4

22. The number of real solutions of the equation 1+|e^x – 1 |= e^x e ^{x} – 2 is :

a 1 b 2

c 4 d 8

23. The points of extrema of f(x= $\int_0^x \frac{\sin t}{t}$ dt in a domain x>0 are :

a 2n+1 $\frac{\pi}{2}$, n = 1,2,.....

b 4n+1 $\frac{\pi}{2}$, n = 1,2,.....

c 2n+1 $\frac{\pi}{4}$, n = 1,2,.....

d n π,n =1,2,......

24. If i=x^2 + y^2 and x=s+3t,y=2s-t,then $\frac{d^e u}{ds^2}$ is equal to :

a 12 b 10

c 32 d 36

25. If the equation x^2+qx+p = 0 have a common root then p+q+1 is equal to :

a 0 b 1

c 2 d -1

26. The value of aa $\geq$b for which the sum of the cubes of the roots of x ^{2}- a -2 x+ a -3 =0 assumes the last value is :

a 3 b 4

c 5 d none of these

27. Let z_1,z_2,z_3 be three vertices of an equilateral triangle circumscribing the circle |z| = $\frac{1}{2}$. If z_1 = $\frac{1}{2}$ + $\frac{i\sqrt{3}}{2}$ and z_1,z_2,z_3 were in anticlockwise sense,then z_2 is :

a 1+ $\sqrt{3i}$ b 1- $\sqrt{3i}$

c 1 d -1

28. If z=$\frac{-2}{1+\sqrt{3i}}$, then the value of arg z is :

a π b $\pi/3$

c 2 $\pi/3$ d $\pi/4$

29. Let ω is an imaginary cube roots of unity ,then the value of

21+ ω 1+ ω^2 + 3 2 ω+1 2 ω^2+1 + ...+ n+1 n ω+1 n ω^2 + 1 is :

a $\left[\frac{n(n+1)}{2}\right]^2 + n$ (b $\left[\frac{n^2(n+1)^2}{4}\right]$

c $\left[\frac{n(n+1)}{2}\right]^2 - n$ d none of these

30. The locus of the point z satisfying arg $\left[\frac{z-1}{z+1}\right]$ = k,(where k is non zero is :

a a circle with centre on y-axis

b circle with centre on x-axis

c a straight line parallel to x- axis

d a straight line making an angle 60^0 with the x-axis

31. If 3,4,5,Q(4,6,3,R -1,2,4,s1,0,5,then the projection of RS on PQ is :

a -2/3 b -4/3

c ½ d 2

32. If a line makes α,β,γ with the positive direction of x,y,z-axes respectively.Then $\cos^2\alpha+\cos^2\beta+\cos^2\gamma$ is equal to :

a ½ b -1/2

c -1 d 1

33. The projection of a line on co-ordinate axes are 2,3,6.Then the length of the line is :

a 7 b 5

c 1 d 11

34. The decimal equivalent of the binary number 10011.1 is :

a 19.50 b 11001.11

c 5005.55 d 19.10

35. The binary represents of 60 is :

a 101110 b

111100

c 110011 d

110000

36. Which of the following statement is not tautology ?

a ~p q p

b p q p

c q ~ p q

d ~p q ∩ ~p p

37. The period of f(x = sin $\left(\frac{rx}{n-1}\right)$ + cos$\left(\frac{rx}{n}\right)$, n ∈ z,n>2 is :

a 2rn n -1

b 4nn -1

c 2nn -1

d none of these

39. The radius of the circle whose arc of length 15 km makes an angle of $\frac{3}{4}$ radian at the centre ,is :

a 10 cm

b 20 cm

c 11 $\frac{1}{4}$ cm

d 22 $\frac{1}{2}$ cm

40. If f_n x = e f_{n-1} ^{x} ,for all n ∈ N and f_0 x = x,then $\frac{d}{dx}$\{f_n x\} is equal to :

a f $_n$ x f $_{n-1}$ x

b f $_n$ x $\frac{d}{dx}$\{f_{n+1} 9x\}

c f_n x f $_{n-1}$ x

....f_2 x f $_1$ x d none of these

41. if $3^x + 2^{2x} \geq 5^x$, then the solution set for x is :

a - ∞,2]

b [2, ∞

c [0,2]

d {2}

42. The number of integral solution of $\frac{x+1}{x^{2+2}} > \frac{1}{4}$ is :

a 1

b 2

c 5

d none of these

43. The value of k for which the equation k -2 x ^{2} + 8x + k +4 = 0 has both real,distinct and –ve,is :

a 0

b 2

c 3

d -4

44. The triangle PQR of which the angles P,Q,R satisfy cos P = $\frac{\sin Q}{2 \sin R\, is}$:

a equilateral

b right angled

c any triangle

d isosceles

45. If fx = a -x^{n} $^{1/n}$, where a>0 and n is a positive integer , then f[f x] is equal to :

a x ^{3}

b x ^{2}

c x

d none of tese

46. The function f(x = [x] ^{2} – [x^{2}] where [y] is the gretest integer less then or equal to y is discontinuous at :

a all integers

b all integers except 0 and 1

c all integers except 0

d all integers except 1

47. the function f(x) = | px-q | + r | x |, x ∈ (-∞,∞) where p>0,q.0,r>0 assumes its maximum value only at one point,if :

a p ≠q b q≠r

c r ≠p d p=q=r

48. A function f(x) = $\frac{x^2-3x+2}{x^2+2x-3}$ is :

a maximum at x= -3

b maximum at x= -3 and maximum at x= 1

c maximum at x= 1

d function is increasing in its domain

49. The locus of the point p(x,y) satisfying the relation

$$\sqrt{(x-3)^2+(y-1)^2} + \sqrt{(x+3)^2+(y-1)^2} = 6 \text{ is}$$

a Straight line
b Pair of straight lines
c Circle
d Ellipse

50. If z_1 , z_2 and z_3 are complex number such that $|z_1| = |z_2| = |z_3| = \left|\frac{1}{z_1}+\frac{1}{z_2}+\frac{1}{z_3}\right| = 1$ then $|z_1 + z_2 + z_3|$ is :

a equal to 1

b less than 1

c greater than 3

d equal to 3

51. Let a_1,a_2,a_3 be any positive real numbers , then which of the following statement is not true ?

a $3a_1a_2a_3 \leq a_1^3 + a_2^3 + a_3^3$

b $\frac{a_1}{a_2} + \frac{a_2}{a_3} + \frac{a_3}{a_1} \geq 3$

c $a_1a_2a_3 \left(\frac{1}{a_1} + \frac{1}{a_2} + \frac{1}{a_3}\right) \geq 9$

d $a_1a_2a_3 \left(\frac{1}{a_1} + \frac{1}{a_2} + \frac{1}{a_3}\right)^3 \leq 27$

52. If ab = 2a +3b,a>0,b<0,then the minimum value of ab is :

a 12

b 24

c $\frac{1}{4}$

d none of these

53. Let N be +ve integer $\neq$ 1, then none of the numbers 2,3,…,N is divisor of N ! -1.So we can conclude that N! -1 is :

a prime number

b at least one of this number N+1, N+2,….,N ! – 2 is divisor of N! – 1

c The smallest numbers between N and N ! which is divisor of N ! -1 is pr ime number

d none of these

54 . If f(x = cos [π^2] x+cos [- π^2] x,then :

a f $\pi/4$=2

b f $-\pi$=2

c f π = 1

d f π/2= -1

55. let fx = $\frac{x^2-4}{x^2+4}$, for |x| > 2,then the function f : $-\infty$,-2] $\cup$ [2,∞ $\rightarrow$ -1,1 is :

a one - one into b one -one onto

c many - one into d many-one onto

56. The function f(x = sin log x+ $\sqrt{x^2+1}$ is :

a even function b odd function

b neither even nor odd d periodic funnction

57. The range of f(x = sec $\left(\frac{\pi}{4}\cos^2 x\right)$, $-\infty < x < \infty$ is :

a [1, $\sqrt{2}$]

b [1,∞

c [$-\sqrt{2}$,-1] $\cup$ [1,$\sqrt{2}$] d $-\infty$,1] $\cup$ [1,∞

58. For any three sets A_1 ,A_2,A_3.Let $B_1 = A_1$,$B_2 = A_2-A_1$ and $B_3 = A_3 - A_1 \cup A_2$,then which of the following statement is always true ?

a $A_1 \cup A_2 \cup A_3 \supset B_1 \cup B_2 \cup B_3$

b $A_1 \cup A_2 \cup A_3 = B_1 \cup B_2 \cup B_3$

c $A_1 \cup A_2 \cup A_3 \subset B_1 \cup B_2 \cup B_3$

d none of these

59. the domain of the function f(x = $\frac{\sin^{-1}(3-x)}{\log(|x|-2)}$ is :

a [2,4]

b 3,4]

c [2, ∞

d - ∞,3 $\cup$ [2,∞

60. The remainder obtained when 1! + 2! + …. + 200! Is divided by 14 is :

a 3

b 4

c 5

d none of these