GGSIPU Mathematics 2005

1. The equation of the plane through the intersection of the planes x+y+z = 1 and 2x+3y-z+4 = 0 and parallel to x-axis is :

a y -3z+6 = 0 b 3y -z+6 = 0

c y+3z+6 = 0 (d) 3y-2z+6 = 0

2. The distance of the point 3,8,2 from the line $\frac{x-1)}{2} = \frac{y-3)}{4} = \frac{y-2)}{3}$ measured parallel to the plane 3x+2y-2z+15 = 0 is :

a 2 b 3

c 6 d $\frac{19}{2}$

3. Let 3,4, -1 and -1,2,3 are the end points of a diameter of sphere.Then the redius of the sphere is equal to :

a 1 b 2 c 3 d 9

4. If A,B,C,D are the points 2,3, -1,3,5, -3,1,2,3,3,5,7respectively,Then the angle between AB and CD is :

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

(c) $\frac{\pi}{4}$ d $\frac{\pi}{6}$

5. If u = log $\left(\frac{x^2+y^2}{x+y}\right)$, then the value of $x\frac{\partial u}{\partial x} + y\frac{\partial u}{\partial y}$ is :

a -1 b 0

c 1 d 2

6. A five digits number is formed by writing the digits 1,2,3,4,5 in a random order without repetitions.Then the probability that the number is divisible by 4,is :

a3/5 b 18/5

c 1/5 d 6/5

7. Two persons A and B takes turns In throwing a pair of dice.The first person to throw 9 from both dice will be awarded the price.If A throws first,then the probability that B wins the game ,is :

a 9/17 b 8/17

c 8/9 d 1/9

8. The probability that in year of the 22nd century chosen at random,then there will be 53 Sundays,is :

a 3/28 b 2/28

c 7/28 d 5/28

9. The standard deviation of a variable x is 10.Then the standard deviation of 50+5x is :

a 50 b 550

c 10 d 0.98

10. The octal equivalent of the decimal number 0.3125 is :

a 0.24 b 0.42

c 0.39 d 0.98

11. The hexadecimal equivalent of the binary number 111100001010001 is

a 15C3 b C351

c 3C51 d C315

12. A real value of x will satisfy the equation $\left(\frac{3-4ix}{3+4ix}\right) = \alpha - i\beta$ α and β are real,If :

a $\alpha^2 - \beta^2 = -1$ b $\alpha^2 - \beta^2 = 1$

c $\alpha^2 + \beta^2 = 1$ d $\alpha^2 - \beta^2 = 2$

13. If ω is a complex cube root of unity,then the value of

$\frac{p+q\omega+r\omega^2}{r+p\omega+q\omega^2} + \frac{p+q\omega+r\omega^2}{q+r\omega+p\omega^2}$ p,q,r $\in$ R is equal to :

a 0 b 1

c -1 d 2

14. If P,Q,R,S are represented by the complex numbers 4 + I,1 + 6 I,-4 + 3i,-1 -2i respectively,then PQRS is a :

a rectangle b square

c rhombus d parallelogram

15. If n is a positive integer,then $1+i^n + 1 - i^n$ is equal to :

a $\sqrt{2}^{\,n-2} \cos\left(\frac{n\pi}{4}\right)$

b $\sqrt{2}^{\,n-2} \sin\left(\frac{n\pi}{4}\right)$

c $\sqrt{2}^{\,n+2} \cos\left(\frac{n\pi}{4}\right)$

d $\sqrt{2}^{\,n+2} \sin\left(\frac{n\pi}{4}\right)$

16. The number of ways in which 9 persons can be divided into three equal groups is :

a 1680 b 840

c 560 d 280

17. A dictionary is printed consisting of 7 letters words only that can be made with a letters of the word CRICKET.If the words are printed are alphabetical order is an ordinary dictionary,then the number of words are before the word CRICKET is :

a 530 b 480

c 531 d 481

18. If the sum of the coefficient in the expansion of x+y ^{n} is 1024, then the value of the greatest coefficient in the expansion is :

a 356 b 252

c 210 d 120

19. The value of the determinant

$$\begin{vmatrix} 10! & 11! & 12! \\ 11! & 12! & 13! \\ 12! & 13! & 14! \end{vmatrix}$$ **is :**

a 2 10 ! 11 ! b 2 10 ! 13 !

b 2 10 ! 11 ! 12 ! d 2 11 ! 12 ! 13 !

20. If A and B are 3x3 matrices such that AB = B and BA = A,than :

a $A^2 = A$ and $B^2 \neq B$

b $A^2 \neq A$ and $B^2 = B$

c $A^2 = A$ and $B^2 = B$

d $A^2 \neq A$ and $B^2 \neq B$

21. If the points $x x_1, y_1$,;,(x_2, y_2) and x_3, y_3 are collinear,then the rank of the matrix

$$\begin{bmatrix} x_1 & y_1 & 1 \\ x_2 & y_2 & 1 \\ x_3 & y_3 & 1 \end{bmatrix}$$ will always be less than :

a 2 b 3

c 1 d none of these

22. The system of equations; x+y+z = 6,x+2y+3z = 10,x+2y+λ z = 6 has number solution for :

a $\lambda = 3, \mu = 10$ b $\lambda = 3, \mu \neq 10$

c $\lambda \neq 3, \mu \neq 10$ d none of these

23. If A = $\begin{vmatrix} \sin(\theta+\alpha & \cos(\theta+\alpha) & 1 \\ \sin(\theta+\beta & \cos(\theta+\beta) & 1 \\ \sin(\theta+\gamma & \cos(\theta+\gamma) & 1 \end{vmatrix}$ Then :

a A=0 for all θ

b A is a odd function of θ

c A=0 for $\theta=\alpha+\beta+\gamma$

d A is a independent of θ

24. An investigator interviewed 100 students to determine the performance of three drinks milk,coffy and tea;20 students take milk and coffee ,30 students take coffee and tea,25 students take milk and tea,12 students take milk only,5 students take coffee only and 8 students take tea only.Then the number of students who did not take any drinks any of three,is :

a 10 b 20

c 25 d 30

25. Let Y={1,2,3,4,5} , A={1,2}, B={3,4,5} and ϕ denots null set.If AxB denotes Cartesian product of the sets A and B,then YxA $\cap$ yxB is :

a Y b A

b B d ϕ

26. let A={2,3,4,5,……..,16,17,18}.Let $\approx$ be the equivalence relation on AxA Cartesian product of A and A,defined by a,b $\approx$ c,d if ad=bc,then the number of ordered pairs of the equivalence class of 3,2 is :

a 4   b 5   c 6   d 7

27. A question 'who have studied Physics?' was asked to three students A,B and C.The question was answered correctly as it is true that If A studied Physics,then B also studied Physics but it is false statement that if C studied Physics,then B also studied physics.Then physics was studied by :

a both A and B   b only A

c only B   d only C

28. If a,b be two fixed positive integers such that f(a+x=b+[b ^{3} +1 -3b^2 f x + 3b{f x} – {f(x] ^{3}]$^{1/3}$ for all real x,then f(x is a periodic function with period :

a a   b 2a

c l b   d 2b

29. The domain of the function f(x = log $_3$ + x $x^2 - 1$ is :

a -3,-1 ∪ 1, ∞

b [-3,-1] ∪ [1,∞

c -3,-2 ∪ -2,-1 ∪ 1, ∞

d [-3,-2 ∪ -2,-1 ∪ 1, ∞

30. The value of cot70^0+4cos 70^0 is :

a 1/ $\sqrt{3}$ b $\sqrt{3}$

c 2 $\sqrt{3}$ d ½

31. The equation of sinx+siny+sinz = -3 for 0≤x≤2 π, 0≤y≤2 π,0≤z≤2 π has :

a one solution

b two sets of solution

c four sets of solution

d no solution

32. If θ = sin^{-1} x+= cos^{-1} x- tan^{-1} x,x ≥ 0 then the smallest interval in which θ lies is :

a $\frac{\pi}{2}$≤θ≤$\frac{3\pi}{4}$ b 0 ≤θ≤$\frac{\pi}{4}$

c - $\frac{\pi}{4}$≤θ≤0   d $\frac{\pi}{4}$≤θ≤$\frac{\pi}{2}$

33. Let A,B and C are the angles Of a plain triangle and $\tan\left(\frac{A}{2}\right) = \frac{1}{3}$,$\tan\left(\frac{B}{2}\right) = \frac{2}{3}$. Than $\tan\left(\frac{C}{2}\right)$ is equal to :

a 7/9 b2/9 c 1/3 d 2/3 2/3

34. If α,β $\alpha\neq\beta$ satisfies the question a cos θ + b sin θ=c,then the value of tan $\left(\frac{\alpha+\beta}{2}\right)$ is :

a b/a b c/a c a/b d c/b

35. A ray of light passing through the point 1,2 is reflected on the x -axis at a point P and passes through the point 5,3,then the abscissa of a point P is :

a 3 b 13/3

c 13/ 5 d 13/4

36. The equation $4x^2$-24 x y+11 y^2 = 0 represents :

a two parallel lines

b two perpendicular lines

c two lines through the origin

d a circle

37. The length of the chord joining the points in which the straight line $\frac{x}{3} + \frac{y}{4}$ = 1 cuts the circle x^2+y^2 = $\frac{169}{25}$ is :

a 1 b 2

c 4 d 8

38. The normal to the parabola y^2=8x at the point 2,4 meets the parabola against the point :

a -18,-12 b -18,12

c 18,12 d 18, -12

39. If a bar of given length moves with its extremities on two fixed straight lines at right angles,then the locus of any point on bar marked on the bar describes a/an :

a circle b parabola

c ellipse d hyperbola

40. The straight line x+y=$\sqrt{2}$p will touch the hyperbola $4x^2$-$9y^2$=36 if :

a p2= 2 b p^2=5

c $5p^2 = 2$ d $2p^2 = 5$

41. The function f(x = $\frac{1-\sin x+\cos x}{1+\sin x+\cos x}$ is not defined at x=π.The value of f(π,so that fx is continuous at x=π,is :

a -1/2 b ½

c -1 d 1

42. If fx=$\sin^2 x$and the composite function gf(x = | sin x | ,then the function gx is equal to :

a $\sqrt{x-1}$ b $\sqrt{x}$

c $\sqrt{x+1}$ d - $\sqrt{x}$

43. Area of the figure bounded by the curves y= | x-1 | and y= 3 - | x | is :

a 1 sq. units b 2 sq.units

c 3 sq. units d 4 sq. units

44. Let x=$\left[\frac{a+2b}{a+b}\right]$ and y=$\frac{a}{b}$, where a and b are positive integers.If $y^2>2$,then :

a $x^2\leq 2$ b $x^2 < 2$

c $x^2>2$ d $x^2\geq 2$

45. $\int_0^1 tan^{-1}\left(\frac{1}{x^2-x+1}\right)$ dx is :

a log 2 b -log 2

c $\frac{\pi}{2}$ + log 2 d $\frac{\pi}{2}$ - log 2

46. The curves x=log y+e and y= log $\left(\frac{1}{x}\right)$:

a do not meet

b meet at one point

c meet at two points

d meet at more than two points

47. $\lim_{x\to 0}\frac{\cos(\sin x)-1}{x^2}$ equals :

a 0 b -1

c ½ d -1/2

48. Let $\vec{a}$, $\vec{b}$, $\vec{c}$ be three vectors from $\vec{a} \times \vec{b} \times \vec{c} = \vec{a} \times \vec{b} \times \vec{c}$ if :

a $\vec{b} \times (\vec{a} \times \vec{c}) = 0$ b $\vec{a}(\vec{b} \times \vec{c}) = 0$

c $\vec{c} \times \vec{a} = \vec{a} \times \vec{b}$ d $\vec{c} \times \vec{b} = \vec{b} \times \vec{a}$

49. If $\hat{\imath}, \hat{\jmath}, \hat{k}$ are units vectors and $|\vec{a}|$ = a, then the value of

$$|\hat{\imath} \times \vec{a}|^2 + |\hat{\jmath} \times \vec{a}|^2 + |\hat{k} \times \vec{a}|^2 \text{ is :}$$

a a^2 b $3a^2$ c $2a^2$ d $4a^2$

50. If the area above the x-axis bounded by the curves $y = 2^{kx}$ and x = 0 and x = 2 is $\frac{3}{\log 2}$, then the value of k is :

a ½ b 1 c -1 d 2

51. The value of $\int_a^b \frac{x}{|x|}$ dx, a<b<0 is :

a $-|a| + |b|$ b $|b| - |a|$

c $|a| - |b|$ d $|a| + |b|$

52. The value of

$$\int_{-2}^{2}\left[p \log\left(\frac{1+x}{1-x}\right) + q \log\left(\frac{1-x}{1+x}\right)^{-2} + r\right] dx \text{ depends on:}$$

a The value of p
b The value of q
c The value of r
d The value of p and q

53. A curve having the condition that the slope of tengent at some point is two times the slope of the straight line joining the same point to the oigin of co-ordinates, is a/an :

a circle b ellipse

c parabola d hyperbola

54. If a is an arbitrary constant, then solution of differential equation

$$\frac{dy}{dx} + \sqrt{\frac{1-y^2}{1-x^2}} = 0 \text{ is :}$$

a $X\sqrt{1-y^2}$ + y $\sqrt{1-x^2}$ = a

b $y\sqrt{1-y^2}$ + x $\sqrt{1-x^2}$ = a

c $X\sqrt{1-y^2}$ - y $\sqrt{1-x^2}$ = a

d $y\sqrt{1-y^2}$ - x $\sqrt{1-x^2}$ = a

55. A particle is moving along the curve x=a t^2 + b t + c.If a c = b^2,then the particle would be moving with uniform :

a rotation b velocity

c acceleration d retardation

56. The solution of the equation $x^2\frac{d^2y}{dx^2}$ = log x when x=1,y=0 and $\frac{dy}{dx}$ =-1 is :

a $\frac{1}{2}$log x ^{2} + log x

b $\frac{1}{2}$(log x ^{2} - log x

c - $\frac{1}{2}$log x ^{2} + log x

d - $\frac{1}{2}$log x ^{2} - log x

57. Let the unit vectors $\vec{a}$ and $\vec{b}$ be the perpendicular to each other and the unit vector $\vec{c}$ be inclined at an angle θ to both $\vec{a}$ and $\vec{b}$.If $\vec{c}$ = α $\vec{a}$ + β $\vec{b}$ + γ $\vec{a}.\vec{b}$, where α,β,γ are scalars,then :

a α=cot θ, β=sin θ,γ^2=cos 2 θ

b α=cos θ, β=cos θ,γ^2=cos 2 θ

c α=cos θ, β=sin θ,γ^2=cos 2 θ

d α=sin θ, β=cos θ,γ^2= - cos 2 θ

58. If y = $\frac{1}{\sqrt{a^2-b^2}}$ $\cos^{-1}\left[\frac{a\cos(x-\alpha)+b}{\theta}\right]$ where θ = a+b cosx -α,then $\frac{dy}{dx}$ is equal to :

a 1/ θ b 2/ θ

c 1/ θ^2 d 2/ θ^2

59. Let K be a set of real number and f:K $\rightarrow$ R such that for all x any y | f(x – f(y | $\leq$ | x-y $|^5$. If f(3 = 7, then the value of f(9 is equal to

a 5 b 7

c 9 d 11

60. If f(x = $\frac{1}{1-x}$ then the darrivative of the composite function f [f { f(x }]   is equal to :

a 0   b ½

c 1   d 2