VITEEE Mathematics 2012

1. The function f:R → R defined by f(x) = (x-1) (x-2) (x-3)is

   (a) one-one but not onto

   (b) onto but not one-one

   (c) both one-one and onto

   (d) neither one-one nor onto

2. If the complex numbers z_1,z_2 and z_3 are in AP, then they lie on a

   (a) a circle (b) a parabola

   (c) line (d) ellipse

3. Let a,b and c be in AP and | a | < 1, | b | < 1, | c | < 1. If $x=1+a+a^2+\ldots$ to ∞,

   $Y= 1+b+b^2+\ldots$ to ∞,

   $Z= 1+c+c^2+\ldots$ to ∞, then x,y and z are in

   (a) AP (b) GP

   (c) HP (d) None of these

4. The number of real solutions of the equation $\left(\frac{9}{10}\right) = -3+x-x^2$ is

   (a) 0 (b) 1

   (c) 2 (d) None of these

5. The lines 2x-3y-5 = 0 and 3x-4y = 7 are diameters of a circle of area 154 sq units, then the equation of the circle is

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

6. The angle of depressions of the top and the foot of a chimney as seen from the top of a second chimney, which is 150 m high and standing on the same level as the first are θ and ϕ respectively, then the distance between their tops when $\tan\theta = = \frac{4}{3}$ and $\tan\phi = \frac{5}{2}$ is

(a) $\frac{150}{\sqrt{3}}$ m (b) $100\sqrt{3}$ m

(c) 150 m (d) 100 m

7. If one root is square of the other root of the equation $x^2+px+q = 0$, then the relations between p and q is

(a) $p^3-(3p-1)q+q^2 = 0$

(b) $p^3-q(3p+1)+q^2=0$

(c) $p^3+q(3p-1)+q^2 = 0$

(d) $p^3+q(3p+1)+q^2 = 0$

8. The coefficient of x^{53} in the following expansions $\sum_{m=0}^{100} 100_{C_m} (x-3)^{100-m} . 2^m$ is

(a) $100_{C_{47}}$ (b) $100_{C_{53}}$

(c) $-100_{C_{53}}$ (d) $-100_{C_{100}}$

9. if (-3,2) lies on the circle $x^2+y^2+2gx+2fy+c = 0$, which is concentric with the circle $x^2+y^2+6x+8y-5 = 0$, then c is equal to

(a) 11 (b) -11 (c) 24 (d) 100

10. If a=i+j+k, b=i+3j+5k and c=7i+9j+11k, then the area of parallelogram having diagonals a+b and b+c is

(a) $4\sqrt{6}$ (b) $\frac{1}{2}\sqrt{21}$ sq units

(c) $\frac{\sqrt{6}}{2}$ (d) $\sqrt{6}$ sq units

11. If A = $\begin{bmatrix} 1 & -5 & 7 \\ 0 & 7 & 9 \\ 11 & 8 & 9 \end{bmatrix}$, then trace of matrix A is

(a) 17 (b) 25 (c) 3 (d) 12

12. The value of the determinant $\begin{vmatrix} \cos\alpha & -\sin\alpha & 1 \\ \sin\alpha & \cos\alpha & 1 \\ \cos(\alpha+\beta) & -\sin(\alpha+\beta) & 1 \end{vmatrix}$ is

(a) independent of α

(b) independent of β

(c) independent of α and β

(d) None of the above

13. The maximum value of $4\sin^2 x - 12 \sin x + 7$ is

(a) 25 (b) 4 (c) does not exist (d) None of these

14. A straight line through the point A(3,4) is bisected at A. Its equation is

(a) 3x-4y+7=0 (b) 4x+3y=24

(c) 3x+4y=25 (d) x+y=7

15. The tangent at (1,7) to the curve $x^2 = y-6$ touches the circle $x^2+y^2+16x+12y+c = 0$ at

(a) (6,7) (b) (-6,7)

(c) (6,-7) (d) (-6,-7)

16. The equation of straight line through the intersection of the lines x-2y =1 and x+3y=2 and parallel to 3x+4y=0 is

(a) 3x+4y+5=0

(b) 3x+4y-10=0

(c) 3x+4y-5=0

(d) 3x+4y+6=0

17. $\int \frac{dx}{\sin x - \cos x + \sqrt{2}}$ equals to

(a) $\frac{1}{\sqrt{2}} \tan\left(\frac{x}{2} + \frac{\pi}{2}\right) + C$

(b) $\frac{1}{2} \tan\left(\frac{x}{2} + \frac{\pi}{2}\right) + C$

(c) $\frac{1}{\sqrt{2}} \cot\left(\frac{x}{2} + \frac{\pi}{2}\right) + C$

(d) $-\frac{1}{\sqrt{2}} \cot\left(\frac{x}{2} + \frac{\pi}{2}\right) + C$

18. The value of integral $\int_0^1 \sqrt{\frac{1-x}{1+x}}\, dx$ is

(a) $\frac{\pi}{2} + 1$ (b) $\frac{\pi}{2} - 1$

(c) -1 (d) 1

19. The value $I = \int_0^1 x \left|x - \frac{1}{2}\right| dx$ is

(a) $\frac{1}{3}$ (b) $\frac{1}{4}$

(c) $\frac{1}{8}$ (d) None of these

20. The eccentricity of the ellipse, which meets the straight line $\frac{x}{7}+\frac{y}{2}=1$ on the axis of y and whose axes lie along the axes of coordinates, is

(a) $\frac{3\sqrt{2}}{7}$ (b) $\frac{2\sqrt{6}}{7}$

(c) $\frac{\sqrt{3}}{7}$ (d) None of the above

21. If $\frac{x^2}{a^2}+\frac{y^2}{b^2}=1$ (a>b) and $x^2-y^2 = c^2$ cut at right angles, then

(a) $a^2+b^2 = 2c^2$

(b) $b^2-a^2 = 2c^2$

(c) $a^2-b^2= 2c^2$

(d) $a^2b^2 =2c^2$

22. The equation of the conic with focus at (1,-1) directrix along x-y+1 = 0 and with eccentricity $\sqrt{2}$, is

(a) $x^2-y^2 = 1$ (b) xy =1

(c) 2xy-4x+4y+1 = 0

(d) 2xy+4x-4y-1 =0

23. There are 5 letters and 5 different envelopes. The number of ways in which all the letters can be put in wrong envelope, is

(a) 119 (b) 44 (b) 59 (d) 40

24. The sum of the series $1+\frac{1^2+2^2}{2!}+\frac{1^2+2^2+3^2}{3!}+\frac{1^2+2^2+3^2+4^2}{4!}+\ldots$is

(a) 3e (b) $\frac{17}{6}$e

(c) $\frac{13}{6}$e (d) $\frac{19}{6}$e

25. The coefficient of x^n in the expansion of $\log_a(1+x)$ is

(a) $\frac{(-1)^{n-1}}{n}$ (b) $\frac{(-1)^{n-1}}{n}\log_a e$

(c) $\frac{(-1)^{n-1}}{n}\log_a a$ (d) $\frac{(-1)^{n}}{n}\log_a e$

26. If a plane meets the coordinate axes at A,B ankd C in such a way that the centroid of ΔABC is at the point (1,2,3), then equation of the plane is

(a) $\frac{x}{1}+\frac{y}{2}+\frac{z}{3}=1$ (b) $\frac{x}{3}+\frac{y}{6}+\frac{z}{9}=1$

(c) $\frac{x}{1}+\frac{y}{2}+\frac{z}{3}=\frac{1}{3}$ (d) None of these

27. Area lying in the first quadrant and bounded by the circle $x^2+y^2 = 4$, the line $x=\sqrt{3}y$ and x-axis is

(a) π sq units (b) $\frac{\pi}{2}$ sq units

(c) $\frac{\pi}{3}$ sq units (d) None of these

28. The value of $\lim_{x\to\infty}\left(\frac{\pi}{2}-tan^{-1}x\right)^{1/x}$ is

(a) 0 (b) 1 (c) -1 (d) e

29. If $f(x) = \begin{cases} mx+1, & x\le\frac{\pi}{2} \\ \sin x+n, & x\le\frac{\pi}{2} \end{cases}$ is continuous at $x=\frac{\pi}{2}$, then

(a) m=1,n=0 (b) $m=\frac{n\pi}{2}+1$

(c) $n=m\frac{\pi}{2}$ (d) $m=n=\frac{\pi}{2}$

30. The domain of the function $f(x) = \frac{\sqrt{4-x^2}}{sin^{-1}(2-x)}$ is

(a) [0,2] (b) [0,2]

(c) [1,2] (d) [1,2]

31. The general solution of the differential equation $(1+y^2)dx+(1+x^2)dy = 0$ is

(a) x-y = C (1-xy) (b) x-y = C (1+xy)

(c) x+y = C (1-xy) (d) x+y = C (1+xy)

32. The order and degree of the differential equation $\rho = \frac{\left[1+\left(\frac{dy}{dx}\right)^2\right]^{3/2}}{\frac{d^2y}{dx^2}}$ are respectively

(a) 2,2 (b) 2,3 (c) 2,1 (d) None of these

33. The relation R defined on the set of natural numbers as {(a,b) : a differes from b by 3} is given

(a) { (1,4), (2,5), (3,6), …}

(b) { (4,1), (5,2), (6,3), …}

(c) { (1,3), (2,6), (3,9), …}

(d) None of the above

34. The solution of the differential equation $\frac{dy}{dx}+\frac{2yx}{1+x^2}=\frac{1}{(1+x^2)^2}$ is

(a) $y(1+x^2) = C+\tan^{-1} x$

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

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

(d) $y(1+x^2) = C+\sin^{-1} x$

35. If x,y and z are all distinct and $\begin{vmatrix} x & x^2 & 1+x^3 \\ y & y^2 & 1+y^2 \\ z & z^2 & 1+z^3 \end{vmatrix} =)$, then the value of xyz is

(a) -2 (b) -1 (c) -3 (d) None of these

36. The probability that atleast one of the events A and B occurs is 0.6. If A and B occur simultaneously with probability 0.2, then $P(\bar{A}) + P(\bar{B})$ is

(a) 0.4 (b) 0.8

(c) 1.2 (d) 1.4

37. If 3p and 4p are resultant of a force 5p, then angle between 3p and 5p is

(a) $\sin^{-1}\left(\frac{3}{5}\right)$ (b) $\sin^{-1}\left(\frac{4}{5}\right)$

(c) 90^0 (d) None of these

38. If $2\tan^{-1}(\cos x) = \tan^{-1}(2 \operatorname{cosec} x)$, then the value of x is

(a) $\frac{3\pi}{4}$ (b) $\frac{\pi}{4}$

(c) $\frac{\pi}{3}$ (d) None of these

39. Let a be any element in a Boolean algebra B. If a+x =1 and ax=0, then

(a) x=1 (b) x=0

(c) x=a (d) x=a'

40. Dual of (x+y).(x+) = x+x . y+y is

(a) (x.y) + (x.0) = x.(x+y).y

(b) (x+y) + (x.1) = x.(x+y).y

(c) (x.y) (x.0) = x.(x+y).y

(d) None of the above