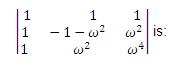
**IIT-JEE-Mathematics-Screening-2002**

**SCREENING**\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_   
  
**1.** Let ω=-1/2+i √3/2 . Then the value of the determinant   
  
         
  
(A) 3ω   
(B) 3ω(ω-1)   
(C) 3ω2   
(D) 3ω(1-ω)   
  
**2.** For all complex numbers z1,z2 satisfying |z1 |=12 and |z2-3-4i|=5, the minimum value of |z1-z2 | is:   
(A) 0   
(B) 2   
(C) 7   
(D) 17   
  
**3.** If a1 a2,…..,an are positive real numbers whose product is a fixed number c, then the minimum value of a1+a2+…+an-1+2an is   
  
(A)       n(2c)1/n   
(B)       (n+1)c1/n   
(C)       2nc1/n   
(D)       (n+1)(2c)1/n      
    
    
**4.**        Suppose *a, b, c* are I A.P. and *a2, b2, c2* are in G.P. If a<b<c  and  *a+b+c* =3/2, then the value of *a* is   
    
(A)       1/2√2   
(B)       1/ 2√3   
(C)       ½ - 1/√3   
(D)       ½ - 1/√3     
    
    
**5.**        The number of arrangements of the letters of the word BANANA in which the two N' s do not appear adjacently is   
(A)       40   
(B)       60   
(C)       80   
(D)       100   
    
    
    
**6.**         The sum   
  
     iit-question  
if p > q is maximum when m is   
(A)       5   
(B)       10   
(C)       15   
(D)       20   
    
    
**7.**        The number of values of k for which the system of equations   
(k+1)x + 8y=4k   
kx +(k+3)y = 3k -1    
has infinitely many solution is   
(A)       0   
(B)       1   
(C)       2   
(D)       Infinite   
 **8.**         The set of all real numbers x for which  x2 - |x+2| + x > 0 is   
(A)    (-∞, -2) υ (2, ∞)    
(B)    (-∞, -√2) υ (√2, ∞)    
(C)    (-∞, -1) υ (1, ∞)   
(D)    (√2, ∞)   
    
**9.**        The length of a longest interval in which the function  3sin x - 4sin3 x is increasing, is   
(A)   Π/3   
(B)   Π/2   
(C)   3Π/3   
(D)   Π   
    
**10.**       Which of the following pieces of data does NOT uniquely determine an acute-angled triangle ABC (R being the radius of the circumcircle)?   
(A)   a sin A, sin B   
(B)   a, b, c   
(C)   a, sin B, R   
(D)   a, sin A, R   
    
**11.**      The number of integral values of k for which the equation 7 cos x + 5 sin x = 2k + 1 has a solution is   
(A)       4   
(B)       8   
(C)       10   
(D)       12   
    
**12.**       Let 0 < α < Π/2 be a fixed angle. If P = ( cosθ, sinθ ) and Q = ( cos(α-θ), sin(α-θ) ) then Q is obtained from P by   
(A)       Clockwise rotation around origin through an angle α   
(B)       Anticlockwise rotation around origin through an angle α   
(C)       Reflection in the line through origin with slope tan α   
(D)       Reflection in the line through origin with slope tan α/2   
    
**13.**       Let P=(-1, 0) Q=(0, 0) R=(3, 3√3) be three points. Then the equation of the bisector of the bisector of the angle PQR is   
(A) √3/2 x+y=0   
(B) x+√3 y=0   
(C) √3 x+y=0   
(D) x+√3/2 y=0   
  
**14.**     A straight line through the origin O meets the parallel lines 4x + 2y = 9 and  
  2x + y + 6 = 0 at points P and Q respectively. Then the point O divides the segment PQ in the ratio   
(A)       1:2   
(B)       3:4   
(C)       2:1   
(D)       4:3   
    
**15.**      If the tangent at the point  P on the circle x2 + y2 + 6x + 6y = 2 meets the straight  line  5x + 2y = 6 at a point Q on the y-axis, then the length of PQ is   
(A)   4   
(B)   2√5   
(C)   5   
(D)   3√5   
    
**16.**       If a>2b>0 then the positive value of m for which y = mx - b√ (1 + m2 ) is a common tangent to x2+y2=b2 and (x- a)2+y2=b2  is   
(A)  2b/√(a2 - 4b2)   
(B)  √(a2 - 4b2)/2b   
(C)  2b/(a-2b)   
(D)   b/(a-2b)

**17.**       The locus of the mid-point of the line segment  joining the focus to a moving point on the parabola y2=4ax is another parabola with directrix   
(A)      x = -a   
(B)      x = -a/2   
(C)      x = 0   
(D)      x = a/2   
    
**18.**       The area bounded by the curves y = |x| - 1 and y = - |x| + 1 is   
(A)       1   
(B)       2   
(C)       2√2   
(D)       4   
    
**19.**      Suppose f(x) = (x + 1)2 for  x ≥ -1  If g(x) is the function whose graph is reflection of the graph of f(x) with respect to the line y = x then g(x) equals   
(A)      -√x - 1, x ≥ 0   
(B)       1/(x + 1)2 , x > -1   
(C)       √(x + 1), x ≥ -1   
(D)       √x - 1,  x ≥ 0   
    
**20.**       Let function f : R→R be defined by f(x) = 2x + sin x for  x ε R Then f is   
(A)       One-to-one and onto   
(B)       One-to-one but NOT onto   
(C)       Onto but NOT one-to-one   
(D)       Neither one-to-one nor onto   
    
**21.**      The domain of the derivative of the function   
             functions   
(A)    R - {0}   
(B)    R - {1}   
(C)    R - {-1}   
(D)    R - {-1,1}   
    
**22.**      The integer n for which   limx→0 (cosx-1)(cosx-ex) / xn is a finite non-zero number is   
    
(A)       1   
(B)       2   
(C)       3   
(D)       4   
    
**23.**      Let f : R→R be such that f(1) = 3, and f'(1) = 6 Then   limx→0 ( f(1+x) / f(1) )1/x     equals   
    
(A)       1   
(B)       e1/2   
(C)       e2   
(D)       e3   
    
**24.**      The point (s) on the curve y3 + 3x2 = 12y where the tangent is vertical , is (are)   
(A)     ( ± 4/√3 , -2)   
(B)     ( ± √11/3 , -0)   
(C)      (0, 0)   
(D)      ( ± 4/√3 , 2)   
 **25.**       The equation of the common tangents to the curves y2 = 8x and xy = -1 is   
(A)       3y = 9x+2   
(B)       y = 2x + 1   
(C)       2y = x +8   
(D)       y = x + 2   
    
**26.**       Let  f(x) = ∫x1 √(2 - t2)  The real roots of the equation x2 - f' (x) = 0 are   
(A)    ± 1   
(B)    ± 1/√2   
(C)    ± 1/2   
(D)    0 and 1   
    
**27.**       Let T>0 be a fixed real number. Suppose f is a continuous function such that for all  x ε R.f(x+T)  If I = ∫T0 f(x).dx  then the value of ∫33+3T is   
(A)   (3/2) I   
(B)    I   
(C)    3I   
(D)    6I   
    
**28.**       The integral ∫1/2-1/2 ( [x] + ln(1+x/1+x) )dx equals   
(A)     -1/2   
(B)       0   
(C)       1   
(D)       2ln(1/2)   
    
**29.**       If vector a and bare two vectors such that  a→ + 2b→ and 5a→ - 4b→ are perpendicular to each other then the angle between vector a and b is   
(A)       450   
(B)       600   
(C)       cos-1 1/3   
(D)       cos-1 2/7   
    
    
**30.**       Let  vector V = 2i→ + j→ - k→ and W→ = i→ + 3k→ . If vector U  is a unit vector, then the maximum value of the scalar triple product [U→V→W→] is   
(A)       -1   
(B)     √10 + √6   
(C)     √59   
(D)     √60