**IIT-JEE-Mathematics–Screening-2005**

**SCREENING**
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**1.** The area of the equilateral triangle, in which three coins of radius 1 cm are placed, as shown in the figure, is:
(a) 6 + 4√3
(b) 4√3 – 6
(c) 7 + 4√3
(d) 4√3

**2.** The area bounded by the curves y = (x – 1)2, y = (x + 1)2 and y = 1/4 is:
(a) 1/3
(b) 2/3
(c) 1/4
(d) 1/5

**3.** The value of ∫-20[x3+3x2+3x+3+(x+1)cos(x+1)dx] is:
(a) 0
(b) 3
(c) 4
(d) 1

**4.** The tangent at (1, 7) to the curve x2 = y – 6 touches the circle x2 + y2 + 16x + 12y + c = 0 at :
(a) (6, 7)
(b) (–6, 7)
(c) (6, –7)
(d) (–6, –7)

**5.** If dy/dx=xy/(x2+y2 ), y(1) = 1, then one of the values of x0 satisfying y(x0) = e is given by
(a) e√2
(b) e√3
(c) e√5
(c) e/√2

**6.**         The locus of the centre of circle which touches (y -1)2 + x2 = 1 externally also touches x axis is:
            (a)       x2 = 4y È (0, y), y < 0
            (b)       x2 = y
            (c)        y = 4x2
            (d)       y2 = 4x È (0, y), y Î R

**7.**If ∫sin x1 t2 f(t) dt = 1 – sin x ∀ x ∈ [0, Π/2] then f(1/√3) is:

            (a)       3
            (b)       √3
            (c)       1/3
            (d)       none of these

**8.** 
            (a)       30C11
            (b)       60C10
            (c)        30C10
            (d)       65C55
 **9.**        A variable plane x/a + y/b + z/c = 1 at a unit distance from origin cuts the coordinate axes at A, B and C. Centroid (x, y, z) satisfies the equation 1/x2 + 1/y2 + 1/z2 = K. The value of K is :
            (a)       9
            (b)       3
            (c)      1/9
            (d)      1/3

**10.**      Let f(x) = ax2 + bx + c, a ¹ 0 and D = b2 - 4ac. If a + b, a2 + b2 and a3 + b3 are in G.P., then :
            (a)       Δ ≠ 0
            (b)       b ≠ 0
            (c)       c ≠ 0
            (d)       bc ≠ 0

**11.** Tangent at a point of the ellipse x2/a2 + y2/b2 = 1 is drawn which cuts the coordinate axes at A and B. The minimum area of the triangle OAB is (O being the origin) :
(a) ab
(b) (a3 + ab + b3)/3
(c) a2 + b2
(d) ((a2 + b2))/4

**12.** A fair die is rolled. The probability that the first time 1 occurs at the even throw is :
(a) 1/6
(b) 5/11
(c) 6/11
(d) 5/36

**13.** If xdy = y (dx + ydy), y(1) = 1 and y(x) > 0. Then y(–3) = :
(a) 3
(b) 2
(c) 1
(d) 0



(a) one-one and into
(b) neither one-one nor onto
(c) many one and onto
(d) one-one and onto

**15.** A rectangle with sides (2n – 1) and (2m – 1) is divided into squares of unit length. The number of rectangle which can be formed with sides of odd length is :
(a) m2 n2
(b) mn(m + 1) (n + 1)
(c) 4m + n – 1
(d) none of these

**16.** The minimum value of |a + bω + cω2|, where a, b and c are all not equal integers and ω(≠  1) is a cube root of unity, is:
(a) √3
(b) 1/3
(c) 1
(d) 0

   

**18.** The shaded region, where
P ≡ (–1, 0), Q ≡ (–1 + √2,√2)
R ≡ (–1 + √2, – √2), S ≡ (1, 0) is represented by:
(a) |z + 1| > 2, |arg (z + 1)|< π/4
(b) |z + 1| < 2, |arg (z + 1)|< π/2
(c) |z – 1| > 2, |arg (z + 1)|> π/4
(d) |z – 1| < 2, |arg (z + 1)|> π/2

**19.** The number of ordered pairs (α, β), where α, β ∈ (–Π, Π) satisfying cos (α – β) = 1 and cos (α + β) = 1/e is :
(a) 0
(b) 1
(c) 2
(d) 4

**20.** Let f(x) = |x|–1, then points where f(x) is not differentiable is/(are) :
(a) 0, + 1
(b) + 1
(c) 0
(d) 1

**21.** The second degree polynomial f(x), satisfying f(0) = 0, f(1) = 1, f’(x) > 0 for all x ∈ (0, 1) :
(a) f(x) = φ
(b) f(x) = ax + (1 – a) x2; ∀ a ∈ (0, ∞)
(c) f(x) = ax + (1 – a) x2; ∀ a ∈ (0, 2)
(d) no such polynomial

**22.** If f is a differentiable function satisfying f(1/n) = 0 for all n > 1, n  I, then :
(a) f(x) = 0, x  (0, 1]
(b) f’(0) = 0 = f(0)
(c) f(0) = 0 but f’(0) not necessarily zero
(d) |f(x)| < 1, x  (0, 1]



6A-1 = A2 + cA + dI, then (c, d) is:

(a) (–6, 11)
(b) (–11, 6)
(c) (11, 6)
(d) (6, 11)

**24.** In a ΔABC, among the following which one is true?
(a) (b + c) cos A/2 = a sin ((B+C)/2)
(b) (b + c) cos ((B+C)/2) = a sin A/2
(c) (b – c) cos ((B-C)/2) = a cos (A/2)
(d) (b – c) cos A/2 = a cos ((B-C)/2)



**26.** If y = f(x) and y cos x + x cos y = Π, then the value of f’(0) is :
(a) Π
(b) – Π
(c) 0
(d) 2Π

**27.** Let f be twice differentiable function satisfying f(1) = 1, f(2) = 4, f(3) = 9, then :
(a) f’(x) = 2, ∀ x ∈ (R)
(b) f’(x) = 5 = f’’ (x), for some x ∈ (1, 3)
(c) There exists at least one x ∈ (1, 3) such that f’(x) = 2
(d) none of these

**28.** If X and Y are two non-empty sets where f : X --> Y is function is defined such that
f(c) = {f(x) : x ∈ C} for C ⊆ X
and f-1 (D) = {x : f(x) ∈ D} for D  y,
for any A  X and B  Y then :

(a) f-1 (f(A)) = A
(b) f-1 (f(A)) = A only if f(X) = Y
(c) f(f-1 (B)) = B only if B  f(x)
(d) f(f-1 (B)) = B