**AIEEE Previous Years Papers Solutions**

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| http://www.askiitians.com/images/image_40.jpg |
| [AIEEE Paper](http://www.askiitians.com/aieee/AIEEE-Past-Papers) > 2007-Mathematics Solutions**AIEEE 2007 Mathematics Answers and Solutions**\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ **ANSWERS**

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| 1) 4 | 2) 2 | 3) 4 | 4) 3 |
| 5) 4 | 6) 3 | 7) 4 | 8) 2 |
| 9) 1 | 10) 3 | 11) 4 | 12) 3 |
| 13) 2 | 14) 1,4 | 15) 3 | 16) 1 |
| 17) 2 | 18) 2 | 19) 4 | 20) 4 |
| 21) 1 | 22) 2 | 23) 3 | 24) 2 |
| 25) 4 | 26) 3 | 27) 3 | 28) 4 |
| 29) 1 | 30) 4 | 31) 3 | 32) 1 |
| 33) 3 | 34) 1 | 35) 3 | 36) 4 |
| 37) - | 38) 1 | 39) 3 | 40) 3 |

**Some Important Hints and Solutions:****1.** nth term of the Geometric progression = an = arn-1So, arn-1 = arn + arn+1=> i = r + r2=> r = 1/2(√5 - 1) **2.**  sin-1(x/5) + cosec-1(5/4) = π/2=> sin-1(x/5) = π/2 - cosec-1(5/4) = π/2 - sin-1(4/5)=> sin-1(x/5) = cos-1(4/5) = sin-1(3/5)=> x = 3 **3.** nC4 an-4(-b)4 + nC5 an-5(-b)5 = 0=> a/b = (n-5+1)/5 = (n-4)/5 **4.**Number of ways to partition : 12C4 x 8C4 x 4C4 = 12!/(4!)3 **5.**x/2 - 1 must be between -1 and 1 , so-1 ≤ x/2 - 1 ≤ 1 .......... (i)and, cosx must be greater than 0, i.ecosx > 0 ..................(ii)By solving (i), 0 ≤ x ≤ 4By solving (ii), π/2 < x < -π/2So, x ∈ [ 0 , π/2 ) **6. trignometric-diagram**T2cosθ +T1sinθ = mg .....................(i)T2sinθ = T1cosθ .....................(ii)T2 = mgcosθ .....................(iii) By solving (ii) and (iii)T1 = mg sinθtanθ = 5/12So, T1 = 13kg x (5/13) = 5 KgAnd, T2 = 13kg x (12/13) = 12 Kg**7.**  Probability of getting score 9 in a single throw = 4/36 = 1/9Probability of getting sum nine exactly two times out of three draws = 3C2 (1/9)2(8/9) = 8/243 **8.**Equation of circle is: (x-h)2 + (y-k)2 = k2The circle passes thru (-1,1), so(-1-h)2 + (1-k)2 = k2h2 + 2h -2k + 2 = 0D ≥ 02k-1 ≥ 0⇒ k ≥ 1/2 **9.**  If direction cosines of L be l, m, n, then2l + 3m + n = 0 ............(i)l + 3m + 2n = 0 ............(ii)By solving (i) and (ii)l/3 = -m/3 = n/3So, l:m:n = 1/√3 : -1/√3 : 1/√3So, cosα = 1/√3 **10.**Equation of circle passing through origin and having their centres on x-axis is :x2 + y2 + 2gx = 0 ............ (1)2x + 2y dy/dx + 2g = 0Replacing value of **g** from equation (i)y2 = x2 + 2 xy dy/dx **11.**  We know that:Arithmetic Mean ≥ Geometric Mean. So(p2 + q2)/2 ≥ pq=> 1/2 ≥ pq=> 1 ≥ 2pqWe know thatp2 + q2 + 2pq = (p+q)21 + 1 ≥ (p+q)2=> √2  ≥  (p+q) **12.****equilateral-triangle**∠ACB = 60°ΔABC is an equilateral triangleRadius of the circle = aDC/AC = tan30°DC = a/√3 **13.**  (1+x)20 = 20C0 + 20C1x + 20C2x2 + .... + 20C20x20Let x = -1, then0 = 20C0 - 20C1 + 20C2 + .... + 20C200 = 2(20C0 - 20C1 + 20C2 + .... - 20C9) + 20C1020C0 - 20C1 + 20C2 + .... - 20C9 + 20C10 = (1/2)20C10**14.**  Equation of normal at P(x,y) is : Y-y = (dy/dx) (X-x)Co-ordinate of point G is (x+y(dy/dx) , 0)|x+y(dy/dx)| = 2x ................ (i)=> y(dy/dx) = x **OR** y(dy/dx) = -3x=> y dy = x dx **OR** ydy= -3xdx=> y2/2 = x2/2 + c **OR** y2/2 = -3x2/2 + c=> x2 - y2 = -2c **OR** 3x2 + y2 = 2c **15.**circle |z + 4| ≤ 3=> z can be on the circle or inside the circle of radius=3 and center at: (-4,0).=> So maximum value of |z+1| will be 6 **16.** find-value-of-p72 = P2 + 9 + 6Pcosθ=> 6Pcosθ = 40 - P2 ............................(i)19 = P2 + 9 + 6Pcos(π - θ)=> 19 = P2 + 9 - 6Pcosθ ............................(ii)Solving (i) and (ii)19 = P2 + 9 - 40 + P2So, P = 5N **17.**  Required probability = 0.7 x 0.2 + (0.7) (0.8) (0.7) (0.2) + (0.7) (0.8) (0.7) (0.8) (0.7) (0.2) + ...= 0.14 [ 1 + (0.56) + (0.56)2 + (0.56)3 + (0.56)4..... ]= 0.14 (1/(1-0.56)) = 0.14/0.44 = 7/22 **18.** **matrix-3**Do following:Column3 = Column3 - Column1Column2 = Column2 - Column1So,matrix-2So, D is divisible by x and y. **19.  Eccentricity**: Eccentricity measures as how much the conic section deviates from being circular.a2 = cos2α ................(i)b2 = sin2α ................(ii)b2 = a2(e2 - 1) ................(iii)By solving (i), (ii) and (iii)e = secαcoordinates of focii : (±ae , 0) = (±1 , 0)Hence abscissae of foci remain constant when α varies. **20.** cos2α + cos2β + cos2γ = 1=> cos2π/4 + cos2π/4 + cos2γ = 1=> 1/2 + 1/2 + cos2γ = 1=> cos2γ = 0=> γ = π/2 **21.**  f'(C) = (f(3)-f(1))/(3-1)=> 1/c = (loge3)/2=> c = 2log3e**22.**   f(x) = tan-1(sinx + cosx)f'(x) = (cosx - sinx)/( 1+(sinx + cosx)2 )f'(x) = (√2 cos(x+π/4))/( 1+(sinx + cosx)2 )So, f(x) increases if -π/2 < x + π/4 < π/2=> So, f(x) increases if -3π/4 < x < π/4=> So f(x) increases in x ∈ (-π/2 , π/4) **23.**matrix-4 |A . A| = |A|.|A| = (25α). (25α) = 25So, α2 = 1/25=> α = ± 1/5 **24.**   e-x = 1 - x + X2/2! - x3/3! + x4/4! - .......Repace x with 1, then1/2! - 1/3! + 1/4!..... = e-1 **25.**   |2**u** × 3**v**| = 16|**u** × **v**| = 1|**u** × **v**| = 1/6sinθ = ±1/6As θ is accute angle so θ can have only value **26.**angle-of-projectiona = u cosα t ................... (i)b = u sinα t - 1/2 gt2 .........................(ii)c = (u2 sin2α)/2 ..............................(iii)Using (i) and (ii)b = a tanα - (1/2)g (a2)/(u2cos2α) .........(iv)Repacing value of u2 from (iii) in (iv)b = (a tanα) - (a2g sin2α sec2α)/(2cg)Use, sin2α = 2sinα cosαb = a tanα - (a2 2tanα)/(2c)tanα = (bc)/(a(c-a)) **27.**Let number of boys = xnumber of girls - yTotal marks = 52x + 42y = 50 (x+y)=> 2x = 8y=> x = 4ySo percent of boys = 100x/(x+y) = 400y/(5y) = 80% **28.**Point of intersection of two perpendicular tangents to the parabola must be on directrix of the parabola.Equation of directrix isx + 2 = 0Hence the point is (-2, 0). **29.** Coordinates of centre = (3,6,1)Let coordinates of other end of the diameter is (α, β, γ)So,(α+2)/2 = 3(β+3)/2 = 6(γ+5)/2 = 1So, α = 4β = 9γ = -3 **30.**matrix-5By solving above ,2x + 4 = 0x = -2**31.** right-angled-triangle A = (1/2).1.|k-1| = 1=> k-1 = 2 OR k-1= -2=>k = 3 OR k = -1**32.** bisectorSlope of QR = √3So ∠PQR = 120°Slope of QS = tan120° = -√3So equation of QS will bey=-√3 x **33.** my2 + (1 - m2)xy - mx2 = 0=> my2 + m2xy + xy - mx2 = 0=> my(y-mx)+x(y-mx) = 0=> (my+x)(y-mx) = 0=> y=mx and y=(-1/m)xSo, m=±1 **34.** **find-integration****35.** function-f(x)f(x) = Min { x + 1 , |x| , 1 }(under progress) **40.**  α+β=-aand α.β=1|α-β| < √5=> (α-β)2 < 5=> (α+β)2 - 4α.β < 5=> a2-4 < 5=> a ∈ (-3,3)

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