KARNATAKA COMMON ENTRANCE TEST-MODEL PAPER-6
MATHEMATICS

1. If $\vec{a}, \vec{b}$ and $\vec{c}$ are three non coplanar vectors, then $(\vec{a}+\vec{b}+\vec{c}).(\vec{a}+\vec{b})\times(\vec{a}+\vec{c})$ equals
1) 0 2) $[\vec{a},\vec{b},\vec{c}]$ 3)2 $[\vec{a},\vec{b},\vec{c}]$ 4)- $[\vec{a},\vec{b},\vec{c}]$

2. If $\vec{a}, \vec{b}$ and $\vec{c}$ are vectors of length 3, 4, 5 such that $\vec{a}$ is perpendicular to $(\vec{b}+\vec{c})$ and $\vec{b}$ is perpendicular to $(\vec{c}+\vec{a})$ and $\vec{c}$ is perpendicular to $(\vec{a}+\vec{b})$ then length of $\vec{a}+\vec{b}+\vec{c}=$
1) $10\sqrt{2}$ 2) $\frac{10}{\sqrt{2}}$ 3) $\frac{5}{\sqrt{2}}$ 4)None

3. The directions cosines of the lines through the points (3,4,5) and (4,5,6) are
1)(1, 1, 1) 2) $(\sqrt{3},\sqrt{3},\sqrt{3})$ 3) $\left(\frac{1}{\sqrt{3}},\frac{1}{\sqrt{3}},\frac{1}{\sqrt{3}}\right)$ 4)(2,2,2)

4. If $\vec{a}$ =i+2j-3k and $\vec{b}$ =3i-j+2k are the adjacent sides of a parallelogram, then the angle between the diagonals of parallelogram is
1) 30^0 2)60^0 3)90^0 4)0^0

5. If 1, ω, ω^2 , ... ω^{n-1} are n th roots of unity, then the value of (16- ω)(16- ω^2).....(16- ω^{n-1}) is
1) $\frac{16^n-1}{8}$ 2) $\frac{16^n+1}{15}$ 3) $\frac{16^n-1}{15}$ 4)0

6. The smallest positive integer n for which $(1+\sqrt{3}i)^{n/2}$ is real is
1)3 2)0 3)6 d)12

7. The number i^i is
1) real and positive 2) real and negetive 3)pure imaginary 4) negetive

8. The differential coefficient of $f(\log_e x)$ w.r.t. x where $f(x)=\log_e x$ is
1) $\frac{x}{\log_e x}$ 2) $\frac{1}{x}\log_e x$ 3) $\frac{1}{x\log_e x}$ 4)logx

9. If y=4x-5 is tangent to the curve $y^2=px^3+q$ at (2,3) then
1)p=2, q=-7 2)p=-2, q=7 3)p=-2 q=-7 4)p=2, q=7

10. Area bounded by parabola $y^2=4ax$ and $x^2=4by$ is ..... sq units
1)16ab 2) $\frac{16ab}{3}$ 3) $\frac{16a^2}{3}$ 4) $\frac{8a^2}{3}$

11. $\int_0^{\frac{\pi}{2}} \frac{dx}{16\cos^2 x+9\sin^2 x} =$
1) $\frac{\pi}{24}$ 2) $\frac{\pi}{12}$ 3) $\frac{\pi}{8}$ 4)0

12. $\int \frac{3\sin x-2\cos x}{4\cos x+5\sin x}dx =$
1) $\frac{7}{40}x-\frac{22}{41}\log(4\cos x+5\sin x)$ 2) $\frac{7}{40}x-\frac{22}{40}\log(4\cos x+5\sin x)$
3) $\frac{7}{41}x-\frac{22}{41}\log(4\cos x+5\sin x)$ 4) $\frac{7}{42}x-\frac{22}{42}\log(4\cos x+5\sin x)$

13. The condition that the circles $x^2+y^2+2gx+2fy=0$ and $x^2+y^2+2g'x+2f'y=0$ touch each other is
1)gf ' =g ' f 2)gg ' =ff ' 3)g+g ' =f +f ' 4) ff' =gg'

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14. If $f(x) = \begin{cases} 1-2x; & x<0 \\ 2 & x=0 \\ x^2+2; & x>0 \end{cases}$ then at x=0

1) f is continuous 2) f is continuous from left 3)f is continous from right
4)f has removable disontinuity

15. At x=1, the function $f(x)= \begin{cases} x^3-1; & 1<x<\infty \\ x-1; & -\infty<x \leq 1 \end{cases}$ is

1)continuous and differentiable 2)continuous and nondifferentiable
3)discontinuous and differentiable 4)discontinuous and nondifferentiable

16. The equation of the directrix of the parabola $y^2+4y+4x+2=0$ is

1)x=-1 2)x=1 3)x= -3/2 4)x=3/2

17. If e, e' be the eccentricities of two conics S=0 and S'=0 and if $e^2+e'^2=3$ then both S and S' can be

1)Hyperbola 2)Ellipse 3)Parabola 4)circle

18. The eccentricity of the conic $3x^2+4y^2-6x-8y+4=0$

1)1/2 2) $\frac{1}{\sqrt{2}}$ 3) $\sqrt{2}$ 4)1

19. The radius of a circle whose tangents are 2x+3y-9=0 &4x+6y+19=0 is

1) $\frac{17}{4\sqrt{3}}$ 2) $\frac{27}{4\sqrt{5}}$ 3) $\frac{37}{4\sqrt{13}}$ 4)2

20. The last digit of 43^{17}

1)2 2)3 3)4 4)0

21. The foci of the ellipse $\frac{x^2}{16}+\frac{y^2}{b^2}=1$ and the hyperbola $\frac{x^2}{144}-\frac{y^2}{81}=\frac{1}{25}$ coincide , then the value of b^2 is

1)5 2)9 3)7 4)3

22. The co-ordinates of point on the hyperbola $y^2=8x$ whose focal distance is 4 are

1) $\left(\frac{1}{2},\pm 2\right)$ 2) $\left(1,\pm 2\sqrt{2}\right)$ 3) $\left(2,\pm 4\right)$ 4)(2, -1)

23. If the tangnet at the point P on the circle $x^2+y^2+6x+6y=2$ meets the straight line 5x-2y+6=0 at a point Q on the y axis then the length of PQ is

1)4 2) $2\sqrt{5}$ 3)5 4) $3\sqrt{5}$

24. $\lim_{x\to 0}\left(1-\frac{1}{2^x}\right)\left(\frac{1}{\sqrt{tanx+4}-2}\right)$ =

1)log16 2)does not exist 3)3log2 4)6 log2

25. The Differential equation of all parabolas with its axis parallel to x axis is

1) $\left(\frac{d^2y}{dx^2}\right)^2=\frac{dy}{dx}$ 2) $\frac{d^3y}{dx^3}=0$ 3) $\frac{d^2y}{dx^2}+\frac{dy}{dx}=c$ 4) $\frac{d^2y}{dx^2}=0$

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

1)(x+1)(y+1)=c 2)xy(x+1)(y+1) =c 3)cxy=(1+x)(1+y) 4)None

27. The term independent of x in the expansion of $\left(\sqrt[6]{x}-\frac{1}{\sqrt[3]{x}}\right)^9$ is equal to

1) $-{}^9C_3$ 2) ${}^9C_4$ 3) ${}^9C_2$ 4)None of these

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28. $1+\frac{3}{2}+\frac{5}{2^2}+\frac{7}{2^3}+.....upto\infty$ is

1)4 2)5 3)6 4)0

29. If sinx +siny =a and cosx +cosy =b then $\tan\left(\frac{x+y}{2}\right)$ =

1) $\frac{ab}{a+b}$ 2) $\frac{a}{b}$ 3) $\frac{b}{a}$ 4) $\frac{b+a}{ab}$

30. If $\tan(\cos^{-1}x) = \sin(\cot^{-1}\frac{1}{2})$ then x =

1) $\frac{\pm 1}{3}$ 2) $\frac{\pm 3}{\sqrt{5}}$ 3) $\frac{\sqrt{5}}{3}$ 4) $\frac{1}{2}$

31. In ABC , (b+c)cosA +(c+a)cosB +(a+b)cosC =

1)a+b+c 2)a-b+c 3)a+b-c 4)-a+b+c

32. Find the value of $\sum_{n=1}^{\infty}\tan^{-1}\frac{1}{1+n+n^2}$

1) $\frac{\pi}{6}$ 2) $\frac{\pi}{4}$ 3) $\frac{\pi}{3}$ 4) $\frac{\pi}{2}$

33. The product of lengths of perpendicular drawn from the loci on any tangnet to $\frac{x^2}{a^2}+\frac{y^2}{b^2}=1$ is

1)2a 2)a^2 3)2b 4)b^2

34. Find the locus of the point of intersection of the tangents to the ellipse $\frac{x^2}{a^2}+\frac{y^2}{b^2}=1$ which meet at right angles

1)$x^2+y^2=a^2+b^2$ 2)$2(x^2+y^2)=a^2+b^2$ 3)$x^2+y^2=2(a^2+b^2)$ 4)None of these

35. The domain of definition of $\log\sqrt{4-x^2}$ is

1)-4<x<4 2)-2<x<2 3) $-2\le x\le 2$ 4)x>2

36. The general solution sin2x=tanx is x=

1) $n\pi, 2n\pi\pm\frac{\pi}{4}$ 2) $2n\pi\pm\frac{\pi}{4}$ 3) $2n\pi\pm\frac{\pi}{4}, 2n\pi\pm\frac{3\pi}{4}$ 4) $n\pi, 2n\pi\pm\frac{\pi}{4}, 2n\pi\pm\frac{3\pi}{4}$

37. If cosx cosec 2x =cot2x, then x=

1) $2n\pi$ 2) $\frac{2n\pi}{3}$ 3) $2n\pi, \frac{2n\pi}{3}$ 4) $2n\pi, 2n\pi\pm\frac{3\pi}{4}$

38. If A={a, b,c,d} , B={c,d,e,f} then the number of the elements (A-B)x(B-A) is

1)2 2)16 3)8 4)4

39. If p is a tautology and q is a contradiction then for any statement P, $(P\wedge q)\rightarrow(P\vee q)$ is

1)true 2)false 3)neither true nor false 4)not a statement

40. $\log_{0.01}0.0001$ =

1)1/2 2)10 3)100 4)2

41. The identity element in the set of nonzero integers w.r.t the binary operation defined by a*b=ab is

1) 1 2)-1 3)0 4)not existing

42. A={1,2,3} , B={a, b} then f={(1,a) (2,b) (3,a) } is

1)not a function 2)a function 3)a one-one funtion 4)an onto function

43. A matrix both symmetric and skew symmetric then it must be

1)zero matrix 2)identity matrix 3)singular matrix 4)non singular matrix

44. If the inverse of f(x)= $\frac{x-1}{3}$ is g(x) then g(x)=(when f and g are functions)

1)3x+1 2)3x-1 3) $\frac{x+1}{3}$ 4) $\frac{3}{x-1}$

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45. The number of divisors of 960 is
1)28 2)24 3)96 4)480

46. If |A|=5 , |adjA|=125 then the size of the matrix A is
1)5 x 5 2)3 x 3 3)4 x 4 4)2 x 2

47. The maximum value of $x^{1/x}$
1)e 2)1/e 3)e^{e} 4)$e^{1/e}$

48. The radius of a sphere is increasing at the rate of 3 cm/sec then the rate at which its volume is increasing when the radius is 2.5 cm is
1)25π 2)15π 3)75π 4)2

49. The equation of tangent to the curve $y=be^{-x/a}$ at the point where it crosses the y axis is
1)ax+by=1 2)x+y =a+b 3)x+y=ab 4)bx +ay =ab

50. Which of the following is a subgroup of $(Z_4 +)$?
1){0} under + 2){0, 1} under + 3){0,1,2} under + 4){0, +1, -1} under +

51. The set $M=\left\{\begin{bmatrix}1&0\\0&1\end{bmatrix},\begin{bmatrix}1&0\\0&-1\end{bmatrix},\begin{bmatrix}-1&0\\0&1\end{bmatrix},\begin{bmatrix}-1&0\\0&-1\end{bmatrix}\right\}$ under matrix multiplication is
1)not a group 2)a commutative group 3)a noncommutative group 4) a group

52. The eigen values of $\begin{bmatrix}0&0&-1\\0&2&0\\-4&2&3\end{bmatrix}$ are
1)1, 2, 4 2)-1, 2, -4 3)-1, 2, 4 4)0, 2, 3

53. If $a_1, a_2, a_3, \ldots\ldots a_n$ are in G.P then $\begin{vmatrix}\log a_1 & \log a_2 & \log a_3\\ \log a_4 & \log a_5 & \log a_6\\ \log a_7 & \log a_8 & \log a_9\end{vmatrix}$ is equal to
1)2 2)1 3)0 4)5

54. The inverse of the matrix A= $\begin{bmatrix}0&1&0\\1&0&0\\0&0&1\end{bmatrix}$ is
1)A 2)A^T 3)I 4) $\begin{bmatrix}1&0&0\\1&0&0\\0&1&0\end{bmatrix}$

55. The image of the point (2,3) on the line x+3y+4=0 is
1)(1,6) 2)(-1,-6) 3)(-1, 6) 4)(1,-6)

56. If the slopes of the lines $3x^2 +2hxy+4y^2 =0$ are in the ratio 3:1 then h equals
1)1/4 2)4 or -4 3)-4 or 2 4)-1/4 or 4

57. If $f(x)=2x^3 +mx^2 -13x +n$ and 2,3 are the roots of the equation f(x)=0 then the values of m and n are
1)-5, -30 2)-5, 30 3)5, 30 4)5, -5

58. $10^n +3.4^{n+2} +5$ is divisible by
1)9 2)5 3)10 4)25

59. The value of $\cos^2 5^0 +\cos^2 10^0 +\cos^2 15^0 + \ldots\ldots+\cos^2 90^0$
1)9 2)17/2 3)16/3 4)0

60. If f(a-x) =f(x) and g(a-x) +g(x)=5 , then $\int_0^a f(x)g(x)dx$ =
1) $\frac{5}{2}\int_a^a f(x)dx$ 2) $\frac{5}{2}\int_a^a g(x)dx$ 3) $5\int_a^a f(x)dx$ 4) $\int_a^a f(x)dx$

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