MOCK TEST - 02
COMMON ENTRANCE TEST 2012
SUBJECT: MATHEMATICS

Time: 1.10Hrs Max. Marks 60

Questions – 60

1. The value of $\sin^{-1}\left[\cot\left(\sin^{-1}\sqrt{\frac{2-\sqrt{3}}{4}}+\cos^{-1}\frac{\sqrt{12}}{4}+\sec^{-1}\sqrt{2}\right)\right]=$

   a) 0 b) $\frac{\pi}{4}$ c) $\frac{\pi}{6}$ d) $\frac{\pi}{2}$

2. If $\text{Tan}^{-1}\left(\frac{\sqrt{1+x^2}-\sqrt{1-x^2}}{\sqrt{1+x^2}+\sqrt{1-x^2}}\right)=\alpha$ then x^2 =

   a) cos 2α b) Tan2α c) sin 2α d) cot 2α

3. If $\sin^{-1}x+\sin^{-1}y+\sin^{-1}z=\frac{3\pi}{2}$

   then the value of $\left(x^{2012}+y^{2012}+z^{2012}\right)-\frac{9}{\left(x^{2013}+y^{2013}+z^{2013}\right)}=$

   a)1 b)0 c)2 d)3

4. If $2^{1+\cos^2 x+\cos^4 x+.....\infty}=4$ then the values of x are

   a) $\frac{\pi}{3}\&-\frac{\pi}{3}$ b) $\frac{\pi}{4}\&-\frac{\pi}{4}$ c) $\frac{\pi}{6},\&-\frac{\pi}{6}$ d) $\frac{\pi}{2}\&-\frac{\pi}{2}$

5. The General solution of $9^{\sin x} - 2.3^{\sin x} + 1 = 0$ is

   a) nπ b) $\frac{n\pi}{2}$ c) $n\pi+(-1)^n\frac{\pi}{2}$ d) $2n\pi\pm\frac{\pi}{2}$

6. The value of $\sum_{k=1}^{2012}\left(\sin\frac{2k\pi}{2013}+i\cos\frac{2k\pi}{2013}\right)$ is

   a) 1 b) i c) – i d) – 1

7. If p is the point represented by the complex number Z rotate OP (O is the origin) through $\pi/2$ in the anticlockwise direction. Then the new position of the complex number is represented by

   a) z + i b) iz c) z - i d) $\frac{z}{i}$

8. The continued product of the cube roots of $\sqrt{3}+i$ is

   a) $\sqrt{3}+i$ b) $-\sqrt{3}+i$ c) $-\sqrt{3}-i$ d) $\sqrt{3}-i$

9. If $\left(\frac{1-i}{1+i}\right)^{100}=a+ib$ then (a,b)=

a) (2,-1) b) (1,0) c) (0,1) d) (-1,2)

10. The number $(49^2 - 4)(49^3 - 49)$ is divisible by
a) 5! b) 6! c) 7! d) 9!

11. For all positive values of x,y & z the value of $\frac{\left(1+x+x^2\right)\left(1+y+y^2\right)\left(1+z+z^2\right)}{xyz}$ will not be less than
a)81 b) 9 c) 27 d) 3

12. The digit in the unit place of the number $(2009)!+3^{7886}$ is
a) 1 b) 7 c) 3 d) 9

13. If $A=\begin{bmatrix}1&1&1&1\\1&1&1&1\\1&1&1&1\\1&1&1&1\end{bmatrix}$ $then\ A^4 =$ _____
a)16A b)64A c)32A d)4A

14. If $A=\begin{bmatrix}\cos\theta & -\sin\theta\\ \sin\theta & \cos\theta\end{bmatrix}$ then $(\text{adj } A)^{-1}$ is equal to
a) A b) – A c) A^{-1} d) adj A

15. The characteristic roots of the matrix $\begin{bmatrix}1&0&0\\2&3&0\\4&5&6\end{bmatrix}$ are
a) 1,2,4 b) 4,5,6 c) 1,3,6 d) 2,4,6

16. If for a triangle $ABC\begin{vmatrix}1&a&b\\1&c&a\\1&b&c\end{vmatrix}=0$ then the value of $\sin^2 A + \sin^2 B + \sin^2 C$ is
a) $\frac{3\sqrt{3}}{2}$ b) $\frac{4}{9}$ c)1 d) $\frac{9}{4}$

17. The identity element in the group $M=\left\{\begin{pmatrix}x&x\\x&x\end{pmatrix}, x\in R \,\&\, x\neq 0\right\}$ with respect to matrix multiplication is
a) $\begin{pmatrix}0&1\\1&0\end{pmatrix}$ b) $\begin{pmatrix}1&0\\0&1\end{pmatrix}$ c) $\frac{1}{2}\begin{pmatrix}1&1\\1&1\end{pmatrix}$ d) $\begin{pmatrix}1&1\\1&1\end{pmatrix}$

18. In the group G={0,1,2,3,4,5} under addition modulo 6, a sub group is _____
a){0,1,3} b){0,2,4} c){0,3,5} d){0,4,5}

19. Which of the following statement is not true
    a)The identity element in a group is unique
    b)In a group of even order there exists an element $a \neq e$ such that $a^{-1}=a$
    c)The cube roots of unity are, $1, \frac{1-i\sqrt{3}}{2}, \frac{1+i\sqrt{3}}{2}$
    d)In an abelian group, $(ab)^2 = a^2b^2$ for all $a,b \in G$

20. If $\vec{u} = \vec{a} - \vec{b}, \vec{v} = \vec{a} + \vec{b}$ *and* $|\vec{a}| = 2, |\vec{b}| = 2$
    Then $|\vec{u} \times \vec{v}|$ *is*
    a) $2\sqrt{16-\left(\vec{a}\cdot\vec{b}\right)^2}$ b) $2\sqrt{4-\left(\vec{a}\cdot\vec{b}\right)^2}$ c) $\sqrt{16-\left(\vec{a}\cdot\vec{b}\right)^2}$ d) $\sqrt{4-\left(\vec{a}\cdot\vec{b}\right)^2}$

21. If the volume of the parallelepiped with $\vec{a}, \vec{b}$ & $\vec{c}$ as co-terminal edges is 40 cubic units. Then the volume of the parallelepiped having $\vec{b}+\vec{c}, \vec{c}+\vec{a}$ & $\vec{a}+\vec{b}$ as co-terminal edges in cubic units is
    a) 160 b) 40 c) 80 d) 120

22. The sum of two unit vector is a unit vector. Then the magnitude of their difference is
    a) 2 b) $\sqrt{3}$ c) $\sqrt{2}$ d) 1

23. If $\vec{u}, \vec{v}, \vec{w}$ be such that $|\vec{u}| = 1, |\vec{v}| = 2, \& |\vec{w}| = 3$. If the projection of $\vec{v}$ *along* $\vec{u}$ *is equal to that of* the projection of $\vec{w}$ along $\vec{u}$. *and If* $\vec{v}$ & $\vec{w}$ are perpendicular to each other then. $|\vec{u} - \vec{v} + \vec{w}|$ =
    a) $\sqrt{7}$ b) $\sqrt{14}$ c) 2 d) 14

24. If $f(x) = 1 + nx + \frac{n(n-1)}{2}x^2 + \frac{n(n-1)(n-2)}{6}x^3 + \ldots\ldots + x^n$ Then $f^{11}(1) =$
    a) $n(n-1)2^n$ b) $n(n-1)2^{n-1}$ c)$(n-1)2^{n-1}$ d) $n(n-1)2^{n-2}$

25. If $y = \cos^2\left(\frac{3x}{2}\right) - \sin^2\left(\frac{3x}{2}\right)$ *then* $\frac{d^2y}{dx^2}$ *is* ____
    a) $-3\sqrt{1-y^2}$ b)9y c)-9y d) $3\sqrt{1-y^2}$

26. 26. If sin(x + y) + cos(x + y) = log(x + y) then $\frac{d^2y}{dx^2}$
    a)0 b) $-\frac{y}{x}$ c)1 d)-1

27. If $y=\frac{e^x+e^{-x}}{e^x-e^{-x}}$ $then$ $\frac{dy}{dx}=$

a) $-\sec^2 hx$ b) $\text{cosech}^2 x$ c) $-\text{cosech}^2 x$ d) $\sec^2 hx$

28. If $y=1+x+\frac{x^2}{2!}+\frac{x^3}{3!}+.....+\frac{x^n}{n!}$ $then$ $\frac{dy}{dx}+\frac{x^n}{n!}=$

a)x b) $\frac{1}{x}$ c)y d) $\frac{1}{y}$

29. If $y=\sin^{-1}\left[\sqrt{x-ax}-\sqrt{a-ax}\right] then \frac{dy}{dx}=$

a) $\frac{1}{2\sqrt{x}\sqrt{1-x}}$ b) $\frac{1}{\sin\sqrt{a-ax}}$ c) $\sin^{-1}\sqrt{x}\sin^{-1}\sqrt{a}$ d) 0

30. A stone is thrown vertically upwards from the top of a tower 64 meters high according to the law s = $48t - 16t^2$. The greatest height attained by the stone above the ground is

a) 100mts b) 64mts c) 36mts d) 32mts

31. The tangent & the normal drawn to the curve $y=x^2-x+4$ at the point p(1,4)cuts the x-axis at A & B respectively. Then the area of the triangle PAB in square units is

a)32 b)4 c)16 d)8

32. The rate of change of the surface area of a sphere of radius r when the radius is increasing at the rate of 2cm/sec is proportional to

a) $\frac{1}{r^2}$ b) $\frac{1}{r}$ c) r^2 d) r

33. $\int e^x.x^5\,dx$ is

a) $e^x [x^5 + 5x^4 + 20x^3 + 60x^2 + 120x + 120] + c$
b) $e^x [x^5 - 5x^4 - 20x^3 - 60x^2 - 120x - 120] + c$
c) $e^x [x^5 - 5x^4 + 20x^3 - 60x^2 + 120x - 120] + c$
d) $e^x [x^5 + 5x^4 + 20x^3 - 60x^2 - 120x + 120] + c$

34. The value of $\int_{-2}^{2}\left(ax^3+bx+c\right)dx$ depends on the

a) value of b b) value of c c) value of a d) values of a & b

35. $\int_0^{\pi/2}\frac{dx}{1+\left(\tan x\right)^{2012}}=$

a) $\frac{\pi}{2}$ b) $\frac{\pi}{3}$ c) $\frac{\pi}{4}$ d) 0

36. The area of the ellipse $\frac{x^2}{64}+\frac{y^2}{36}=1$ is

a)64π b)36π c)48π d)6π

37. $\int \frac{\cos x\,dx}{\cos(x-\alpha)} =$

a)x cos α + sinα log cos (x - α)
b)x sinα + cos α log cos(x - α)
c)x sin α - sin α log cos (x - α)
d) x cos α - sinα log sin (x - α)

38. The order & degree of the differential equation $\left[1+\left(\frac{dy}{dx}\right)^5\right]^{\frac{1}{3}}=\frac{d^2y}{dx^2}$ are respectively

a)1&5 b)2&1 c)2&5 d)2&3

39. The solution of $\frac{dy}{dx}=\sqrt{1-x^2-y^2+x^2y^2}$ is

a) $\sin^{-1}y=\left(\frac{1}{2}\right)\sin^{-1}x+c$ b) $2\sin^{-1}y=x\sqrt{1-y^2}+c$

c) $2\sin^{-1}y=x\sqrt{1-x^2}+\sin^{-1}x+c$ d) $\cos^{-1}y=x\cos^{-1}x+c$

40. If 3x+y+k=0 is a tangent to the circle $x^2+y^2=10$,then the values of k are

a)±7 b)±5 c)±10 d)±9

41. If (x, 3) and (3, 5) are the end points of the diameter of a circle with centre at (2, y) then the value of x and y are:

a) x = 1, y = 4 b) x = 4, y = 1 c)x = 8, y = -2 d) x= -8, y= -1

42. The area of the circle x=2+3cosθ & y=3sinθ-1 is

a)9πsq.units b)4πsq.units c)6πsq.units d)π sq.units

43. The number of values of C such that the line y = 4x + c touches the ellipse $\frac{x^2}{4}+y^2=1$ is

a) infinite b) 0 c) 1 d) 2

44. The equation $-\frac{x^2}{2-\lambda}-\frac{y^2}{\lambda-5}-1=0$ represents an ellipse if

a) $\lambda>5$ b) $\lambda < 2$ c) $2 < \lambda < 5$ d) $2 > \lambda > 5$

45. If the distance between the foci & the distance between the directrices of the hyperbola $\frac{x^2}{a^2}-\frac{y^2}{b^2}=1$ are in the ratio 3:2 then a:b is

a) $\sqrt{3}:\sqrt{2}$ b) $\sqrt{2}:1$ c) 2 : 1 d) 1 : 2

46. The focus of the parabola $y^2 + 16x = 0$ is

a) (16, 0) b) (-16, 0) c) (4, 0) d) (-4, 0)

47. The angle between the pair of lines $x^2 + 2xy – y^2 = 0$ is :

a) 0 b) $\frac{\pi}{3}$ c) $\frac{\pi}{6}$ d) $\frac{\pi}{2}$

48. If the area of the triangle with vertices (x,0) (1,1) & (0,2) is 4 square units. Then the value of x is.

a) -2 b) -4 c) -6 d) 8

49. If p is the length of the perpendicular from the origin on the line whose intercepts on the axes are a&b then.

a) $p^2=a^2+b^2$ b) $p^2=a^2-b^2$ c) $\frac{1}{p^2}=\frac{1}{a^2}+\frac{1}{b^2}$ d) $\frac{1}{p^2}=\frac{1}{a^2}-\frac{1}{b^2}$

50. $\lim_{x\to\infty}\frac{3.2^{n+1}-4.5^{n+1}}{5.2^n+7.5^n}=$

a) $\frac{-20}{7}$ b) 0 c) $\frac{3}{5}$ d) $-\frac{4}{5}$

51. The function $f(x)=\frac{\log(1+ax)-\log(1-bx)}{x}$ is not defined at x = 0. The value which should be assigned to f at x = 0 so that it is continuous at x = 0 is

a) loga + logb b) 0 c) a – b d) a + b

52. $\sin^2 17.5^0 + \sin^2 72.5^0$ is equal to

a) $\cos^2 90^0$ b) $\text{Tan}^2 45^0$ c) $\cos^2 30^0$ d) $\sin^2 45^0$

53. OA & OB are two roads enclosing an angle of 120^0. X & Y start from O at the same time. X travels along OA with a speed of 4 km/hr & Y travels with a speed of

3km/hr. The rate at which the shortest distance between X & Y is increasing after 1 hour is

a) $\sqrt{37}\,km/hr$ b)37 km/hr c)13 km/hr d) $\sqrt{13}km/hr$

54. If A+B+C=180^0 then cos 2A + cos 2B +cos 2C =
a) -1-4cosA cosB cosC b) 4cosA cosB cosC
c) 1+4cosA cosB cosC d) -1+4cosA cosB cosC

55. The value of $\sin^2\left(\frac{\pi}{8}\right)+\sin^2\left(\frac{3\pi}{8}\right)+\sin^2\left(\frac{5\pi}{8}\right)+\sin^2\left(\frac{7\pi}{8}\right)$ is

a) 1 b) 2 c) $1\frac{1}{8}$ d) $2\frac{1}{8}$

56. If A={1,2,3,4,5,6} how many subsets does the set A have
a) 64 b) 63 c) 30 d) 6

57. If $n=\underline{|2020}$ then $\frac{1}{\log_2^n}+\frac{1}{\log_3^n}+\frac{1}{\log_4^n}+.....+\frac{1}{\log_{2020}^n}=.....$

a) $\underline{|2020}$ b) 0 c) 2020 d) 1

58. If p$\rightarrow$(q$\vee$r) is false then the truth value of p,q,r, are respectively
a)TFF b)FFF c)FTT d)TTF

59. The 9th term of the expansion $\left(3x-\frac{1}{2x}\right)^8$ is

a) $\frac{1}{512x^9}$ b) $\frac{-1}{512x^9}$ c) $\frac{-1}{256x^8}$ d) $\frac{1}{256x^8}$

60. The sum of the coefficients in the expansion of $\left(1+x-3x^2\right)^{3148}$ is

a) 8 b) 7 c) 1 d) -1