



# ASPIRE STUDY

MCA ENTRANCE CLASSES By Shivam Gupta

## JAMIA MILLIA ISLAMIA- 2017

### ORIGINAL PAPER

- If  $y = \tan^{-1} \left\{ \frac{1+x}{1-x} \right\}$ , then  $\frac{dy}{dx}$  is equal to .....  
(a)  $\frac{2}{1+x^2}$  (b)  $\frac{1}{1+2x^2}$   
(c)  $\frac{1-x^2}{1+x^2}$  (d)  $\frac{1}{1+x^2}$
- If  $y = \log(\tan x)$ , then  $\frac{dy}{dx}$  is equal to .....  
(a)  $2 \operatorname{cosec} 2x$  (b)  $2 \sec 2x$   
(c)  $2 \sin 2x$  (d)  $2 \cos 2x$
- If  $y = \cos^{-1} x$  and  $z = \sin^{-1} \sqrt{1-x^2}$  then  $\frac{dy}{dz}$  is equal to .....  
(a)  $\frac{1}{1-x^2}$  (b) 1  
(c)  $\frac{1}{1+x^2}$  (d)  $\frac{x}{1-x^2}$
- If  $y = e^{2x}$ , then  $\frac{d^2y}{dx^2} \cdot \frac{d^2x}{dy^2}$  is equal to .....  
(a)  $-2e^x$  (b)  $-2e^{2x}$   
(c)  $-2e^{-2x}$  (d)  $-2e^{-x}$
- If  $\sqrt{x+y} + \sqrt{y-x} = \sqrt{2}$ , then  $\frac{d^2y}{dx^2}$  is equal to .....  
(a) 1 (b) 2  
(c)  $1/2$  (d)  $-2$
- $\lim_{x \rightarrow 0} \frac{1-\cos x}{x^2}$  is equal to .....  
(a) 0 (b)  $\frac{1}{2}$   
(c)  $\frac{1}{4}$  (d) 1
- $\lim_{x \rightarrow \infty} (x - \sqrt{x^2 + x})$  is equal to .....  
(a)  $\frac{1}{2}$  (b) 1  
(c)  $-1$  (d)  $-\frac{1}{2}$
- $\int \frac{dx}{x \log x \log(\log x)}$  is equal to .....  
(a)  $\log x$  (b)  $\log(\log x)$   
(c)  $\log(\log(\log x))$  (d)  $(\log(\log x))^2$
- $\int x^x (1 + \log x) dx$  is equal to .....  
(a)  $x^x$  (b)  $x^x \log x$   
(c)  $\frac{x^x}{\log x}$  (d)  $\frac{x^x}{a+x}$
- $\int_0^1 \frac{x}{(1-x)^{3/4}} dx$  is equal to .....  
(a)  $12/5$  (b)  $-12/5$   
(c)  $16/5$  (d)  $-16/5$
- Let  $A$  and  $B$  are two disjoint subsets of a universal set  $E$ . The  $(A \cup B) \cap B'$  is equal to  
(a)  $E$  (b)  $\phi$   
(c)  $A$  (d)  $B$
- $(A - B) - A$  is equal to .....  
(a)  $\phi$  (b)  $A$   
(c)  $B$  (d)  $A \cap B$
- Let 10 is the cardinality of set  $A$ . The number of bijective mapping from set  $A$  to itself is .....  
(a) 10 (b) 55  
(c) 100 (d) 3628800
- Let  $n$  be a positive decimal integer. The number of digits in  $n$  is equal to ...  
(a)  $\lceil \log_{10} n \rceil + 1$  (b)  $\lfloor \log_{10} n \rfloor + 1$   
(c)  $\lceil \log_{10} n \rceil$  (d)  $\lfloor \log_{10} n \rfloor$
- Let cardinality of the set  $A$  and  $B$  are 2 and 5 respectively. The number of relations from  $A$  to  $B$  is .....  
(a) 1024 (b) 1000  
(c) 1010 (d) 1025
- Let  $f: R \rightarrow R, g: R \rightarrow R$  be two functions given by  $f(x) = 2x - 3$  and  $g(x) = x/2$ . The  $(f \circ g)^{-1}(x)$  is equal to .....  
(a)  $\frac{x+3}{2}$  (b)  $x + 3$   
(c)  $2x + 3$  (d)  $2x - 4$
- Let  $f: R \rightarrow R$  is defined by  $f(x) = x^2 + 5$ , then value of  $f^{-1}(4)$  is equal to .....  
(a) +1 (b) -1 (c)  $\phi$  (d) 20
- If  $g: R \rightarrow R$  is defined by  $g(x) = x^2 - 2$ , then value of  $g^{-1}(23)$  is equal to ....  
(a)  $\pm 5$  (b) 25 (c)  $\pm 4$  (d) 527
- Let cardinality of  $A$  and  $B$  are 3 and 10 respectively. The number of one one functions from  $A$  to  $B$  is.....

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- (a)  $2^{10}$  (b)  $2^2$  (c) 101 (d) 720
20. Let  $A = \{1,2,3,4\}$  and  $B = \{a,b\}$  are two sets. The number of subjective mappings from  $A$  to  $B$  is ...  
(a) 14 (b) 16 (c)  $2^8$  (d) 8!
21. Let  $z = \sqrt{3} + i$  be a complex number and  $\bar{z}$  be its conjugate. The  $|\arg z| + |\arg \bar{z}|$  is equal to .....  
(a)  $\frac{\pi}{3}$  (b)  $\frac{2\pi}{3}$  (c)  $\frac{\pi}{6}$  (d)  $\frac{\pi}{4}$
22. The  $\frac{(\sqrt{3}+i)^{17}}{(1-i)^{50}}$  is equal to .....  
(a)  $\frac{-1-\sqrt{3}i}{2^9}$  (b)  $\frac{1+\sqrt{3}i}{2^9}$   
(c)  $\frac{-1-\sqrt{3}i}{2^8}$  (d)  $\frac{1+\sqrt{3}i}{2^8}$
23. For which of the following value of  $x$ , the  $\left(\frac{1+i}{1-i}\right)^x = 1$  is .....  
(a) 29 (b) 35 (c) 34 (d) 68
24. If  $\omega$  is a cube root of unity, then the value of  $(1 - \omega - \omega^2)(1 + \omega^3)$  is .....  
(a) 2 (b) 4 (c)  $\omega$  (d)  $\omega^2$
25. Let  $z$  be a complex number. Which of the following is a solution of  $|z| - z = 1 + 2i$ ?  
(a)  $\frac{3}{2} + 2i$  (b)  $2 - \frac{3}{2}i$   
(c)  $\frac{3}{2} - 2i$  (d)  $2 + \frac{3}{2}i$
26. If  $\sin \theta + \operatorname{cosec} \theta = 1$ , then  $\sin^n \theta + \operatorname{cosec}^n \theta$  is equal to .....  
(a) 1 (b) 2 (c)  $2^n$  (d)  $2^n - 1$
27. The value of  $\sin^6 x + \cos^6 x + 3 \sin^2 x \cos^2 x$  is equal to .....  
(a) 3 (b) 2 (c) 1 (d) 0
28. If  $x = a \cos^2 \theta \sin \theta$  and  $y = a \sin^2 \theta \cos \theta$ , then  $(x^2 + y^2)^3$  is equal to .....  
(a)  $a^2 x^2$  (b)  $a^2 x^2 y^2$   
(c)  $a^2 (y^2 - x^2)$  (d)  $a^2 (x^2 - y^2)$
29. The minimum value of  $3 \cos \theta + 4 \sin \theta + 10$  is equal to  
(a) 5 (b) 9 (c) 7 (d) 3
30.  $\sin 6^\circ \sin 42^\circ \sin 66^\circ \sin 78^\circ$  is equal to .....  
(a)  $\frac{1}{32}$  (b)  $\frac{1}{16}$  (c)  $\frac{1}{8}$  (d)  $\frac{1}{4}$
31. If  $20^{\text{th}}$  term of an AP is 30 and its  $30^{\text{th}}$  term is 20, then the  $10^{\text{th}}$  term is .....  
(a) 40 (b) 10 (c) 20 (d) 30
32. Let sum of  $n$  terms of an AP is  $2n(n-1)$ , then the sum of their squares is .....  
(a)  $\frac{8n(n-1)(2n-1)}{3}$  (b)  $\frac{8n(n-1)(2n-1)}{6}$   
(c)  $\frac{n(n+1)(2n+1)}{6}$  (d)  $\frac{8n(n+1)(2n+1)}{3}$
33. For what value of  $x$ , the  $\log_2(5.2^x + 1)$ ,  $\log_4(2^{1-x} + 1)$  and 1 are in AP?  
(a)  $\log_2 5$  (b)  $\log_5 2$   
(c)  $1 + \log_2 5$  (d)  $1 - \log_2 5$
34. If the ratio of sum of  $m$  terms and  $n$  terms of an AP be  $m^2 : n^2$ , then the ratio of the  $m^{\text{th}}$  and  $n^{\text{th}}$  term will be .....  
(a)  $m : n$  (b)  $2m - 1 : 2n - 1$   
(c)  $m + n : n + 1$  (d)  $n : m$
35. The value of  $9^{1/3} \times 9^{1/9} \times 9^{1/27} \times \dots \infty$  is .....  
(a) 3 (b) 9 (c) 1 (d)  $\infty$
36. If  $\alpha$  and  $\beta$  are the roots of equation  $x^2 + px + p^2 + q = 0$ , then the value  $\alpha^2 + \alpha\beta + \beta^2$  .....  
(a)  $p$  (b)  $-p$  (c)  $q$  (d)  $-q$
37. If the roots of  $x^2 - bx + c = 0$  are two consecutive numbers, then  $b^2 - 4c$  is equal to .....  
(a) 1 (b) 2 (c) 3 (d) 4
38. The number of the real roots of the equation  $(x-1)^2 + (x-2)^2 + (x-3)^2 = 0$  is ...  
(a) 0 (b) 1 (c) 2 (d) 3
39. If the roots of the equation  $(b-c)x^2 + (c-a)x + (a-b) = 0$  be equals, then  $a, b, c$  are in ...  
(a) HP (b) GP  
(c) AP (d) None of these
40. If the equations  $x^2 + 2x + 3\lambda = 0$  and  $2x^2 + 3x + 5\lambda = 0$  have a non-zero common root, then  $\lambda$  is equal to .....  
(a) 1 (b) -1 (c) 2 (d) -2
41. If  ${}^n P_r = {}^n P_{r+1}$  and  ${}^n C_r = {}^n C_{r-1}$ , then  $(n, r)$  is ...  
(a) (2,3) (b) (3,2)  
(c) (4,3) (d) (3,4)
42. 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

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43. The sum  $(n + 1)$  terms of the series  $\frac{C_0}{2} - \frac{C_1}{3} + \frac{C_2}{4} - \frac{C_3}{5} + \dots$  is ....
- (a)  $\frac{1}{n+1}$  (b)  $\frac{1}{n+2}$   
(c)  $\frac{1}{n(n+1)}$  (d)  $\frac{1}{(n+1)(n+2)}$
44. If  $\omega$  is a cube root of unity, then  $\begin{vmatrix} 1 & \omega & \omega^2 \\ 1 & \omega^2 & 1 \\ \omega & 1 & \omega^2 \end{vmatrix}$  is equal to ...
- (a)  $\omega$  (b)  $\omega^2$  (c) 0 (d)  $-3$
45. If  $A = \begin{bmatrix} x & 2 \\ 2 & x \end{bmatrix}$  and  $|A^2| = 0$ , then  $x$  is equal to ...
- (a)  $\pm 2$  (b)  $\pm 3$  (c) 1 (d) 4
46. Let  $\vec{A} = i - j + k, \vec{C} = -i - j$  be two vectors. Which of the following is the vector  $\vec{B}$  such that  $\vec{A} \times \vec{B} = \vec{C}$  and  $\vec{A} \cdot \vec{B} = 1$ ?
- (a)  $i$  (b)  $k$  (c)  $-j$  (d)  $i + j$
47. A point  $P$  on  $y$ -axis is equidistance from the points  $A(-5,4)$  and  $B = (3,-2)$ . Its coordinate is
- (a)  $(0, \frac{3}{4})$  (b)  $(0, \frac{4}{3})$   
(c)  $(0, \frac{3}{7})$  (d)  $(0, \frac{7}{3})$
48. The area of the triangle with vertices  $A(a, b + c), B(b, c + a), C(c, a + b)$  is equal to ...
- (a) 0 (b)  $ab + bc + ca$   
(c)  $a + b + c$  (d)  $a + b - c$
49. Two dices are thrown simultaneously. The probability of obtaining a total score of 5 is ...
- (a)  $\frac{1}{12}$  (b)  $\frac{1}{36}$  (c)  $\frac{1}{9}$  (d)  $\frac{1}{8}$
50. Three of the six vertices of a regular hexagon are chosen at random. The probability that triangle formed with these chosen vertices is equilateral, equal to .....
- (a)  $\frac{1}{2}$  (b)  $\frac{1}{10}$  (c)  $\frac{1}{5}$  (d)  $\frac{1}{20}$
51. Minimum number of two-input NAND gates used to perform the function of two-input OR gate is ...
- (a) One (b) Two  
(c) Three (d) Four
52. The time required for an electronic circuit to change its state is called .....
- (a) Propagation time (b) Rise Time  
(c) Decay Time (d) Changing Time
53. Which of the following is not equivalent to  $x$ ?
- (a)  $x.x$  (b)  $x + x$   
(c)  $x.1$  (d)  $x + 1$
54. Which of the following is a sequential circuit?
- (a) Adder (b) Decoder  
(c) Multiplexer (d) Flip Flop
55. Which of the following will be the number of output lines in a combinational circuit that takes input a two bit number and produce the output cube of it?
- (a) 3 (b) 4 (c) 5 (d) 6
56. Which of the following is a web browser?
- (a) Avira (b) TrustPort  
(c) Opera (d) None of these
57. Which of the following is an operating system?
- (a) Baidu (b) Symbian  
(c) AVG (d) None of these
58. Which of the following is antivirus software?
- (a) Symbian (b) Norton  
(c) AVG (d) None of these
59. Which of the following is a web search engine?
- (a) Opera (b) Symbian  
(c) AVG (d) None of these
60. Which of the following is a social media website?
- (a) Instagram (b) Norton  
(c) Symbian (d) None of these
61. z/OS is a
- (a) PC operating system  
(b) Mainframe operating system  
(c) Mobile operating system  
(d) None of these
62. Which of the following is a mobile operating system?
- (a) Palm operating system  
(b) AVG  
(c) BeOS  
(d) None of these
63. Intel 8086 is a bit microprocessor.
- (a) 4 (b) 8 (c) 16 (d) 32
64. Which of the following is mainframe computer?
- (a) Vtech (b) Rabbit  
(c) Dubna (d) IBM System/360