Question Paper of University of Pune MCA Entrance - 2015

1. If $f(x) = f(x + a)$ and $\int_0^a f(x) = k$ then find $\int_0^{na} f(x) = ?$

   (a) nk (b) $(n-1)k$ (c) $(n-1)k$ (d) 0

2. Three square are choosen at random on the chess board. The chance that they are in diagonal line is

   (a) $\frac{7}{744}$ (b) $\frac{3}{744}$ (c) $\frac{7}{64}$ (d) $\frac{3}{64}$

3. Consider the differential equation $\frac{dy}{dx} + 2y = 0$

   (a) Every solution of equation is identically zero.
   (b) All solutions of equation are unbounded
   (c) All solutions of equation approaches to zero when $x \to \infty$
   (d) No solution of equation approaches to zero when $x \to \infty$

4. For what value of k the line $y = 9x$ be the tangent to the curve $y = \frac{ke^{k\sqrt{x+1}}}{\sqrt{x+1}}$ at some point on the xy plane with constraint that $x > -1$

   (a) $k < 0$ (b) $k > 0$ & $k < 1$ (c) $K > 1$ and $k < 3$ (d) $k > 3$

5. If m things are distributed among 'a' men and 'b' women, then the chance that men get odd number of things ?

(a) $\frac{1}{2}\cdot\frac{(b+a)^m-(b-a)^m}{(b+a)^m}$ (b) $\frac{1}{2}\cdot\frac{(b+a)^m+(b-a)^m}{(b+a)^m}$

(c) $\frac{1}{2}\cdot\frac{(b-a)^m-(b+a)^m}{(b-a)^m}$ (d) None of these

6. Find the total number of distinct relations on the set containing 3 elements ?
(a) 8 (b) 128 (c) 18 (d) 512

7. Find the equation of tangent to the curve $y = 4e^{-\frac{x}{4}}$ at the point where it crosses y-axis is
(a) $4x + y = 4$ (b) $4x - y = 16$ (c) $x - y = 4$ (d) $x + y = 4$

8. The curve $y = x^3 - 6x^2 + 9x + 1$ has symmetric rotation about the point
(a) (0, 0) (b) (3, 2) (c) (2, 3) (d) None of these

9. Find the differential equation of the curve $y = ae^{bx}$ after eliminating arbitrary constants
(a) $y\frac{d^2y}{dx^2}-\left(\frac{dy}{dx}\right)^2=0$ (b) $x\frac{d^2y}{dx^2}-\left(\frac{dy}{dx}\right)^2=0$ (c) $y\left(\frac{d^2y}{dx^2}\right)-\frac{dy}{dx}=0$ (d) $\frac{d^2y}{dx^2}-y\left(\frac{dy}{dx}\right)^2=0$

10. If $f(x + y) = f(x) \cdot f(y)$ and $f(6) = 3$, $f'(0) = 10$ then $f'(6) = ?$
(a) 15 (b) 22 (c) 28 (d) 30

11. Find the maximum value of the function $(x+1)^{1/3}-(x-1)^{1/3}$ is
(a) 0 (b) 1 (c) 2 (d) 3

12. If $f(9) = 9$ and $f'(9) = 3$ then find the value of $\lim_{x\to 9}\frac{f(x)-3}{\sqrt{x}-3}$
(a) 3 (b) 0 (c) 1 (d) 9

13. The digit at unit place of the number $(13)^{27}$
(a) 1 (b) 7 (c) 9 (d) 3

14. The function $f(x) = e^{-|x|}$ is
(a) continuous every where but not differentiable at x = 0
(b) continuous and differentiable everywhere
(c) only continuous at x = 0
(d) None of these

15. $\lim_{x\to 0}(1-ax)^{\frac{1}{x}} = ?$
(a) 0 (b) e^{-a} (c) e^{a} (d) none

16. If $(3n + 690)^2 = (492k04)$ where n is a number and k is a digit. Then what is the possible value of n ?
(a) greater than –1 and less than 3 (b) greater than 0 and less than 10
(c) greater than 9 and less than 18 (d) None of these

17. Find the angle between the tangents to the curve $y = x^2 - 5x + 6$ at the points (3, 0) and (2, 0) is
(a) $\frac{\pi}{2}$ (b) $\frac{\pi}{3}$ (c) $\frac{\pi}{4}$ (d) $\frac{\pi}{6}$

18. S is a set and P(S) denotes the power set of S then
(a) $P(P(S)) = P(S)$ (b) $P(P(S)) \cap P(S) = P(S)$
(c) $P(P(S)) \cap P(S) = \{\phi\}$ (d) $S \in P(S)$

19. If $x^y = e^{x-y}$ then find $\frac{dy}{dx}$ at (1, 1) ?
(a) 1 (b) 2 (c) 0 (d) 4

20. Find the area bounded by $x^2 = 8y$ and the line $x - 2y + 8 = 0$
(a) 25 (b) 48 (c) 36 (d) 32

21. There are four machines and it is known that exactly two of them are faulty. They are tested one by one, in a random oreder till both the faulty machines are identified. Then the probability that only two tests are needed is
(a) $\frac{1}{3}$ (b) $\frac{1}{6}$ (c) $\frac{1}{2}$ (d) $\frac{1}{4}$

22. If $\int v''u = uv' - u'v + k$ then k then find the value of k ?
(a) $\int v'u$ (b) $\int u''v$ (c) $\int u'v'$ (d) $\int uv''$

23. If three numbers are selected from (2n +1) consequitive integers then find the probability that the numbers from and A.P. ?
(a) $\frac{3n}{4n-1}$ (b) $\frac{3}{4n^2-1}$ (c) $\frac{3n}{4n^2-1}$ (d) None of these

24. The error in measuring radius of a circle is 0.5%. Then what will be the percentage change in the area of the circle is ?
(a) 0.1% (b) 0.0025% (c) 0.01% (d) 0.5%

25. Five person entered in a lift cabin on the ground floor of 8 - floor house. Suppose each of them with equal probability and independently can leave the cabin at any floor beginning with the first. Then find the probability that all five person leaving at different floors.
(a) $\frac{{}^7P_5}{7^5}$ (b) $\frac{{}^7P_5}{7^7}$ (c) $\frac{{}^7C_5}{7^5}$ (d) None of these

26. The probability that a student passes in Mathematics, Physics and Chemistry are m, p and c respectively of these subjects, the student has 75% chance of passing in at least once, a 50% chance of passing in at least, two and a 40% chance of passing in exactly two, which of the following relations are true
(a) $p + m + c = \frac{19}{20}$ (b) $p + m + c = \frac{27}{20}$ (c) $pmc = \frac{1}{20}$ (d) $pmc = \frac{1}{4}$

27. A is a set containing n elements. A subsets P of A is chosen at random. Then returning back the elements of P the set A is completed. A subset Q is again chosen at random. Find the probability that have no element common.
(a) $\left(\frac{1}{2}\right)^n$ (b) $\left(\frac{2}{3}\right)^n$ (c) $\left(\frac{3}{4}\right)^n$ (d) None of these

28. If A has (n + 1) coins and B has n coins. Coins are flipped simultaneously then what is the probability that a gets more heads than B ?
(a) $\frac{1}{2}$ (b) $< \frac{1}{2}$ (c) $> \frac{1}{2}$ (d) None

29. The maximum number of cricket ball which are placed such that each touches the remaining is 4. Then the maximum number of coins that are placed such that touches the remaining is
(a) less than 5 (b) greater than 4 but less than 8
(c) Greater than 7 but less than 11 (d) None

30. f(x) is a differentiable function satisfying $f(x^3) = 4x^4$ then find the value of $f'(8)$?
(a) $\frac{16\sqrt{2}}{3}$ (b) $\frac{64}{3}$ (c) $\frac{32}{3}$ (d) $\frac{16}{3}$

31. If f and g are two positive functions having relation R such that $f \sim g$ it is given that $\lim_{x\to\infty} \frac{f(x)}{g(x)} = 1$ which one of the following is not consequence
(a) $f^2 \sim g^2$ (b) $\sqrt{f} \sim \sqrt{g}$ (c) $e^f \sim e^g$ (d) $(f+g) \sim 2f$

32. A chess match starts between 6 pm - 7pm and ends between 9 pm - 10 pm, observing in 12 hours wall clock, when the match starts the minute hand points at position m and hour hand points at position h. When the match ends, the hour hand points at m and minute hand at h, then what is the minimum time the game is played ?
(a) less than 130 minutes
(b) Greater than 131 minutes and less than 181 minutes
(c) Greater than 180 minutes and less than 210 minutes
(d) none

33. One day a horse is stolen and G, R, B are rounded up for questioning. Each of them made two statement and none of them made more than one false statement -
R : I. did not stole the horse II. The one who has stolen the horse is arab.
G : I. R never stole the horse II. The one who has stolen the horse is Jewish.
B : I. I never stole the horse II. G stole the horse
(a) B stolen the horse (b) G stolen the Horse
(c) R stolen the horse (d) Data insufficient

34. A cricket match is played and you want to know the result of the match immediately you can know the result only by asking your friend. Your friend tries to have some fun and telly you that you can ask only questions which he answer as 'yes' or 'no'. Your friend tells you that he will lie but at most once. A cricket match took place in which one team lost and so another won. You want to know the result. What is the minimum number of questions you need to ask your friend so you can know the result ?
(a) 2 (b) 3 (c) 4 (d) None

35. P is a moving point and tangents from P meet a circle. Whose centre is at the origin and radius is unity, at A and B [where A and B are point of contact] and angle AOB = 60°. Then locus of P is
(a) circle of radius $\frac{2}{\sqrt{3}}$ (b) circle of radius $\sqrt{3}$
(c) circle of radius 2 (d) None of these

36. A and B are two candidates seeking admission for an interview. The probability that A is getting selected is 0.5 and the probability that both A and B are selected is atmost 0.3. The probability of B getting selected is
(a) $P(B) \le 0.8$ (b) $P(B) \ge 0.8$ (c) $P(B) = 0.9$ (d) Data Insuficient

37. 50 defective bulbs and 50 non-defective bulbs are selected at random, one by one with replacement. If X, Y, Z are the events defined as
X : Chance of getting 1st bulb defective
Y : Chance of getting 2nd bulb non - defective
Z : Chance of getting both defective or both non-defective
Then which of the following is true.

(a) X, Y, Z are independent
(b) X, Y, Z are pairwise independent
(c) X, Y, Z are mutually exclusive
(d) None of these

38. Numbers is selected from the numbers 00, 01, ..., 99 and the product obatined of the 2 digits of the numbers is 18. If 4 numbes are selected then what is the chance that atleast 3 numbers are such that their digits have products 18 ?

(a) $\frac{7}{(25)^4}$ (b) $\frac{3}{(25)^4}$ (c) $\frac{97}{100}$ (d) $\frac{97}{(25)^4}$

39. Let a $\in z^+$ is element of A and a relation a R b defined on A such that $a = b^k$ where k is a positive integer then which of the following belongs to this relation ?
(a) (8, 128) (b) (16, 256) (c) (169, 13) (d) (11, 3)

40. A ring of diameters 20 cm is suspended horizontally by 6 strings of equal length such that the height between the centre of the ring and top of the string is 24 cm, and the strings are attached in such a way that they are equidistant from each other then what is the cosine of the angle between two adjacent strings ?

(a) $\frac{313}{338}$ (b) $\frac{\sqrt{13}}{7}$ (c) $\frac{335}{338}$ (d) None of these

41. A coin is tossed 10 times and a bag is filled with white and black ball accordingly by getting heads or tails respectively 10 balls are drawn from the bag with replacement and we get all white balls then what is probability that all balls in the bag are white

(a) $\frac{1}{(2)^9}$ (b) $\frac{10}{2^9}$ (c) $\frac{9}{2^9}$ (d) $\frac{2}{2^9}$

42. In the equation SHOO + SHOO = BRAIN, if all digits represent distinct numbers, then the sum of digits of minimum possible number of SHOO is
(a) less than 18
(b) Number lying between 13 - 18
(c) Number lying between 17 - 22
(d) None of these

Group Questions : (43 - 45)

NEWTON + ALWAYS = TOTALED
Here each letters belongs to a single digit integer. On the basis of the given statement, answer the following questions :

43. In the above statement, NEWTON belong to
(a) less than 500001
(b) greater than 500000 or less than 600001
(c) greater than 600000 or less than 700001
(d) greater than 700000

44. In the above statement, ALWAYS belongs to
(a) less than 500001
(b) greater than 500000 or less than 600001
(c) greater than 600000 or less than 700001
(d) greater than 700000

45. In the above statement, D belongs to which integer or single digit
(a) 0 (b) 1 (c) 3 (d) None of these

Group Questions : (46 - 48)

Consider an infinite non-decreasing series in which every natural numbers repeats for n times. The first 12 digit of the series is [122333444455].

46. The sum of first 200 elements is
(a) less than 2000
(b) greater than 2001 and less than 2301
(c) greater than 2301 and less than 2701
(d) greater than 2701

47. The smallest value of n when the sum of numbers exceed by 1 million
(a) less than 40 (b) > 41 and < 50
(c) > 51 and < 60 (d) None

48. The sum of all the elements of the sequence starting from 1001th to 10000th element :
(a) less than 500000 (b) greater than 800000 and less than 1300001
(c) greater than 500000 and less than 800001 (d) None of these

Group Questions : (49 - 51)

If NDD is described as finite non decreasing distinct sequence
Eg → S_1 = {1, 2, 4, 7, 31, 100} is a NDD.
and S_2 = {1, 2, 2, 5} is not NDD because of 2 is repeated.
New NDDS can be formed from a given sequence of NDD → example from above sequence S_1, NDD {1, 2, 7} and {1, 7, 31, 100} can be foremd.

49. How many NDD of length 2 can be formed from NDD of lengths 20.
(a) less than 201 (b) More than 200
(c) More than 300 & less than 701 (d) None of these

50. How many NDD of lenght 3 can be formed from NDD of length 30 ?
(a) less than 201 (b) More than 200
(c) More than 300 & less than 701 (d) None of these

51. How many NDD of length 4 can be formed from NDD of length 30 ?
(a) less than 201 (b) More than 200
(c) More than 300 & less than 701 (d) None of these

52. If z is represented by abcde and x = 1abcde and y = abcde1 and y = 3x, then z is
(a) greater than 30001 but less than 40001 (b) less than 30000
(c) greater than 40000 but less than 50001 (d) None

53. FAR + FAR + FAR = NEAR such that each letter represents a distinct digit then the minimum value of NEAR is
(a) less than 1401 (b) greater than 1400 and less than 1601
(c) greater than 1600 and less 2001 (d) None

54. There are three person named Newton, Galelio and Einstien. Newton's age is 10 times that at Galelio. If Einstein's age's digits are interchanged, we obtain Newton's age. Difference between the ages of Einstein and Newton is twice the age of Galelio, then what is the age of Einstien ?
(a) less than 31 (b) greater than 30, less than 51
(c) greater than 50, less than 71 (d) None of these

55. A new building is all to have a store room with the base having length & breadth equal to 12 feet, with the ceeling supported by 4 columns at 4 corners of the room. The ceeling corresponding to the surface is defined by the equation z = 24 + y sin (y) . cos (x) where x and y range from 0 to 12 and z corresponding to the height of the room. Assume that the base of the column are at the points whose co-ordinates are (0, 0), (12, 0), (12, 12) & (0, 12) respectively. If wall be put up to the ceeling joining the adjacent column then the volume of the room is
(a) < 3456 cu. feet (b) ≥ 3456 but less than 4000 cu. feet
(c) ≥ 4000 but less than 6000 cu. feet (d) ≥ 6000 cu. feet

56. In a village, there are 2 groups of people, group A, who always lie and group C, who always speak the truth. If a camel is stolen, then the following cases will arise :
R, G and B say the following statements :
R : G is innocent or G belong to group C
G : I did not steal the camel or R belongs to group A
B : Only two of us are speaking the truth.

Then which of the following is true ?
(a) R has stolen (b) G has stolen (c) B has stolen (d) None

57. Among H, V, Z one is the owner of the camel. They are asked a question that who is owner of the camel which V replies and you conclude that the owner of the camel
H : V is the owner
Z : I am not the owner of the camel
V : Atleast two of us are type A workers.
(a) S is owner
(b) H or S is owner
(c) S or V is owner
(d) V's response does not helps to know the answer to the question

58. Under the considerationof above question V is asked about the owner of camel and V answered
(a) S is owner
(b) H or S is owner
(c) S or V is owner
(d) V's response does not helps to know the answer to the question

59. The distance covered by pendulum BOB in successive swing are 16, 12, 9, 6.75, ... cm. Then total distance covered by BOB before it came to rest is ?
(a) 58 (b) 64 (c) 60 (d) 65

Q. 60 - 62 : (Varied according to the candidate's name, user ID & Group ID & Paper Code.)

60. The question paper you are provided, A code in the centre of the bottom of every page is given. What is your code ?
(a) A (b) B (c) C (d) D

61. The userID in your answer sheet and the candidate name in your admit card ?
(a) both are identical (same)
(b) both are different
(c) 3 letters are same, rest are different
(d) 5 letters are same, rest are different

62. The check ID in your answer sheet and the Group ID in your admit card
(a) both are identical (same)
(b) both are different
(c) 6 letters starting are same rest different
(d) Starting 10 letters are same rest different