BRIKS ACADEMY

TIME : 3 Hours 15 Minutes   Max Marks : 80

Instructions : 1. The question paper has five parts namely A, B, C, D and E. Answer all the Parts.

2. Part A has 15 multiple choice questions, 5 fill in the blank questions

PART -A

I. Answer all the multiple choice questions :

15 x 1 = 15

1. Write X = {1, 4, 9, 16, 25,…} in set builder form.

   a) X = {x: x is a set of prime numbers}   b) X = {x: x is a set of whole numbers}

   c) X = {x: x is a set of natural numbers}   d) X = {x: x is a set of square numbers}

2. If $f(x) = x^2 + 2$, $x \in R$, then the range of $f(x)$ is

   a) [2, ∞)   b) (-∞, 2]   c) (2, ∞)   d) (-∞, 2) U (2, ∞)

3. The degree measure of 2π radians is equal to

   a) 225^0 b) 300^0 c) 420^0 d) 360^0

4. The conjugate of $3 + 4i$ is

   a) $4i + 3$ b) $-3 - 4i$ c) $-3 + 4i$ d) $- i + 2$

5. If 4x + 3 < 6x +7, then x belongs to the interval

   a) (2, ∞)   b) (-2, ∞)   c) (-∞, 2)   d) (-4, ∞)

6. The number of ways in which 8 students can be seated in a line is

   a) 5040   b) 50400   c) 40230   d) 40320

7. The number of terms in the expansion of $(a + b)^7$ is
   a)6   b) 5   c) 7   d) 8

8. If a sequence is defined as $a_n = 2^n + 7$, then the second term is

   a) 11   b) 6   c) 7   d) 8

9. The equation of y – axis is

   a) x = 0   b) y = 0   c) xy = 0   d) x = y

10. Th e centre of the circle $4x^2 + 4y^2 - 8x + 12y - 25 = 0$ is

   a) (-2, 3)   b) (1, -3/2)   c) (–4, 6)   d) (4, – 6)

11. The length of major axis of the ellipse $\frac{x^2}{9} + \frac{y^2}{16} = 1$ is

   a) 4   b) 6   c) 9   d) 8

12. The octant in which the point (8, 1, 2) lies is

   a) First   b) second   c) third   d) fourth

13. The derivative of $4x^2$ with respect to x is

   a) 2   b) $\frac{-3}{4}$ c) $8x$ d) 0

14. The Median of the data 3, 9,5,3,12,10,18,4,7,19,21 is

   a) 18   b) 9   c) 12   d) 10

15. The probability of drawing a diamond card from a well shuffled deck of 52 cards is

   a) $\frac{1}{4}$ b) $\frac{1}{52}$ c) $\frac{1}{13}$ d) 1

II. Fill in the blanks by choosing the appropriate answer from those given in the bracket

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(0, 1, 13, 40, 512)   5x1=5

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16. If A = { a, b, c } and B = { 1, 2, 3 }, then the subset of $A \times B$ is _____
17. The value of sin 4п is _____
18. The value of $0!$ is _____
19. the distance between origin to (5,12) is _____ units
20. The derivative of $2x^2$ at x = 10 is _____

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PART –B

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III. Answer any six questions

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6 x 2 =12

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21. Let A = { 1, 2, 3, 5, 6 } , B = { 2, 4, 6, 8 } . Find $A \cup B$ and $A \cap B$

22. List all the the subsets of the set { 1,2,3 }

23. Prove that $2\sin^2\frac{3\pi}{4} + 2\cos^2\frac{\pi}{4} + 2\sec^2\frac{\pi}{3} = 10$

24. Express $(-\sqrt{3} + \sqrt{-2})(2\sqrt{3} - i)$ in the form of a + ib

25. If $x - iy = \sqrt{\frac{a-ib}{c-id}}$, prove that $(x^2 + y^2)^2 = \frac{a^2+b^2}{c^2+d^2}$

26. Solve inequality $3x - 2 < 2x + 1$ and show the graph of the solutions on number line.

27. If $\frac{1}{6!} + \frac{1}{7!} = \frac{x}{8!}$, find x

28. Expand $(96)^3$, using Binomial theorem

29. Find the equation of the line passing through $(2, 2\sqrt{3})$ and inclined with the

   x-axis at an angle of 75^0

30. Evaluate $\lim\limits_{x \to 3} \frac{x^4 - 81}{2x^2 - 5x - 3}$

31. A coin is tossed three times, consider the following events.

   i) No head appears,   ii)Exactly one head appears,

PART – C

IV. Answer any six questions

$6 \times 3 = 18$

32. Let U = { 1, 2, 3, 4, 5, 6, 7, 8, 9 } , A = {2, 4, 6 , 8 },

   and B = { 2, 3, 5, 7}   prove that $(A \cup B)^I = A^I \cap B^I$

33. Let f(x) = $\sqrt{x}$ and g(x) = x be two real functions . Find (f +g) (x) ,

       (f – g) (x) ,   (f g) (x)

34. Prove that $sin3x = 3sinx - 4\sin^3 x$

35. Find the degree measure of the angle subtended at the centre of

    a circle of radius100 cm by an arc of length 22 cm

36. Express $\frac{(3+i\sqrt{5})(3-i\sqrt{5})}{(\sqrt{3}+\sqrt{2}i)-(\sqrt{3}-i\sqrt{2})}$ in the form a + ib

37. The longest side of a triangle is 3 times the shortest side and the

       third side is 2cm shorter than the longest side. If the perimeter of the triangle is at least 61cm, find the minimum length of the shortest side.

38. The sum of first three terms of a G.P. is $\frac{39}{10}$ and their product is 1.

    Find the common ratio and the terms.

39. Find the angle between the lines $\sqrt{3}x + y = 1 \; and \; x + \sqrt{3}y = 1$

40. Find the equation of the circle passing through the points (4,1) and (6,5)

And whose center is on the line $x - 3y - 11 = 0$

41. Find the equation of set of points P such that $PA^2 + PB^2 = 2K^2$,

where A and B are the points (3, 4, 5) and (-1, 3, -7) respectively.

42. Find the derivative of cosx with respect to x form first principle.

PART – D

V. Answer any four questions

4 x 5 =20

43. Define Signum function, draw the graph . write the domain and range

44. Prove that $tan4x = \dfrac{4tanx(1 - \tan^2 x)}{1 - 6\tan^2 x + \tan^4 x}$

45. In how many ways can the letters of the PERMUTATIONS be arranged if the

i) Words start with P and end with S,   ii) Vowels are all together,

iii) There are always 4 letters between P and S.

46. Prove that for every positive integer n $(a + b)^n =$
$${}^n c_0 a^n + {}^n c_1 a^{n-1} b + {}^n c_2 a^{n-2} {}^n c_0 a^n + - - - - {}^n c_{n-1} a^n b^{n-1} + {}^n c_n b^n$$

47. Derive the formula to find the distance between the parallel lines

$Ax + By + c_1 = 0$ and $Ax + By + c_2 = 0$

48. Prove that geometrically $\lim\limits_{x \to 0} \dfrac{sinx}{x} = 1$, x being measured in radians

49. Calculate the mean, variance and standard deviation for the

following distribution

Class	30-40	40-50	50-60	60-70	70-80	80-90	90-100
	3	7	12	15	8	3	2
Frequency							

50. Three coins are tossed once. Find the probability of getting

i) 3 heads   ii) atmost 2 heads   iii) exactly two tails   iv) no tail

PART –E

Answer the following questions

51. Prove geometrically that cos (x + y) = cosx cosy − sinx siny   **6**

OR

Derive the equation of Hyperbola in the standard form $\frac{x^2}{a^2} - \frac{y^2}{b^2} = 1$

52. Find the sum of the sequence 8, 88, 888, 8888 , - - - - - - - to n   **4**

terms

OR

Find the derivative of $\frac{2}{x+1} - \frac{x^2}{3x-1}$ with respect to x

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