FOUNDATION COURSE EXAMINATION

June 2013

PAPER 4 -.Business Mathematics and Statistics Fundamentals

Full Marks: 50

Answer all the questions. Each question carries 1 mark. Each Question has four alternatives.
Indicate the correct alternative by darkening the circle on the OMR Sheet.

1. The ratio of $({}^{2n}P_n + {}^{2n}C_n) : ({}^{2n}P_n - {}^{2n}C_n)$ is
   (a) (n + 1): (n - 1)
   (b) (n - 1): (n + 1)
   (c) (n! + 1) : (n! - 1)
   (d) (n+ 1)!:(n -1)!

2. A quantity p varies directly as t and another quantity q varies inversely as t. When t = 2, p + q = 7and when t = 3, p + q = 8. When t = 4, p + q =
   (a) 8.5
   (b) 9
   (c) 9.5
   (d) 8

3. If p and q be respectively two statements "he is tall" and "he is intelligent" then the symbolic form of the statement "it is not true that he is short or dull" is
   (a) $\sim p \wedge \sim q$
   (b) $\sim(\sim p \vee q)$
   (c) $\sim(\sim p \vee \sim q)$
   (d) $\sim (p \vee \sim q)$

4. The area of the triangle with sides of 9 cm, 12 cm and 15 cm is
   (a) 50 sq cm
   (b) 54 sq cm
   (c) 56 sq cm
   (d) none of the above

5. Sum of all interior angles of a decagon is
   (a) 1200°
   (b) 1300°
   (c) 1400°
   (d) none of the above

6. The circumference of the base of a cylinder is 66 cm. If the volume of the cylinder be 3465 cu cm, then the height of the cylinder is
   (a) 10 cm
   (b) 10.5 cm
   (c) 11 cm
   (d) 12.5 cm

7. Base of a right prism is an equilateral triangle of side 4 cm. If the volume of the prism is $60\sqrt{3}$ cu cm, then its height is
   (a) 20 cm
   (b) 12 cm
   (c) 18 cm
   (d) 15 cm

8. Three solid spherical balls of diameters 10, 8 and 6 cm respectively are melted into one solid ball. Its diameter is
   (a) 11 cm
   (b) 12 cm
   (c) 10 cm
   (d) 13 cm

9. Diameter of the base of a conical tent is 14 metre and its height is 9 metre. Its volume is
   (a) 450 cu metre
   (b) 460 cu metre
   (c) 470 cu metre
   (d) none of the above

10. A right pyramid of height 4 cm stands on a square base of side 3 cm. Its volume is
    (a) 10 cu cm
    (b) 12 cu cm
    (c) 14 cu cm
    (d) none of the above

11. The perimeter of a rhombus is 64 cm and one of the diagonals is 20 cm. The area of the rhombus is
    (a) $80\sqrt{39}$sqcm
    (b) $20\sqrt{39}$sqcm
    (c) $40\sqrt{39}$sqcm
    (d) $39\sqrt{40}$sqcm

12. If the point R divides the line segment joining (6, 3) and (9, 12) internally in the ratio 2:1, then R is
    (a) (5,6)
    (b) (6,7)
    (c) (7,8)
    (d) none of the above

13. The perpendicular distance of the point $\left(\frac{3}{2}, -\frac{5}{2}\right)$ from the line 2x - y = 3 is
    (a) $\frac{2}{\sqrt{5}}$ units
    (b) $\sqrt{5}$ units
    (c) $\frac{1}{2}$ units
    (d) $\frac{\sqrt{5}}{2}$ units

14. If the centre of the cricle $x^2 + y^2 + 6x - 3by + 2 = 0$ be (-3, 6), then the value of b is
    (a) 3
    (b) 4
    (c) -3
    (d) -4

15. The eccentricity of an ellipse is $\frac{\sqrt{3}}{2}$ and major axis is 12 units. The minor axis is
    (a) 4 units
    (b) 2 units
    (c) 6 units
    (d) $2\sqrt{3}$ units

16. The vertex of the parabola $x^2 + 8x + 12y + 4 = 0$ is
    (a) (-4, 1)
    (b) (4,-1)
    (c) (-4,-1)
    (d) none of the above

17. $\lim_{x \to 0} \frac{x + \log(1+x)}{e^x - 1} = 1$
    (a) 1
    (b) 4
    (c) 1.5
    (d) none of the above

18. If $f(x) = \frac{3x+2}{2x+3}$, then $f(-x)f(-\frac{1}{x})$ is
    (a) -1
    (b) 1
    (c) $\frac{2}{3}$
    (d) $\frac{3}{2}$

19. The derivative of $\sqrt{x}$ with respect to log x is
    (a) $\sqrt{x}$
    (b) $2\sqrt{x}$
    (c) X
    (d) $\frac{\sqrt{x}}{2}$

20. A firm produces x units of output per week at a total cost of ₹ $\frac{1}{3}x^3 - 7x^2 + 45x$. The level of output at which the marginal cost attains the minimum is 5 units
    (a) 5 units
    (b) 7 units
    (c) 9 units
    (d) none of the above

21. If $y = x^3 - 9x^2 + x - 2$, then the value of x for which $\frac{d^2y}{dx^2} = 12$ is
    (a) 3
    (b) 6
    (c) 5
    (d) 1

22. If $u = x^3 - 2y^3 + 3x^2y$, then $x\frac{\partial u}{\partial x} + y\frac{\partial u}{\partial y}$ is
    (a) 3
    (b) u
    (c) 3u
    (d) 2u

23. $\int_0^{\log 2} \frac{e^x}{e^x + 1} dx =$
    (a) log4
    (b) 3 log 2
    (c) $\log(\frac{2}{3})$
    (d) $\log(\frac{3}{2})$

24. The algebraic sum of deviations of 10 observations from the constant C is -14 and the A.M. of the observations is 7.6. The value of C is
    (a) 8
    (b) 6
    (c) 9
    (d) 5

25. If the H.M. of 4, x and 6 be 6, the value of x is
    (a) 8
    (b) 12
    (c) 10
    (d) 6

26. A.M. and G.M. of two numbers are 10 and 6 respectively. The numbers are
    (a) 2 and 18
    (b) 3 and 17
    (c) 4 and 9
    (d) none of the above

27. Heights (in cm) of 8 boys are: 70, 74, 70, 73, 72, 70,74 and 70. The median is
    (a) 70 cm
    (b) 71 cm
    (c) 72 cm
    (d) none of the above

28. If $\sum_{i=1}^{4} x_i = 32$ and $\sum_{i=1}^{4} (x_i - 3)2 = 120$, then $\sum_{i=1}^{4} x^2_i$ is
    (a) 276
    (b) 303
    (c) 108
    (d) None of the above

29. Relation between two variables x and y is 3x -y +11 = 0. If the median of y be 14, the median of x is
    (a) 1
    (b) 2
    (c) 3
    (d) none of the above

30. The sum of 11 observations is 231 and mode is 18. The median of the observations is
    (a) 20
    (b) 16
    (c) 12
    (d) none of the above

31. A.M. of n observations $x_1, x_2, \ldots, x_n$ is 15 and $\sum_{i=1}^{n} (x_i - 9) = 72$. The value of n is
    (a) 12
    (b) 16
    (c) 21
    (d) none of the above

32. The means of two groups of n and 12 observations are 33 and 40 respectively and the combined group mean is 36. The value of n is
    (a) 10
    (b) 18
    (c) 14
    (d) 16

33. If 3u = 2x and the H.M. of x is 0.09, the H.M. of u is
    (a) 0.03
    (b) 0.04
    (c) 0.06
    (d) none of the above

34. Daily wages (in ₹) of 5 workers are 90, 100,70, 140 and 150. When the highest wage earner is absent on a particular day, the percentage change in range is
    (a) 10.5
    (b) 12.5
    (c) 14.3
    (d) none of the above

35. If $\sum_{i=1}^{10} x_i = 120$ and $\sum_{i=1}^{10} x_i^2 = 1690$, the standard deviation is 4
    (a) 4
    (b) 5
    (c) 6
    (d) 8

36. The relation between two variables x and y is 2x + 5y = 15. If the mean deviation of x about its mean 5 be 4, the mean deviation of y about its mean is
    (a) 1.4
    (b) 1.8
    (c) 1.2
    (d) 1.6

37. The cost of manufacturing an article is ₹ 180 and it is represented in a pie chart. If electricity cost is given by 100°, the sum spent on other heads is
    (a) ₹ 130
    (b) ₹ 140
    (c) ₹ 150
    (d) none of the above

38. 50 workers in a plant earn ₹ 25,000 monthly with variance of wage distribution as 100. The coefficient of variation for plant is
    (a) 1%
    (b) 2%
    (c) 2-5%
    (d) none of the above

39. For a moderately skewed distribution, mean = 20, coefficient of skewness = 0.25 and coefficient of variation is 20%. The mode is
    (a) 19
    (b) 17
    (c) 12
    (d) 15

40. For a shoe-maker, which one of the following measures is most suitable to decide on the shoe sizes to manufacture?
    (a) Median
    (b) Arithmetic mean
    (c) Mode
    (d) Geometric mean

41. If x : y = 3 : 4, y : z = 5 : 6 and z : w = 7 : 8, then x : y : z : w is
    (a) 3:5:7:8
    (b) 3:4:6:8
    (c) 105 : 140 : 168 : 192
    (d) 3 : 4 : 24 : 192

42. The average monthly consumption of petrol for a car for 12 months is 160 litre. If the average monthly consumption for first 8 months is 145 litre, then the average monthly comsumption of petrol for the last 4 months is
    (a) 190 litre
    (b) 165 litre
    (c) 180 litre
    (d) 175 litre

43. If 9 men working 10 hours daily can complete a job in 10 days, then 15 men working 6 hours daily shall complete same job in
    (a) 6 days
    (b) 8 days
    (c) 10 days
    (d) none of the above

44. In 25 years at 8% p.a. simple interest, a sum becomes ₹ 4629. The amount of sum is
    (a) ₹1534
    (b) ₹1453
    (c) ₹1435
    (d) ₹1543

45. True discount at interest rate 5% p.a. is ₹ 40. A bill of ₹ 1240 is due in
    (a) 6 months
    (b) 8 months
    (c) 1 year
    (d) $1\frac{1}{2}$ year

46 . If $3^{x+1} + 3^{x-1} = 270$, then the value of x is
    (a) 5
    (b) 3
    (c) 4
    (d) 8

47. If $x = 7 - 4\sqrt{3}$, then the value of $\sqrt{x} + \frac{1}{\sqrt{x}}$ is
    (a) $2\sqrt{3}$
    (b) $4\sqrt{3}$
    (c) 4
    (d) 6

48. If $x = 2+3i$ then $x^2 - 4x + 13$ is
    (a) 0
    (b) 1
    (c) 2
    (d) None of the above

49. Value of log 144 with base $2\sqrt{3}$ is
    (a) 2
    (b) 3
    (c) 4
    (d) None of the above

50. If P and Q be two non-empty sets, then $(P-Q) \cap (Q-P) \cap (P \cap Q)$
    (a) Φ
    (b) $P \cap Q$
    (c) $P \cup Q$
    (d) none of the above

Answer:

1. (c) (n! + 1):(n!-1)
2. (c) 9.5
3. (c) ~(~ p $\vee$ ~q)
4. (b) 54 sq cm
5. (d) none of the above
6. (a) 10 cm
7. (d) 15 cm
8. (b) 12 cm
9. (d) none of the above
10. (b) 12 cu cm
11. (c) $40\sqrt{39}$sq cm
12. (d) None of the above
13. (d) $\frac{\sqrt{5}}{2}$ unit
14. (b) 4
15. (c) 6 units
16. (a) (-4, 1)
17. (d) None of the above
18. (b) 1
19. (d) $\frac{\sqrt{x}}{2}$
20. (b) 7 units
21. (c) 5
22. (c) 3u
23. (d) log ($\frac{3}{2}$)
24. (c) 9
25. (b) 12
26. (a) 2 and 18
27. (b) 71 cm
28. (a) 276
29. (a) 1
30. (a) 20
31. (a) 12
32. (d) 16
33. (c) 0.06
34. (b) 12.5
35. (b) 5
36. (d) 1.6
37. (a) ₹130
38. (b) 2%
39. (a) 19
40. (c) Mode
41. (c) 105 : 140 : 168 : 192
42. (a) 190 litre
43. (c) 10 days
44. (d) ₹1543
45. (b) 8 months
46. (c) 4
47. (c) 4
48. (a) 0
49. (c) 4
50. (a) Φ