

MODEL TEST PAPERS

FOUNDATION COURSE

PAPER 3 – QUANTITATIVE APTITUDE

S. No.	Model Test Paper	Page No.
	QUESTION	
1.	Model Test Paper 1	1 - 18
2.	Model Test Paper 2	19 - 36
3.	Model Test Paper 3	37 - 55
	ANSWER	
4.	Model Test Paper 1	56
5.	Model Test Paper 2	57
6.	Model Test Paper 3	58

MODEL TEST PAPER 1
FOUNDATION COURSE
PAPER 3: QUANTITATIVE APTITUDE

Time: 2 Hours

Marks: 100

1. The students in three classes are in the ratio 2 : 3 : 5. If 40 students are increased in each class the ratio changes to 4 : 5 : 7. Originally the total number of students was
 - (a) 180
 - (b) 400
 - (c) 100
 - (d) 200
2. A bag contains coins of denominations 1 rupee , 2 rupee and 5 rupees . Their numbers are in the ratio 4:3:2 .If bag has total of Rs. 1800 then find the number of 2 rupee coins ?
 - (a) 270
 - (b) 230
 - (c) 180
 - (d) 210
3. 4 tables and 3 chairs together cost ₹ 2,250 and 3 tables and 4 chairs cost ₹ 1950. Find the cost of 2 chairs and 1 table.
 - (a) ₹ 550
 - (b) ₹ 1005
 - (c) ₹ 750
 - (d) None of these
4. One root of the equation: $x^2 - 2(5 + m) + 3(7 + m) = 0$ is reciprocal of the other. Find the value of m.
 - (a) $-20/3$
 - (b) 7
 - (c) $1/7$
 - (d) 117
5. A small manufacturing firm produces two types of gadgets A and B, which are first processed in the foundry then sent to the machine shop for finishing. The number of man-hours of labour required in each shop for the production of

each unit of A and B, and the number of man-hours the firm has available per week are as follows:

Gadget	Foundry	Machine-shop
A	10	5
B	6	4
Firm's capacity per week	1000	600

Let the firm manufactures x units of A and y units of B. The constraints are:

- (a) $10x+6y \leq 1000$, $5x+4y \geq 600$, $x \geq 0, y \leq 0$
 (b) $10x+6y \leq 1000$, $5x+4y \leq 600$, $x \geq 0, y \geq 0$
 (c) $10x+6y \geq 1000$, $5x+4y \leq 600$, $x \leq 0, y \leq 0$
 (d) $10x+6y \leq 1000$, $5x+4y \geq 600$, $x \leq 0, y \leq 0$
6. Sangeeta leaves from her home. She first walk 30 metres in North-West direction, and then 30m in South-West direction, next she walks 30 metres in South-East direction. Finally she turns towards her house. In which direction is she moving?
 (a) North-West
 (b) North-East
 (c) South-East
 (d) South-West
7. Rahim started from point X and walked straight 5 km. East, then turned left and walked straight 2 km. and again turned left and walked straight 7 km. In which direction is he from the point X ?
 (a) North-East
 (b) South-West
 (c) South-East
 (d) North-West
8. Find out the next number in the following series 7,11, 13, 17, 19, 23, 25, 29, ?
 (a) 30
 (b) 31
 (c) 32
 (d) 33
9. If MACHINE is coded as 19 - 7 - 9 - 14 - 15 - 20 - 11, how will you code DANGER?
 (a) 11-7-20-16-11-24
 (b) 13-7-20-9-11-25
 (c) 10-7-20-13-11-24
 (d) 13-7-20-10-11-25

10. A, B, C, D, E and F are sitting around a round table. A is between E and F, E is opposite to D, and C is not in either of the neighbouring seats of E. Who is opposite to B ?
- (a) C
 - (b) D
 - (c) F
 - (d) None of these
11. Pointing to a photograph, a man said to a woman "His mother is the only daughter of your father " How is the woman related to that person
- (a) Daughter
 - (b) Sister
 - (c) Mother
 - (d) Wife
- (12-13) Read the following information and answer the given below it :
- (i) A is the father of C, But C is not his son,
 - (ii) E is the daughter of C. F is the spouse of A .
 - (iii) B is the brother of C. D is the son of B.
 - (v) G is the spouse of B. H is the father of G
12. Who is the grand mother of D?
- (a) A
 - (b) C
 - (c) F
 - (d) H
13. Who is son of F
- (a) B
 - (b) C
 - (c) D
 - (d) E
14. A is the father of C and D is the son of B. E is the brother of A . If C is the sister of D, how is B is related to E?
- (a) Daughter
 - (b) Brother-in-law
 - (c) Husband
 - (d) Sister-in-law

15. If 'P+Q' means 'P is the father of Q', 'P×Q' means 'P is the brother of Q', 'P-Q' means 'P is the mother of Q', then which of the following is definitely true about 'C-A+B'?
- B is the son of A
 - A is the son of C
 - B is the father of C
 - C is the mother of B
16. If a simple interest on a sum of money at 6% p.a. for 7 years is equal to twice of simple interest on another sum for 9 years at 5% p.a. The ratio will be:
- 2:15
 - 7:15
 - 15:7
 - 1:7
17. How much money is required to be invested every year as to accumulate Rs,6,00,000 at the end of 10 years, if interest is compounded annually at 10% rate of interest [Given : $(1.1)^{10}=259734$
- ₹ 37,467
 - ₹ 37,476
 - ₹ 37,647
 - ₹ 37,674
18. The Scarap value of machine valued at Rs,10,00,000 after 15 yaers of depreciation is 10% per annmum .
- ₹ 215891.13
 - ₹ 205891.13
 - ₹ 225891.13
 - None
19. The effective annual rate of interest corresponding to nominal rate 6% p.a. payable quaterly is:
- 6.14%
 - 6.07%
 - 6.08%
 - 6.09%
20. If the difference between the compound interest compounded annually and simple interest on a certain amount at 10% per annum for two years is ₹ 372, then the principal amount is.
- ₹ 37,000
 - ₹ 37,200

- (c) ₹ 37,500
 (d) None of the above
21. The future value of an annuity of ₹ 1500 made annually for 5 years at an interest rate of 10% compounded annually is [Given that $(1.1)^5 = 1.61051$]
- (a) 9517.56
 (b) 9157.65
 (c) 9715.56
 (d) 9175.65
22. Find the present value of an annuity of ₹ 1,000 payable at the end of each year for 10 years. If rate of interest is 6% compounding per annum. (given $(1.06)^{-10} = 0.5584$):
- (a) ₹ 7,360
 (b) ₹ 8,360
 (c) ₹ 12,000
 (d) None of these.
23. Mr. A borrows 5,00,000 to buy a house. If he pays equal instalments for 20 years and 10% interest on outstanding balance what will be the equal annual instalment?
- (a) ₹ 58239.84
 (b) ₹ 58729.84
 (c) ₹ 68729.84
 (d) None of these
24. Suppose your mom decides to gift you ₹ 10,000 every year starting from today for the next sixteen years. You deposit this amount in a bank as and when you receive and get 8.5% per annum interest rate compounded annually. What is the present value of this money: [Given that $P(15, 0.085) = 8.304236$]
- (a) ₹ 83,042
 (b) ₹ 90,100
 (c) ₹ 93,042
 (d) ₹ 10,100
25. What will be the population after 3 years, when present population is 1,00,000 and the population increases at 3% in year 1st year, at 4% in second year and 5% in third year.
- (a) 1,12,476
 (b) 1,15,476
 (c) 1,20,576
 (d) 1,25,600

26. Find the present value of an annuity which pays 200 at the end of each 3 months for 10 years assuming money to be worth 5% converted quarterly?
- ₹ 3473.86
 - ₹ 3108.60
 - ₹ 6265.38
 - None of these
27. The value of furniture depreciates by 10% a year, if the present value of the furniture in an office is ₹ 21870, calculate the value of furniture 3 years ago:
- ₹ 30,000
 - ₹ 40,000
 - ₹ 35,000
 - ₹ 50,000
28. A sum of money, lent out at simple interest, doubles itself in 8 years. Find in how many years will the sum become triple (three times) of itself at the same rate per cent ?
- 16 years
 - 15 years
 - 20 years
 - None.
29. $\int 2^{3x} \cdot 3^{2x} \cdot 5^{2x} dx$
- $\frac{2^{3x} \cdot 3^{2x} \cdot 5^x}{\log(720)} + C$
 - $\frac{2^{3x} \cdot 3^{2x} \cdot 5^x}{\log(360)} + C$
 - $\frac{2^{3x} \cdot 3^{2x} \cdot 5^{2x}}{\log(1800)} + C$
 - $\frac{2^{3x} \cdot 3^{2x} \cdot 5^x}{\log(90)} + C$
30. $\int_1^4 (2x + 5) dx$ and the value is
- 10
 - 3
 - 30
 - none
31. The equation of the tangent to the curve, $x^3 - 2x + 3$, at the point (2, 7) is:
- $y = 2x - 13$
 - $y = 10x$
 - $y = 10x - 13$

- (d) $y = 10$
32. If $x = c.t$, $y = c/t$, then dy/dx is equal to :
- (a) $1/t$
 - (b) $t.e^t$
 - (c) $-1/t^2$
 - (d) None of these
33. The letters of the word VIOLENT are arranged so that the vowels occupy even place only. The number of permutations is:
- (a) 144
 - (b) 120
 - (c) 24
 - (d) 72
34. A garden having 6 tall trees in a row. In how many ways 5 children stand, one in a gap between the trees in order to pose for a photograph?
- (a) 24
 - (b) 120
 - (c) 720
 - (d) 30
35. Find the number of arrangements in which the letters of the word 'MONDAY' be arranged so that the words thus formed begin with 'M' and do not end with 'N'.
- (a) 720
 - (b) 120
 - (c) 96
 - (d) None
36. In how many ways can a party of 4 men and 4 women be seated at a circular table, so that no two women are adjacent ?
- (a) 164
 - (b) 174
 - (c) 144
 - (d) 154
37. A Supreme Court Bench consists of 5 judges. In how many ways, the bench can give a majority division ?
- (a) 10
 - (b) 5
 - (c) 15
 - (d) 16

38. If the p th term of an A.P. is 'q' and the q th term is 'p', then its r th term is:
- $p + q + r$
 - $p + q - r$
 - $p - q - r$
 - $p + q$
39. Find the numbers whose GM is 5 and AM is 7.5:
- 12 and 13
 - 13.09 and 1.91
 - 14 and 11
 - 17 and 19
40. If the sum of n terms of an A.P. be $2n^2 + 5n$, then its ' n ' term is:
- $4n - 2$
 - $3n - 4$
 - $4n + 3$
 - $3n + 4$
41. The first, second and seventh term of an AP. are in G.P. and the common difference is 2, the 2nd term of A.P. is :
- $5/2$
 - 2
 - $3/2$
 - $1/2$
42. Find the sum of all natural numbers between 250 and 1,000 which are exactly divisible by 3 :
- 1,56,375
 - 1,56,357
 - 1,65,375
 - 1,65,357
43. On the set of lines, being perpendicular is a satisfies which property :
- Reflexive
 - Symmetric
 - Transitive
 - None of these
44. If $A = (1, 2, 3, 4, 5)$, $B = (2, 4)$ and $C = (1, 3, 5)$ then $(A - C) \times B$ is:
- $\{(2, 2)(2, 4)(4, 2)(4, 4)(5, 2) (5, 4)\}$
 - $\{(1, 2) (1, 4) (3, 2) (3, 4) (5, 2) (5, 4)\}$

- (c) $\{(2, 2) (4, 2) (4, 4) (4, 5)\}$
 (d) $\{(2, 2) (2, 4) (4, 2) (4, 4)\}$
45. Out of total 150 students, 45 passed in Accounts, 30 in Economics and 50 in Maths, 30 in both Accounts and Maths, 32 in both Maths and Economics, 35 in both Accounts and Economics, 25 students passed in all the three subjects. Find the numbers who passed atleast in anyone of the subjects:
- (a) 63
 (b) 53
 (c) 73
 (d) None.
46. Let R is the set of real numbers, such that the function $f: R \rightarrow R$ and $g: R \rightarrow R$ are defined by $f(x) = x^2 + 3x + 1$ and $g(x) = 2x - 3$. Find $(f \circ g)$:
- (a) $4x^2 + 6x + 1$
 (b) $x^2 + 6x + 1$
 (c) $4x^2 - 6x + 1$
 (d) $x^2 - 6x + 1$
47. The ages of two persons are in the ratio 5:7. Eighteen years ago their ages were in the ratio of 8:13, their present ages (in years) are :
- (a) 50,70
 (b) 70,50
 (c) 40,56
 (d) None of these
48. A box contains ₹ 56 in the form of coins of one rupee, 50 paise and 25 paise. The number of 50 paise coin is double the number of 25 paise coins and four times the numbers of one rupee coins. The numbers of 50 paise coins in the box is
- (a) 64
 (b) 32
 (c) 16
 (d) 14
49. A man starts his job with a certain monthly salary and earns a fixed increment every year. If his salary was ₹ 1,500 after 4 years of service and ₹ 1,800 after 10 years of service, what was his starting salary and what is the annual increment in rupees?
- (a) ₹ 1,300, ₹ 50
 (b) ₹ 1,100, ₹ 50
 (c) ₹ 1,500, ₹ 30

- (d) None
50. Find the positive value of k for which the equations: $x^2 + kx + 64 = 0$ and $x^2 - 8x + k = 0$ will have real roots:
- (a) 12
 - (b) 16
 - (c) 18
 - (d) 22
51. Praveen is facing west. He turns 45° in the clockwise direction and then again another turns with 180° in the same direction i.e. clockwise direction, after that he turns 270° in the anti-clockwise direction. Which direction is he facing now ?
- (a) North-West
 - (b) West
 - (c) South-West
 - (d) South
52. Shweta moved a distance of 75 metres towards the north. She then turned to the left and walking for about 25 metres, turned left again and walked 80 metres. Finally, she turned to the right at an angle of 45° . In which direction was she moving finally?
- (a) South
 - (b) South-West
 - (c) North-East
 - (d) North-West
53. In a straight line there are six persons sitting in a row. B is between F and D. E is between A and C. A does not stand next to F or D, C does not stand next to D. F is between which of the following persons?
- (a) B and E
 - (b) B and C
 - (c) B and D
 - (d) B and A
54. Rashmi walked 2 km west of her house and then turned south covering 4 km. Finally, she moved 3 km towards east and then again 1 km west. How far is she from her initial position?
- (a) 7 km
 - (b) 3 km
 - (c) 4 km
 - (d) 12 km

55. Five boys A, B, C, D and E are sitting in a row. A is to the right of B, and E is to the left of B but to the right of C. A is to the left of D. Who is second from the left end ?
- D
 - A
 - E
 - B
56. Eight leaders P, Q, R, S, T, U, V and W are sitting on a bench facing towards North.
- T is fourth to the left of P
 - S is fourth to the right of W
 - U and R are not sitting at the ends, but they are neighbours of T and Q respectively.
 - P is next to the right of W and but left of Q.
- Who are sitting at the extreme ends ?
- T and S
 - P and Q
 - U and R
 - None
57. If $\log_4(x^2 + x) - \log_4(x + 1) = 2$ then the value of x is
- 2
 - 3
 - 16
 - 8
58. If HEALTH is written as GSKZDG, then how will NORTH be written in that code?
- OPSUI
 - GSQNM
 - FRPML
 - IUSPO
59. In a certain code, TEACHER is written as VGCEJGT. How is CHILDREN written in that code ?
- EJKNEGTP
 - EGKNEITP
 - EJKNFGTO
 - EJKNFTGP

60. Find odd man out of the following:
- (a) 15
 - (b) 25
 - (c) 37
 - (d) 49
61. Which of the following statement is true?
- (a) Statistics is derived from the French word 'Statistik'
 - (b) Statistics is derived from the Italian word 'Statista'
 - (c) Statistics is derived from the Latin word 'Statistique'.
 - (d) None of these
62. In tabulation, source of data, if any is shown in the :
- (a) Stub
 - (b) Body
 - (c) Caption
 - (d) Footnote
63. From the following data 73, 72, 65, 41, 54, 80, 50, 46, 49, 53, find the number of class intervals if class length is given as 5,
- (a) 6
 - (b) 5
 - (c) 7
 - (d) 8

64. The number of observations between 150 and 200 based on the following data is:

Value	More than 100	More than 150	More than 200	More than 250
No. of Observations	70	63	28	05

- (a) 46
 - (b) 35
 - (c) 28
 - (d) 23
65. Data collected on religion from the census reports are:
- (a) Primary data
 - (b) Secondary data
 - (c) Sample data
 - (d) (a) or (b)

66. The number of test of Adequacy in Index numbers:
- (a) 2
 - (b) 3
 - (c) 4
 - (d) 5
67. Circular Test is satisfied by:
- (a) Paasche's Index Number
 - (b) The simple geometric mean of price relatives and the weighted aggregative with fixed weights
 - (c) Laspeyre's Index Number
 - (d) None of these
68. In the data group Bowley's and Laspeyre's index number is as follows. Bowley's index number = 150, Laspeyre's index number = 180 then Paasche's index number is:
- (a) 120
 - (b) 30
 - (c) 165
 - (d) None of these
69. If Fisher's index = 150 and Paasche's Index = 144, then Laspeyre's index is _____
- (a) 147
 - (b) 156.25
 - (c) 104.17
 - (d) 138
70. Monthly salary of an employee was ₹ 10,000 in the year 2010 and it was increased to ₹ 20,000 in the year 2023 while the consumer price index number is 240 in year 2023 with the base year 2010, what should be his salary in comparison of consumer price index in the year 2023 ?
- (a) 2,000
 - (b) 16,000
 - (c) 24,000
 - (d) None of these
71. Parameter is a characteristic of:
- (a) Population
 - (b) Sample
 - (c) Probability distribution
 - (d) Both (a) & (b)

72. The Interval $(\mu - 3\sigma, \mu + 3\sigma)$ covers
- (a) 95% area of normal distribution
 - (b) 96% area of normal distribution
 - (c) 99% area of normal distribution
 - (d) All but not 0.27% area of a normal distribution
73. The overall percentage of failure in a certain examination is 0.30. What is the probability that out of a group of 6 candidates at least 4 passed the examination?
- (a) 0.74
 - (b) 0.71
 - (c) 0.59
 - (d) 0.67
74. In a certain manufacturing process, 5% of the tools produced turn out to be defective. Find the probability that in a sample of 40 tools, at most 2 will be defective: [Given: $e^{-2} = 0.135$]
- (a) 0.555
 - (b) 0.932
 - (c) 0.785
 - (d) 0.675
75. For binomial distribution $E(x) = 2$, $V(x) = 4/3$. Find the value of n .
- (a) 3
 - (b) 4
 - (c) 5
 - (d) 6
76. If standard deviation of a poisson distribution is 2 , then its Mode
- (a) 2
 - (b) 4
 - (c) 3 and 4
 - (d) 5
77. Consumer price index is commonly known as
- (a) Chain Based index
 - (b) Ideal index
 - (c) Wholesale price index
 - (d) Cost of living index.

78. The covariance between two variables X and Y is 8.4 and their variances are 25 and 36 respectively. Calculate Karl Pearson's coefficient of correlation between them.
- 0.82
 - 0.28
 - 0.01
 - 0.09
79. If r is the Karl Pearson's coefficient of correlation in a bivariate distribution the two regression lines are at right angles when _____
- $r = \pm 1$
 - $r = 0$
 - $r = \pm \infty$
 - None
80. If $r = 0.6$ then the coefficient of non-determination is _____
- 0.4
 - 0.6
 - 0.36
 - 0.64
81. The correlation coefficient between x and y is $-1/2$. The value of $b_{xy} = -1/8$. Find b_{yx} .
- 2
 - 4
 - 0
 - 2
82. Out of the following which one affects the regression co-efficient:
- Change of origin only
 - Change of scale only
 - Change of scale & origin both
 - Neither change of origin nor change of scale
83. If Y is dependent variable and X is Independent variable and the S.D of X and Y are 5 and 8 respectively and Co-efficient of co-relation between X and Y is 0.8. Find the Regression co-efficient of Y on X.
- 0.78
 - 1.28
 - 6.8
 - 0.32

84. The theory of compound probability states that for any two events A and B:
- (a) $P(A \cap B) = P(A) \times P(B)$
 - (b) $P(A \cap B) = P(A) \times P(B/A)$
 - (c) $P(A \cup B) = P(A) \times P(B/A)$
 - (d) $P(A \cup B) = P(A) + P(B) - P(A \cap B)$
85. Three identical dice are rolled. The probability that the same number will appear on each of them is:
- (a) $1/6$
 - (b) $1/12$
 - (c) $1/36$
 - (d) 1
86. If 10 men, among whom are A and B, stand in a row, what is the probability that there will be exactly 3 men between A and B ?
- (a) $11/15$
 - (b) $4/15$
 - (c) $1/15$
 - (d) $2/15$
87. $P(A) = 2/3$; $P(B) = 3/5$; $P(A \cup B) = 5/6$. Find $P(B/A)$
- (a) $11/20$
 - (b) $13/20$
 - (c) $13/18$
 - (d) $15/20$
88. The odds in favour of A solving a problem is 5:7 and Odds against B solving the same problem is 9:6. What is the probability that if both of them try, the problem will be solved?
- (a) $117/180$
 - (b) $181/200$
 - (c) $147/180$
 - (d) $119/180$
89. A bag contains 15 one rupee coins, 25 two rupee coins and 10 five rupee coins. If a coin is selected at random from the bag, then the probability of not selecting a one rupee coin is:
- (a) 0.30
 - (b) 0.70
 - (c) 0.25
 - (d) 0.20

90. If two variables x and y are related by $2X + 3Y - 7 = 0$ and the mean and mean deviation about mean of X are 1 and 0.3 respectively, then the co-efficient of mean deviation of Y about mean is .
- (a) -5
 (b) 4
 (c) 12
 (d) 50
91. If X and Y are related as $3X - 4Y = 20$ and the quartile deviation of X is 12, then the quartile deviation of Y is :
- (a) 14
 (b) 15
 (c) 16
 (d) 9
92. Suppose a population A has 100 observations 101,102,103,200 and another population B has 100 observations 151, 152, 153, 250. If V_A and V_B represents the variance of the two populations respectively, then $V_A / V_B =$:
-
- (a) 9/4
 (b) 1
 (c) 4/9
 (d) 2/3
93. The rate of returns from three different shares are 100%, 200% and 300% respectively. The average rate of return will be.
- (a) 350%
 (b) 233.33%
 (c) 200%
 (d) 300%
94. If variance of x is 5, then find the variance of $(2 - 3x)$
- (a) 10
 (b) 45
 (c) 5
 (d) -13
95. The sum of the squares of deviations of a set of observations has the smallest value, when the deviations are taken from their
- (a) A. M.
 (b) H. M.
 (c) G. M.

- (d) None
96. For a moderately skewed distribution, which of the following relationship holds?
- (a) Mean – Median = 3 (Median – Mode)
 - (b) Median -Mode = 3 (Mean -Median)
 - (c) Mean – Mode = 3 (Mean – Median)
 - (d) Mean – Median 3 (Mean – Mode)
97. The mean salary for a group of 40 female workers is ₹ 5200 per month and that for a group of 60 male workers is ₹ 6800 per month. What is the combined salary ?
- (a) ₹ 6160
 - (b) ₹ 6280
 - (c) ₹ 6890
 - (d) ₹ 6920
98. The mean weight of 15 students is 110 kg. The mean weight of 5 of them is 100 kg. and that of another five students is 125 kg., then the mean weight of the remaining students is:
- (a) 120
 - (b) 105
 - (c) 115
 - (d) None of these
99. If the difference between mean and mode is 69, then the difference between Mean and Median will be _____
- (a) 63
 - (b) 31.5
 - (c) 23
 - (d) None of the above
100. The average age of 15 students is 15 years. Out of these the average age of 5 students is 14 years and that of other 9 students is 16 years, then the age of 15th student is _____
- (a) 11 years
 - (b) 14 years
 - (c) 15 years
 - (d) None of these

MODEL TEST PAPER 2
FOUNDATION COURSE
PAPER 3: QUANTITATIVE APTITUDE

This paper is a objective type Question Paper, it carries 100 objective type questions and all are compulsory. Each MCQ carry one mark .

Negative marking is applicable, deducting one-fourth of a mark for each incorrect answer.

Time: 2 Hours

Marks: 100

Part A: Business Mathematics and Logical Reasoning

1. if α and β are the roots of the equation $x^2+7x+12=0$, then the equation, whose roots are $(\alpha+\beta)^2$ and $(\alpha-\beta)^2$ will be
 - (a) $x^2-14x+49=0$
 - (b) $x^2-24x+144=0$
 - (c) $x^2-50x+49=0$
 - (d) $x^2-19x+144=0$
2. x, y and z are together starts business. If x investes 3 times as much as y invests and y invests two third of what z invests, then the raio of capitals of x, y and z is:
 - (a) 3:9:2
 - (b) 6:3:2
 - (c) 3:6:2
 - (d) 6:2:3
3. $\log_a \sqrt{3} = \frac{1}{6}$, find the value of a
 - (a) 9
 - (b) 81
 - (c) 27
 - (d) 3
4. $\log \frac{p^2}{qr} + \log \frac{q^2}{pr} + \log \frac{r^2}{pq} =$
 - (a) pqr
 - (b) $\frac{1}{pqr}$
 - (c) 1
 - (d) 0
5. Simplification $\frac{1}{1+z^{a-b}+z^{a-c}} + \frac{1}{1+z^{b-c}+z^{b-a}} + \frac{1}{1+z^{c-a}+z^{c-b}}$ would reduces to

(a) $\frac{1}{z^2(a+b+c)}$

(b) $\frac{1}{z(a+b+c)}$

(c) 1

(d) 0

6. A bag contains 25 paise, 10 paise and 5 paise coins in the ratio 3:2:1. The total value of ₹ 40, the number of 5 paise coins is

(a) 45

(b) 48

(c) 40

(d) 20

7. If one root of $5z^2 + 13z + y = 0$ is the reciprocal of the other then the value of y is

(a) $\frac{1}{5}$

(b) $-\frac{1}{5}$

(c) 5

(d) -5

8. If $2^x \times 3^y \times 5^z = 720$ then the value of x, y, z ?

(a) 4, 2, 1

(b) 1, 2, 4

(c) 2, 4, 1

(d) 1, 4, 2

9. A man wants to cut three lengths from a single piece of board of length 91 cm. The second length is to be 3 cm longer than the shortest and third length is to be twice as the shortest. What is the possible length for the shortest piece?

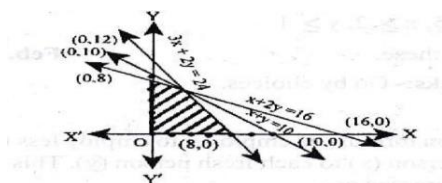
(a) 22

(b) 20

(c) 15

(d) 18

10. The shaded region represents:



(a) $3x + 2y < 24, x + 2y > 16, x + y < 10, x > 0, y > 0$

- (b) $3x+2y < 24, x+2y < 16, x+y > 10, x > 0, y > 0$
- (c) $3x+2y < 24, x+2y < 16, x+y < 10, x > 0, y > 0$
- (d) None of these.
11. The time required to produce a unit of product A is 3 hours and that for product B is 5 hours. The total available time is 220 hours. If x and y are the number of units of A and B that are produced then
- (a) $3x+2y = 220$
- (b) $3x+5y \geq 220, x \geq 0, y \geq 0$
- (c) $3x+5y \leq 220, x \geq 0, y \geq 0$
- (d) $5x+2y \geq 220, x \geq 0, y \geq 0$
12. What must be added to each term of the ratio 49:68. So that it becomes 3:4 ?
- (a) 3
- (b) 5
- (c) 8
- (d) 9
13. Find future value of annuity of ₹ 1000 made annually for seven years at interest rate 16% compounded annually. [Given that $(1.16)^7 = 2.8262$]
- (a) ₹ 11413.75
- (b) ₹ 11000.35
- (c) ₹ 8756
- (d) ₹ 9892.34
14. Assuming that the discount rate is 7% p.a. How much would you pay to receive ₹ 500. Growing at 5% annually forever?
- (a) ₹ 2,500
- (b) ₹ 5,000
- (c) ₹ 7,500
- (d) ₹ 25,000
15. Rajesh deposits ₹ 3,000 at the start of each quarter in his savings account. If the account earns interest 5.75% per annum compounded quarterly, how much money (in ₹) will he have at the end of 4 years? [Given that $(1.014375)^{16} = 1.25654$]
- (a) ₹ 54,308.6
- (b) ₹ 58,553.6
- (c) ₹ 68,353.6
- (d) ₹ 63,624.4
16. The annual rate of simple interest is 12.5%. In how many years does principal double?
- (a) 11 years
- (b) 9 years

- (c) 8 years
(d) 7 years
17. ₹ 5000 is paid every year for 10 years to pay off a loan. What is the loan amount of interest rate be 14% p.a compounded annually?
(a) ₹ 26,000.90
(b) ₹ 26080.55
(c) ₹ 15000.21
(d) ₹ 16,345.11
18. ₹ 800 is invested at the end of each month in account paying interest 6% per year compounded monthly. What is the future value of annuity after 10th payment ? [Given that $(1.005)^{10} = 1.0511$]
(a) ₹ 4444
(b) ₹ 8766
(c) ₹ 3491
(d) ₹ 8176
19. Certain sum of money borrowed at simple interest to ₹ 2688 in three years and to ₹ 2784 in four years at the rate per annum equal to
(a) 4%
(b) 6%
(c) 5%
(d) 7%
20. Ravi made of an investment of ₹ 15,000 in a scheme and at the time of maturity the amount was ₹ 25,000. If Compound Annual Growth Rate (CAGR) for this investment is 8.88%. Calculate the approximate number of years for which he has invested the amount.
(a) 6
(b) 7.7
(c) 5.5
(d) 7
21. The present value of an annuity which pays Rs.200 at the end of each 3 months for 10 years, assuming money to be worth 5% converted quarterly
(a) Rs. 3473.86
(b) Rs. 3108.60
(c) Rs.114180.44
(d) none of these
22. Rajesh invests ₹ 20,000 per year in a stock index fund, with earns 9% per year, for the next ten years.What would be closest value of accumulated investment upon payment of the last installment? [Given: $(1.09)^{10} = 2.36736$]
(a) ₹ 3,88,764.968

- (b) ₹ 3,03,858.564
 (c) ₹ 2,68,728.484
 (d) ₹ 4,08,718.364
23. An investment is earning compounded interest ₹ 100 invested in the year 2 accumulated to ₹ 105 by year 4. If ₹ 500 invested in the year 5, will become ₹ _____ by year 10.
- (a) ₹ 364.80
 (b) ₹ 564.80
 (c) ₹ 464.80
 (d) ₹ 664.80
24. An investor is saving to pay off an obligation of ₹ 15,250 which will due in seven years, if the investor is earning 7.5% simple interest rate per annum, he must deposit ₹ _____ to meet the obligation.
- (a) ₹ 8,000
 (b) ₹ 9,000
 (c) ₹ 10,000
 (d) ₹ 11,000
25. The value of scooter is ₹ 1,00,000 find its depreciation is 10% p.a. Calculate total depreciation value at the end of seven years.
- (a) ₹ 47829.70
 (b) ₹ 47000.90
 (c) ₹ 42709
 (d) ₹ 42,000
26. Effective rate of interest does not depend upon
- (a) Amount of Principal
 (b) Amount of Interest
 (c) Number of conversion periods
 (d) none of these
27. The number of triangles that can be formed by choosing the vertices from a set of 12 points, Seven of which lie on the same lie on the same straight line is:
- (a) 185
 (b) 175
 (c) 115
 (d) 105
28. Five bulbs of which three are defective are to be tired in two light-points in a dark-room. In how many trails the room shall be lightened ?
- (a) 10
 (b) 7

- (c) 3
(d) none of these
29. In how many ways can a party of 4 men and 4 women be seated at a circular table, so that no two women are adjacent ?
- (a) 164
(b) 174
(c) 144
(d) 154
30. How many words can be formed with the letters of the word 'ORIENTAL'. So that A and E always occupy odd places:
- (a) 540
(b) 8460
(c) 8640
(d) 8450
31. The number of ways of painting the faces of a cube by 6 different colours is
- (a) 30
(b) 36
(c) 24
(d) 1
32. The sum of an AP, whose first is -4 and last term is 146 is 7171. Find the value of n
- (a) 99
(b) 100
(c) 101
(d) 102
33. In a geometric progression , the second term is 12 and sixth term is 192. Find 11th term.
- (a) 3,072
(b) 1,536
(c) 12,288
(d) 6,144
34. The first and last terms of an arithmetic progression are 5 and 905. Sum of the terms is 45,955. The number of terms is
- (a) 99
(b) 100
(c) 101
(d) 102

35. The sum of first eight terms of geometric progression is five times the sum of the first four terms. The common ratio is
- $\sqrt{3}$
 - $\sqrt{2}$
 - 4
 - 2
36. If the sum of n terms of an AP is $(3n^2-n)$ and its common difference is 6, then its term is
- 3
 - 2
 - 4
 - 1
37. Two finite sets have m and n elements. The total number of sub sets of first set is 56 more than the total number of subsets of the second set. The value of m and n are
- 6,3
 - 7,6
 - 5,1
 - 8,7
38. If $f(p) = \frac{1}{1-p}$, then f^{-1} is
- $1-p$
 - $\frac{p-1}{p}$
 - $\frac{p}{p-1}$
 - $\frac{1}{p}$
39. Determine $f(x)$, given that $f'(x) = 12x^2 - 4x$ and $f(-3) = 17$
- $f(x) = 4x^3 - 2x^2 + 143$
 - $f(x) = 6x^3 - x^4 + 137$
 - $f(x) = 3x^4 - x^3 - 137$
 - $f(x) = 4x^3 - 2x^2 - 143$
40. $\int_0^1 x \cdot e^x dx$
- 1
 - 1
 - e^1

(d) 1/e

Logical Reasoning

41. Find the missing term in each of the following series : 6, 13, 25, 51, 101?
- (a) 201
 - (b) 202
 - (c) 203
 - (d) 205
42. Find the missing term in each of the following series : 28, 33,31,36, 34,39, ?
- (a) 48
 - (b) 37
 - (c) 54
 - (d) 62
43. In a certain code, TEACHER is written as VGCEJGT, How is CHILDREN written in that code?
- (a) EJKNEGTP
 - (b) EGKNEITP
 - (c) EJKNFGTO
 - (d) EJKNFTGP
44. In a certain code language, '253' means 'books are old'; '546' means 'man is old' and '378' means 'buy good books'. What stands for 'are' in that code?
- (a) 2
 - (b) 4
 - (c) 5
 - (d) 6
45. If SUMMER is coded as RUNNER, the code for WINTER will be
- (a) SUITER
 - (b) VIOUER
 - (c) WALKER
 - (d) SUFFER
46. From home Neha goes towards North for her college and then she turns left and then turns right, and finally she turns left and reaches college. In which direction her college is situated with respect to her home ?
- (a) South-West
 - (b) North-East
 - (c) North-West
 - (d) South-East

47. Y is to the East of X, which is to the North of Z. If P is to the South of Z, then P is in which direction with respect to Y.
- North
 - South
 - Soth-East
 - South-West
48. Five villages P, Q, R, S, and T are situated close to each other. P is to the west of Q, R is to the south of P. T is to the north of Q and S is to the east of T. Then, R is in which direction with respect to S?
- North-West
 - South-East
 - South-West
 - Data inadequate
49. If South-West becomes North, then what will North-East be?
- North
 - South-East
 - South
 - East
50. In a clock at 12 : 30, hour needle is in North direction while minute needle is in South direction. In which direction would be minute needle at 12:45?
- North-West
 - South-East
 - West
 - East
51. Five students are standing in a circle. Abhinav is between Alok and Ankur. Apurva is on the left of Abhishek. Alok is on the left of Apurva. Who is sitting next to Abhinav on his right?
- Apurva
 - Ankur
 - Abhishek
 - Alok
52. Six persons M, N, O, P, Q and R are sitting in two rows with three persons in each row. Both the rows are in front of each other. Q is not at the end of any row. P is second the left of R. O is the neighbour of Q and diagonally opposite to P. N is the neighbour of R. Who is in fronts of N ?
- M
 - R
 - Q
 - P

53. A, P, R, X, S and Z are sitting in a row. S and Z are in the centre. A and P are at the ends. R is sitting to the left of A. Who is to the right of P ?
- A
 - X
 - S
 - Z
54. Five friends A, B, C, D and E are standing in a row facing South but not necessarily in the same order. Only B is between A and E, C is immediate right to E and D is immediate left to A, On the basis of above information, which of the following statements is definitely true ?
- B is to the left of A.
 - D is third to the left of E.
 - B is to the right of E.
 - A is second to the left of C.
55. There are four children P, Q, R, S sitting in a row. P occupies seat next to Q but not next to R. If R is not sitting next to S ? Who is occupying seat next to adjacent to S.
- Q
 - P
 - P and Q
 - None
56. B is the brother of A whose only sister is mother of C, D is maternal grandmother of C How is A related to D?
- Aunt
 - Daughter-in-law
 - Daughter
 - Nephew
57. If $X+Y$ means X is the mother of Y; $X-Y$ means X is the brother of Y; $X\%Y$ means X is the father of Y and $X\times Y$ means X is the sister of Y, Which of the following shows that A is the maternal uncle of B?
- $B+D\times C-A$
 - $B-D\%A$
 - $A-C+D\times B$
 - $A+C\times D-B$

Directions(Questions 58-60) Read the following information and answer the questions given below.

Anita is the niece of Prateek's mother. Anita's mother is Prateek's aunt. Rohan is Anita's mother's brother. Rohan's mother is Anita's grandmother. From this information. deduce the relationship between.

58. Rohan's mother is _____ to Anita's mother.

- (a) Aunt
 - (b) Mother
 - (c) No relation
 - (d) Sister
59. Prateek's and Anita's mother are _____
- (a) Cousin sister
 - (b) Sister-in-law
 - (c) Friends
 - (d) Sisters
60. Rohan is Prateek's _____
- (a) Brother
 - (b) Brother-in-law
 - (c) Uncle
 - (d) Cousin brothers

Part B: Statistics

61. The distribution of profits of a company follows:
- (a) J-shaped frequency curve
 - (b) U-shaped frequency curve
 - (c) Bell-shaped frequency curve
 - (d) Any of these
62. Median of a distribution can be obtained from:
- (a) Histogram
 - (b) Frequency Polygon
 - (c) Less than type ogives
 - (d) none of these
63. Frequency density corresponding to a class interval is the ratio of
- (a) Class Frequency to the Total Frequency
 - (b) Class Frequency to the class Length
 - (c) Class frequency to the class Frequency
 - (d) Class Frequency to the Cumulative Frequency.
64. Standard Error can be described as
- (a) The error committed in ksampling
 - (b) The error committed in sample survey
 - (c) The error committed in estimating parameter
 - (d) Standrad deviation of Statistic

65. In a group of persons, average weight is 60 kg. If the average of males and females taken separately is 80 kg and 50 kg respectively, find the ratio of the number of males to that of females.
- (a) 2:3
 (b) 3:2
 (c) 2:1
 (d) 1:2
66. A train covered the first 5 km of its journey at a speed of 30km/hr and next 15 km at a speed of 45 km/hr. The average speed of the train was :
- (a) 38 km/hr
 (b) 40 km/hr
 (c) 36 km/hr
 (d) 42 km/hr
67. If $2x + 3y + 4 = 0$ and $v(x) = 6$ then $v(y)$ is:
- (a) $8/3$
 (b) 9
 (c) -9
 (d) 6
68. If the standard deviation of 1, 2, 3, 4, 10 is σ , then the standard deviation of 11, 12, 13, 14, 20 is:
- (a) 10σ
 (b) $10+\sigma$
 (c) σ
 (d) None of these
69. What is the standard deviation of the following series :
- | | | | | |
|--------------|------|-------|-------|-------|
| Measurements | 0-10 | 10-20 | 20-30 | 30-40 |
| Frequency : | 1 | 3 | 4 | 2 |
- (a) 81
 (b) 7.6
 (c) 9
 (d) 2.26
70. If the difference between Mean and Mode is 69, then the difference between Mean and Median will be _____:
- (a) 63
 (b) 31.5
 (c) 23
 (d) None of these

71. If all observations in a distribution are increased by 6, then the variance of the series will be _____
- (a) Increased
 - (b) Decreased
 - (c) Unchanged
 - (d) None of these.
72. Which measure of dispersion is base on the absolute deviation only?
- (a) Range
 - (b) Standard Deviation
 - (c) Mean Devaition
 - (d) Quartile Devation
73. Calculuae the value of 3rd quartile from the following data 40, 35, 51, 21, 25, 16, 29, 27, 32
- (a) 36.25
 - (b) 30.25
 - (c) 25
 - (d) 35
74. The mean of 100 students was 45 . Later on, it was discovered that the marks of two students were misread as 85 and 54 instead of 58 and 45. Find correct mean.
- (a) 68
 - (b) 36
 - (c) 44.64
 - (d) 52
75. The arithmetic maen and coefficienct of variation of data set x are respectively, 10 and 30. The variance of $30-2x$ is
- (a) 28
 - (b) 32
 - (c) 34
 - (d) 36
76. The approximate ratio of SD, MD, QD is
- (a) 2:3:4
 - (b) 3:4:5
 - (c) 15:12:10
 - (d) 5:6:7
77. The geometric mean of three numbers 40, 50 and x is 10, the value of x is
- (a) 5

- (b) 4
 - (c) 2
 - (d) $\frac{1}{2}$
78. Difference between upper limit and lower limit of class is known as
- (a) Range
 - (b) Class Mark
 - (c) Class Size
 - (d) Class Boundary
79. Let P be a probability function on $S = \{X_1, X_2, X_3\}$ if $P(X_1)=1/4$ and $P(X_3) = 1/3$ then $P(X_2)$ is equal to:
- (a) $5/12$
 - (b) $7/12$
 - (c) $3/4$
 - (d) none of these
80. A speaks truth in 60% of the cases and B in 90% of the cases. In what percentage of cases are they likely to contradict each other in stating the same fact:
- (a) 36%
 - (b) 42%
 - (c) 54%
 - (d) none of these.
81. A candidate is selected for interview for 3 posts. For the first there are 3 candidates, for the second there are 4 and for the third there are 2. What are the chances of his getting at least one post?
- (a) $3/4$
 - (b) $2/3$
 - (c) $1/10$
 - (d) 1
82. A card is drawn from a pack of playing cards and then another card is drawn without the first being replaced. What is the probability of getting two kings:
- (a) $7/52$
 - (b) $1/221$
 - (c) $3/221$
 - (d) none of these.
83. The probability of a man hitting the target is $1/4$. If he fires 7 times, the probability of hitting the target at least twice is :

(a) $1 - \left(\frac{5}{2}\right)\left(\frac{3}{4}\right)^6$

(b) $1 - \frac{15}{2}\left(\frac{3}{4}\right)^6$

(c) $1 - \frac{5}{6}, 3^5$

(d) $1 - \left(\frac{3}{4}\right)^6$

84. If 5% of the electric bulbs manufactured by a company are defective, use Poisson distribution to find the probability that in a sample of 100 bulbs, 5 bulbs will be defective. [Given : $e^{-5} = 0.007$]
- (a) 0.1823
(b) 0.1723
(c) 0.1623
(d) 0.1923
85. In a non- leap year, the probability of getting 53 Sundays or 53 Tuesdays or 53 Thursdays is:
- (a) $\frac{4}{7}$
(b) $\frac{2}{7}$
(c) $\frac{3}{7}$
(d) $\frac{1}{7}$
86. Examine the validity of the following : Mean and standard deviation of a binomial distribution are 10 and 4 respective:
- (a) Not valid
(b) Valid
(c) Both [a] and [b]
(d) Neither [a] nor [b]
87. For a Poisson variate X, $P(x=1) = P(x=2)$, what is the mean of x ?
- (a) 1
(b) $\frac{3}{2}$
(c) 2
(d) $\frac{5}{2}$
88. Thirty balls are serially numbered and placed in bag. Find chance that the first ball drawn is a multiple of 3 or 5

- (a) $\frac{8}{15}$
 (b) $\frac{2}{15}$
 (c) $\frac{1}{2}$
 (d) $\frac{7}{15}$
89. For a normal distribution, the first and third quartile are given to be 37 and 49, the mode of the distribution is.
 (a) 37
 (b) 49
 (c) 43
 (d) 45
90. The odds in favour of event A in a trail is 3:1. In a three independent trails, the probability of non occurrence of the event A is
 (a) $\frac{1}{64}$
 (b) $\frac{1}{32}$
 (c) $\frac{1}{27}$
 (d) $\frac{1}{8}$
91. If $4y - 5x = 15$ is the regression line of y on x and the coefficient of correlation between x and y is 0.75, what is the value of the regression coefficient of x on y ?
 (a) 0.45
 (b) 0.9375
 (c) 0.6
 (d) none of these
92. If the regression line of y on x and of x on y are given by $2x + 3y = -1$ and $5x + 6y = -1$ then the arithmetic means of x and y are given by.
 (a) (1,-1)
 (b) (-1,1)
 (c) (-1, -1)
 (d) (2,3)
93. If correlation co-efficient between x and y is 0.5 then $b_{yx}=0.5$ then $b_{xy}=?$
 (a) 1
 (b) 0.5
 (c) -0.5
 (d) 0

94. For a positive and perfectly correlated random variables , one of the regression coefficient is 1.4 and the standard deviation of X is 2, the variance of Y is
- 2.38
 - 6.76
 - 6.56
 - 3.16
95. For n pairs of observations , the coefficient of concurrent deviation is calculated as $\frac{1}{\sqrt{3}}$. If there are six concurrent deviations, n=
- 11
 - 10
 - 9
 - 8
96. Consumer Price Index Number goes up from 100 to 200 and salary of a worker is also raised from 300 to 500, then Real Wage is
- 300
 - 250
 - 600
 - 350
97. The Circular Test is known as:
- $P_{01} \times P_{12} \times P_{20} = 1$
 - $P_{12} \times P_{01} \times P_{20} = 1$
 - $P_{20} \times P_{12} \times P_{01} = 1$
 - $P_{02} \times P_{21} \times P_{12} = 1$
98. In the data group Bowley's and Laspyre's index number is as follows. Bowley's index number =150, Laspyre's index number = 180 then Paasche's index number is
- 120
 - 30
 - 165
 - None of these
99. Laspyres index number is aweighted aggregate method by taking _____ as weights.
- Quaanatity consumed in the base year
 - Quaanatity consumed in the current year
 - Value of items consumed in base year
 - Vlaue of items consumed in the current year

100. Find the Paasche's Index number for prices from the following

Commodity	Base year		Current year	
	Price	Commodity	Price	Commodity
A	5	25	6	30
B	3	8	4	10
C	2	10	3	8
D	10	4	3	45

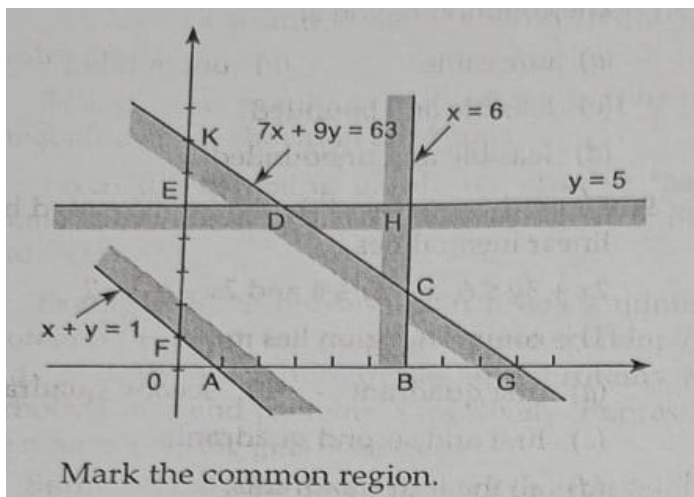
- (a) 151.21
- (b) 165.28
- (c) 157.26
- (d) 160.21

MODEL TEST PAPER 3
FOUNDATION COURSE
PAPER 3: QUANTITATIVE APTITUDE

Time: 2 Hours

Marks: 100

1. If 'GOAL' is coded as 'HPBM' and 'FROCK' is coded as 'GSPTL' then how will 'LOFAR' be coded?
 - (a) MPGZO
 - (b) MNEBS
 - (c) MPGBS
 - (d) MPEBR
2. Graph of the following linear inequalities :
 $x+y \geq 1$, $y \leq 5$, $x \leq 6$, $7x+9y \leq 63$, $x \geq 0$, $y \geq 0$ is given below;



- (a) DCHAD
 - (b) BCGB
 - (c) ABCDEFA
 - (d) EDKE
3. If mean and variance are 5 and 3 respectively then relation between p and q is :
 - (a) $P > q$
 - (b) $p < q$
 - (c) $p = q$
 - (d) p is symmetric
4. The expenditures and savings of a person are in the ratio 4:1. If his savings are increased by 25% of his income , then what is the new ratio of his expenditure and savings ?
 - (a) 11:9

- (b) 8:5
 (c) 7:5
 (d) 7:4
5. The sum of mean and SD of a series is $a + b$, if we add 2 to each observation of the series then the sum of mean and SD is :
- (a) $a + b + 2$
 (b) $6 - a + b$
 (c) $4 + a - b$
 (d) $a + b + 4$
6. What is the mean of X having the following density function?
- $$f(x) = \frac{1}{\sqrt{2\pi}} e^{-\frac{(x-10)^2}{32}} \text{ for } -\infty < x < \infty$$
- (a) 4
 (b) 10
 (c) 40
 (d) None of these
7. In a Poisson distribution if $P(x=4) = P(x=5)$ then the parameter of Poisson distribution is:
- (a) $\frac{4}{5}$
 (b) $\frac{5}{4}$
 (c) 4
 (d) 5
8. Two events A and B are such that they do not occur simultaneously then they are called _____ events.
- (a) Mutually exhaustive
 (b) Mutually Exclusive
 (c) Mutually Independent
 (d) Equally Likely
9. Data are said to be _____ if the investigator himself is responsible for the collection of data.
- (a) Primary Data
 (b) Secondary Data
 (c) Mixed of Primary and Secondary Data
 (d) None

10. A suitable graph for representing the portioning of total into sub parts in statistics is:
- (a) A Pictograph
 - (b) A Pie Chart
 - (c) An Ogive
 - (d) A Histogram
11. Ram is known to hit a target in 2 out of 3 shots whereas Shyam is known to hit the same target in 5 out of 11 shots. What is the probability that the target would be hit if they both try?
- (a) $\frac{9}{11}$
 - (b) $\frac{6}{11}$
 - (c) $\frac{10}{33}$
 - (d) $\frac{3}{11}$
12. If from a population with 25 members, a random sample without replacement of 2 members is taken, the number of all such samples is
- (a) 300
 - (b) 625
 - (c) 50
 - (d) 600
13. The sum of two numbers is 75 and their difference is 20. Find the difference of their squares.
- (a) 1500
 - (b) 1600
 - (c) 1550
 - (d) None of these
14. A room has 10 doors. In how many ways can a man enter the room by one door and come out by a different door.
- (a) 90
 - (b) 100
 - (c) 50
 - (d) None of these
15. The average of marks obtained by 120 students in a certain examination is 135. If the average marks of passed students is 39 and that of the failed students is 15; what is the number of students who passed in the examination?

- (a) 100
 (b) 150
 (c) 200
 (d) None of these
16. If $\log \frac{a-b}{2} = \frac{1}{2} (\log a + \log b)$, the value of $a^2 + b^2$ is
 (a) $6ab$
 (b) $8ab$
 (c) $6a^2b^2$
 (d) None of these
17. In an election, there are five candidates contesting for three vacancies; an elector can vote any number of candidates not exceeding the number of vacancies. In how many ways can one cast his votes?
 (a) 12
 (b) 14
 (c) 25
 (d) None of these
18. The number of ways that 12 prizes can be divided among 4 students so that each may have 3 prizes is:
 (a) 15,400
 (b) 15,000
 (c) 14,400
 (d) 369600
19. Five balls of different colours are to be placed in three boxes of different sizes. Each box can hold all the five balls. In how many different ways can we place the balls so that no box remains empty?
 (a) 100
 (b) 120
 (c) 150
 (d) None of these
20. Find the sum of the series. $243 + 324 + 432 + \dots$ to n terms
 (a) $3^6 \left(\frac{4^n}{3^n} - 1 \right)$
 (b) $3^4 \left(\frac{4^n}{3^n} - 1 \right)$

(c) $3^6 \left(\frac{3^n}{4^n} - 1 \right)$

(d) None of these

21. The sum of the first eight terms of a G.P. is five times the sum of the first four terms; then the common ratio is –

(a) $\sqrt{2}$

(b) $-\sqrt{2}$

(c) $\pm\sqrt{2}$

(d) None of these

22. The sum of the following series $4 + 44 + 444 + \dots$ to n term is:

(a) $\frac{4}{9} \left[\frac{10(10^n - 1)}{9} - n \right]$

(b) $\frac{4}{9} \left[\frac{10(10^n - 1)}{9} + n \right]$

(c) $\frac{10(10^n - 1)}{9} + n$

(d) None of these

23. The Arithmetic Mean between two numbers is 15 and their G.M. is 9; then the numbers are –

(a) 27, 3

(b) 9, 9

(c) 16, 9

(d) None of these

24. Find the gradient of curve $y = 3x^2 - 5x + 4$ at the point (1, 2)

(a) 1

(b) 3

(c) 4

(d) 5

25. Evaluate: $\int_0^5 \frac{x^2}{x^2 + (5-x)^2} dx$

(a) 0

(b) 1

(c) -1

(d) none of these

26. If $f'(x) = 3x^2 + 2$ & $f(0) = 0$ then find $f(2)$.
- 8
 - 10
 - 12
 - none of these
27. A box contains 7 red, 6 white and 4 blue balls. How many selections of three balls can be made so that none is red?
- 90
 - 120
 - 48
 - None of these
28. The number of times a particular item occurs in a given data is called its
- Variation
 - Frequency
 - Cumulative frequency
 - None of these
29. If the width of each of ten classes in a frequency distribution is 2.5 and the lower class boundary is 5.1, then the upper class boundary of the highest class is
- 30.1
 - 31.1
 - 30
 - 27.6
30. Let L be the lower class boundary of a class in a frequency distribution and m be the mid point of the class. Which one of the following is the higher class boundary of the class?
- $m + \frac{m+2}{2}$
 - $L + \frac{m+L}{2}$
 - $2m - L$
 - $m - 2L$
31. The mean of the values of 1, 2, 3, n with respective frequencies $x, 2x, 3x, \dots, nx$ is
- $\frac{n+1}{2}$

- (b) $\frac{n}{2}$
- (c) $\frac{2n+1}{3}$
- (d) $\frac{2n+1}{6}$
32. The correlation between two variables x and y is found to be 0.4. What is the correlation between $2x$ and $(-y)$?
- (a) 0.4
- (b) -0.4
- (c) 0.6
- (d) None of these
33. Correlation Co-efficient is _____ of the units of measurements
- (a) Dependent
- (b) Independent
- (c) both
- (d) none of these
34. If for two variable x and y , the covariance, variance of x and variance of y are 40, 16 and 256 respectively, what is the value of the correlation coefficient?
- (a) 0.01
- (b) 0.625
- (c) 0.4
- (d) 0.5
35. The coefficient of rank correlation of marks obtained by 10 students in English and Economics was found to be 0.5, it was later discovered that the difference in ranks in the two subjects obtained by one student was wrongly taken as 3 instead of 7. Find correct coefficient of rank correlation.
- (a) 0.514
- (b) 0.364
- (c) 0.15
- (d) 0.260
36. If $r = 0.5$, $\sum xy = 120$, $\sigma_y = 8$, $\sum x^2 = 90$, then value of n is equal to _____
- (a) 5
- (b) 10
- (c) 15
- (d) 20

37. For a $(m \times n)$ classification of bivariate data, the maximum number of conditional distributions is
- (a) p
 - (b) $p+q$
 - (c) pq
 - (d) p
38. _____ is an extension of time reversal test.
- (a) Factor reversal test
 - (b) Circular test
 - (c) Unit test
 - (d) None of these
39. Fisher's method for construction of Index Numbers uses _____
- (a) Geometric Mean
 - (b) Harmonic Mean.
 - (c) Median
 - (d) HM
40. The consumer price index in 1990 increases by 80- per cent as compared to the base 1980. A person in 1980 getting ₹ 60,000 per annum should now get
- (a) ₹ 1,08,000 per annum
 - (b) ₹ 82,000 per annum
 - (c) ₹ 64,000 per annum
 - (d) None of these
41. If 'INSURE' is coded as 951395, then how will 'PATRIOT' be coded?
- (a) 7129962
 - (b) 7129962
 - (c) 7129962
 - (d) 7129962
42. If in a certain code '493' means 'Friendship difficult challenge', '961', means, 'Struggle difficult Exam., and '178' means 'Exam believable subject', then which digit is used for 'believable'?
- (a) 7 or 8
 - (b) 7 or 9
 - (c) 8
 - (d) 8 or 1

43. In the following series, which number will replace the question mark:
23, 29, 31, 37, 41, 43, ?
(a) 45
(b) 53
(c) 47
(d) 49
44. In the following letter-series some letters are missing. The missing letters are given in the proper sequence as one of the alternatives. Find the correct alternative.
ab—abcab—abc—bca—c
(a) abac
(b) bcac
(c) ccab
(d) bbac
45. A and B both are children of C. If C is the mother of A, A is the son of C but B is not the daughter of C, then how are A and B mutually related?
(a) A is the brother of B
(b) A is the nephew of B
(c) A is the sister of B
(d) A is the cousin of B
46. A husband and wife had five married sons and each of these had four children. How many members are there in the family?
(a) 50
(b) 40
(c) 32
(d) 36
47. Pointing to the lady in the photograph , Seema said, "Her son's father is the son-in-law of my mother." How is Seema related to the lady?
(a) Sister
(b) Mother
(c) Cousin
(d) Aunt

(48-49). Each of these questions is based on the following information:

P % Q means P is the father of Q.

P @ Q means P is the sister of Q.

P \$ Q means P is the brother of Q.

$P * Q$ means P is the wife of Q.

48. In the expression $F \$ D \% K @ H * R$, how is D related to R?
- (a) Father
 - (b) Mother
 - (c) Sister
 - (d) Father in law
49. In the expression $A \% B @ K * H \% P$, how is B related to P?
- (a) Aunt
 - (b) Cousin
 - (c) Uncle
 - (d) Daughter
50. The length and breadth of a room are 8 m and 6 m respectively. A cat runs along all the four walls and finally along a diagonal order to catch a rat. How much total distance is covered by the cat?
- (a) 10 m
 - (b) 14 m
 - (c) 38 m
 - (d) 48 m
51. If $A \times B$ means A is to the south of B; $A + B$ means A is to the north of B; $A \% B$ means A is to the east of B; $A - B$ means A is to the west of B; then in $P \% Q + R - S$, S is in which direction with respect to Q?
- (a) South-West
 - (b) South-East
 - (c) North-East
 - (d) North-West
52. P started from his house towards west. After walking a distance of 25 m. He turned to the right and walked 10 m. He then again turned to the right and walked 15 m. After this he is to turn right at 135° and to cover 30 m. In which direction should he go?
- (a) West
 - (b) South
 - (c) South-West
 - (d) South-East
53. A man is facing north. He turns 45° in the clockwise direction and then another 180° in the same direction and then 45° in the anticlockwise direction. Find which direction he is facing now ?
- (a) North

- (b) East
 - (c) West
 - (d) South
54. A child is looking for his father. He went 90 meters in the east before turning to his right. He went 20 meters before turning to his right again to look for his father at his uncle's place 30 meters from this point. His father was not there. From there, he went 100 meters to his north before meeting his father in a street. How far did the son meet his father from starting point ?
- (a) 80 m
 - (b) 90 m
 - (c) 100 m
 - (d) 110 m
- (55-56) A, B, C, D, E, F and G are sitting in a straight line facing north, but not necessarily in the same order. There is only one person between F and C. E sits between A and D. There are only two persons between E and G. F sits on the immediate left of A, who sits in the middle of the row.
55. How many persons are there between E and F
- (a) 1
 - (b) 2
 - (c) 3
 - (d) 4
56. Who among the following sit at the extreme ends on the row ?
- (a) D, F
 - (b) G, C
 - (c) B, C
 - (d) None of these
57. Who among the following sits to the immediate right of D
- (a) G
 - (b) E
 - (c) F
 - (d) B
58. In a line, P is sitting 13th from left. Q is sitting 24th from the right and 3rd left from P. How many people are sitting in the line?
- (a) 34
 - (b) 31
 - (c) 32

- (d) 33
59. Four ladies A, B, C and D and four gentlemen E, F, G and H are sitting in a circle round a table facing each other.
- Directions:
- (1) No two ladies or two gentlemen are sitting side by side.
 - (2) C, who is sitting between G and E is facing D.
 - (3) F is between D and A and is facing G.
 - (4) H is to the right of B.
- Who are immediate neighbours of B?
- (a) G and H
 - (b) F and H
 - (c) E and F
 - (d) E and H
60. If the mean deviation of a normal variable is 16, what is its quartile deviation?
- (a) 10
 - (b) 13.50
 - (c) 15
 - (d) 12.50
61. An Ogive can be prepared in _____ different ways.
- (a) 2
 - (b) 3
 - (c) 4
 - (d) 5
62. _____ is an absolute measure of dispersion.
- (a) Range
 - (b) Mean Deviation
 - (c) Standard Deviation
 - (d) All the above
63. The wages of 8 workers expressed in rupees are 42, 45, 49, 38, 56, 54, 55, 47. Find median wage?
- (a) 47
 - (b) 48
 - (c) 49
 - (d) 50

64. If the Standard Deviation of 10 observations is 4 and if each item is divided by -2 then Standard Deviation of new series is
- 2
 - -2
 - 4
 - None of these
65. If the relationship between x and y is given by $4x - 6y = 13$ and if the median of x is 16. Find median of y .
- 7.50
 - 8
 - 8.50
 - none of these
66. Two variables x and y are related by $5x + 2y + 5 = 0$ and $\bar{x} = 5$, then \bar{y} is
- 10
 - -10
 - 15
 - -15
67. Find Q_1 for the following observations: 7,9,5,4,10,15,14,18,6,20
- 4.75
 - 5.25
 - 5.75
 - 6.25
68. _____ is the entire upper part of the table which includes columns and sub-column numbers, unit(s) measurement.
- Sub
 - Box-head
 - Body
 - Caption
69. If $P(A) = \frac{1}{2}$; $P(B) = \frac{1}{3}$ and $P(A \cap B) = \frac{1}{4}$ then the value of $P(\bar{A} \cap \bar{B})$ is
- $\frac{5}{12}$
 - $\frac{7}{12}$
 - $\frac{1}{2}$

(d) None of these

70. From the following probability distribution table, find $E(x)$.

x:	1	2	3
f(x):	$\frac{1}{2}$	$\frac{1}{3}$	$\frac{1}{6}$

(a) 1

(b) 1.50

(c) 1.67

(d) None of these

71. In a box carrying one dozen of oranges, one third has become bad. If 3 oranges are taken out from the box at random, what is the probability that at least one orange out of the three oranges picked up is good?

(a) $\frac{54}{55}$

(b) $\frac{1}{55}$

(c) $\frac{45}{50}$

(d) None of these

72. Find the effective rate of interest at 10% p.a. when interest is payable quarterly.

(a) 10.38%

(b) 5%

(c) 5.04%

(d) 4%

73. Arslan invested ₹ 10,000 at 8% per annum compound quarterly, then the value of the investment after 2 years is [given $(1.02)^8 = 1.171659$]

(a) ₹ 11,716.59

(b) ₹ 10,716.59

(c) ₹ 117.1659

(d) None of the above

74. The future value of an annuity of ₹ 1,000 made annually for 5 years at the interest of 14% compounded annually is:

(a) ₹ 5,610

(b) ₹ 6,610

(c) ₹ 6,160

- (d) ₹ 5,160
75. A man invests an amount of ₹ 15,860 in the names of his three sons A, B and C in such a way that they get the same interest after 2,3 and 4 years respectively. If the rate of interest is 5%, then the ratio of amount invested in the name of A, B and C is.
- (a) 6 : 4 : 3
(b) 3 : 4 : 6
(c) 30 : 12 : 5
(d) None of the above
76. What annual payment will discharge a debt of ₹ 770 due in years, the rate of interest being 5% per annum?
- (a) ₹ 150
(b) ₹ 140
(c) ₹ 130
(d) None of these
77. In _____ receipts / payments takes place forever.
- (a) Annuity
(b) Perpetuity
(c) Annuity regular
(d) Annuity due
78. Present value of a scooter is ₹ 7,290 if its value decreases every year by 10% then its value before 3 years is equal to:
- (a) 10,000
(b) 10,500
(c) 20,000
(d) 20,5000
79. How much amount is required to be invested every year so as to accumulate ₹ 3,00,000 at the end of 10 years, if interest is compounded annually at 10%?
- (a) ₹ 18,823.65
(b) ₹ 18,000
(c) ₹ 18,728.65
(d) ₹ 18,882.65
80. The relation between two variables is $2x-3y+12=0$. If mean deviation of y is 6 then mean deviation of x is
- (a) 9
(b) 6

- (c) 3
(d) None of these
81. A company may obtain a machine either by leasing it for 5 years (useful life) at an annual rent of Rs. 2,000 or by purchasing the machine for Rs. 8,100. If the company can borrow money at 18% per annum, which alternative is preferable?
- (a) Leasing
(b) Purchasing
(c) Can't say
(d) None of these
82. The time by which a sum of money is 8 times of itself if it doubles itself in 15 years.
- (a) 42 years
(b) 43 years
(c) 45 years
(d) 46 years
83. Mr. X invests 'P' amount at Simple Interest rate 10% and Mr. Y invests 'Q' amount at Compound Interest rate 5% compounded annually. At the end of two years both get the same amount of interest, then the relation between two amounts P and Q is given by:
- (a) $P = \frac{41Q}{80}$
(b) $P = \frac{41Q}{40}$
(c) $P = \frac{41Q}{100}$
(d) $P = \frac{41Q}{200}$
84. In what time will a sum of money double its y at 6.25% p.a. simple interest?
- (a) 5 years
(b) 8 years
(c) 12 years
(d) 16 years
85. If two variables x and y are related by $2x + 3y - 7 = 0$ and the mean and mean deviation about mean of x are 1 and 0.3 respectively, then the coefficient of mean deviation of y about mean is:
- (a) -5

- (b) 4
(c) 12
(d) 50
86. Which of the following result hold for a set of distinct positive observations?
(a) A.M. > G.M. > H.M.
(b) G.M. > A.M. > H.M.
(c) G.M. > A.M. > H.M.
(d) G.M. > A.M. > H.M.
87. For a set of 100 observations, taking assumed mean as 4, the sum of the deviations is -11 cm, and the sum of the squares of these deviations is 257 cm². The coefficient of variation is:
(a) 41.13%
(b) 42.13%
(c) 40.13%
(d) None
88. ____ & ____ are called ratio averages:
(a) H.M & G.M
(b) H.M. & A.M.
(c) A.M. & G.M.
(d) None
89. If X and Y are two random variables then $v(x+y)$ is:
(a) $v(x) + v(y)$
(b) $v(x) + v(y) - 2v(x,y)$
(c) $v(x) + v(y) + 2v(x,y)$
(d) $v(x) - v(y)$
90. Mean and S.D. of x is so and 5 respectively, Find mean and S.D. of $\frac{x-50}{5}$
(a) (1,0)
(b) (0,1)
(c) (1,-1)
(d) (0, - 1)
91. A letter is taken out at random from the word RANGE and another is taken out from the word PAGE. The probability that they are the same letters is :
(a) 1/20
(b) 3/20

(c) $\frac{3}{5}$

(d) $\frac{3}{4}$

92. A bag contains 8 red and 5 white balls. Two successive draws of 3 balls are made without replacement. The probability that the first draw will produce 3 white ball and second 3 red balls is :

(a) $\frac{6}{255}$

(b) $\frac{5}{548}$

(c) $\frac{7}{429}$

(d) $\frac{3}{233}$

93. Daily demand for calculators is having the following probability distribution:

Demand	1	2	3	4	5	6
Probability:	0.10	0.15	0.20	0.25	0.18	0.12

Determine the variance of the demand.

(a) 2.54

(b) 2.93

(c) 2.22

(d) 2.19

94. One Card is drawn from pack of 52, what is the probability that it is a king or a queen?

(a) $\frac{11}{13}$

(b) $\frac{2}{13}$

(c) $\frac{1}{13}$

(d) None of these

95. Let R is the set of real numbers such that the function $f : R \rightarrow R$ and $g : R \rightarrow R$ are defined by $f(x) = x^2+3x+1$ and $g(x) = 2x-3$. Find $(f \circ g)$:

(a) $4x^2+6x+1$

(b) x^2+6x+1

(c) $4x^2-6x+1$

(d) $x^2- 6x+1$.

96. In a town of 20,000 families it was found that 40% families buy newspaper A, 20% families buy newspaper B and 10% families buy newspaper C, 5% families buy A and B, 3% buy B and C and 4% buy A and C. If 2% families buy all the three newspaper, then the number of families which buy A only is:

(a) 6600

(b) 6300

(c) 5600

- (d) 600.
97. Given the function $f(x) = (2x + 3)$, then the value of $f(2x) - 2f(x) + 3$ will be:
- (a) 3
 - (b) 2
 - (c) 1
 - (d) 0
98. if $(x+1)$, $3x$ $(4x+2)$ are in A.P. Find the value of x
- (a) 2
 - (b) 3
 - (c) 4
 - (d) 5
99. Divide 144 into three parts which are in AP and such that the largest is twice the smallest, the smallest of three numbers will be:
- (a) 48
 - (b) 36
 - (c) 13
 - (d) 32
100. Find the variance of binomial distribution with $n = 10$, $p = 0.3$
- (a) 2.1
 - (b) 3
 - (c) 7
 - (d) None of these

ANSWER OF MODEL TEST PAPER 1
FOUNDATION COURSE

PAPER 3: QUANTITATIVE APTITUDE

1.	(d)	2.	(d)	3.	(c)	4.	(a)	5.	(b)
6.	(b)	7.	(d)	8.	(b)	9.	(b)	10.	(c)
11.	(c)	12.	(c)	13.	(a)	14.	(d)	15.	(b)
16.	(c)	17.	(c)	18.	(b)	19.	(a)	20.	(b)
21.	(b)	22.	(a)	23.	(b)	24.	(c)	25.	(a)
26.	(c)	27.	(a)	28.	(a)	29.	(c)	30.	(c)
31.	(c)	32.	(c)	33.	(a)	34.	(b)	35.	(c)
36.	(c)	37.	(d)	38.	(b)	39.	(b)	40.	(c)
41.	(a)	42.	(a)	43.	(b)	44.	(d)	45.	(b)
46.	(c)	47.	(a)	48.	(a)	49.	(a)	50.	(b)
51.	(c)	52.	(b)	53.	(b)	54.	(c)	55.	(c)
56.	(a)	57.	(c)	58.	(b)	59.	(d)	60.	(c)
61.	(b)	62.	(d)	63.	(d)	64.	(b)	65.	(b)
66.	(c)	67.	(b)	68.	(a)	69.	(b)	70.	(c)
71.	(a)	72.	(d)	73.	(a)	74.	(d)	75.	(d)
76.	(c)	77.	(d)	78.	(b)	79.	(b)	80.	(d)
81.	(a)	82.	(b)	83.	(b)	84.	(b)	85.	(c)
86.	(d)	87.	(b)	88.	(a)	89.	(b)	90.	(c)
91.	(d)	92.	(b)	93.	(c)	94.	(b)	95.	(a)
96.	(c)	97.	(a)	98.	(b)	99.	(c)	100.	(a)

ANSWER OF MODEL TEST PAPER 2

FOUNDATION COURSE

PAPER 3: QUANTITATIVE APTITUDE

Key Part A: Business Mathematics and Logical Reasoning

1	(c)	2	(d)	3	(c)	4	(d)	5	(c)
6	(c)	7	(c)	8	(a)	9	(a)	10	(c)
11	(c)	12	(c)	13	(a)	14	(d)	15	(a)
16	(c)	17	(b)	18	(d)	19	(a)	20	(a)
21	(c)	22	(b)	23	(b)	24	(c)	25	(a)
26	(a)	27	(a)	28	(b)	29	(c)	30	(c)
31	(a)	32	(c)	33	(d)	34	(c)	35	(b)
36	(b)	37	(a)	38	(b)	39	(a)	40	(b)
41	(c)	42	(b)	43	(d)	44	(a)	45	(b)
46	(c)	47	(d)	48	(c)	49	(c)	50	(c)
51	(d)	52	(c)	53	(c)	54	(b)	55	(c)
56	(c)	57	(c)	58	(b)	59	(d)	60	(c)

Key Part B: Statistics

61	(c)	62	(c)	63	(b)	64	(d)	65	(d)
66	(b)	67	(a)	68	(c)	69	(c)	70	(c)
71	(c)	72	(c)	73	(a)	74	(c)	75	(d)
76	(c)	77	(d)	78	(c)	79	(a)	80	(b)
81	(a)	82	(b)	83	(a)	84	(a)	85	(c)
86	(a)	87	(c)	88	(d)	89	(c)	90	(a)
91	(a)	92	(a)	93	(b)	94	(a)	95	(b)
96	(c)	97	(a)	98	(a)	99	(a)	100	(c)

ANSWER OF MODEL TEST PAPER 3
FOUNDATION COURSE
PAPER 3: QUANTITATIVE APTITUDE

1.	(c)	2.	(c)	3.	(b)	4.	(a)	5.	(a)
6.	(b)	7.	(d)	8.	(b)	9.	(a)	10.	(b)
11.	(d)	12.	(a)	13.	(a)	14.	(a)	15.	(a)
16.	(a)	17.	(c)	18.	(d)	19.	(c)	20.	(a)
21.	(c)	22.	(a)	23.	(a)	24.	(a)	25.	(b)
26.	(b)	27.	(b)	28.	(b)	29.	(a)	30.	(c)
31.	(c)	32.	(b)	33.	(b)	34.	(b)	35.	(d)
36.	(b)	37.	(c)	38.	(b)	39.	(a)	40.	(a)
41.	(c)	42.	(a)	43.	(c)	44.	(c)	45.	(a)
46.	(c)	47.	(a)	48.	(d)	49.	(a)	50.	(c)
51.	(b)	52.	(c)	53.	(d)	54.	(c)	55.	(a)
56.	(c)	57.	(d)	58.	(d)	59.	(a)	60.	(b)
61.	(a)	62.	(d)	63.	(b)	64.	(a)	65.	(c)
66.	(d)	67.	(c)	68.	(b)	69.	(a)	70.	(c)
71.	(a)	72.	(a)	73.	(a)	74.	(b)	75.	(a)
76.	(b)	77.	(b)	78.	(a)	79.	(a)	80.	(a)
81.	(a)	82.	(c)	83.	(a)	84.	(d)	85.	(c)
86.	(d)	87.	(a)	88.	(a)	89.	(a)	90.	(b)
91.	(b)	92.	(c)	93.	(c)	94.	(b)	95.	(c)
96.	(a)	97.	(d)	98.	(b)	99.	(d)	100.	(a)