**2022**

# FUNDAMENTALS OF BUSINESS MATHEMATICS

Full marks : 80 Time : 3 hours

**General instructions:**

*i) Approximately 15 minutes is allotted to read the question paper and revise the answers.*

*ii) The question paper consists of 21 questions. All questions are compulsory.*

*iii) Marks are indicated against each question.*

*iv) Internal choice has been provided in some questions.*

***N.B: Check to ensure that all pages of the question paper is complete as indicated on the top left side.***

1. Express $\sqrt[6]{100000}$ into index form. **1**

2. Define compound surd. **1**

3. Define slope of a straight line. **1**

4. What is meant by compound fraction? **1**

5. Express $2.3\dot{5}$ as a proper fraction. **1**

6. If $x = 3^{2/3} + 3^{1/3}$, prove that $x^3 = 12 + 9x$ **4**

7. Simplify: $\frac{2\sqrt{2}}{\sqrt{3}+\sqrt{5}} + \frac{\sqrt{5}}{\sqrt{2}+\sqrt{3}} - \frac{3\sqrt{3}}{\sqrt{2}+\sqrt{5}}$ **4**

8. In how many ways can words of 4 letters be formed out of the letters of the word 'COMPUTER'? **4**

9. In how many ways three letters can be placed in five post boxes? **4**

10. A person has got 10 acquaintances, of whom 6 are relatives. In how many ways he may invite 5 guest so that 4 of them would be relatives? **4**

11. **a.** The simple interest on a sum of money at the end of 5 years is one-quarter of the sum itself. Find the rate of interest percent per annum.

**Or** **4**

**b.** A man borrows two sums of money differencing by ₹140 at the same time,

one at 3% and other at 4% per annum both at simple interest. At the end of 7 years, he pays back the loan with interest. If he pays the same amount in respect of each loan, find the sum borrowed by him.

12. **a**. A man left his property to be divided among his wife, son and daughter so that the son's share to the daughter's is 8:7 and wife's share to the son's share is 8:7. If the wife received ₹300 more than the daughter, find the total value of the property of the man.

**Or** **4**

**b**. A man left $\frac{3}{7}$ of his property to his wife, $\frac{1}{4}$ to his son and the remainder was divided between his grandson and grand daughter as 5:4. The grand daughter received ₹3,000. Find how much each of them received.

13. **a.** An apple seller has a certain number of apples of which 2% are bad and are discarded. He sells 95% of the remainder. If he has now 98 apples left, how many had he originally?

**Or** **4**

**b.** In an examination, 80% of the candidates passed in English and 85% passed in Mathematics, while 75% passed in both. If 45 candidates failed in both the subjects, find the total number of candidates.

14. **a.** If 5% of sale price of an article is equal to 6% of its cost and 8% of the sale price exceeds 9% of the cost by ₹3. What were the sale price and cost price?

**Or** **4**

**b**. The producer, the wholesaler and the retailer gained 20%, 30% and 40% respectively. If the retailer sells an article for ₹54.60, what is the actual cost of producing the article?

15. **a.** If $x = \frac{2ab}{a+b}$, Prove that $\frac{x+a}{x-a} + \frac{x+b}{x-b} = 2$

**Or** **5**

**b**. If $x = \frac{\sqrt{1+2a} + \sqrt{1-2a}}{\sqrt{1+2a} - \sqrt{1-2a}}$, prove that $ax^2 - x + a = 0$

16. **a.** Determine the smallest quantity that must be added to $\frac{3\cdot\dot{3}}{6\cdot0625}$ *of* $\frac{9\cdot7}{2\cdot4\dot{2}}$ *of* 218 to make the sum the square of a whole number.

**Or** **5**

**b.** A bamboo 20 feet long rests against a tree. If the foot of the bamboo is 7 feet far from the tree, how high up the tree does bamboo reach (Correct upto 1 place of decimal)?

17. **a.** A man borrowed an equal sum of money from two money lenders A and B at 3% and 2% per annum simple interest respectively. He had to pay A ₹26,000 after a certain number of years and 5 years later he had to pay the same amount to B. Obtain the amount borrowed from A and B respectively.

**Or** **5**

**b.** A father leaves ₹36,200 in a bank at 5% simple interest for his 3 daughters A, B and C and their ages being 2, 5 and 8 years old respectively. If each gets the same amount at the age of 18, find their shares at the father's death.

18. **a.** A manufacturer produces 20 television sets at a total cost of ₹1,50,000 and 40 television sets at a total cost of ₹2,50,000. Assuming the cost curve to be linear.
   i. Find the relationship between the product ($x$) and the total cost ($y$)
   ii. Use it to estimate the cost of 30 television sets.
   iii. Also find marginal cost (MC), average variable cost (AVC) and average cost of producing 50 television sets

**Or** **6**

**b.** Find the equation of a circle passing through the points (2, 0) (-6,-6) and 1,1).

19. **a.** Prove that $x^{\log y-\log z} \times y^{\log z-\log x} \times z^{\log x-\log y} = 1$

**Or** **6**

**b.** If $\log_2 x + \log_4 x + \log_{16} x = \frac{21}{4}$, find the value of $x$.

20. **a.** The population of a town in the beginning of the year 1990 was 50,000. If the rate of increase of the population is 25 per thousand, find the population at the beginning of the year 1994. [Given log1.025=0.0107 and AL(0.0428)=1.104]

**Or** **6**

**b.** The price of a car is ₹90,000. If the rate of depreciation of its value per year is 5%. Find the depreciated value after 4 years, and also calculate its total depreciation. [Given $\log\left(\bar{1}\cdot 9777\right) = -0^{\bullet}0223$ and $AL(\bar{1}\cdot 9108) = 0.8143$).

21. **a**. During a sale, a businessmen reduced the price of his goods 15% below list price which had originally been fixed at 10% profit on SP after deducting 5% for cash. What percent does he gain or lose if no cash discount is allowed in the latter case?

**Or** **6**

**b.** A trader sold his 3 books for ₹100, ₹150 and ₹200 respectively, thereby gaining 10% on the total selling price. He gained 15% by selling the 1st and loss 10% by the sale of 3rd, the percentage being based on the selling price. What percentage of profit did he obtain by the 2nd?

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