

2021

**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 that all pages of the question paper is complete as indicated on the top left side.

1. Define pure surd. 1
2. What is meant by quadratic mixed surd? 1
3. Write the equation of X axis and Y axis. 1
4. What is vulgar fraction? 1
5. Define irrational number. 1
6. Prove that  $\left(x^{\frac{1}{a-b}}\right)^{\frac{1}{a-c}} \left(x^{\frac{1}{b-c}}\right)^{\frac{1}{b-a}} \left(x^{\frac{1}{c-a}}\right)^{\frac{1}{c-b}} = 1$  4
7. Find the square root of  $16 + 4\sqrt{10} - 2\sqrt{15} - 4\sqrt{6}$  4
8. If  $6P(n,2) = P(n,4)$ , find  $n$ . 4
9. Prove that  $(2n)! = \{1.3.5.....(2n-1)\}2^n . n!$  4
10. Prove that,  ${}^n C_r + 3^n C_{r-1} + 3^n C_{r-2} + \dots + {}^n C_{r-3} = {}^{n+3} C_r$  4
11. a. The simple interest on ₹5,000 for 5 years together with that on ₹6,000 for 8 years comes to ₹2,190 the rate being the same in both the cases. Calculate the rate of interest. 4

**Or****4**

- b.** A man lends ₹4,000 to two persons at the rate of 3% and 4% simple interest per annum respectively. At the end of 6 years, he receives ₹810 from them. How much did he lend to each?
12. **a.** Divide ₹350 among A, B and C so that A may get ₹80 less than B and C may get half of what A gets. **Or** 4
- b.** The price of 8 goats is equal to that of 3 cows, the price of 5 cows is equal that of 2 horses. If the price of 3 horses be ₹2,880, find the price of 2 goats.
13. **a.** A man's wage is increased by 5% and afterwards decreased by 5%, find the total change percent of his wage. **Or** 4
- b.** The price of tea decreased by 25%. By how much percent must a man increase his consumption so that his expenses on tea may remain unaltered?
14. **a.** If 400 oranges are bought at ₹24 a dozen and sold at ₹210 per hundred, what percentage of profit is earned? **Or** 4
- b.** A book is sold at a loss of 10 % on sales. How much does it represent on cost?
15. **a.** If  $x = 3\sqrt{2 + \sqrt{4 - a^3}} + 3\sqrt{2 - \sqrt{4 - a^3}}$ , Prove that  $x^3 = 4 + 3ax$  **Or** 5
- b.** If  $x = \frac{2\sqrt{216}}{\sqrt{2} + \sqrt{3}}$ , prove that  $\frac{x + \sqrt{72}}{x - \sqrt{72}} + \frac{x + \sqrt{108}}{x - \sqrt{108}} = 2$
16. **a.** Simplify  $\frac{1}{1 + \frac{1}{1 + \frac{1}{3}}} + \left( \frac{5\frac{1}{2} \div 3\frac{1}{2} \times 2\frac{1}{2}}{5\frac{1}{2} \div 3\frac{1}{2} \text{ of } 2\frac{1}{2}} \right) \div 14.58\dot{3}$  **Or** 5
- b.** Simplify  $\left[ \frac{\frac{3}{2} - \frac{4}{6} \text{ of } 2\frac{2}{3}}{\frac{9}{7} \div \frac{3}{7}} \right] \times \left[ \frac{1}{2} \text{ of } 1\frac{1}{4} + \frac{7}{9} \div \frac{1}{6} \right] + \frac{159}{324}$

17. a. Mr. X deposited ₹4,000 on 12<sup>th</sup> March in the bank paying interest at 3% per annum, he withdraws ₹3,000 on 18<sup>th</sup> June and deposited ₹5,000 on 10<sup>th</sup> July. How much interest was due to him on 31<sup>st</sup> August following?

**Or** **5**

- b. A man borrowed equal sum of money from two money lenders X and Y at 6% and 5% per annum simple interest respectively. He had to pay ₹32,000 to X after a certain number of years and 2 years later he had to pay the same amount to Y. Find the amount borrowed from each of X and Y.
18. a. Find the equation of the line passing through the point of intersection of the lines  $2x-3y+4=0$  and  $3x+4y-5=0$  and perpendicular to the line  $6x-7y+8=0$

**Or** **6**

- b. Find the equation of a straight line which passes through (3, 4) and the sum of whose intercepts on the coordinate axis is 14.

19. a. If  $a^{2x+5} b^{4+x} = b^{2x} a$ , prove that  $4\log ab = x \log\left(\frac{b}{a^2}\right)$

**Or** **6**

- b. Prove that  $\frac{\log\sqrt{27} + \log 8 + \log\sqrt{1000}}{\log 120} = \frac{3}{2}$

20. a. The simple and compound interest on a certain sum of money for 2 years (at the same rate) are respectively ₹500 and ₹600. Find the rate of interest and the sum.

**Or** **6**

- b. A man divided a sum of ₹50,000 between his two daughters of 12 years and 15 years respectively in such a way that each would receive the equal amount at 4% per annum compound interest when they attain the age of 25 years. Find the original share of each daughter.

21. a. A milk vendor sells two grades of milk at ₹22 and ₹18 per litre gaining 10% and 20% respectively. If he mixes the two in the ratio of 2:3 and sells the mixture at ₹22 per litre, what percentage gain does he earn?

**Or** **6**

- b. A scooter and the television together cost ₹30,000. If the price of the scooter rises by 5% and that of the television decreases by 10% , the two together will cost ₹28,500. Calculate the former price of the scooter and television.

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