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, ${}^{n}c_{r}+3{}^{n}c_{r-1}+3{}^{n}c_{r-2}+{}^{n}c_{r-3}={}^{n+3}c_{r}$ **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.

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 $x = \dfrac{2\sqrt{216}}{\sqrt{2}+\sqrt{3}}$, prove that $\dfrac{x+\sqrt{72}}{x-\sqrt{72}} + \dfrac{x+\sqrt{108}}{x-\sqrt{108}} = 2$

16. **a.** Simplify $\dfrac{1}{1+\dfrac{1}{1+\dfrac{1}{3}}} + \left(\dfrac{5\frac{1}{2} \div 3\frac{1}{2} \times 2\frac{1}{2}}{5\frac{1}{2} \div 3\frac{1}{2} of\, 2\frac{1}{2}} \right) \div 14.58\dot{3}$

Or **5**

b. Simplify $\left[\dfrac{\frac{3}{2} - \frac{4}{6} of\, 2\frac{2}{3}}{\frac{9}{7} \div \frac{3}{7}} \right] \times \left[\frac{1}{2} of\, 1\frac{1}{4} + \frac{7}{9} \div \frac{1}{6} \right] + \frac{159}{324}$

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