Subject : **Elementary Mathematics**

Full Marks : **50**

PAPER-I

PART-A

TIME : $2\frac{1}{2}$HRS. for Part A & B

Answer may be given either in English or in Bengali but all answers must be in one and the same language.

No Calculator can be used.

Group - I

Arithmetic : 20 marks

Attempt two questions.

1. (a) In a unit test a student has got 15 marks out of 25 marks in Mathematics, 7 out of 15 in English and 8 out of 20 in Bengali. Fing in which subject he has done the best. **2**

(b) An orange seller purchased at the rate of 24 oranges for Rs.20 and sold at the rate of 25 oranges for Rs.24. Find his percentage of gain or loss. **3**

(c) A sum of Rs.37,500 is left by a will by a father to be divided between two sons of 12 and 14 years of age, so that when they attain majority at 18, the amount received by each at 10% p.a. simple interest will be the same. Find the sum allotted at present to each son. How much did each receive after attaining 18 years of age? **3+2**

2. (a) In what proportion should water and wine at Rs.294 a litre be mixed to reduce the price to Rs.210 a litre? **2**

(b) A and B are partners in a business in which their capitals are as 15 : 17; B, being the working partner, receives $\frac{1}{20}$ of all the profit; the rest is devided in proportion to the capital. What does B receive out of profit of Rs.6080? **3**

(c) A goods train starts from Kolkata to Kanpur; at the same time a passenger train starts from Kanpur to Kolkata. If they take 6 hours and 1 hour 30 minutes respectively to arrive at Kanpur and Kolkata after they passed each other, show that the passenger train travels twice as fast as the goods train **5**

3. (a) A sum of money invested at $4\frac{1}{18}$% p.a. gives Re 1 as interest per day. Find the sum. **2**

(b) How must a grocer mix teas at Rs.300 a kg and Rs.345 a kg so that by selling the mixture at Rs.352 a kg he may gain 10% **3**

(c) The length of a rectangular land be increased by 10% and the breadth diminished by 10%, by how much percent will its area increase or decrease? **5**

4. (a) A pair of shoes costing Rs.1200 lasts for 2 years 6 months whereas another pair costing Rs.2000 lasts for 3 years 9 months. Which pair is profitable for a man to purchase? **2**

(b) A man buys 100 kg of fish. He loses as much by selling 40 kg at Rs. 80 a kg as he gains by selling the rest at Rs.105 a kg. Find the cost price of one kg of fish. **3**

(c) A and B together can do a piece of work in 8 days. B alone can do it in 12 days. They started the work together and B ceases work after 4 days due to illness. In how many more days could A alone finish it? **5**

Group-II

Algebra : 15 Marks

Attempt three questions

5. (a) Resolve into factors : $a^3 + b^3 + 1 - 3ab$ **2**

(b) Find L.C.M. of $8a^3b^2c$, $12a^5b^3c^8$, $25a^4b^6c^5d$ and $225abcd^3$ **3**

6. (a) Solve : $\left.\begin{aligned} \frac{1}{5x} - \frac{y}{9} &= 5 \\ \frac{1}{3x} + \frac{y}{2} &= 14 \end{aligned}\right\}$ **2**

(b) Solve : $\frac{9}{3x-4} + \frac{20}{4x+1} = \frac{8}{x+7}$ **3**

7. (a) Find the fraction which becomes 1, if 1 be added to the numerator and becomes $\frac{1}{2}$, if 1 be added to the denominator. **2**

(b) Solve : $\frac{1}{x+a} + \frac{1}{x+2a} + \frac{1}{x+3a} = \frac{3}{x}$ **3**

8. (a) If $\frac{ay-bx}{c} = \frac{cx-az}{b} = \frac{bz-cy}{a}$, show that $\frac{x}{a} = \frac{y}{b} = \frac{z}{c}$. **2**

(b) Simplify : $\frac{a}{a+b} + \frac{2ab}{a^2+b^2} + \frac{4ab^3}{a^4-b^2}$ **3**