

B.Sc. Semester - 5 (NEP-2020) Examination

Oct/Nov - 2025

MATH: Essential Mathematics for Competitive Examinations (Minor-4)

Time: 2:00 Hours

Marks: 50

Instructions:

1. All questions are compulsory.
2. Figures to the right indicate marks.
3. Calculate of any kind is not allowed.

Que.1 Answer any TWO. (10)

- (1) The denominator of a rational number is 3 more than its numerator. If the numerator is increased by 7 and the denominator is decreased by 2, we obtain 2. Find this rational number.
- (2) A cyclist covers first 1 Km at 20 Km/hr, second 1 Km at 16 Km/hr and third 1 Km at 12 Km/hr respectively. Find the average speed of the cyclist.
- (3) The ratio of the number of boys and girls in the school is 3:2. If 20% of the boys and 30% of the girls are scholarship holders, then find the percentage of the students who are not scholarship holders.

Que.2 Answer any TWO. (10)

- (1) A bicycle is sold at a gain of 16%. If it had been sold for Rs. 60 more, 20% would have been gained. Find the cost price of the bicycle.
- (2) A sum of money amounts to Rs. 6690 after 3 years and to Rs. 10035 after 6 years on compound interest. Find the sum.
- (3) A mixture of 20 liters of spirit and water contains 10% water. How much water must be added to this mixture to raise the percentage of water to 25% ?

Que.3 Answer any TWO. (10)

- (1) A can do a piece of work in 80 days. If A and B both work at it for 10 days together and then B alone finishes the work in another 32 days. Suppose if both A and B work together to finish the entire work, then find the number of days taken by them.
- (2) Find the angle between the minute hand and the hour hand of a 12-hour clock when the time is 9 : 25AM.
- (3) An equilateral triangle, a circle, a regular hexagon and a square have the same perimeter. Which one will enclose the minimum area?

Que.4 Answer any TWO. (10)

- (1) Find the positive value of k for which the equations $x^2 + kx + 64 = 0$ and $x^2 - 8x + k = 0$ will both have real roots.
- (2) If α and β are the roots of the quadratic equation $2x^2 - 5x + 7 = 0$, then find the equation whose roots are $2\alpha + 3\beta$ and $3\alpha + 2\beta$.
- (3) A jar contains 9 balls: 3 are red, 2 are green and 4 are yellow. What is the probability of drawing 2 different coloured balls with replacement?

Que.5 Answer any TWO. (10)

(1)

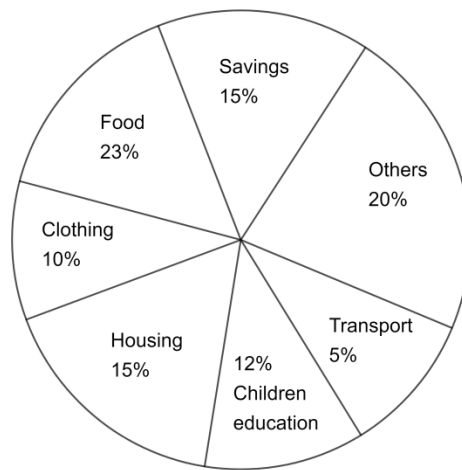
- (A) 5 years ago, the ratio of the ages of A and B was 3:2 and 5 years hence, their ages will be in the ratio of 5:4. The present ages of A and B are (02)
- (B) A train 360 m. long is running at a speed of 54 Kmph. What is the time taken by the train to cross a tunnel 390 m. long? (02)
- (C) A successive discount of 20% + 30% + 10% on an article of MRP Rs. 1500 is equal to an overall discount of Rs. on this article. (01)

(2)

- (A) Is 769573512 divisible by 22? Justify. (01)
- (B) Find the GCD and LCM of 2923 and 3239. (01)
- (C) Between $\sqrt[5]{6}$ and $\sqrt[6]{5}$, which number is larger? Justify. (01)
- (D) Solve: $|2x - 3| = 7, x \in \mathbb{R}$. (01)
- (E) Express $2.30\overline{791}$ as a fraction. (01)

(3)

The circle graph given below shows the spending of a family on various items and its savings during a year. Study the graph and answer the following questions.



- (A) If the total income of the family is Rs. 75000, the expenditure on children education is : (01)
- (B) What percentage of the income was spent on transport and other items?..... (01)
- (C) Out of the total income of Rs. 75000, the difference of the expenses on Housing and Transport was : (01)
- (D) The expenditure (in Rs.) on Food was more than that on clothing by : (01)
- (E) What fraction of total income was spent on Food clothing and housing collectively? : (01)
