

General Instructions:

1) All questions are compulsory.

The question paper consists of 25 questions divided into three sections- A, B and C. Section A

2) contains 7 questions of 2 marks each, Section B is of 12 questions of 3 marks each and Section C is of 6 questions of 5 marks each.

3) There is no overall choice. However, an internal choice has been provided in two questions of two marks each, two questions of three marks each and two questions of five marks each.

4) In question on construction, the drawing should be neat and exactly as per the given measurements.

5) Use of calculators is not permitted. However, you may ask for Mathematical tables.

SECTION A

Question 1

Find the LCM of $x^3 + x^2 + x + 1$ and $x^4 - 1$.

Question 2

Solve for x and y:

$$8x - 9y = 6xy \quad ; \quad 10x + 6y = 19xy$$

Question 3

In an A.P., the sum of its first n terms is $n^2 + 2n$. Find its 18th term.

Question 4

In Figure 1, two circles touch each other externally at C. Prove that the common tangent at C bisects the other two common tangents.

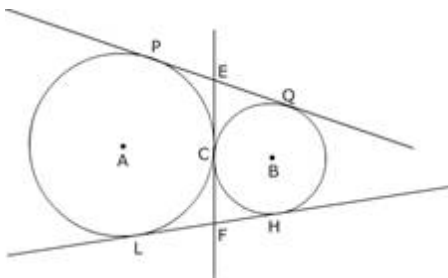


Fig.1

Question 5

Find the mean of the following distribution:

| Class | Frequency |
|-------|-----------|
| | |

| | |
|-------|----|
| 0-10 | 8 |
| 10-20 | 12 |
| 20-30 | 10 |
| 30-40 | 11 |
| 40-50 | 9 |

Question 6

A ceiling fan is marked at Rs. 970 cash or for Rs. 210 as cash down payment followed by three equal monthly instalments of Rs. 260. Find the rate of interest charged under the instalment plan.

Question 7

A box contains 5 red balls, 4 green balls and 7 white balls. A ball is drawn at random from the box. Find the probability that the ball drawn is

- (a) white.
 (b) neither red nor white.

SECTION B

Question 8

Solve the following system of linear equations graphically:

$$2x + 3y = 12 \text{ and } 2y - 1 = x$$

Question 9

Simplify $\left[1 - \frac{4ax}{(a+x)^2}\right] \times \frac{(x+a)^2}{x^2-a^2}$

Question 10

The first term, common difference and last term of an A.P are 12, 6 and 252 respectively. Find the sum of all terms of this A.P

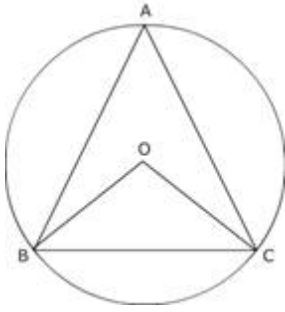
Question 11

Prove that any four vertices of a regular pentagon are cyclic.

(Out of syllabus.)

(OR)

BC is a chord of a circle with centre O. A is a point on arc BAC as shown in Figure 2. Prove that $\angle BAC + \angle OBC = 90^\circ$



Question 12

Draw a circle of radius 4.5 cm. At a point A on it, draw a tangent to the circle without using the centre.

Question 13

A toy in the form of a cone mounted on a hemisphere with same radius. The diameter of the base of the conical portion is $7\frac{22}{7}$ cm and the total height of the toy is 14.5 cm. Find the volume of the toy. (use $\pi = \frac{22}{7}$)

Question 14

The expenditure on different heads of a household (in hundreds of rupees) is as follows:

| Head | Education | Games | Entertainment | Gardening | Decoration |
|-------------|-----------|-------|---------------|-----------|------------|
| Expenditure | 20 | 10 | 15 | 10 | 17 |

Draw a pie diagram to represent the above data.

Question 15

All the three face cards of spades are removed from a well shuffled pack of 52 cards. A card is then drawn at random from the remaining pack. Find the probability of getting (a) a black face card, (b) a queen, (c) a black card.

Question 16

$$\frac{\tan A + \sec A - 1}{\tan A - \sec A + 1} = \frac{1 + \sin A}{\cos A}$$

Prove that

Question 17

Three consecutive vertices of a parallelogram are (2, 1); (1, 0) and (4, 3). Find the coordinates of the fourth vertex.

Question 18

If the point C (1, 2) divides internally the line segment AB in the ratio 3 : 4, where the coordinates of A are (2, 5), find the coordinates of B.

Question 19

A loan of Rs. 2550 is to be paid back in two equal half-yearly instalments. How much is each instalment if interest is

compounded half-yearly at 8% per annum

SECTION C

Question 20

Prove that the ratio of the areas of two similar triangles is equal to the ratio of the squares of their corresponding sides.

Use the above for the following :

If the areas of two similar triangles are equal, prove that they are congruent.

Question 21

If a line touches a circle and from the point of contact a chord is drawn, the angles which this chord makes with the given line are equal respectively to the angles formed in the corresponding alternate segments.

Use the above for the following: In Figure 3, ABCD is a cyclic quadrilateral and PQ is the tangent to the circle at C.

If BD is the diameter and $\angle DCQ = 40^\circ$ and $\angle ABD = 60^\circ$, find

(i) $\angle ADB$

(ii) $\angle BCP$.

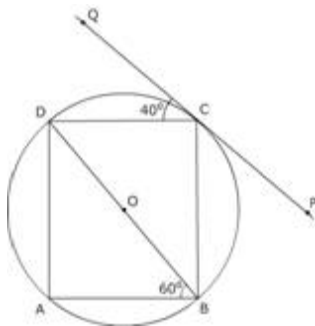


Fig. 3

Question 22

The numerator of a fraction is one less than its denominator. If three is added to each of the numerator and denominator, the

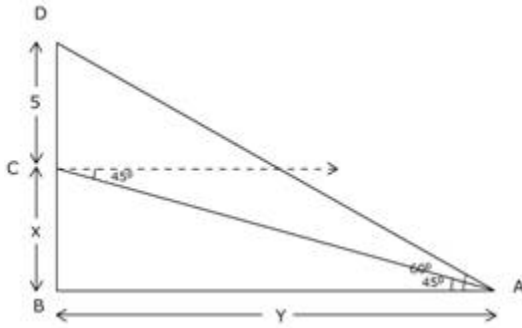
fraction is increased by $\frac{3}{28}$. Find the fraction.

Question 23

A hemispherical bowl of internal diameter 36 cm is full of some liquid. This liquid is to be filled in cylindrical bottles of radius 3 cm and height 6 cm. Find the number of bottles needed to empty the bowl.

Question 24

A pole 5 m high is fixed on the top of a tower. The angle of elevation of the top of the pole observed from a point A on the ground is 60° and the angle of depression of point A from the top of the tower is 45° . Find the height of the tower. (Take $\sqrt{3} = 1.732$)



Question 25

The salary of Hukam Singh is Rs. 42,000 per month (exclusive of HRA). He donates Rs. 30,000 to Prime Minister's Relief Fund (100% exemption). He contributes Rs. 6,500 per month towards Provident Fund and Rs. 5,000 quarterly towards LIC premium. He also purchases NSC worth Rs. 10,000. He pays income tax of Rs. 5,100 per month for 11 months. Calculate the income tax he has to pay in the 12th month of the year. Use the following to calculate income tax :

(a) Savings 100% exemption for permissible savings

upto Rs. 1,00,000

(b) Rates of Income tax

lab Income tax

(i) Upto Rs. 1,00,000 No tax

(ii) From Rs. 1,00,001 to Rs. 1,50,000 10% of the taxable income exceeding Rs. 1,00,000

(iii) From Rs. 1,50,001 to Rs. 2,50,000 Rs. 5,000 + 20% of the amount exceeding Rs. 1,50,000

(iv) Rs. 2,50,001 and above Rs. 25,000 + 30% of the amount exceeding Rs. 2,50,000

(c) Education Cess 2% of Income tax :