GCE O/L December 2001
Mathematics Paper 2
Duration 3 Hour

1. (a) A dealer buys a bicycle for Rs. 6000. He marks its price keeping a price keeping a profit of 25%

(i) What is the marked price of the bicycle?

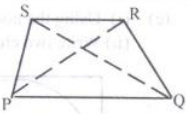
(ii) If he gives a discount of 10% off the marked price when selling the bicycle, what will be its selling price?

(ii) Express the profit he gets by selling the bicycle as a percentage of the cost price.

(b) (i) Vijitha bouht a certain number of five rupee stamps and a certain number of two rupee stamps. The total number of stamps she bought was 40. She paid Rs 182 for the stamps. By taking **x** as the number of five rupee stamps and **y** as the number of two rupee stamps she bought, form a pair of simultaneous equations using the information given above. By solving them or otherwise find the number of five rupee stamps Vijitha bought.

(ii) Using the relation $a^2 - b^2 = (a + b)(a-b)$ find the value of 67^2-17^2

(c) In a trapezium PQRS shown in the diagram PQ//SR



(i) If the value of QPS = 75° what is the value of PSR. Give reasons for your answer.

(ii) Name another triangle equal in area to the triangle PQS. Give reasons for your answer.

(iii) PQ = 13cm, SR = 7cm, and the perpendicular distance between the sides PQ and SR is 11cm. Calculate the area of the trapezium PQRS.

(d) (i) Find the volume of a solid hemisphere of radius 7cm.

(ii) The base radius of a right circular cylinder is 7cm and its height is 10 cm. Find its volume.

(iii) The diagram shows an object made out of a right circular solid cylinder of base radius 7cm and height 10cm from which a hemispherical part of radus 7cm is symmetrically carved out. Find the volume of the object.

(e) A distribution of marks obtained at a monthly test in Mathematic by 21 students is given below.

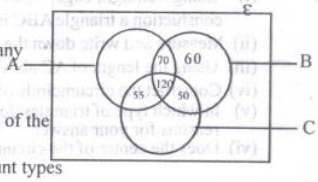
42	22	17	65	56	31	33
64	45	58	33	20	74	26
45	39	28	35	62	52	54

(i) What is the range of this distribution of marks?

(ii) What is the median of this distribution of marks?

(iii) Is this a unimodal distribution? Give reasons for your answer?

(f) The Venn diagram given above shows information gathered regarding three typs of accounts A, B and C maintained by the account holders of a branch of a certain Bank.



(i) How many account holders have account types A and B **only**?

(ii) The number of account holders who have type A accounts is 325, How many of them have **only** type A accounts?

(iii) The number of account holders who have type C accounts is 260. Find which of these three types of accounts has been selected by the majority of the account holders.

(iv) Find the number of account holders maintaining at least one of the account types A, B or C.

2. A portion of a sales advertisement published by a sales establishment is given below.

--- Pay $\frac{1}{5}$ of the value of the article at the beginning and the balance to be paid in 12 equal monthly instalments with an interest of 20% per annum.....

Accordingly,

(i) what fraction of the value of the article will be left behind to be paid in instalments?

(ii) when buying an article of value Rs^23 500 how much has to be paid at the begining?

(iii) When buying the above article what is the amount that has to be paid as an instalment?

(iv) When buying an article of value Rs P $\frac{1}{5}$ of its value has to be paid at the begining and the balance in ***m*** equal monthly instalments with an interest of **r** % per annum. If the value of a monthly instalment is Rs A, find an expression for **A** in terms of ***P, r*** and ***m.***

3. a) An incomplete table of values of x and y obtained for drawing the graph of the function $y = x^2 - 4$ is given below.

x	-3	-2	-1	0	1	2	3
y	5	.....	-3	-4	.....	0	5

(i) Copy the above table on to your answer script and fill inthe blanks.

(ii) Draw the graph of the above function taking **10 small divisions** on the graph paper provieded, to represent **one unit** along both x - axis as the scale .

(b) Using your graph,

(i) write down its axis of symmetry.

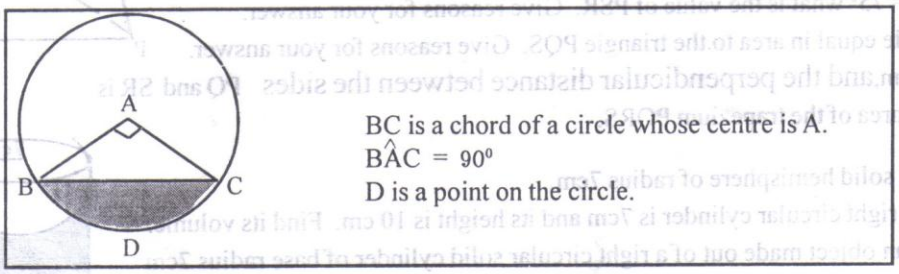
(ii) write down the range of values of ***x*** for which the function is negative.

(iii) find the roots of the equation $x^2 - x - 3 = 0$

(c) (i) Using the above graph write down the co - ordinates of the turrning point of the function $y = 4 - x^2$

(ii) Write two characteristics common to both graphs of the functions $y = x^2 - 4$ and $y = 4 - x^2$

4.



BC is a chord of a circle whose centre is A.
$B\hat{A}C = 90^0$
D is a point on the circle.

(i) What fraction of the circle is the sector ABDC?

(ii) If the radius of the circle is 7cm, find the lenght of BC in centimetres to the nearest first decimal place (use logarithmic tables)

(iii) Find the area of the shaded portion of the diagram.

(iv) Let us assume that the circle in the diagram represents a cross section of a cylindrical pipe through which water flows and **BC** represents the level of water in the pipe. If water flows through the pipe at the rate of 5 metres per second, find in cubic centimetres, the volume of water which flows out in one second, Express this volume of water in litres.

5. (i) Using a straight edge, a pair of compasses and a cm/mm scale only and showing the construction lines clearly, constuction a triangle ABC in which BC = 6cm $ABC = 90^0$ and BA = 4cm

(ii) Measure and write down the length of AC

(iii) Using the length of AC above, find the value of $\sqrt{13}$ to the nearest first decimal place.

(iv) Construct the circumcircle of the triangle ABC

(v) In which type of triangles does the centre of the circumcircle of the triangle lies on a side of that triangle? Give reasons for your answer.

(vi) Does the centre of the circumctircle of an obtuse angled triangle lie inside the triangle or outside the triangle?

6. (a) Using the formula or by completing the square solve the equation $x^2 + 3x + 1 = 0$

(b) Kamal cut a roll of ribbon into pieces of length 2cm , 5cm , 8cm etc. to be used for a decoration. The numbers that represent the lengths of piecs of ribbon when arranged in order form an arithmetic progression.

(i) If the length of the longest piece of ribbon he cut is 23 cm, how many pieces of ribbon were cut?

(ii) what is the total length of all the pieces that he cut?

(iii) If he cut the above pieces from roll of ribbon 3 metres long, what is the length of the remaining piece of ribbon?

7. In the given diagram the diameter AB of the circle whose centre is O intersects the chord CD at right angles.
$CDB = 30^0$ and $CA = 8\sqrt{3}$ cm
Copy this diagram on to your answer script and answer the following questions.

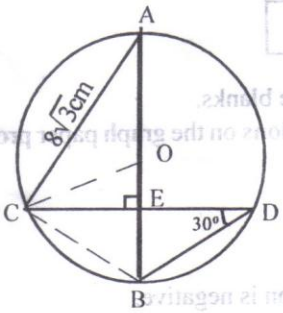
(i) Find the value of CAB (ii) Find the value of OCD

(iii) Show that OCE and BCE are congruent.

(iv) Take OA = r and form an equation in r to represent a relationship between the sides of the right angled triangle ABC, Solve this equation and find the value of r,

(v) Explain why OCBD is a parallelogram.

(vi) Find the perimeter of the parallelo OCBD (vii) Find the area of the parallelogram OCBD



8.(a) **For publishing a newspaper advetisement, Rs 45 is charged for the first 10 words and Rs 8 per word for the next 10 words and Rs 12 per word for every additional word.**

(i) How much is charged to publish an advertisement consisting of 11 words?
(ii) How much is charged to publish an advertisement consisting of 25 words?
(iii) Write an expression for the amout charged to publish an advertisement with b(b > 20) number of words, in terms of b, and simplify it.
(iv) A sume of Rs 257.25 had to be paid to publish an advertisement on the front page for which an additional charge of 5% is included. How many words were there in this advertisement?

b) The ratio between the charges for publishing a sales advertisement in a daily paper and broadcasting the same over a radio channel is 2 : 25, A person had to spend Rs. 2160 to publish an advertisement in the daily paper and for broadcasting the same over the radio channel.
Find the amount paid to
(i) Publish it in the daily paper.
(ii) broadcast it over the radio channel,

9. (a) Information collected by a student of grade 11 for his project about the sale of rice in a shop during a period of 30 days is shown below.

Rice sold (kg)	40 - 54	55 - 69	70 - 84	85 - 99	100 - 114	115 - 129
No. of days (frequency)	2	3	6	8	7	4

(i) According to the above information, what could be the maximum number of kilogrammes of rice sold in the shop during a day?
(ii) Taking the mid - value of the class interval 85 - 99 as the assumed mean, find the mean number of kilogrammes of rice sold in a day.
(iii) How many kilogrammes of rice are expected to be sold during the 7 days of the coming week? Give reasons for your answer.

(b) 120 apprentices were admitted to a certain training institite. At the end of the training period 110 apprentices completed the training course successfully. 8 out of those who successfully completed the course were appointed as instructors in the same institute. If a person is selected at random from these apprentices, find the probability that

(i) he be a person who did not successfully complete the training course,
(ii) he be a person who successfully completed the training course and was appointed as an instructor.

10. (a) A straight boundary of length 68 m is represented by a straight line of length 6.8cm in a scale drawing

(i) Find the scale used in drawing the above diagram.
(ii) What is the true length in metres of a straight road which is represented by a line of length 8.2cm in the scale drawing.

(b) In the given diagram ABC and ACD are right angles. BC = 6.8cm ¢ CD = 7.5 cm and , BAC = 57 ^{0}40' .

(i) Write an expression for sin ABC in tems of the sides of triangle ABC .Using logarithmic tables for simplification, calculate the lenght of AC to the nearest centimetre.
(ii) Using the answer for AC in (i)above, which was expressed as an integer,calculate the magnitude of DAC