Alternative No:

Index No:

Supervising Examiner's/Invigilator's initial:

**Mathematics
hours**

Writing Time: $2\frac{1}{2}$

Total Marks : 80

READ THE FOLLOWING DIRECTIONS CAREFULLY:

1. **Do not** write for the first **fifteen minutes.** This time is to be spent reading the questions. After having read over the questions, you will be given **two and a half hours** to answer all questions.

2. Write your **index number** in the space provided on the **top right hand   corner of   this cover page only.**

3. In this paper, there are **two sections:** Section A and Section B. You are expected   to answer **ALL** the questions in Section A and any **FOUR** questions from Section B. The intended marks for a question or its parts are stated in the brackets.

4. Read the directions to each question carefully and write **all** your answers in the space provided in the **question booklet** itself.

5. Remember to write **quickly** but **neatly.**

6. You are not allowed to remove any page from this booklet.

7. **Do not** leave the examination hall before you have made sure that you have answered all the required number of questions.

For Chief Marker's and Markers' Use Only

Section	A						B								Chief Marker's initial
Question	1	2	3	4	5	6	7	8	9	10	11	12	13	Total	
Award															
Markers' initial															

SECTION A (40 Marks)

**Answer *ALL* questions in this section**

Question 1.

(a)   Mr. Dorji has 150 shares of a company. The face value of each share is Nu.10. If the company declares 20% annual dividend at the end of the financial year, then calculate the dividend on one share of Nu.10.   **[2]**

(b)   If $R= \{(x, y): (x, y) \in N \times N$ and $x+2y=7\}$, then list the elements of R.   **[2]**

(c)   Draw all possible lines of symmetry of a trapezium and a kite.   **[2]**

Question 2.

(a) In the figure, chord ED is parallel to the diameter AC of the circle and $\angle CBE = 75$
Calculate the value of $\angle DEC$. **[2]**
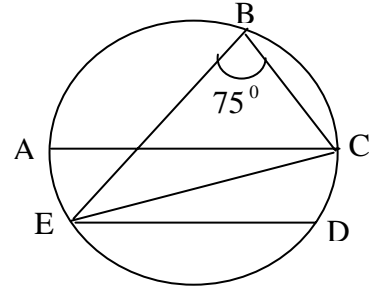
(b) The area of a circle is 154 cm^2. Calculate the circumference of the circle. **[2]**

(c)   If $4\sin^2\theta = 3$. Find θ, where θ is an acute angle.   **[2]**

Question 3.
(a)   Calculate the distance between the point A (7, 3) and the point B on the X-axis, whose abscissa is 11.   **[2]**

(b)   The table given below shows the marks obtained by 19 students in a class test. **[4]**

Marks	5	10	15	20	25
Frequency	3	2	7	5	2
Cumulative Frequency					

BCSE/Maths/2006

Find the
i. cumulative frequency of the marks.

ii. median mark.

(c)   If the mean of 5, *x*, 8,14,17,18 and 22 is 13, then find the median after finding the
value of *x*.   **[2]**

Question 4.

(a)   Calculate the coordinates of the point *P* that divides the line joining the points
         A (-1, 3) and *B* (5,-6) internally in the ratio 1:2.   **[3]**

(b)   If $A = \begin{bmatrix} 1 & 3 \\ 2 & 6 \end{bmatrix}$ and $B = \begin{bmatrix} -1 & 4 \\ 2 & 1 \end{bmatrix}$, then find $(B - A)^2$.   [2]

(c)   In the figure given below, point P (3,-2) is the mid-point of the line segment AB. Find the coordinates of points A and B.   [2]
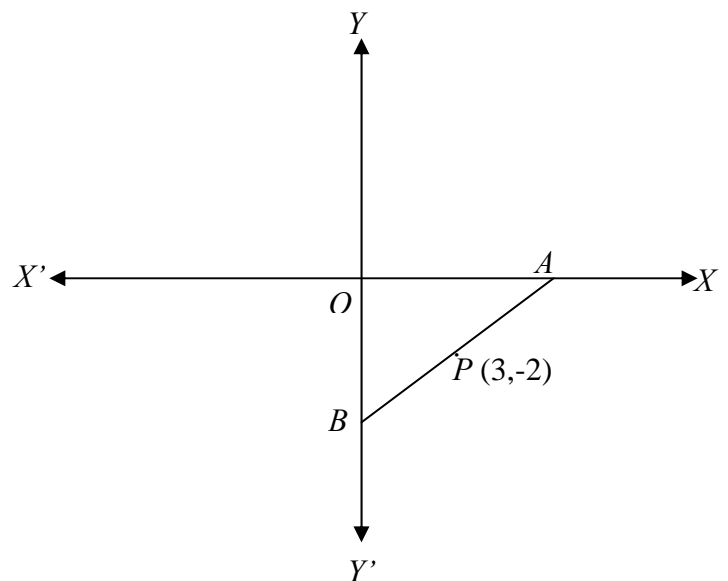
Question 5.

(a)   If $f(x) = 3x^2 + 7, where -2 \leq x \leq 1$, then find the domain and the range of $f(x)$.

                                                                                              [2]

(b)   Evaluate $\dfrac{\sin 35^0}{\cos 55^0} + \dfrac{\cos 55^0}{\sin 35^0}$ without using the trigonometric tables.   **[2]**

(c)   Prove that $\sec^2 \theta + \cos ec^2\theta = \sec^2 \theta \cos ec^2\theta.$ **[2]**
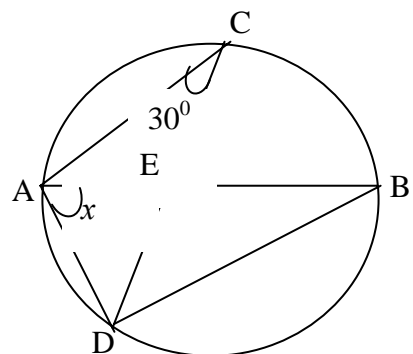
Question 6.

(a) Mr. Ugyen had a savings bank account in the Bank of Bhutan. His passbook had the following entries as shown in the table below.

Date	Particulars	Withdrawals (Nu.)	Deposits (Nu.)	Balance (Nu.)
January 8, 2004	By cash	------	500.00	500.0
March 18, 2004	To cheque	100.00	------	400.00
May 23, 2004	By cheque	-------	1500.00	1900.00
July 29, 2004	To withdrawal slip	200.00	------	1700.00
September 2, 2004	By cash	------	1300.00	3000.00

If the interest was paid at the rate of 5% per annum simple interest at the end of September every year, then calculate the interest that Mr. Ugyen got upon closing the account on October 20, 2004. **[3]**

(b)   The diagram given below is a circle with diameter AB. Find the value of angle x.

[2]

(c) P' is the image of P, when reflected through the origin.   **[2]**
        (i)   If P' is (-8, 6), then find the coordinates of P.

        (ii)   Find P'', the image of P, when reflected through the line $y=0$.

_____

SECTION B (40 Marks)

Attempt any *FOUR* questions from this section.

Question 7.

(a) The annual salary of Mr. Sangay Dorji is Nu.191734.00. He contributes Nu.875.00 per month to Provident Fund, pays Nu.260.00 per month to the RICB for his Life Insurance Policy, buys National Savings Certificates worth Nu.40000.00, invests Nu.12000.00 in Mutual Trust Funds, donates Nu.2500.00 towards Prime Minister's Relief Fund (eligible for 100% deductions) and Nu.500.00 to a Charitable Trust (eligible for 50% deduction). Find the net taxable amount to be paid by him. **[4]**

Table for Income Tax Slabs

| Slab (Taxable Income)	Rate of Tax
Up-to Nu.100000.00	Nil
Nu.100000.00 to Nu.150000.00	20% of an amount exceeding Nu.100000.00
Nu.150000.00 to Nu.175000.00	Nu.10000.00+20% of an amount exceeding Nu.150000.00
More than Nu.175000.00	Nu.15000.00+25% of an amount exceeding Nu.175000.00

Standard deduction = Nu.25000.00
Tax Rebate = 20% of the money invested in Provident Fund, Life Insurance Policy, National Savings Certificates, Mutual Trust Fund, etc., subject to a limit of Nu.15000.00

(b)   The product of Ms. Dechen's age five years ago and her age nine years later is 15 years. Find Dechen's present age.   **[3]**

(c)   Ms. Dema bought a coat for Nu.336.00, including 12% sales tax and a shirt for Nu.110.00, including 10% sales tax. Find the Printed Price (without sales tax) of coat and shirt together.   **[3]**

Question 8.

(a)   In the diagram given below, two chords AB and CD of lengths 24 cm and 32 cm respectively of a circle are parallel. If the distance between AB and CD is 4 cm, then find the radius of the circle.   **[4]**
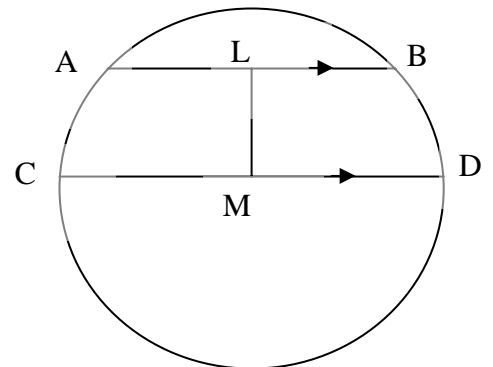
(b)   Describe the locus of a point in each of the following cases. Draw diagrams to illustrate the locus**.**   **[3]**

  i.   The point is moving such that it remains at a distance of 5 cm from a fixed point, say O.

  ii.   The point is equidistant from the arms of an angle *AOB*.

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      iii.   The point is equidistant from two concentric circles of radii 3 cm and 5

(c)   Ms. Uden fills a cylindrical bucket 32 cm in height and 18 cm in radius with sand. She empties the bucket on the ground and makes a conical heap of the sand. If the height of the conical heap is 24 cm, then find the **[3]**

      i.   radius of the conical heap.

      ii.   slant height of the heap.

Question 9.

(a)   A branch of a tree broken by the wind makes an angle of 30^0 with the ground and the horizontal distance from the root of the tree to the point where the top of the broken branch meets the ground is 8 cm. Find the height of the tree before it was broken to the nearest metre.   **[3]**

_____

(b)   Find the length of a tangent drawn to a circle of radius 4 cm from a point 9 cm from the center.   **[3]**

(c)   The marks of 200 students in a test were recorded as shown in the table below.

Marks (%)	Number of students
10-19	7
20-29	11
30-39	20
40-49	46
50-59	57
60-69	37
70-79	15
80-89	7

Draw the Ogive (use graph paper) and use it to find the number of students who scored more than 35% marks.   **[4]**

Question 10.

(a) A closed rectangular box 40 cm long, 30 cm wide and 25 cm deep has the same volume as that of a cylindrical tin of radius 17.5 cm. Calculate the height of the cylindrical tin correct to one decimal place. (Take $\pi = 3.14$). **[2]**
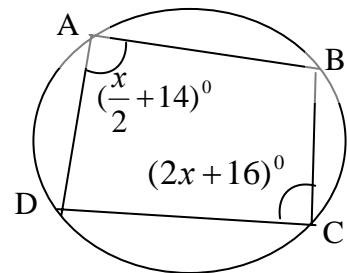
(b) Find the equation of the line which passes through the point A(-3, 4) and is perpendicular to the line $2x + 3y - 2 = 0$ **[3]**

(c)   By investing Nu.7500.00 on shares of a company that pays 10% divid<s>
        income of Nu.500.00 is received. What price is paid for a Nu.100.00 share?**[2]**

(d)   From the figure given on the right, find the   **[3]**

        i.   value of x

ii.   value of $\angle BAD$ and $\angle DCB$.

Question 11.

(a)   Find the values of *m* and *n*, when (*x*-1) and (*x*+2) are factors of $2x^2 + mx^2 + nx - 14$.

[4]

(b)   Find x if the points (-2, 3), (3, 4) and (x, 5) are collinear.   **[3]**

(c)   The perimeter of a circle and a square is 132 cm. Compare their areas and write the larger area of the two.   **[3]**

Question 12.

(a)   Draw a circle of radius 3.5 cm. Take a point *m* at a distance of 7.5 cm from the center. Construct the pair of tangents to a circle from the point *m*.   **[4]**

(b)   A piece of butter 3 cm by 3 cm by 12 cm is placed in a hemispherical bowl (or cup) of diameter 7.5 cm. If the butter melts in the bowl, will the butter overflow?
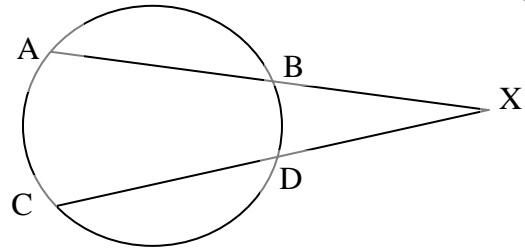
[2]

(c)   If $A = \begin{bmatrix} 1 & -3 \\ -4 & 6 \end{bmatrix}$, then find $A^2 - 7A - 6I$, where I is the point unit matrix of order 2×2.   **[4]**

Question 13.

(a)   If $\sqrt{2x^2 - 2x + 21}$ =2x-3, then find the value of x.   **[3]**

(b)   In the figure, chords AB and CD when extended meet at X. AB=4 cm, B[?]
       and XD=5 cm. Calculate the length of CD.   **[3]**

(c)   A sector is cut from a circle of radius 21 cm. The angle of the sector is 150^0. Find
       the area of the sector.   **[2]**

(d)   What is the angle of elevation of a vertical flag staff of height 150 m from
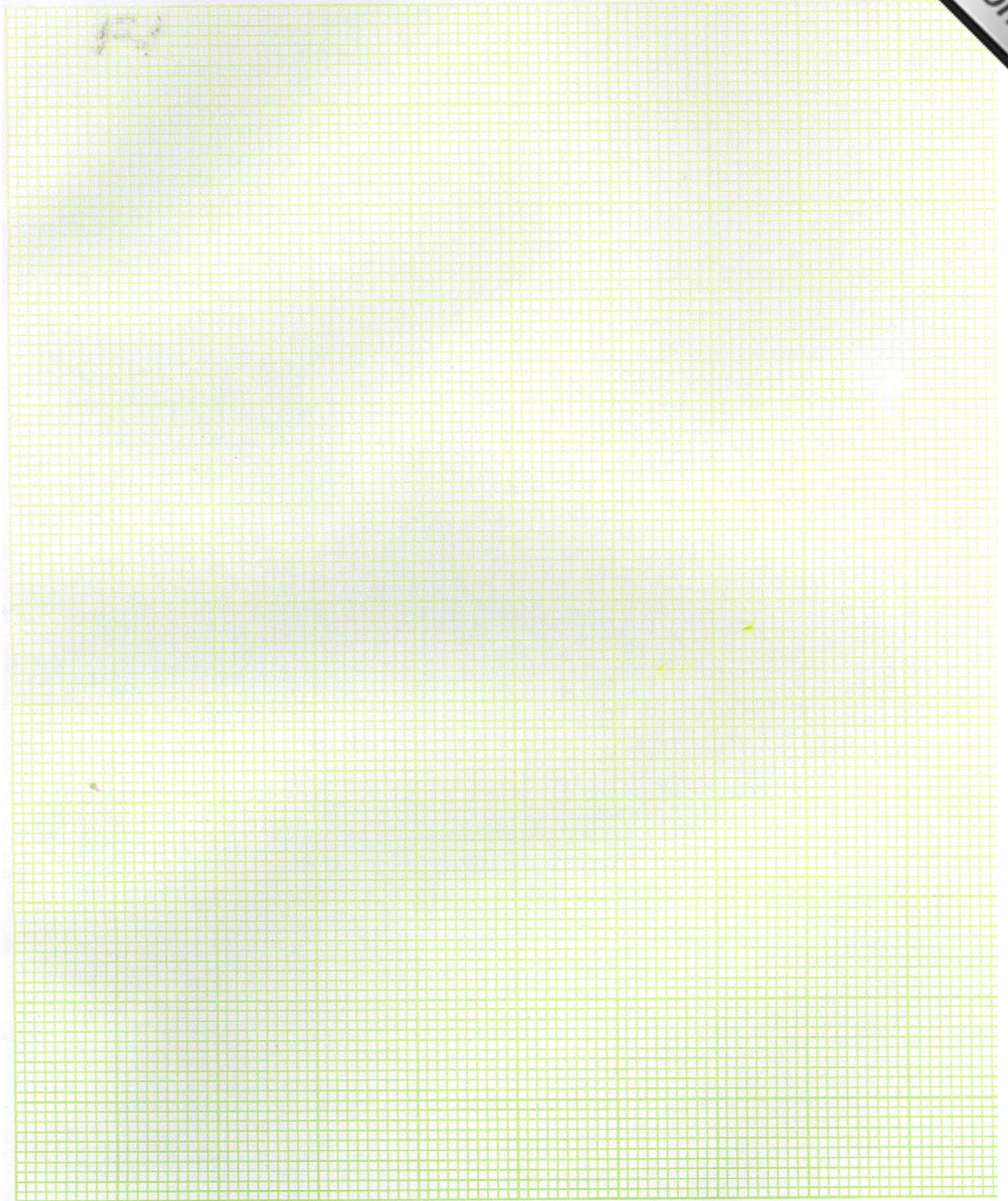 $150\sqrt{3}$ m from its foot?   **[2]**

Rough Work

Rough Work

Rough Work

Rough Work

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