Register Number

MATHEMATICS — Paper II

Time Allowed : $2\frac{1}{2}$ Hours]

[Maximum Marks : 100

N. B. : i) The question paper consists of *six* Sections A, B, C, D, E and F.

ii) Read the instructions under each Section before you start answering.

iii) Diagrams should be drawn, wherever necessary.

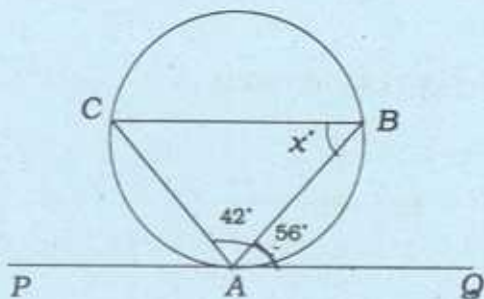iv) Rough work and calculations should be shown legibly at the bottom of the pages of the answer-book.

SECTION – A

Note : i) Answer *all* the *ten* questions.

ii) Each question carries *one* mark. $10 \times 1 = 10$

1. In the following figure PQ is a tangent at A. Then $\angle ABC$ is

a) 52°

b) 98°

c) 82°.

2. In a circle, two chords AB and CD cut internally at E. If AE = 6 cm, EB = 4 cm and CE = 8 cm, then CD is equal to

    a)   11 cm   b)   12 cm   c)   3 cm.

3. The slope of the line whose inclination is 30° is

    a) $\sqrt{3}$ b) $\dfrac{1}{\sqrt{3}}$ c)   1.

4. The equation of the line joining (0, 1), (1, 0) is

    a) $x + y - 1 = 0$ b) $x = 1$ c) $x - y - 1 = 0$.

5. $\cos^2 80° + \sin^2 80°$ is

    a) $\tan^2 80°$ b) $\tan 80°$ c)   1.

6. If $\cos x = \sin 76°$ then x is

    a)   14°   b)   90°   c)   76°.

7. The range of 20, 30, 10, 5, 18, 70, 90 is

    a)   90   b)   85   c)   95.

8. The probability of drawing a diamond king from a pack of 52 cards is

    a) $\dfrac{1}{13}$ b) $\dfrac{3}{13}$ c) $\dfrac{1}{52}$.

9. $\begin{pmatrix} 1 & 0 & 0 \\ 0 & 1 & 0 \\ 0 & 1 & 1 \end{pmatrix}$ is a

   a) unit matrix   b) square matrix   c) diagonal matrix.

10. Which one of the following is not an executable statement ?
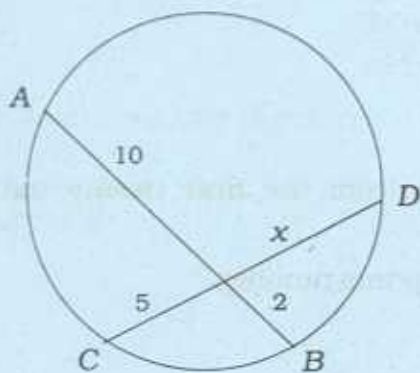
   a) REM   b) LET   c) INPUT.

SECTION – B

Note : i)   Answer any *ten* of the following questions.

   ii)   Each question carries *three* marks. $10 \times 3 = 30$

11. Find the value of x in the following figure.

12. The tangent drawn from a point P at a distance of 13 cm from the centre of a circle is of length 12 cm. Calculate the diameter of the circle.

13. A ladder 25 m long rests on a wall of a house 20 m above the ground. Determine the distance of the foot of the ladder from the house.

14. The centroid of a triangle is at the origin. Two of the vertices of the triangle are

   (1, – 3) and (–4, 9). Find the third vertex.

15. Find the slope of the line joining the points ($2a$, $3b$) and (a, – b).

16. Find the equation of a line having slope $\dfrac{-2}{3}$ and y-intercept 4.

17. Show that $\sin^6 \theta + \cos^6 \theta = 1 - 3 \sin^2 \theta \cos^2 \theta$.

18. The angle of elevation of the top of the tower from a point A on the ground

   100 m away from the foot of the tower is 60°. Find the height of the tower.

19. Simplify :

$$\frac{3 \sin 85°}{\cos 5°} + \frac{2 \cos 57°}{\sin 33°}.$$

20. An integer is chosen from the first twenty natural numbers. What is the

   probability that it is a prime number ?

21. Calculate the S.D. for the following data :

   2, 4, 6, 8, 10.

22. What is the probability of getting a number greater than 4 in throwing a die

   once ?

23. If $\begin{pmatrix} 2x - y \\ x + 3y \end{pmatrix} = \begin{pmatrix} 8 \\ -3 \end{pmatrix}$ find x and y.

24. If $A = \begin{pmatrix} 1 & 0 \\ 2 & 1 \end{pmatrix}$, $B = \begin{pmatrix} 4 & 2 \\ 3 & 5 \end{pmatrix}$ find $A - 2B$.

25. Find the following mathematical expression in BASIC expression :

$ax^2 + bx + c.$

SECTION - C

Note : i)　Answer *all* the questions, choosing either *(a)* or *(b)* in each question.

ii)　Each question carries *five* marks.　　　　　　　$4 \times 5 = 20$

26. a)　If two triangles are equiangular to one another, the two triangles are similar.

OR

b)　State and prove Basic Proportionality theorem.

27. a)　ABC is an equilateral triangle and $AD \perp BC$. Prove that $AD^2 = 3BD^2$.

OR

b)　In triangle ABC, D is a point on BC such that $\angle ADC = \angle BAC$. Prove that

$AC^2 = BC \cdot DC$

28. a)　The vertices of a quadrilateral are $(-3, -4)$, $(12, 5)$, $(14, 12)$ and

$(-1, 3)$. Show that the diagonals bisect each other.

OR

b) If $A(3, 5)$, $B(-3, 4)$ and $C(2, -7)$ are the vertices of a triangle, find the equation of the median through B.

29. a) Find the area of a quadrilateral whose vertices are $(-1, 6)$, $(-3, -9)$, $(5, -8)$ and $(3, 9)$.

OR

b) The three vertices of a triangle are $(-3, 7)$, $(4, -2)$ and $(x, 5)$. If its area is 48·5 sq. units, find the value of x.

SECTION – D

Note : i) Answer *all* questions, choosing either *(a)* or *(b)* in each question.

ii) Each question carries *five* marks. $4 \times 5 = 20$

30. a) Show that

$$(1 - \tan A)^2 + (1 - \cot A)^2 = (\sec A - \text{cosec } A)^2$$

OR

b) From the top of a tower 30 m high a person observes the base of a tree at an angle of depression measuring 45°. Find the distance between the tree and the tower.

31. a) A box contains 6 red and 4 white balls. Two balls are successively drawn

without replacement. What is the probability of obtaining one red ball and

one white ball ?

OR

b) Find the S.D. of the following data :

x :	10	20	30	40	50	60	70
f :	3	6	9	13	10	7	2

32. a) Solve :

$$\begin{pmatrix} 2 & -1 \\ 3 & 4 \end{pmatrix} \begin{pmatrix} x \\ y \end{pmatrix} = \begin{pmatrix} 1 \\ 7 \end{pmatrix}$$

OR

b) Find x and y if $\quad x + y = \begin{pmatrix} 3 & 1 \\ -4 & 5 \end{pmatrix}$

and $\quad x - y = \begin{pmatrix} 5 & 3 \\ 2 & -7 \end{pmatrix}$

33. a) Draw a flow-chart to find the area of a circle given the radius of the circle.

OR

b) Write a BASIC program to find the volume of a cylinder given the height and

radius.

SECTION – E

Note : i) Answer the question, choosing *one* of the alternatives *(a)* or *(b)*.

    ii) The question carries *ten* marks. $1 \times 10 = 10$

34. a) Draw a triangle ABC with $AB = 5$ cm, $\angle A = 60°$, $\angle B = 45°$ and enlarge it such that the sides are in the ratio $1 : 2$.

OR

b) Find the mean proportional between 9 and 4 geometrically.

SECTION – F

Note : i) Answer the question, choosing *one* of the alternatives *(a)* or *(b)*.

    ii) The question carries *ten* marks. $1 \times 10 = 10$

35. a) Draw the 'greater than ogive' for the following data and find median :

C.I. :	0 – 5	5 – 10	10 – 15	15 – 20	20 – 25	25 – 30
f:	5	7	15	20	9	4

OR

b) Draw the 'lesser than ogive' for the following data and find median :

C.I. :	0 – 10	10 – 20	20 – 30	30 – 40	40 – 50
f:	12	23	34	20	11