No. of questions:38
Time: 3 hours
Subject Code: 81E
Max. Marks : 80
I.Four alternatives are given to the following questions or incomplete statements. Choose the correctfrom them and write it along with serial letter. $08 \times 01=08$

1) If straight lines representing a pair of linear equations with two variables are intersecting, then the number solutions
A) infinite
B) unique
C) zero
D) none of these
2) The value of discriminant of the quadratic equation $x^{2}-4 x+4=0$ is
A) 0
B) 1
C) 2
D) 3
3) The product of HCF and LCM of two numbers 'a' and 'b' is equal to
A) $\mathrm{a}+\mathrm{b}$
B) $\mathrm{a}-\mathrm{b}$
C) $\mathrm{a} \times \mathrm{b}$
D) $a \div b$
4) The formula used to find the $n^{\text {th }}$ term of an arithmetic progression having first term 'a' and common difference ' $d$ '
A) $\mathrm{a}+(\mathrm{n}+1) \mathrm{d}$
B) $\mathrm{a}-(\mathrm{n}+1) \mathrm{d}$
C) $a-(n-1) d$
D) $a+(n-1) d$
5) If $\sin \theta=\frac{1}{2}$, the value of $\theta$ is
A) $30^{\circ}$
B) $45^{\circ}$
C) $60^{\circ}$
D) $90^{\circ}$
6) Coordinates of the mid-point of the line segment joining the points $(3,5)$ and $(7,3)$ is
A) $(2,1)$
B) $(2,4)$
C) $(4,5)$
D) $(5,4)$
7) Maximum number of tangents that can be drawn to a circle from an external point is
A) 1
B) 2
C) 3
D) 4
8) Total surface atrea of a solid hemisphere of radius 7 cm is
A) $246 \mathrm{~cm}^{2}$
B) $426 \mathrm{~cm}^{2}$
C) $462 \mathrm{~cm}^{2}$
D) $642 \mathrm{~cm}^{2}$
II. Answer the following questions.
9) Express 210 as the product of prime factors.
10) What is the degree of the polynomial $x^{3}+x^{2}+x^{5}-7$ ?
11) Write the formula of to find the roots of quadratic equation $a x^{2}+b x+c=0$
12) In an arithmetic progression $a_{n}=4 n-3$. Find the value of $a_{5}$.
13) Find the distance between the point $(4,3)$ and the origin.
14) Write the formula to find the length of the arc of a sector with the angle at the centre $\theta^{\prime}$.
15) Check whether pair of linear equations $x+y=5$ and $2 x+y=10$ are consistent.
16) Write the formula to find the lateral surface area of frustum of a cone.

## III. Answer the following questions.

$08 \times 02=16$
17) Prove that $5+\sqrt{3}$ is an irrational number.
18) Find the zeroes of the polynomial $p(x)=x^{2}-2 x-8$.

## OR

Write the quadratic polynomial having sum and product of zeroes equal to $\frac{1}{4}$ and -1 respectively.
19) Solve : $x+y=14, x-y=2$
20) Find the sum of first 20 terms of the arithmetic progression $1+4+7+\cdots$
21) Two dice are thrown simultaneously. Find the probability of getting a sum of numbers on faces shown up is 8 .
22) Given $\frac{\cot A-\cos A}{\cot A+\cos A}=\frac{\operatorname{cosec} A-1}{\operatorname{cosec} A+1}$ and $\sin 3 A=\cos \left(A-26^{\circ}\right)$. If $3 A$ is an acute angle find the value of $A$.
23) In a circle of radius 3 cm construct tangents at the end point of radius having angle between the radius equal to $110^{\circ}$
24) In the following figure $O A . O B=O C$. $O D$. Prove that $\angle A=\angle C$ and $\angle B=\angle D$.


OR
In the figure shown below $P Q \| B C, A B=7.2 \mathrm{~cm}, \mathrm{AQ}=1.8 \mathrm{~cm}$ and $\mathrm{CQ}=5.4 \mathrm{~cm}$. Find AP.

25) In an arithmetic progression sum of first 3 consecutive terms is 15 and their product is 105 . Find such numbers.

## OR

In an arithmetic progression $7^{\text {th }}$ and $13^{\text {th }}$ terms are -4 and -16 respectively. Find the sum of first 20 terms.
26) Divide $3 x^{2}-x^{3}-3 x+5$ by the polynomial $x-1-x^{2}$ and verify by division algorithm.

## OR

When $x^{3}-3 x^{2}+x+2$ is divided by a polynomial $g(x)$, the quotient and remainder obtained are $(x-2)$ and $(-2 x+4)$ respectively. Find $g(x)$.
27) Prove that the tangent at any point of a circle is perpendicular to the radius through the point of contact.

## OR

28) Prove that the lengths of tangents drawn from an external point to a circle are equal.
29) In the figure shown below, $A B C$ is a quadrant of a circle of radius 14 cm and a semicircle is drawn with BC as diameter. Find the area of the shaded region.

30) If $4 \tan \theta=3$ find the value of $\frac{4 \sin \theta-\cos \theta+1}{4 \sin \theta+\cos \theta-1}$

## OR

Prove that $\frac{\cos A}{1+\sin A}+\frac{1+\sin A}{\cos A}=2 \sec A$.
31) Find the area of the triangle formed by joining the mid-points of the sides of the triangle ABC whose vertices are $A(2,2), B(4,4)$ and $C(2,6)$.
32) The length of the shadow of a vertical pole standing on the ground with the angle of elevation $30^{\circ}$ at the sun is 40 m more than when it is $60^{\circ}$. Find the height of the sun.
33) By changing the given distribution to 'less than type' distribution draw ogive.

| Class <br> Interval | $5-10$ | $10-15$ | $15-20$ | $20-25$ | $25-30$ | $30-35$ | $35-40$ |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| Frequency | 2 | 12 | 2 | 4 | 3 | 4 | 3 |

34) Solve graphically: $2 x-y=3, x+2 y=4$

## V. Answer the following questions.

34)Construct a triangle with sides $5 \mathrm{~cm}, 6 \mathrm{~cm}$ and 7 cm . Then construct another triangle similar to this whose sides are $\frac{7}{5}$ times the corresponding sides of the original triangle.
35)A wooden article was made by scooping out a hemisphere from each end of a solid cylinder. If the height of the cylinder is 10 cm and its base is of radius 3.5 cm find the total surface area of the article.
36)A train travels 360 km at a uniform speed. If the speed had been $5 \mathrm{~km} / \mathrm{h}$ more, it would have taken 1 hour less for the same journey. Find the speed of the train.
37)Find the mode and the median of the following data.

| Class Interval | Frequency |
| :---: | :---: |
| $1-4$ | 6 |
| $4-7$ | 30 |
| $7-10$ | 40 |
| $10-13$ | 16 |
| $13-16$ | 4 |
| $16-19$ | 4 |

OR
Mean of following frequency distribution is 18 . Find the missing frequency.

| Class Interval | Frequency |
| :---: | :---: |
| $11-13$ | 7 |
| $13-15$ | 6 |
| $15-17$ | 9 |
| $17-19$ | $f$ |
| $19-21$ | 5 |
| $21-23$ | 4 |
| $23-25$ |  |

VI. Answer the following questions.
$01 \times 05=05$
38) State and prove Pythagoras theorem.

