ಕರ್ನಾಟಕ ಪ್ರೌಢಶಿಕ್ಷಣ ಪರೀಕ್ಷಾ ಮಂಡಳಿ

ಮಲ್ಲೇಶ್ವರಂ, ಬೆಂಗಳೂರು–560003.

KARNATAKA SECONDARY EDUCATION EXAMINATION BOARD

Malleshwaram, Bengaluru – 560003.

2021-22 MODEL QUESTION PAPER

Subject : MATHEMATICS **Subject Code : 81E**

Time : 3 hrs. 15 mins. **Max. Marks : 80**

ENGLISH MEDIUM

Regular Fresh

General Instructions to the Candidate :

1. This question Paper consists of objective and subjective types of 38 questions.

2. This question paper has been sealed by reverse jacket. You have to cut on the right side to open the paper at the time of commencement of the examination. Check whether all the pages of the question paper are intact.

3. Follow the instructions given against both the objective and subjective types of questions.

4. Figures in the right hand margin indicate maximum marks for the questions.

5. The maximum time to answer the paper is given at the top of the question paper. It includes 15 minutes for reading the question paper.

I Four alternatives are given for each of the following questions/incomplete statement. Choose the correct alternative and write the complete answer along with its letter of alphabet 8x1=8

1. If a pair of linear equations $a_1x + b_1y + c_1=0$ $a_2x + b_2y + c_2=0$ in two variables have unique solution then correct relation among the following is

A) $\frac{a_1}{a_2} \neq \frac{b_1}{b_2}$ B) $\frac{a_1}{a_2} = \frac{b_1}{b_2} = \frac{c_1}{c_2}$

C) $\frac{a_1}{a_2} = \frac{b_1}{b_2}$ D) $\frac{a_1}{a_2} = \frac{b_1}{b_2} \neq \frac{c_1}{c_2}$

2. The common difference of the Arithmetic progression 100, 93, 86, ... is

A) 4 B) 8

C) 7 D) –7

3. If the value of the discriminant of a quadratic equation is zero then the nature of the roots are

A) Real distinct and irrational B) Real and equal

C) Real distinct and rational D) Not real

4. The value of cosec 45^0 is

A) 1 B) $\sqrt{2}$

C) $\frac{1}{\sqrt{2}}$ D) 0

5. The distance of a point p(x,y) from the origin is

A) $\sqrt{x^2 - y^2}$ B) $\sqrt{x - y}$

C) $\sqrt{x^2 + y^2}$ D) $\sqrt{y \quad x}$

6. The empirical relationship between mean, median and mode is

A) 3 Median = Mode + Mean B) 3 Median = 2 Mode + Mean

C) 3 Median = 2 Mode + 2 Mean D) 3 Median = Mode + 2 Mean

7. Which of the following pair of triangles are always similar

A) Two isosceles triangles B) Two scalene triangles

C) Two equilateral triangles D) Two right angle triangles

8. A cone is cut by a plane parallel to its base and the small cone that obtained is removed then the remaining part of the cone is

A) a frustum of cone B) a frustum of cylinder

C) a Sphere D) a right circular cone

II Answer the following questions. 8x2=16

9. In an Arithmetic progression the sum of first four terms is 20 and the sum of first three terms is 12 then find the fourth term of the arithmetic progression.

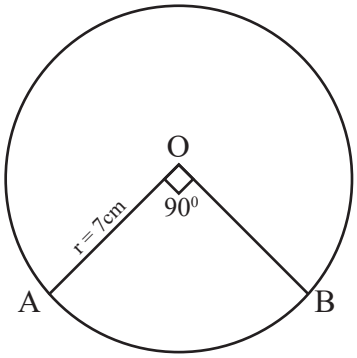
10. If a pair of linear equations in two variables are inconsistent then write how many solutions do they have.

11. Find the value of $\sin^2\theta + \cos^2\theta + 1$

12. A point 'P' divides the line joining of points A (x_1,y_1) and B (x_2,y_2) in the ratio $m_1 : m_2$ internally then write the co-ordinates of P.

13. State "Pythagoras's" theorem

14. In the figure find the length of an arc AB of a circle centre 'O' if $\angle AOB = 90^0$



15. Write the formula to find the volume of a cone.

16. Find the surface area of a sphere of radius 7cm

III Answer the following questions. **8x2=16**

17. Solve the pair of linear equations by elimination method.

$2x + y = 3$

$4x - y = 9$

OR

Show that the lines represented by linear pair of equations $2x + 3y = 1$ and $5x + 6y = 2$ are intersecting lines by comparing their co-efficients.

18. Find the 15^{th} term of the arithmetic progression 6, 10, 14 ..... using the formula.

19. Find the sum of first 15 terms of 3 + 6 + 9 ..... using the formula

OR

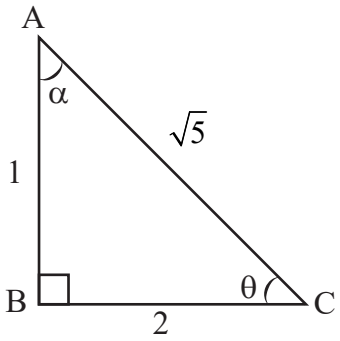
Verify whether 130 is a term of the arithmetic progression 3, 7, 11 .....

20. Solve $3x^2 - 2x - 3 = 0$ by using quadratic formula.

21. Find the value of the discriminant and hence write the nature of roots of the equation $x^2 + 3x + 2 = 0$

22. Find the distance between the points (3, 1) and (6, 2) using distance formula.

23. Divide the line segment AB = 10cm in the ratio 2 : 3 geometrically.

24. 

From the given figure find the value of

a) Sinθ

b) tanα

IV Answer the following questions. 9x3=27

25. Prove that "the tangents drawn to a circle from an external point are equal."

26. Find the mean of the following data by "direct method".

Class Interval	Frequency
10 - 30	2
30 - 50	6
50 - 70	10
70 - 90	2

OR

Find the mode of scores in the following data.

Class Interval	Frequency
1 - 3	6
3 - 5	9
5 - 7	2
7 - 9	2
9 - 11	1

27. Evaluate

$4\sin 30^0 + \tan 48^0 \cdot \tan 42^0 - 3\tan 45^0$

OR

$6\cos 60^0 - \sin 30^0 + \sin^2 45^0 + \cos^2 45^0$

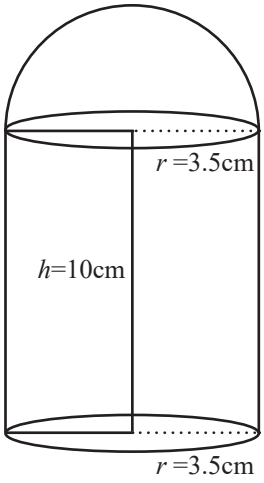
28. Yield of co-conuts grown in a village by '15' farmers is as follows. Draw "less than type" ogive.

No. of Co-conuts	Cummulative frequency
less than 50	2
less than 75	4
less than 100	9
less than 125	10
less than 150	11
less than 175	13
less than 200	15

29. The slant height of a frustum of a cone is 4cm and the perimeters of its circular ends are 18cm and 16cm, then find the curved surface area of the frustum of the cone.

OR

A Toy is in the form of a hemisphere surmounted on a cylinder of height 10cm as shown in the figure. If the radius of the cylinder is 3.5cm find the volume of the toy.



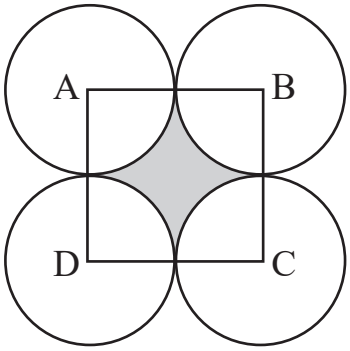
30. The sum of ₹ 700 is to be used to give seven cash prizes to students of a school for their overall academic performance. If each prize is ₹ 20 less than its preceding prize, Find the value of each of the prizes.

31. Find the area of a triangle ABC whose vertices are A(2, 2) B(3,4) and C (–1,3).

OR

Find the coordinates of the points of "trisection" of the line joining the points (6, –2) and (10, 8).

32. Construct a pair of tangents to a circle of radius 4cm from a point 9cm away from its centre.

33. 

In the figure ABCD is a square of side 14cm with Centre A,B,C and D four circles are drawn such that each circle touch externally two of the remaining three circles as shown in the figure. Find the area of the shaded region.

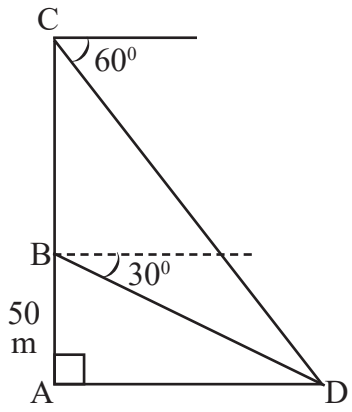
V Answer the following questions 4x4=16

34. Construct a triangle of sides 6cm, 4cm and 7cm then construct an another triangle whose corresponding sides are 3/4 of the sides of the first triangle.

35. Solve graphically

$x + y = 5$

$x - y = 1$

36. 

The angle of depression from the top of a vertical tower to a point on the ground is found to be 60^0 and from a point 50m above the foot of the tower the angle of depression to the same point is found to be 30^0 as shown in the figure find the height of the tower.

37. A train travels 360 km at a uniform speed. If the speed had been 5 km/h more it would have taken 1 hour less for the same journey. Find the speed of the train.

OR

By selling an article for ₹ 18.75 a person losses as much percent as it cost him in Rupees. Find the cost price of the article.

VI Answer the following questions 1x5=5

38. State and prove basic proportionality theorem (Thales theorem).

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