MATHEMATICS

Time allowed: 3 hours ***Maximum Marks: 80***

- *Code number given on the right hand side of the question paper should be written on the title page of the answer- book by the candidate.*

General Instructions:

1. *All questions are compulsory.*
2. *The question paper consists of 25 questions divided into three sections A, B and C. Section A contains 7 questions of 2 marks each, Section B is of 12 questions of 3 marks each and section C is of 6 questions of 5 marks each.*
3. *There is no overall choice. However, an internal choice has been provided in two questions of two marks each, two questions of three marks each and two questions of five mark each.*
4. *In question on construction, the drawing should be neat and exactly as per the given measurements.*
5. *Use of calculators is not permitted. However, you may ask for mathematical tables.*

SECTION - A

Question numbers 1 to 7 carry 2 marks each.

1. Solve the following system of linear equations: $6(ax + by) = 3a + 2b$; $6(bx - ay) = 3b - 2a$.

OR

Solve for x and y: $99x+101y=499xy$; $101x+99y=501xy$

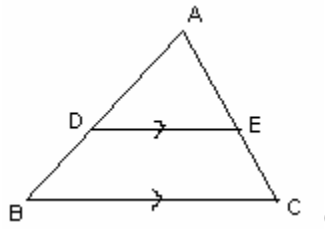
2. Find the value of 'a' and 'b' so that the polynomial $x^3 + ax^2 + bx + 15$ is divisible by $x^2 + 2x - 15$.

3. Solve for x : $x^2 - 2(a+2)x + (a+1)(a+3) = 0$

4. The 8^{th} term of an AP is zero. Find the ratio of its 38^{th} term and 18th term.

5. An electric cooker is available for Rs 970 cash payment or Rs 210 cash down payment followed by three equal monthly installments of Rs 260 each. Compute the rate of interest charged under the installment scheme.

6. In Fig, $\frac{AD}{DB} = \frac{3}{5}$ and DE ‖ BC . If AC = 4 cm , Find the measure of AE.



OR

If one side of a cyclic quadrilateral is produced, then the exterior angle is equal to the interior opposite angles. prove it.

7. A bag contains 25 cards numbered 1 to 25. One card is drawn from the bag. Find the probability that it is (i) a prime number. (ii) divisible by both 2 and 3.

SECTION -B

8. Draw the graph of 2x + y =6 and 2x – y + 2=0. Shade the region bounded by these lines and x – axis . Find the area of the shaded region.

9. If $P = \frac{1}{x - y} - \frac{1}{x + y}; Q = \frac{x^2 - y^2}{x^2 y - x y^2}$ and $R = \frac{1}{x - y}$, express P x Q ÷ R as a rational expression in lowest terms.

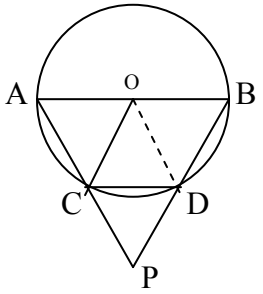
10. A piece of cloth costs Rs 200. If the piece was 5m longer and each metre of cloth costs Rs 2 less the cost of the piece would have remained unchanged. How long is the piece and what is the original rate per metre?

11. Find the three terms in A.P, such that their sum is 27 and product is 648.

OR

For what values of n, the nth term of the series "3 + 10 + 17 + ……." and "63 + 65 + 67 + … …."are same?

12. AB is a diameter of the circle with centre O and chord CD is equal to radius OC. AC and BD produced meet at P. Prove that $\angle CPD = 60^0$.



13. A man borrows Rs 36410 from a finance company and has to repay it in three equal annual instalments. Find the amount of each instalment if the rate of interest is 10 % p.a compounded annually.

14. Construct a quadrilateral ABCD with $\angle A = 60^0$, AB = 5.2 cm , AC = 6.3 cm , AD = 4.3 cm and BC = 3.7 cm. Construct a quadrilateral AB'C'D' similar to quadrilateral ABCD such that its diagonal AC' = 8.1 cm..

15. Prove that : $\frac{\sin\theta + \cos\theta}{\sin\theta - \cos\theta} + \frac{\sin\theta - \cos\theta}{\sin\theta + \cos\theta} = \frac{2}{1 - 2\cos^2\theta} = \frac{2}{2\sin^2\theta - 1}$

OR

Evaluate with out using tables : $2\left(\frac{\sin^2 32 + \sin^2 58}{\tan 20 . \tan 70}\right) - \tan^2 45 - \frac{\tan 30 . \tan 50 . \tan 40 . \tan 60}{\sec^2 28 - \cot^2 62}$

16. Three consecutive vertices of a parallelogram are (-2 , -1) , (1 , 0) and (4, 3). Find the fourth vertex.

17. Find a point on the y-axis which is equidistant from (-5, -2), and (3, 2).

18. A right circular conical vessel of internal radius 15 cm and height 27 cm is full of water. This water is poured into a right cylindrical vessel with internal radius 5 cm. Find the height to which the water rises in the cylindrical vessel.

19. The following data shows the expenditure incurred by a person on the following items in a month Draw a pie chart to represent the data:

Item	Education	Food	Rent	Clothing	Others
Expenditure (in Rs)	1600	3200	4000	2400	3200

SECTION –C

20. The monthly salary of Mrs Bhasker is Rs 38,200 excluding HRA. She is a senior citizen and has donated Rs 20,000 towards Natural calamity Fund (100 % exemption) She contributes Rs 3,200 per month to her G P.F and pays Rs 5,500 as half yearly premium of Life Insurance Policy. How much should she invest in NSC so as to avail of maximum rebate on savings? Assuming her investment in NSC, Calculate his income tax liability in the last month of the year if her earlier deduction for 11months towards income tax were at the rate of Rs 1,600 per month.

Use the following for calculating income tax:

Savings : 100 % exemption for savings upto Rs 1,00,000.

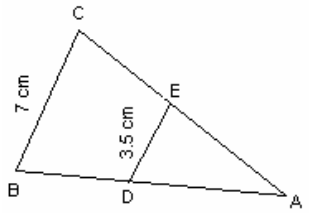
The rates of income tax for Women Employees are as under:

SLAB	RATE OF TAX
1. Taxable income upto Rs.1,35,000	NIL
2. Taxable income from Rs.1,35001 to Rs. 1,50,000	10% of the amount by which taxable income exceeds Rs. 1,35,000.
3. Taxable income from Rs.1,50,001 to Rs. 250,000	Rs. 1500 + 20% of the amount by which taxable income exceeds Rs. 1,50,000
4. Taxable income above Rs.2,50,000	Rs. 21500 + 30% of the amount by which taxable income exceeds Rs. 250,000
5. Surcharge	10% of the amount of tax payable if the taxable income exceeds Rs. 1000,000
6. Education Cess	2% of the amount of tax payable.

The rates of Income tax for Senior Citizens are as under :(65 years and above)

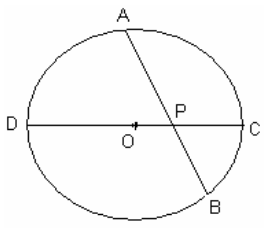
SLAB	RATE OF TAX
1. Taxable income upto Rs.1,85,000	NIL
2. Taxable income from Rs.185001 to Rs. 250,000	20% of the amount by which taxable income exceeds Rs. 1,85,000.
3. Taxable income above Rs.2,50,000	Rs. 13000 + 30% of the amount by which taxable income exceeds Rs. 2,50,000
4. Surcharge	10% of the amount of tax payable if the taxable income exceeds Rs. 1000000
5. Education Cess	2% of the amount of tax payable.

21. The ratio of two similar triangles is equal to the ratio of the squares on their corresponding sides. Using the above, do the following: DE ‖ BC , If DE = 3.5 cm , BC = 7 cm and area Δ ADE = 25 cm^2. Find the area of ΔABC



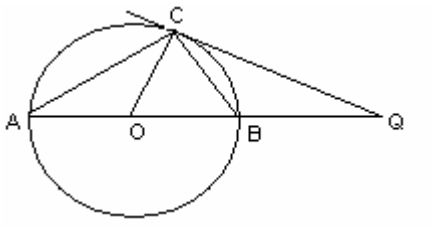
OR

If two chords of a circle intersect inside or outside the circle,. then the rectangle contained by the two parts of one chord equal in, area to the rectangle formed by the two parts of the other. Using the above, do the following: If in Fig. AP = 5 cm, AB = 8 cm, DP = x and PC = x - 2, find x.



22. Prove that if a line touches a circle and from the point of contact a chord is drawn, the angles which this chord makes with the given line are equal respectively to the angles formed in the

corresponding alternate segments.
Using the above do the following:
In fig. AB is a diameter of a circle and QC is a tangent to the circle at C. If $\angle CAB = 30^{o}$
Find i) $\angle CQA$ ii) CBA



23. Given below is the sale (in Rupees) of 40 stationary shops per hour in a locality. Considering all the shops, the average sale per hour has been calculated to be Rs 21 . Find the missing frequencies given that $f_1 : f_2 = 3 : 4$

Sale in Rs per hour	Number of shops
Below 8	5
Below 16	14
Below 24	f_1
Below 32	f_2
Below 40	40

24. A circus tent that is in the shape of a cylinder surmounted by a cone. The diameter of the cylindrical part is 24m and its height is 11m. If the vertex of the tent is 16m above the ground, find the area of canvas required to make the tent.

25. A person standing on the bank of a river observes that the angle of elevation of the top of a tree standing on the opposite bank is 60^{o}. When he moves 40 m away from the bank, he finds the angle of elevation to be 30^{o}. Find the height of the tree and the width of the river.

OR

The angle of elevation of a jet plane from a point A on the ground is 60^{o}.After flight of 15 seconds, the angle of elevation changes to 30^{o}. If the jet is flying at a constant height of $1500\sqrt{3}$ m. find the speed of the jet plane.