MATHEMATICS 2012

Time: 2 ½ Hours **Max. Marks: 80**

Instruction: **This paper consisting of Short-Answer Questions (Section "B") and Detailed-Answer Questions (Section "C") will be given after 30 minutes and its total duration will be 2 ½ hours only.**

SECTION "B" (SHORT-ANSWER QUESTIONS)

Note: Answer any 10 questions from this section. **(50)**

2. If $U = \{x/x \in N \,.\, x \leq 10\}$, $A = \{2, 4, 6, 8, 10\}$ $B = \{3, 6, 9, 10\}$ Prove that $(A \cup B)' = A' \cap B'$

3. Simplify: $\left(\frac{x^{'}}{x^{m}}\right)^{'\cdot m} \times \left(\frac{x^{m}}{x^{n}}\right)^{m\cdot n} \times \left(\frac{x^{n}}{x^{'}}\right)^{n\cdot '}$

4. If $P = 3 + 2\sqrt{2}$, Find the value of $P^2 + {}^{1}/_{p^2}$

5. With help of log table find the value of $\frac{0.87}{(28.9) \times (0.785)}$

6. Resolve into factors. $R^2(s - t) + s^2(t - r) + t^2(r - s)$

7. The sum of three consecutive odd numbers is 909. Find the numbers.

8. For what value of a and b, $x^4 + 4x^3 + 10x^2 + ax + b$ is a perfect square?

9. By using Cramer's rule, solve the equation:
$$2x + 5y = 9$$
$$4x - 2y = 1$$

10. Find the solution set with the help of quadratic equation. $2b^2 - 7b + 5 = 0$

11. Prove that the sum of the three angles of a triangle is equal to 180°.

12. Find the relation independent of 't' from the following equation.
$$x = \frac{a(1-t^2)}{1+t^2} \qquad y = \frac{b(1-t^2)}{2t^2}$$

13. If a transversal intersect two parallel lines, the alternate angles so formed are congruent. Prove it.

14. If $\frac{a}{b+c} = \frac{b}{c+a} = \frac{c}{a+b}$ and $a + b + c \neq 0$
Prove that $a = b = c$.

15. If two sides of a triangle are congruent, the angles opposite to them are also congruent. Prove it.

16. Prove that $\cot\beta + \tan\beta = \cot\beta \sec^2\beta$.

SECTION 'C' (DETAILED – ANSWER QUESTION)

NOTE: Attempt 3 questions from this section. Including Q.no.19 which is compulsory. **(30)**

17. Factorize the following:
(i) $x^6 - 64$ (ii) $a^8 + a^4 + 1$
(iii) $(ab + cd)^2 - (ac - bd)^2$ (iv) $x^2 + 15x - 100$

18. Find the Solution set of the following equations graphically. (Find four ordered pairs of each equation).
$$4x - y - 10 = 0$$
$$3x + 5y - 19 = 0$$

19. In a correspondence of triangles if three sides of one triangle are congruent to the corresponding three sides of the other, the two triangles are congruent. Prove it.

20.(a) Marks obtained by some students in computer science exam. are given below. Find Median of their numbers.

Marks	20 – 24	25 – 29	30 – 34	35 – 39	40 – 44	45 – 49
No. of student	25	28	32	25	13	12

(b) Find the factors of x3 – x2 – 14x + 24 with the help of remainder theorem.

21. Draw the transverse common tangents of the two circles with the radii 3cm and 2cm, when the distance b/e their centers is 6cm. Write down the steps of construction.