QUARTERLY EXAMINATION 2012- 2013

Sub : Mathematics,   Class - XI

Time : 3hours   MM.:100

1. All questions are compulsory.
2. There is no overall choice but internal choices are given.
3. Section - A consists 10 questions of 1 mark each.
4. Section - B consists 12 questions of 4 marks each.
5. Section - C consists 7 questions of 6 marks each.
6. Use of calculator is not permitted.

SECTION - A

1. Write the interval [-23, 5) in set builder form.

2. If   n (A) = 8, n (B) =15 then find the total number of relations from A to B

3. If A = {1, 2, 3, 4, 5, 6}   B={3, 4, 5, 6}   U = {0, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10}

    Then find $[A \cup B^1]^1$

4. Write the relation R= {(x, x^3) / x is a prime No less than 15} in roster form.

5. In a circle of diameter 60m, the length of a chord is 30m. Find the length of minor arc of the chord.

6. Find the value of $\cot \left(\dfrac{-15\pi}{4} \right)$

7. Evaluate : $\lim\limits_{x \to \frac{\pi}{2}} \dfrac{\cot x}{\dfrac{\pi}{2} - x}$

8. Find derivative of $\dfrac{1}{ax^2 + bx + c}$ with respect to x

9. Express i^{41} in (a + ib) form.

10. How many 3-digit even numbers can be formed from the digits 1, 3, 5, 6, 7, 8, 9 if the digits can be repeated.

SECTION –B

11. In a survey of 60 people, it was found that 25 people read news paper H, 26 read news paper T, 26 read news paper I, 9 read both H and I, 11 read both H and T, 8 read both T and I, 3 read all the three newspaper. Find

    i) The number of people who read at least one of the news paper.

    ii) The number of people who read exactly one news paper.

12. Show that if A $\subset$ B, then (C - B) $\subset$ (C - A)

                          Or

    If A $\cap$ X = B $\cap$ X = ϕ and A $\cup$ X = B $\cup$ X for some set A, B and X then show that A = B.

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13. Prove that $Cos2\theta \; Cos\,\theta/2 - Cos3\theta \; Cos\,\dfrac{9\theta}{2} = Sin\,5\theta \; Sin\,\dfrac{5\theta}{2}$

14. Solve trigonometric equation : $Sin2x + Sin4x + Sin6x = 0$

15. Find f+g, f-g, f.g and $\dfrac{f}{g}$ where $f : R \to R$, $g : R \to R$ are real functions defined as

    f(x)= 3x+1, g (x) = x²+2

16. Define relation, domain, range and codomain.

17. Evaluate the : $\displaystyle\lim_{x\to0} \dfrac{\cos ec x - \cot x}{x}$

    Or

    $\displaystyle\lim_{x\to0} \dfrac{1-\cos x\sqrt{\cos 2x}}{x^2}$

18. Find the derivative of $\dfrac{Sec x - 1}{Sec x + 1}$

19. Solve the equation $21x^2 - 28x + 10 = 0$

    Or

    Find the conjugate of $\dfrac{(3-2i)(2+3i)}{(1+2i)(2-i)}$

20. If $(x + iy)^{\frac{1}{3}} = a + ib$, show that $\dfrac{x}{a} + \dfrac{y}{b} = 4(a^2 - b^2)$

21. In how many of the distinct permutations of the letters in MISSISSIPPI do the four I's not come together?

22. In how many ways can a student choose a programme of 5 course if 9 courses are available and 2 specific courses are compulsory for every student?

    Or

    Find r if $5.^4 Pr = 6.^5 Pr - 1$

23. Solve : i) $2\cos^2 x + 3\sin x = 0$ and find general solution.

    ii) Prove that $\tan 70^0 = \tan 20^0 + 2 \tan 50^0$

24. Prove that :

    i) $\dfrac{\sin 8x \cos x - \sin 6x \cos 3x}{2 \cos 2x \cos x - 2 \sin 4x \sin 3x} = \tan 2x$

    ii) $\cos 4x = 1 - 8 \sin^2 x \cos^2 x$

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25.   a) Define constant function, give its domain and range.

   b) Find the domain and the range of the real function $\quad f(x) = \dfrac{1}{\left(1 - x^2\right)}$

26.   Evaluate :   i) $\lim\limits_{x \to a} = \dfrac{\sqrt{a + 2x} - \sqrt{3x}}{\sqrt{3a + x} - 2\sqrt{x}}$

       ii) $\lim\limits_{x \to 1} = \dfrac{x^{15} - 1}{x^{10} - 1}$

27.   Find the derivative of tan 5x by the first principle.

28.   Convert the complex number $\dfrac{-16}{(1 + i\sqrt{3}}$ to the polar form.

Or

a) For complex value of z, solve $\quad |z| + z = 2 + i$

b) If $|z_1| = |z_2| = |z_3| = \text{..........} = |zn| = 1$ then prove that

$$\left| \frac{1}{z_1} + \frac{1}{z_2} + \frac{1}{z_3} + \text{.........} + \frac{1}{z_n} \right| = \left| z_1 + z_2 + z_3 + \text{........} + z_n \right|$$

29.   Prove that :
$^{4n}C_{2n} : {}^{2n}C_n = [1.3.5 \ldots\ldots (4n - 1)] : [1.3.5 \ldots\ldots (2n - 1)]^2$

Or

A committee of 5 is to be formed out of 6 men and 4 ladies. In how many ways can this be done, when

     a) at least 2 ladies are included.

     b) at most 2 ladies are included.

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