QUARTERLY EXAMINATION, 2013 –14
SUBJECT: MATHEMATICS
CLASS : XI

TIME : 3 hrs M.M.-100

General Instruction:

a. *All questions are compulsory.*

b. *The question paper consists of 29 questions divided in three sections A,B and C. Section A comprises of 10 questions of one mark each. Section B comprises of 12 question of four marks each and section C comprises of 7 questions of six marks each.*

c. *There is no overall choice. However, internal choices have been provided in 4 questions of four marks and 2 questions of six marks each. You have to attempt only one of the alternatives in all such questions.*

SECTION-A

1. If A and B are two sets such that $(A) = 115, n(B) = 326, n(A - B) = 47$, then write $n(A \cap B)$.

2. Write the set $\left\{1, \frac{1}{2}, \frac{1}{3}, \frac{1}{4}, \frac{1}{5}, \ldots\ldots\right\}$ in the set builder form.

3. If $A = \{X, Y, Z\}$ *and* $B = \{a, b\}$. Write the total number of relations can be defined from A to B.

4. Write the range of the function. $f(x) = \frac{1}{\sqrt{x-5}}$.

5. Write the radian measure corresponding to 5^0 37' 30".

6. Draw the rough sketch of graph of $y = sin^2 x$, $x \in [0, 2\pi]$.

7. Find the real value of x and y, if $(x + iy)(2 - 3i) = 4 + i$.

8. If ${}^nC_6 = {}^nC_4$, find ${}^nC_8$.

9. Write the 4th term from end in the expansion of $\left[\frac{4x}{5} - \frac{5}{2x}\right]^9$.

10. Evaluate $\lim_{x \to 0} \frac{\sqrt{1+x}-1}{x}$.

SECTION – B

11. If A,B and C are the sets such that A∪B = A∪C and A∩B= A∪C. Show that B=C.

12. A college awarded 38 medals in Football, 15 in Basketball and 20 in Cricket. If these medals went to a total of 58 men and only three men got medals in all three sports. How many received medals in exactly two of the three sports?

13. If A={1,2,3 ……. 14}, define a relation on the set A by R ={(x,y):3 x-y=0; where x,y∈A}. Depict this relationship using an arrow diagram. Write down its domain, domain, codomain and range.

14. If A = {12,13,14,15,16,17} and f: A → N be a function given by f(x) = highest prime factor of x, write f as the set of ordered pair. Also find range of f.

15. Prove that: $\cos 2\theta \cos\frac{\theta}{2} - \cos 3\theta \cos\frac{9\theta}{2} = \sin 5\theta \sin\frac{5\theta}{2}$.

16. Find the square root of complex number $-11 - 60\sqrt{-1}$.

Or

Find all values of θ such that $\frac{3+2i\sin\theta}{1-2i\sin\theta}$ is purely real.

17. If $\propto$ and β are different complex members with $|\beta|$, *find* $\left|\frac{\beta - \propto}{1 - \overline{\propto}\,\beta}\right|$.

18. If all the letters of the word 'AGAIN' be arranged as in a dictionary, what is the fiftieth word?

OR

If ${}^{n+2}C_8 : {}^{n-2}P_4 = 57:16$, find n.

19. Prove that the term independent of x in the expansion $(x + \frac{1}{x})^{2n}$ is:

$$\frac{1.3.5,.....(2n-1).2^n}{n!}$$

20. Evaluate: $\lim\limits_{x\to 1}\left\{\frac{1}{x^2+x-2} - \frac{x}{x^3-1}\right\}$.

OR

$$\lim_{x\to 0}\ \frac{tanx - sinx}{x^3}$$

21. Suppose f(x) = $\begin{cases} a + bx, when & x < 1 \\ 4, \quad when & x = 1 \\ b - ax\ when & x > 1 \end{cases}$ and $\lim\limits_{x\to 1}$ f(x) = f(1). What are possible values of a and b?

22. Differentiate with respect to x:

$(x\ \sin x + \cos x)(x\ \cos x - \sin x)$

Or

$(ax+b)^m(cx+d)^n$.

SECTION –C

23. Find the domain and range of real valued function f (x) = $\sqrt{9 - x^2}$.

24. Prove that : $\cos^2 x + \cos^2(x + \pi/3) + \cos^2(x - \pi/3) = 3/2$.

Or

If $\tan x = 3/4$, $\pi < x < 3\pi/2$, find the values of $\sin(x/2)$, $\cos(x/2)$ and $\tan(x/2)$.

25. Prove that : (i) $\sin 20^0 \sin 40^0 \sin 60^0 \sin 80^0 = 3/16$.

(ii) $\tan 4x = \dfrac{4\tan x(1-\tan^2 x)}{1-6\tan^2 x+\tan^4 x}$.

26. Find the modulus and argument of the complex number $z = \dfrac{i-1}{\cos\frac{\pi}{3}+i\sin\frac{\pi}{3}}$. Also convert in the "POLAR FORM".

27. A committee for "value development in students" has to be formed from student union of your school consists of 9 boys and 4 girls. In how many ways 7 committee members can be selected from union by taking:

(i) Exactly 3 girls

(ii) At least 3 girls

(iii) At most 3 girls. Discuss in brief about the "values" in the students. You like to develop.

28. Find the coefficient of x^5 in the expansion of the product $(1+2x)^6(1-x)^7$.

OR

Find a, b and n in the expansion of $(a+b)^n$, if the first three terms in the expansion are 729, 7290 and 30375 respectively.

29. (i) Differentiate $(x \sin x)$ with respect to x from first principle.

(ii) Differentiate $\dfrac{x\sin x+\cos x}{\sin x - x\cos x}$ with respect to.