

Delhi Public School, Jammu

Assignment For Half Yearly Examination

Class- 11

Sub: Mathematics

SECTION –A

Q1. The total number of terms after the expansion of  $(x + a)^{100} + (x - a)^{100}$  after simplification is.

Q2. The total number of possible outcomes when a coin is tossed 6 times is

Q3. Find  $x$ ,  $4x + 3 \geq 2x + 17$ ,  $3x - 5 < -2$

Q4. If  $a = \cos\theta + i \sin\theta$ , find the value of  $\frac{1+a}{1-a}$

SECTION-B

Q5. If  ${}_{r-1}C = 36$ ,  ${}_{r}C = 84$  and  ${}_{r+1}C = 126$ , find  ${}_{r}C$

Q6. Show that the solution set of the following system of linear inequalities is an unbounded region.  
 $2x + y \geq 8$ ,  $x + 2y \geq 10$ ,  $x, y \geq 0$

Q7. Find the value of the expression:  $3[\sin^4(\frac{3\pi}{2} - \alpha) + \sin^4(3\pi + \alpha)] - 2\{\sin^6(\frac{\pi}{2} + \alpha) + \sin^6(5\pi - \alpha)\}$ .

Q9. The domain and range of the real function defined by  $F(x) = \frac{4-x}{x-4}$

Q10. Let A, B and C be sets. Then show that:  $A \cap (B \cup C) = (A \cap B) \cup (A \cap C)$

Q11. Find the value of  $\tan 22^\circ 30'$

Q12. Let U be the set of all boys and girls in a school, G be the set of all girls in the school, B be the set of all boys in the school, and S be the set of all students in the school who take swimming. Some, but not all, students in the school take swimming. Draw a Venn diagram showing one of the possible interrelationships among sets U, G, B and S.

SECTION-C

Q13. Prove that  $\sin\theta + \sin 2\theta + \sin 3\theta + \dots + \sin n\theta = \frac{\sin n\theta \sin (n+1)\theta}{\sin\theta/2}$ ,  $\forall n \in \mathbb{N}$ .

Q14. Find the domain and range of the function:  $f(x) = \frac{1}{\sqrt{x-5}}$  and  $f(x) = 1 + 3\cos 2x$

Q15. Prove that  $\cos\theta \cos\theta/2 - \cos 3\theta \cos 9\theta/2 = \sin 7\theta \sin 8\theta$

Q16. If  $\theta$  lies in the first quadrant and  $\cos\theta=8/17$ , then find the value of :

$$\cos(30^\circ+\theta) + \cos(45^\circ-\theta)+\cos(120^\circ+\theta).$$

Q17. Prove the statement by the principle of mathematical induction:  $n^3-7n+3$  is divisible by 3, for each natural number  $n$ .

Q18. A solution of 9% acid is to be diluted by adding 3% acid solution to it. The resulting mixture is to be more 5% but less than 7%. If there is 460 litres of the 9% solution, how many liters 3% solution will have to be added?

Q19. If the letters of the word RACHIT are arranged in all possible ways as listed in dictionary . then what is the rank of the word RACHIT?

Q20. Find the sixth term in the expansion  $(y^{1/2}+x^{1/3})^n$ , if the binomial coefficient the third term from the end is 45.

Q21. In a class of 60 students ,25 students play cricket and 20 students play tennis and 10 students play both the games. find the number of students who play neither.

Q22. Is  $g=\{(1,1)(2,3)(3,5),(4,5)\}$  a function? Justify . Is this is described by the relation ,  $g(x)=\alpha x + \beta$ , then what values should be assigned to  $\alpha$  and  $\beta$

Q23. Prove that  $\sin 4A=4\sin A\cos^3 A-4\cos A\sin^3 A$

#### SECTION-D

Q24. Find the general solution of the equation:  $\sin x-3\sin 2x+\sin 3x=\cos x-3\cos 2x+\cos 3x$ .

Q25. If  $\cos(\alpha + \beta)=4/5$  and  $\sin(\alpha - \beta)=5/13$ , where  $\alpha$  lies between 0 and  $\pi/4$ , find the value of  $\tan 2\alpha$ .

Q26. Find the value of the expression  $\cos^4 \frac{4\pi}{8} + \cos^4 \frac{3\pi}{8} + \cos^4 \frac{5\pi}{8} + \cos^4 \frac{7\pi}{8}$

Q27. In drilling world's deepest hole it was found that the temperature  $T$  in degree celcius,  $x$  km below the earth's surface was given by  $T=30 +25(x-3)$ ,  $3 \leq x \leq 15$ . at what depth will the temperature be between  $155^\circ C$  and  $205^\circ C$ ?

Q28. A box contains two white , three black and four red balls. In how many ways can three balls can be drawn from the box, if atleast one black ball is to be included in a draw.

Q29. If the coefficient of second, third and fourth terms in the expansion of  $(1+x)^{2n}$  are in A.P. Show that  $2n^2 -9n+7=0$