INTERNATIONAL INDIAN SCHOOL – DAMMAM

SECOND TERMINAL EXAMINATION - DEC-2015

SUB: MATHEMATICS **TIME: 3 Hrs**
CLASS: XI **MAX MARKS: 100**

SET – A

Instructions:

i) All questions are compulsory

ii) The question paper consists of 26 questions divided into three sections A, B & C .
Section A comprises of 6 questions of 1 mark each.
Section B comprises of 13 questions of 4 marks each
And Section C comprises of 7 questions of 6 marks each.

iii) There is no overall choice. However internal choice has been provided in three questions of 4 marks each and 2 questions of 6 mark each. You have to attempt only one of the alternatives in all such questions.

iv) Use of calculator is not permitted.

Section – A

1. Let U={ 1, 2, 3, 4, 5, 6 }, A={ 2, 3} and B={ 3, 4,5} Find (A$\cup$B)'

2. If $\lim_{x\to a} \frac{x^5-a^5}{x-a}$ = 405, find all possible values of a.

3. Find the principal solutions of Cot x= $-\sqrt{3}$.

4. Expand $(1-x)^4$.

5. Find the sum to infinity of the geometric progression 1, $\frac{1}{4}, \frac{1}{16},$ ----------

6. Find the equation of the hyperbola whose vertices are ($\pm$2, 0) and foci are ($\pm$3, 0).

Section - B

7. Find the points of trisection of the line segment joining P (4, –5, 3) and Q(1, 2, 4).

8. Find the general solutions of Sin x + Sin3x + Sin5x=0

OR

Find the value of Tan $\frac{\pi}{8}$

9. If U ={x: x $\in$ N, x $\leq$ 10} is the universal set for A={1, 2, 5, 6} and B ={ x: $x^2 - 13x + 42 = 0$}, Then verify that.
i) A – B = B'–A' ii) A'$\cup$B= (A $\cap$ B')'

10. Find the number of words with or without meaning which can be made using all the letters of the word AGAIN.If these words are written as in a dictionary, what will be the 50^{th} word?

OR

How many words can be formed from the letters of the word 'DAUGHTER' so that

i) The vowels always come together
ii) The vowels never come together

11. Evaluate $(\sqrt{3}+\sqrt{2})^4-(\sqrt{3}-\sqrt{2})^4$

12. The sum of two numbers is 6 times their geometric mean, show that the numbers are in the ratio $(3+2\sqrt{2}):(3-2\sqrt{2})$

OR

If a, b, c, d are in GP, prove that

(a^n+b^n), (b^n+c^n), (c^n+d^n) are in G.P.

13. If p is the length of perpendicular from the origin to the line whose intercepts on the axes are a and b, then show that

$$\frac{1}{p^2}=\frac{1}{a^2}+\frac{1}{b^2}$$

14. Find the coordinates of the foci,the vertices,the length of major axis and minor axis,the eccentricity and the length of the latus rectum of the ellipse $4x^2 + 9y^2 = 36$.

15. If the orgin is the centroid of the ΔPQR with vertices P(2a, 2, 6), Q(–4, 3b, –10) and R(8, 14, 2c), then find the values of a, b and c.

16. Evaluate :

$$\lim_{x\to 0}\left(\frac{cosec\,x-\cot x}{x}\right)$$

17. Prove that $\text{Cos } 6x = 32\text{Cos}^6x - 48\text{Cos}^4x + 18\text{Cos}^2x - 1$

18. A group consists of 4 girls and 7 boys. In how many ways can a team of 5 members be selected if the team has

i) At least one boy and one girl.
ii) At least three girls.

19. Sum of the first p, q and r terms of an AP are a, b and c respectively, prove that

$$\frac{a}{p}(q-r)+\frac{b}{q}(r-p)+\frac{c}{r}(p-q)=0$$

Section – C

(6 x 1 = 6)

20. Prove that $\text{Cos}^2 x + \text{Cos}^2 (x + \frac{\pi}{3}) + \text{Cos}^2 (x - \frac{\pi}{3}) = \frac{3}{2}$

OR

$\text{Cos } 2x. \text{ Cos } \frac{x}{2} - \text{Cos}3x. \text{ Cos } \frac{9x}{2} = \text{ Sin}5x. \text{ Sin } \frac{5x}{2}.$

21. The second, third and fourth terms in the binomial expansion $(x+a)^n$ are 240, 720 and 1080 respectively. Find x, a and n.

22. Show that. $\frac{1\times2^2+2\times3^2+\cdots\ldots+n(n+1)^2}{1^2\times2+2^2\times3+\cdots..+n^2(n+1)} = \frac{3n+5}{3n+1}$

OR

Find the sum to n terms of the series 5+ 11+19+29+41+.....

23. i) Find the angle between the lines $y - \sqrt{3}x - 5 = 0$ and $\sqrt{3}y - x + 6 = 0$

ii) If the lines $2x+y - 3 = 0$, $5x + ky - 3 = 0$ and $3x - y - 2 = 0$ are concurrent, find the value of k .

24. In a class of 60 students, 23 play hockey, 15play basketball and 20 play cricket, 7 play hockey and basketball, 5 play cricket and basketball, 4 play hockey and cricket and 15 students do not play any of these games. Find

i) How many play hockey basketball and cricket?

ii) How many play hockey but not cricket?

iii) How many play hockey and cricket but not basketball

iv) Suggest any two values which the students will acquire by taking part in different games.

25. Find the equation of the circle passing through the points (4 , 1) and (6 , 5) and whose centre is on the line $4x + y = 16$.

26. Find the derivative of

i) $\frac{x^2 \sin x}{1+x^3}$ (4)

ii) $5 \sec x + 3 \text{ Cot } x$. (2)

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Section – A

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2. Find the principal solutions of $\tan x = -\sqrt{3}$.

3. Expand $(x-1)^4$.

4. If $\lim_{x \to a} \frac{x^4-a^4}{x-a} = 108$, find all possible values of a.

5. Find the equation of the hyperbola whose vertices are $(0, \pm 2)$ and foci are $(0, \pm 3)$.

6. Find the sum to infinity of the geometric progression $1, \frac{1}{3}, \frac{1}{9},$ ----------

Section - B

7. Evaluate $(\sqrt{3}+\sqrt{2})^4 - (\sqrt{3}-\sqrt{2})^4$

8. The sum of two numbers is 6 times their geometric mean, show that the numbers are in the ratio $(3 + 2\sqrt{2}) : (3 - 2\sqrt{2})$

OR

If a, b, c, d are in GP, prove that (a^n+b^n), (b^n+c^n), (c^n+d^n) are in GP.

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