# INTERNATIONAL INDIAN SCHOOL - DAMMAM

## SECOND TERM EXAMINATION- NOV .2014

**CLASS : XII** **SET – A** **Max Marks : 100**
**Time: 3 hours**

**SUBJECT: MATHEMATICS**

***General Instructions:***

*1. All questions are compulsory.*

*2. The question paper consists of 26 questions divided into three sections A, B, C, Section A contains 6 questions of 1 mark each , Section B is of 13 question of 4 marks each and section C is of 7 questions of 6 marks each.*

*3. All questions in section A are to be answered in one word, one sentence or as per the requirement of the question.*

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

*5. Use of calculator is not permitted. You may ask for logarithmic tables, if required.*

## Section. A

1) What is the angle between vectors $\vec{a}$ and $\vec{b}$ with magnitude $\sqrt{3}$ and 2 respectively

Given that $\vec{a}.\vec{b} = 3$

2) Find the general solution of the differential equation $\frac{dy}{dx} = \frac{1+y^2}{1+x^2}$.

3) If $f(1) = 4$ , $f^1(1) = 2$, find the value of derivative of $\log f(e^x)$ w.r.t. x at the point x = 0.

4) Evaluate $\int_{-1}^{1} \sin^5 x.\cos^4 dx$ .

5) Find the value of $\lambda$ so that the vectors $\vec{a} = 2\hat{i} + \lambda\vec{j} + \hat{k}$ and $\vec{b} = \hat{i} - 2\hat{j} + 3\hat{k}$ are perpendicular

to each other.

6) Find the slope of the tangent to the curve $x = t^2 + 3t - 8$ , $y = 2t^2 - 2t - 5$ at $t = 2$.

## Section. B

7) Form the differential equation of the family of ellipse having foci on Y axis and centre at the origin.

8) Let vector $\vec{a} = \hat{i} + 4\hat{j} + 2\hat{k}$, $\vec{b} = 3\hat{i} - 2\hat{j} + 7\hat{k}$ and $\vec{c} = 2\hat{i} - \hat{j} + 4\hat{k}$. Find a vector $\vec{d}$ which is perpendicular to both $\vec{a}$ and $\vec{b}$ and $\vec{c}.\vec{d} = 15$.

OR

Using vectors find the area of the triangle with vertices $A(1,1,2), B(2,3,5)$ and $C(1,5,5)$.

9) Using properties of definite integrals evaluate $\int_0^{\frac{\pi}{4}} \log(1 + \tan x)\, dx$.

10) Find the relationship between 'a' and 'b' so that the function $f$ defined by

$$f(x) = \begin{cases} ax + 1, if\ x \le 3 \\ bx + 3, if\ x > 3 \end{cases} \quad \text{is continuous at } x = 3.$$

11) Evaluate $\int \frac{3x - 1}{(x + 2)^2}\, dx$.

OR

Evaluate $\int e^{2x} \sin x \, dx$.

12) Show that the four points A , B , C , and D with position vectors $4\hat{i} + 5\hat{j} + \hat{k}$ , $-\hat{j} - \hat{k}$ , $3\hat{i} + 9\hat{j} + 4\hat{k}$ and $4(-\hat{i} + \hat{j} + \hat{k})$ , respectively are coplanar.

13) Find the intervals in which the function $f$ is given by $f(x) = \sin x + \cos x$, $0 \le x \le 2\pi$ is strictly increasing or strictly decreasing.

14) Find $\frac{dy}{dx}$ if $x^{\frac{2}{3}} + y^{\frac{2}{3}} = a^{\frac{2}{3}}$ .

OR

If $y = \log\left[x + \sqrt{x^2 + 1}\right]$ prove that $(x^2 + 1)\frac{d^2y}{dx^2} + x\frac{dy}{dx} = 0$.

15) Find the particular solution of the differential equation $\frac{dy}{dx} + 2y \tan x = \sin x$ . $y = 0$, when $x = \frac{\pi}{3}$.

16) Find the area of the region bounded by the two parabolas $y = x^2$ and $y^2 = x$.

OR

Find the area of the region bounded by the parabola $y = x^2$ and $y = |x|$.

17) Prove that the curves $x = y^2$ and $xy = k$ cut at right angles if $8k^2 = 1$.

18) Using integration find the area of the triangular region whose vertices are $(-1,0),(1,3)$ and $(3,2)$.

19) Solve the differential equation $2x^2 \frac{dy}{dx} - 2xy + y^2 = 0$

## Section -C

20)Evaluate $\int_0^{\frac{\pi}{4}} \frac{\sin x + \cos x}{9 + 16\sin 2x} \, dx$.

**OR**

Evaluate $\int_0^{\frac{\pi}{2}} \frac{\cos^2 x}{\cos^2 x + 4\sin^2 x} \, dx$.

21) Solve the differential equation $3e^x \tan y dx + (2 - e^x)\sec^2 y dy = 0$, given that

$x = 0,\ y = \frac{\pi}{4}$

22) Using integration , find the area of the region $\left\{(x, y) : |x - 1| \le y \le \sqrt{5 - x^2}\right\}$

OR

Find the area of the region enclosed between the two circles

$x^2 + y^2 = 4$ and $(x-2)^2 + y^2 = 4$

23) Differentiate $y = (\sin x)^x + \sin^{-1}\sqrt{x}$ w.r.t. $x$.

24) Evaluate $\int_1^4 (x^2 - x) \, dx$ as limit of sums.

25) Three vectors $\vec{a}$, $\vec{b}$ and $\vec{c}$ satisfy the condition $\vec{a}+\vec{b}+\vec{c}=\vec{0}$. Evaluate the quantity

$\mu = \vec{a}.\vec{b}+\vec{b}.\vec{c}+\vec{c}.\vec{a}$, if $|\vec{a}|=1$, $|\vec{b}|=4$ and $|\vec{c}|=2$.

(b) Find a vector of magnitude 5 units, and parallel to the resultant of the vectors

$\vec{a}=2\hat{i}+3\hat{j}-\hat{k}$ and $\vec{b}=\hat{i}-2\hat{j}+\hat{k}$.

26) A window is in the form of a rectangle surmounted by an equilateral triangle. The total perimeter of the window is 12 m. Find the dimensions of the rectangle that will produce the largest area of the window ?

How large windows help us in saving electricity and conserving environment ?

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