

NAME OF THE FACULTY: SANGHAMITRA NATH

SUBJECT-MATH II

SL NO	PERIOD	TOPICS TO BE COVERED	REMARKS
1	01	<p>1.1 Define Variables, constants, function of real variables, domain and range</p> <p>1.2 Define the following functions: Absolute Value function(x), Greatest Integer function $[x]$, Trigonometric function, Inverse Circular function, Exponential function (e^x), Logarithmic function ($\log x$).</p>	
2	02	<p>1.3 Explain Limit of a function, R.H. Limit, L.H. Limit & existence of Limits, Methods of evaluating Limit (Finite & Infinite Limits)</p> <p>1.4 State Fundamental Theorem on Limits.</p> <p>1.4.1 Prove the following Limits:</p> $\lim_{x \rightarrow a} \left(\frac{x^N - a^N}{x - a} \right) = na^{n-1}$ $\lim_{x \rightarrow 1} \left(\frac{a^x - 1}{x} \right) = \log_e a$ $\lim_{x \rightarrow 1} \left(\frac{e^x - 1}{x} \right) = 1$	
3	03	<p>1.4.1 Prove the following Limits:</p> $\lim_{x \rightarrow 0} (1 + x)^{\frac{1}{x}} = e$ $\lim_{x \rightarrow 0} \frac{\log(1 + x)}{x} = 1$ $\lim_{x \rightarrow 0} \frac{e^x - 1}{x} = 1$ $\lim_{x \rightarrow 0} \frac{e^x - 1}{x} = 1$	
4	04	<p>1.5 Define continuity of functions at a point.</p> <p>1.6 Problems on above (1.1 - 1.5)</p>	

5	05	<p>2. DERIVATIVES</p> <p>2.1 Define derivatives of functions at a given point ($x=a$)</p> <p>2.2 Differentials dx, dy etc. establish geometrical and physical meaning of dy/dx. Differential Coefficient dy/dx, Differential operator ($D=d/dx$). Fundamental theorem on derivative viz (addition rule, subtraction rule, product rule and quotient rule).</p>	
6		<p>2.3 Standard Derivative of functions such as x^n, a^x, $\text{Log}_a x$, e^x, $\text{Log}_a x$, $\text{Sin}x$, $\text{Cos}x$, $\text{Tan}x$, $\text{Sin}^{-1}x$, $\text{Cos}^{-1}x$, $\text{Tan}^{-1}x$ from first principle Methods.</p>	
7		2.4 Perform derivative of composite function	
8		Perform logarithmic differentiation, Differentiation of parametric function,	
9		Differentiation of Implicit Function, Differentiation of a function with respect to another function.	
10		Define Successive Differentiation (up to 2 nd Order)	
11		Define Maxima, Minima & points of inflexion and necessary condition for Maxima & Minima (up to 2 nd Order only)	
12		<p>2.8 Define Local Extremum, absolute Maxima / Minima</p> <p>2.9 Problems on above (2.1 - 2.8)</p>	
13		<p>3. PARTIAL DIFFERENTIATION</p> <p>3.1 Explain functions of several variables.</p> <p>3.2 State partial derivatives up to three independent variables</p>	
14		<p>3.3 State homogeneous function of two variables and Euler's Theorem on homogenous function for two variables.</p> <p>3.4 Problems on above (3.1 - 3.3)</p>	
15		<p>4. INTEGRAL CALCULUS (INTEGRATION)</p> <p>4.1 Define Integration as inverse process of differentiation.</p> <p>4.2 Define indefinite and definite Integral</p> <p>4.3 State Integrals of standard functions</p>	
17		4.4 Explain Methods of Integration (i) Integration by Decomposition of Integrand, (ii) Integration by Substitution, (iii) Integration by parts	
18		4.5 Establish formula for the following	

		$\int \frac{1}{x^2 + a^2} dx$ $\int \frac{1}{x^2 - a^2} dx$ $\int \frac{1}{a^2 - x^2} dx$ $\int \frac{1}{\sqrt{a^2 - x^2}} dx$ $\int \frac{1}{\sqrt{x^2 - a^2}} dx$	
19		4.5 Establish formula for the following $\int \sqrt{a^2 - x^2} dx$ $\int \sqrt{x^2 - a^2} dx$ $\int \sqrt{x^2 + a^2} dx$	
20		4.6 Explain Methods of Integration by partial fraction.	
21		4.7 Definite Integrals, properties of Definite Integrals.	
22		4.8 Find area bounded by the curve $y=f(x)$, $x=a$, $x= b$ and $x -$ axis and the area bounded by the curve $x=f(y)$, $y=c$, $y= d$ and $y -$ axis.	
23		4.9 Problems on above (4.1 - 4.8)	
25		5. DIFFERENTIAL EQUATION 5.1 Define differential equation, order and degree of a differential equation 5.2 Formation of first order first degree differential equation.	
26		5.3 Solution of first order and first degree differential equation by the following methods (i) separation of variables (ii) Linear (iii) Exact 5.4 Problems on above (5.1 - 5.3)	
27		6. ANALYTICAL GEOMETRY IN THREE DIMENSIONS 6.1 Describe co-ordinates of a point in rectangular co-ordinate system 6.2 Derive distance formula, division formula	
28		6.3 Explain Dcs & Drs of a line, the formula for angle between two lines with given Drs, conditions of perpendicularity and parallelism.	

		6.4 State equation of a plane	
29		6.5 Find equation of a plane in different forms (i) General form $Ax+By+Cz+D=0$, where A,B,C are Drs of the normal to the plane, (ii) Intercept form $(X/a+Y/b+Z/c=1)$, (iii) Normal form. 6.6 Find angle between two planes	
30		6.7 Find perpendicular distance from a point to a plane 6.8 Problems on above (6.1 - 6.7)	
31		7. SPHERE 7.1 Define sphere, equation of a sphere 7.2 Find the equation of a sphere whose centre and radius is given 7.3 Derive general equation of a sphere equation of a sphere on a given diameter and equation of a sphere passing through four non-coplanar points	
32		7.4 Problems on above (7.1 - 7.3)	

Books Recommended

1. Elements of Mathematics – Vol -1 & II (Odisha State Bureau of Text Book Preparation & Production)

Reference Books

2. A Text book of Engineering Mathematics by Dr. Chittaranjan Mallick & S.Mallick (Kalyani Publisher)

