ALPHA COLLEGE OF ENGINEERING & TECHNOLOGY

DEPARTMENT OF INFORMATION TECHNOLOGY

LIST OF ASSIGNMENTS

SUBJECT NAME:ADVANCED MATHEMATICS
SUB CODE: 3320003(GROUP-2)

Sr. No.	Topic	Proposed week of issue	Proposed week of submission	Marks
1	CO-ORDINATE GEOMETRY			10
2	FUNCTION AND LIMIT			10
3	DIFFERENTIATION			10
4	INTEGRATION			10
5	STATISTICS			

PREPARED BY:

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HEAD OF DEPARTMENT

ALPHA COLLEGE OF ENGINEERING & TECHNOLOGY

KHATRAJ, TAL.- KALOL, DIST.- GANDHINAGAR – 382721

Diploma 2nd Sem. – Advanced Mathematics (3320003)

GROUP-2 ASSIGNMENT : 1 COORDINATE GEOMETRY

1 Find the equation of line passing through points $(-1,2)$ and $(1,-2)$ also find the slope of line

2 Show that the points $(a,b+c),(b,c+a)$ and $(c,a+b)$ are collinear

3 Find the equation of perpendicular bisector of the line segment joining the points A(4,5) and B(-2,0).

4 Show that the line $3x-2y+5=0$ and $2x+3y-7=0$ are mutually perpendicular

5 Find the equation of the line which is parallel to the line 3x+2y+1= 0 and passing through the point (1,-7)

6 Find the equation of the line which is passing through (2,4) and is perpendicular to 5x-7y+11=0 .

7 Three vertices of parallelogram □ ABCD are A(-4,1) ,B(2,3) and C(8,9) find fourth vertex D.

8 Prove that the triangle ABC is right angled triangle where $A(3,-1)$, B(6,2) and $C(-2,4)$.

9 If A(7,-1), B(9,3) and C(1,-1) then prove that P(4,3) is circum centre of ΔABC

10 Prove that (4,8) (4,12) and ($4+2\sqrt{3}$,10) are the vertices of an equilateral triangle

11 State the nature of triangle whose vertices are $(a,a),(-a,-a)$ and $(-\sqrt{3}a,\sqrt{3}a)$

12 Find the equation of a circle passing through the points (4,0), (0,4) and (0,0).

13 Find centre and radius of circle $x^2+y^2-2x+4y-1=0$

14 Find the equation of tangent and normal to the circle $x^2+y^2-2y-7=0$ at (2,3).

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GROUP-2 ASSIGNMENT : 1 COORDINATE GEOMETRY

15 Find the equation of locus of a point which moves such that its distance from the point A(-2,3) is twice the distance from the point B(-3,2).

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GROUP-2 ASSIGNMENT : 2 FUNCTION AND LIMIT

1 If $f(x) = \log_2 x$ and $g(x) = x^4$ then find $f(g(2))$.

2 If $f(x) = \frac{1+x}{1-x}$ prove that $f\left(\frac{x+y}{1+xy}\right) = f(x).f(y)$

3 If $f(x) = \log x$ prove that 1) $f(x.y) = f(x) + f(y)$ 2) $f\left(\frac{x}{y}\right) = f(x) - f(y)$

4 If $f(x) = \dfrac{x+3}{4x-5}$ and $t = \dfrac{3+5x}{4x-1}$ then prove that $x = f(t)$

5 If $f(x) = e^x$,then prove that

(i) $f(x) \cdot f(y) = f(x+y)$ and (ii) $f(x) \div f(y) = f(x-y)$

6 Evaluate $\lim\limits_{n\to\infty} \dfrac{4n^3 - 7n^2 + 5n - 1}{8n^3 + 7n^2 - 4n + 1}$.

7 Evaluate. $\lim\limits_{x \to 0} \dfrac{\sqrt{9+x}-3}{x}$

8 Evaluate. $\lim\limits_{n \to \infty} \sqrt{n^2 + n + 1} - n$

9 Evaluate : $\lim\limits_{x\to 2} \dfrac{x\sqrt{x} - 2\sqrt{2}}{x-2}$

10 Evaluate : $\lim\limits_{\theta\to\frac{\pi}{4}} \dfrac{\sin\theta - \cos\theta}{\theta - \frac{\pi}{4}}$

11 Find $\lim\limits_{x\to 2} \dfrac{x^3 - 2x^2 + x - 2}{x^2 - x - 2}$.

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GROUP-2 ASSIGNMENT : 2 FUNCTION AND LIMIT

12 Find $\lim_{x\to 0} \dfrac{(1-\cos x)\tan x}{x^3}$.

13 Evaluate. 1. $\lim_{x \to -3} \dfrac{x^3+27}{x^2+5x+6}$ 2. $\lim_{x \to \frac{\pi}{4}} \dfrac{2-sec^2 x}{1-tanx}$

14 Evaluate. 1. $\lim_{x \to 0} \dfrac{a^x-sinx-1}{x}$ 2. $\lim_{x \to 0} \left(1+\dfrac{3x}{4}\right)^{\frac{5}{x}}$

15 Evaluate: (i) $\lim_{x\to 0} \dfrac{\sin 3x}{\tan 5x}$ (ii) $\lim_{x\to\infty} \left(1+\dfrac{1}{x}\right)^{4x}$

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GROUP-2

ASSIGNMENT : 3 DIFFERENTIATION AND ITS APPLICATION

1 Differentiate y = sinx using the defintion.

2 Find $\frac{dy}{dx}$,where $y = x^x$.

3 If $y = (sinx)^x + x^{cosx}$ find $\frac{dy}{dx}$.

4 Find $\frac{dy}{dx}$ for $y = \log[\cos(2x)]$.

5 If $y = x^2 \tan x$ then Find $\frac{dy}{dx}$

6 If $y = \frac{1+\sin x}{1-\sin x}$ then find $\frac{dy}{dx}$

7 If $x = \frac{1}{2}\left(t - \frac{1}{t}\right), y = \frac{1}{2}\left(t + \frac{1}{t}\right)$ then find $\frac{dy}{dx}$.

8 If $x = a\cos^4\theta$ and $y = b\sin^4\theta$ then prove that $\frac{dy}{dx} + \sqrt{\frac{by}{ax}} = 0$

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

10 For $x = at^2, y = 2at$,find $\frac{d^2y}{dx^2}$.

11 If y=Acospt+Bsinpt then prove that $\frac{d^2y}{dt^2} + p^2y = 0$.

12 If y= sin(sinx) prove that $y_2 + y_1 tanx + ycos^2x = 0$

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GROUP-2

ASSIGNMENT : 3 DIFFERENTIATION AND ITS APPLICATION

13 If $x = at^2$ and $y = 2at$, t≠0then prove that $yy_2 + y_1^2 = 0$

14 Find velocity (v) and acceleration (a) at t = 2 for the equation of motion $s = t^3 - 6t^2 + 9t + 6$.

15 Find Maximum and Minimum value of $f(x) = 2x^3 - 3x^2 - 12x + 5$.

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GROUP-2

ASSIGNMENT : 4 INTEGRATION AND APPLICATION

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

2 Evaluate: $\int_{-1}^{1}\frac{x^3-8}{x-2}dx$

3 Evaluate: $\int \sin 5x \cdot \sin 3x\,dx$

4 Evaluate : $\int\frac{\cos 2x}{\cos^2 x\cdot\sin^2 x}dx$

5 Integrate : $\int\frac{e^x(1+x)}{\sin^2(xe^x)}dx$

6 Prove that $\int_0^{\pi/2}\frac{\tan x}{\tan x+\cot x}dx=\frac{\pi}{4}$.

7 Evaluate. $I=\int_0^{\frac{\pi}{2}}\frac{\sec x}{secx+cosecx}dx$

8 Integrate : $\int x^3\tan^5(x^4)\sec^2(x^4)dx$

9 Evaluate: $\int e^{\tan x}\sec^2 x\,dx$

10 Evaluate: $\int\frac{2x+3}{(x-1)(x-2)}dx$

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GROUP-2

ASSIGNMENT : 4 INTEGRATION AND APPLICATION

11 Evaluate : $\int_0^1 \frac{x}{x+1} dx$

12 Evaluate $\int \frac{dx}{2+3\cos x}$.

13 Evaluate. 1. $I = \int \frac{\cos 2x}{cos^2 x sin^2 x} dx$ 2. $I = \int \frac{x^2 \tan^{-1} x^3}{1+x^6} dx$

14 Using integration Find the area of circle $x^2 + y^2 = a^2$

15 Find the area of region bounded by the curves $y = x^2$ and $y = x$.

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GROUP-2 ASSIGNMENT : 5 STATISTICS

1 Find the Mean , Median and Mode for following data

Class	15-20	20-25	25-30	30-35	35-40	40-45
Frequency	3	8	10	19	25	21
Class	45-50	50-55	55-60			
Frequency	6	5	3			

2 Find the mode of frequency distribution of marks of 100 students for biology subject for the given data below:

Marks obtained	10-25	25-40	40-55	55-70	70-85	85-100
No of students	20	15	27	13	15	10

3 If the mean of the following frequency distribution is 26 , then find the missing frequency.

Class	0 - 9	10 – 19	20 – 29	30 – 39	40 - 49	Total
Frequency	6	?	17	?	8	60

4 Find the mean and median for the following data:

x_i	92	93	97	98	102	104
f_i	3	2	2	3	6	4

5 Find the mean and the mode of the following data.

x_i	13	18	23	28	33	38	43	48	53
f_i	8	14	39	47	58	34	13	5	2

6 Find the median of the following data.

x_i	2	5	6	8	10	12
f_i	2	8	10	7	8	3

7 The mean of the following frequency distribution is 17.5. If the sum of the unknown frequencies a and b is 18, find a and b.

Class	1–5	6–10	11–15	16–20	21–25	26–30	31–35
Frequency	a	14	16	30	11	b	8

8 The mean hight of 30 student is 5.3 ft. One reading was entered wrong as 5.2 ft. insted of 4.9 ft. Find the correct mean.

9 Calculate the mean deviation from the median
34,38,42,44,46,48,54,55,63,70.

10 Using the following data calculate the mean deviation from the median.
50,69,20,33,39,53,65,40,59.

11 Find the standard deviation for the following data
120 , 132 , 148 , 136 , 142 , 140 , 165 , 153 .

12 Calculate the standard deviation for the following data
69,67,68,66,69,64,63,65,72.

13 Calculate the standard deviation for the following data.
6.7.10.12.13.4.8.12.

e standard deviation using the following data :

19, 19, 21, 23, 25, 26, 30

14 Calculate th

10, 15, 17,

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GROUP-2 ASSIGNMENT : 5 STATISTICS

15 Find the standard deviation from following data.

Class	0-20	20-40	40-60	60-80	80-100
Frequency	12	38	42	23	5