

ANNUAL/SEMESTER EXAMINATION NOV/DEC. - 2017 (Regulation - 2014)

Subject : 1.2 APPLIED MATHEMATICS

Time : 3 Hours

Max. Marks : 80

PART - A

Answer the following questions

2x10=20

- 1) Evaluate the determinant  $\begin{vmatrix} \cos \theta & \sin \theta \\ \sin \theta & \cos \theta \end{vmatrix}$
- 2) Find x and y, if  $\begin{bmatrix} x+3 \\ 2-y \end{bmatrix} = \begin{bmatrix} 1 \\ -3 \end{bmatrix}$
- 3) Find the value  $\cos 30^\circ \cos 45^\circ - \sin 30^\circ \sin 45^\circ$
- 4) If  $\sin A = \frac{5}{13}$ , compute  $\cos A$  and  $\tan A$
- 5) Find  $\frac{dy}{dx}$ , if  $y = 3x^3 - x^2 + 6$
- 6) Find  $\frac{dy}{dx}$ , if  $y = \frac{2x+1}{x^2+1}$
- 7) Evaluate  $\int (x^6 + x^2 + x + 5) dx$
- 8) Integrate  $\int \cos(2 - 7x) dx$
- 9) If A(3, 4) and B(-2, 1) find the distance between two points
- 10) Find the median of the observation  
4, 7, 3, 2, 5, 6, 8

PART - B

- 11) a) Find the value  $= \begin{vmatrix} 16 & 19 & 13 \\ 15 & 18 & 12 \\ 14 & 17 & 11 \end{vmatrix}$  4
- b) Solve by using Cramer's rule  
 $4x + y - 3z = 3, 2x + 3y - 2z = 6, x + y + z = 4$  8
- OR
- c) If  $A = \begin{bmatrix} 0 & 2 & 3 \\ 2 & 1 & 4 \end{bmatrix}$  &  $B = \begin{bmatrix} 7 & 6 & 3 \\ 1 & 4 & 5 \end{bmatrix}$  then find  $2A - 3B$  4
- d) Find the inverse of matrix  $\begin{bmatrix} 1 & 2 & 3 \\ 2 & 1 & 1 \\ 1 & 1 & 2 \end{bmatrix}$  8

P.T.O.

- 12) a) Prove that,  $\cot A - \tan A = 2 \cot 2A$  4  
b) Prove that,  $\frac{\sin \theta}{1 + \cos \theta} + \frac{1 + \cos \theta}{\sin \theta} = 2 \operatorname{cosec} \theta$  8

OR

- c) Prove that,  $\cot A - \operatorname{cosec} 2A = \cot 2A$  4  
d) If  $A + B + C = 90^\circ$  then prove that  $\cot A + \cot B + \cot C = \cot A \cdot \cot B \cdot \cot C$  8
- 13) a) Differentiate,  $y = ax^2 + b \tan x + 5x$  with respect to  $x$ . 4  
b) Find  $\frac{dy}{dx}$ , when  $y = \ln \tan \left( \frac{\pi}{4} + \frac{x}{2} \right)$  with respect to  $x$  8

OR

- c) Differentiate,  $y = \sqrt{\sec(2x + 1)}$  with respect to  $x$  4  
d) Find  $\frac{dy}{dx}$ , when  $y = \frac{e^{3x^2}}{\ln \sin x}$  with respect to  $x$  8

- 14) a) Evaluate:  $\int (5x^3 + 7x^2 + 10) dx$  4  
b) Integrate:  $\int x^2 e^{ax} dx$  8

OR

- c) Evaluate:  $\int (5 \tan^2 x) dx$  4  
d) Evaluate:  $\int_{-1}^2 (2x + 1)(x - 2) dx$  8

- 15) a) Solve the following simultaneous linear equations 4  
 $5x + 2y + 2 = 0$   
 $3x + 4y - 10 = 0$   
b) Show that the points  $(0, -1)$ ,  $(-2, 3)$ ,  $(6, 7)$  and  $(8, 3)$  are vertices of a rectangle. 8

OR

- c) Show that the points  $A(-1, 4)$ ,  $B(0, 2)$  and  $C(2, -2)$  are collinear. 4  
d) Find the mean of the following distribution 8

C.I	0 - 10	10 - 20	20 - 30	30 - 40	40 - 50	50 - 60	60 - 70
Frequency	1	7	24	36	25	6	1

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**INDIAN INSTITUTE OF HANDLOOM TECHNOLOGY**  
BARGARH/GUWAHATI/FULIA/JODHPUR/SALEM/VARANASI/CHAMPA/KANNUR/KHITI GADAG/SPKM VENKATAGIRI  
**DIPLOMA IN HANDLOOM AND TEXTILE TECHNOLOGY**  
SEMESTER EXAMINATION - NOV/DEC-2017  
(2011 REGULATION)

**SEMESTER : I SEMESTER**

**Hours : 3 Hours**

**Max.marks:80**

**Subject Code & Name: 1.2 APPLIED MATHEMATICS**

**PART - A**

Answer the following questions.

2x10=20

- 1) Evaluate the determinant  $\begin{vmatrix} 2 & 4 \\ 3 & -2 \end{vmatrix}$
- 2) If  $A = \begin{bmatrix} 3 & 2 \\ 1 & 4 \end{bmatrix}$  and  $B = \begin{bmatrix} 2 & 2 \\ 1 & 3 \end{bmatrix}$ , then find  $A+B$
- 3) If  $\sin A = \frac{4}{5}$ , compute  $\cos A$  and  $\tan A$ .
- 4) Find the value of  $\sin 75^\circ$ .
- 5) Find  $\frac{dy}{dx}$ , if  $y = x^3 - 5x$ .
- 6) Find  $\frac{dy}{dx}$ , if  $y = \sqrt{2x+1}$
- 7) Evaluate :  $\int 3x^2 dx$
- 8) Integrate :  $\int \sin 3x dx$
- 9) If  $P(3, -1)$  and  $Q(-1, 1)$  find the distance between two points.
- 10) Find the mode of the data  
5, 3, 4, 8, 4, 3, 4, 8, 2, 6

**PART - B**

- 11) a) Solve  $\begin{vmatrix} 4 & x+1 \\ 3 & x \end{vmatrix} = 5$  4
- b) Solve by using Cramer's rule. 8  
 $2x + y + 2z = 2, 3x + 2y + z = 2, -x + y + 3z = 6$

OR

- c) If  $A = \begin{bmatrix} 1 & -1 \\ 2 & 3 \end{bmatrix}$  &  $B = \begin{bmatrix} 4 & 2 \\ -1 & -2 \end{bmatrix}$  then find  $AB$  4
- d) Find the adjoint of matrix  $\begin{bmatrix} 2 & 1 & 2 \\ 2 & 2 & 1 \\ 1 & 2 & 2 \end{bmatrix}$  8

P.T.O.

- 12) a) Prove that,  $\frac{\cos \theta}{1 - \sin \theta} = \frac{1 + \sin \theta}{\cos \theta}$  4  
b) Prove that,  $\sqrt{\frac{1 - \cos \theta}{1 + \cos \theta}} = \operatorname{cosec} \theta - \cot \theta$  8

OR

- c) Prove that,  $\frac{\sin A + \sin 2A}{1 + \cos A + \cos 2A} = \tan A$  4  
d) Prove that,  $(\sec \theta - \tan \theta)^2 = \frac{1 - \sin \theta}{1 + \sin \theta}$  8

- 13) a) Find the derivative of  $x^2 + 2x - \sin x + 5$  w.r.t.  $x$  4  
b) Find  $\frac{dy}{dx}$ , where  $y = x \sin x - \frac{e^x}{1+x^2}$  8

OR

- c) Find the derivative of  $(x^2 + 2x - 1)^5$  w.r.t.  $x$  4  
d) Find  $\frac{dy}{dx}$ , where  $y = \sqrt{\sin \sqrt{x}}$  8

- 14) a) Evaluate:  $\int x(x-1)^2 dx$  4  
b) Integrate:  $\int x^2 e^x dx$  8

OR

- c) Evaluate:  $\int (3x^3 - x^2 + 5x + 2)^2 dx$  4  
d) Evaluate:  $\int \frac{x^2 + 1}{(x^3 + 3x + 7)^3} dx$  8

- 15) a) Solve the following simultaneous linear equations 4  
 $2x + 3y - 8 = 0$   
 $3x + y - 5 = 0$   
b) Show that the triangle with vertices A(-3, 1), B(5, 4) and C(0, -7) is isosceles. 8

OR

- c) Show that the points A(-1, 4), B(0, 2) and C(2, -2) are collinear. 4  
d) Find the mean of the following grouped frequency distribution. 8

Marks	0 - 20	20 - 40	40 - 60	60 - 80	80 - 100
Number of Students	7	11	10	9	13

DIPLOMA IN HANDLOOM & TEXTILE TECHNOLOGY  
I SEMESTER (BACK PAPER) EXAMINATION – NOV/DEC-2015

1.2 APPLIED MATHEMATICS

Time : 3 Hours

Max. Marks:80

PART A



Answer the following questions

(2x10=20)

1. Find the value of the determinant  $\begin{vmatrix} 8 & -3 \\ 2 & 4 \end{vmatrix} = 0$
2. If  $A = \begin{bmatrix} 1 & -1 \\ 2 & 1 \end{bmatrix}$ ,  $B = \begin{bmatrix} 2 & 3 \\ -4 & 5 \end{bmatrix}$  then Find AB
3. Find the value of  $2\sin 15 \cos 15$
4. If  $A+B+C = 180$ , find the value of  $\tan(A+B)$
5. If  $y = \frac{1}{\sqrt{x}}$  find  $\frac{dy}{dx}$
6. Differentiate  $\log(x^3 + 1)$  with respect to x
7. Evaluate :  $\int (x + 1)^3 dx$
8. Evaluate :  $\int \sec 2x \tan 2x dx$
9. Find the distance between the points P(3,2) and Q (-2,-3)
10. If the arithmetic mean of data 7, 8, x, 11, 14 is x then find the value of x

PART -B

Answer the following questions

1.(a) Show that

$$\begin{vmatrix} x+a & a & a \\ b & x+b & b \\ c & c & x+c \end{vmatrix} = x^2(x+a+b+c) \quad (4)$$

1.(b) Solve the following simultaneous equations using Cramer's rule.

$$\begin{aligned} x + 2y + 5z &= 4 \\ 3x + y + 4z &= 6 \\ -x + y + z &= 3 \end{aligned} \quad (8)$$

OR

1.(c) If  $A = \begin{bmatrix} -1 & 2 & 3 \\ 3 & 4 & -1 \end{bmatrix}$ ,  $B = \begin{bmatrix} 1 & -2 & 0 \\ 2 & 1 & -1 \\ 1 & -1 & 1 \end{bmatrix}$  then verify that  $(AB)^T = B^T A^T$  (4)

1.(d) If  $A = \begin{bmatrix} 1 & 0 \\ 4 & 5 \end{bmatrix}$  and  $B = \begin{bmatrix} 2 & 3 \\ 5 & 7 \end{bmatrix}$  then show that  $(AB)^{-1} = B^{-1}A^{-1}$  (8)

2.(a) Prove that  $(\sin 45 + A) \sin (45 - A) = \frac{\cos 2A}{2}$  (4)

2.(b) Show that  $\frac{\cos A - \cos 3A}{\sin 3A - \sin A} = \tan 2A$  (8)

OR

2.(c) If  $\frac{\cos(A-B)}{\cos(A+B)} = 3$  then show that  $\cot A \cot B = 2$  (4)

2.(d) If  $A+B+C=180$ , prove that  $\cot A \cot B + \cot B \cot C + \cot C \cot A = 1$  (8)

3.(a) Differentiate  $y = x^2 \sin x$  with respect to  $x$  (4)

3.(b) If  $y = \frac{1}{1+x^2-2x}$  then find  $\frac{dy}{dx}$  (8)

OR

3.(c) If  $y = e^{5\sqrt{x}} + \tan x$ , find  $\frac{dy}{dx}$  (4)

3.(d) Find the differential co-efficient of  $\sqrt{\frac{1+x}{1-x}}$  (8)



4.(a) Evaluate :  $\int \frac{\sin(\log x)}{x} dx$

(4)

4.(b) Evaluate :  $\int \frac{x dx}{(x^2+7)^4}$

(8)



OR

4.(c) Evaluate :  $\int (3x + 2)^2 dx$

(4)

4.(d) Evaluate :  $\int \frac{1}{1+\cos x} dx$

(8)

5.(a) Solve the following simultaneous linear equations:

$$8x + 5y = 9$$

$$3x + 2y = 4$$

(4)

5.(b) Prove that the points (1,0) , (-1,0) and (0, $\sqrt{3}$ ) form an equilateral triangle.

(8)

OR

5.(c) Show that the points A(3,0) , B(4,5) , C (-1,4) and D(-2,-1) form a Rhombus.

(4)

5.(d) Find the Mean of the following frequency distribution :

Classes	0-20	20-40	40-60	60-80	80-100
Frequency	7	11	10	9	13

(8)

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DIPLOMA IN HANDLOOM & TEXTILE TECHNOLOGY  
1 YEAR (BACK PAPER) EXAMINATION - NOV/DEC-2015

1.2 APPLIED MATHEMATICS

Time : 3 Hours

Max. Marks:80

PART-A



(2x10=20)

I. Answer all questions

1. Find x if  $\begin{vmatrix} x & 25 \\ 3 & 5 \end{vmatrix} = 0$

2. If  $A = \begin{bmatrix} 2 & 3 & 1 \\ 0 & -1 & 5 \end{bmatrix}$ ,  $B = \begin{bmatrix} 1 & 2 & -1 \\ 0 & 1 & 3 \end{bmatrix}$  Find  $A-2B$

3. Find the value of  $\frac{\tan 4A - \tan 3A}{1 + \tan 4A \tan 3A}$

4. If  $\sin A = \frac{3}{5}$  and  $\cos B = \frac{12}{13}$  find the value of  $\sin(A+B)$

5. If  $y = x^5 + 3$ , find  $\frac{dy}{dx}$

6. Differentiate  $\sin(ax + b)$  with respect to x

7. Evaluate :  $\int \sec^2 x dx$

8. Evaluate :  $\int \sqrt{x} dx$

9. Find the distance between the points P(a,0) and Q (0,b)

10. If the Arithmetic Mean is 24 and Mode is 12, Find the Median.



PART - B

Answer the following questions

1.(a) Show that

$$\begin{vmatrix} 1 & 1 & 1 \\ x & y & z \\ y+z & z+x & x+y \end{vmatrix} = 0 \quad (4)$$

1.(b) Solve the following simultaneous equations using Cramer's rule.

$$\begin{aligned} x + 2y - z &= -3 \\ 3x + y + z &= 4 \\ x - y + 2z &= 6 \end{aligned} \quad (8)$$

OR

1.(c) If  $A = \begin{bmatrix} 2 & 1 & 3 \\ 4 & -1 & 2 \end{bmatrix}$ ,  $B = \begin{bmatrix} -3 & 1 \\ 2 & 3 \\ 0 & 2 \end{bmatrix}$  and  $C = \begin{bmatrix} -1 & 2 & 3 \\ 0 & -1 & 2 \end{bmatrix}$  then verify that  $(AB)C = A(BC)$  (4)

1.(d) If  $A = \begin{bmatrix} 9 & 4 \\ 6 & 3 \end{bmatrix}$ ,  $B = \begin{bmatrix} 5 & -3 \\ -4 & 3 \end{bmatrix}$  Show that  $(AB)^{-1} = B^{-1}A^{-1}$  (8)

2.(a) If  $A+B = 45$  Prove that  $(1+\tan A)(1+\tan B) = 2$  (4)

2.(b) Show that  $\frac{\cos 3A}{\cos A} = 2 \cos 2A - 1$  (8)

OR

2.(c) Prove that  $\cos 20 \cos 40 \cos 80 = \frac{1}{8}$  (4)

(d) Show that  $\frac{\sin 3A + \sin A}{\cos A + \cos 3A} = \tan 2A$  (8)

3.(a) Differentiate  $y = (x^2 + 1) \cos x$  with respect to  $x$  (4)

3.(b) If  $y = \frac{8x+5}{7x-2}$  then find  $\frac{dy}{dx}$  (8)

OR

3.(c) Find the differential co-efficient of  $\log(x^2 + 2x)$  (4)

3.(d) If  $y = \frac{\sqrt{x} + \log x}{1+x^3}$ , find  $\frac{dy}{dx}$  (8)



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3(a) Evaluate :  $\int (x - 1)(x + 3)(x - 3)dx$  (4)  
4.(b) Evaluate :  $\int x e^{x^2} dx$  (8)

OR



4.(c) Evaluate :  $\int (\sin x + \cos x)^2 dx$  (4)

4.(d) Evaluate :  $\int \frac{x dx}{a^2 + x^2}$  (8)

5.(a) Solve the following simultaneous linear equations:

$$\begin{aligned} 3x + 2y &= 11 \\ 2x + 3y &= 4 \end{aligned} \quad (4)$$

5.(b) Prove that the points (2,-2), (-3,8) and (-1,4) are collinear. (8)

OR

5.(c) Show that the points A(1,7), B(4,2), C(-1,-1) and D(-4,4) are the vertices of a Square. (4)

5.(d) Find the Mean of the following frequency distribution :

Classes	0-8	8-16	16-24	24-32	32-40
Frequency	5	9	10	8	8

(8)

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**INDIAN INSTITUTE OF HANDLOOM TECHNOLOGY**  
 RARGARH/FULLIA/GUWAHATI/JODHPUR/SALEM/VARANASI/CHAMPA/KANNUR/KHTI,GADAG/SPKMIHT VENKATAGIRI  
 DIPLOMA IN HANDLOOM & TEXTILE TECHNOLOGY  
 FIRST YEAR (REGULAR & BACK PAPER) – APRIL/MAY-2016

**1.2 – Applied Mathematics**

Time: 3 Hrs

Max Marks: 80

PART A

I. Answer the following questions:

(2 x 10 = 20)

(a) Find the value of determinant  $\begin{vmatrix} \cos\theta & \sin\theta \\ \sin\theta & \cos\theta \end{vmatrix}$

(b) If  $\begin{bmatrix} 2x & y \\ 1 & 3 \end{bmatrix} - \begin{bmatrix} 4 & 2 \\ 0 & -1 \end{bmatrix} = \begin{bmatrix} 8 & 3 \\ 1 & 2 \end{bmatrix}$  find x and y.

(c) Find the value of  $\frac{\cos 30^\circ + \sin 60^\circ}{1 + \cos 60^\circ + \sin 30^\circ}$

(d) Find the value of  $\theta$ ,  $2 \sin 2\theta = \sqrt{3}$

(e) If  $y = (x^2+5)^8$  find  $\frac{dy}{dx}$ .

(f) Differentiate:  $\sqrt{\log x}$  with respect to x.

(g) Integrate:  $\int e^{3x} dx$ .

(h) Evaluate:  $\int (x^2 + \sqrt{x})^2 dx$ .

(i) Find the solution of equation  $x + y = 3$  and  $2x - y = 0$

(j) Find the median of the data 1, 5, 3, 2, 6, 7.

PART B

II. Answer the following questions.

a) If  $A = \begin{bmatrix} 1 & 0 & -2 \\ 2 & 3 & -1 \end{bmatrix}$ ,  $B = \begin{bmatrix} 4 & -1 & 3 \\ 0 & 2 & 1 \end{bmatrix}$  and  $C = \begin{bmatrix} 2 & -3 & 0 \\ 1 & 4 & 5 \end{bmatrix}$  (4)

Then find  $A - 3B + 2C$

b) Solve the following using Cramer's rule (8)

$$2x + y + 2z = 2$$

$$3x + 2y + z = 2$$

$$-x + y + 3z = 6$$

OR

c) Find AB and BA, where  $A = \begin{bmatrix} 1 & 2 \\ 2 & 5 \end{bmatrix}$ ,  $B = \begin{bmatrix} 5 & -2 \\ -2 & 1 \end{bmatrix}$  (4)

d) Find the inverse of matrix,  $\begin{bmatrix} 3 & -2 & 3 \\ 2 & 1 & -1 \\ 4 & -3 & 2 \end{bmatrix}$  (8)

III. a) If  $16 \cot A = 12$ , then find the value of  $\frac{\sin A + \cos A}{\sin A - \cos A}$  (4)

b) Prove that,  $\frac{\cos A - \sin A}{\cos A + \sin A} = \sec 2A - \tan 2A$  (8)

OR

c) If  $(A+B) = 45^\circ$ , Prove that  $(1 + \tan A)(1 + \tan B) = 45^\circ$  (4)

d) Prove that,  $\cot A - \operatorname{cosec} 2A = \cot 2A$  (8)

IV. a) If  $y = \sqrt{x}(\sqrt{x} + 1)$  then find  $\frac{dy}{dx}$  (4)

b) Differentiate,  $\tan\left(\frac{\pi}{4} + \frac{x}{2}\right)$  with respect to  $x$ . (8)

OR

c) If  $y = \sqrt{\sin \sqrt{x}}$  then find  $\frac{dy}{dx}$ . (4)

d) Differentiate,  $\frac{e^x + \cos x}{1 - \sin x}$  with respect to  $x$ . (8)

V. a) Evaluate:  $\int 5 \tan^2 x dx$  (4)

b) Evaluate:  $\int_{-1}^2 (2x + 1)(x - 2) dx$  (8)

OR

c) Evaluate:  $\int \frac{\cos x}{\sin^5 x} dx$  (4)

d) Evaluate:  $\int x^2 \sin ax dx$  (8)

VI. a) Solve the following simultaneous linear equations. (4)

$$3x + 2y = 10$$

$$4x - 3y = 2$$

b) Show that the points  $(3, 2)$ ,  $(0, 5)$ ,  $(-3, 2)$  and  $(0, -1)$  are vertices of a square. (8)

OR

c) Prove that the points  $(7, 2)$ ,  $(1, -2)$  and  $(-2, 4)$  are collinear. (4)

$$20 \left( \frac{20 - 14}{14} \right) \times 10$$

d) Find the median of the following grouped frequency distribution. (8)

Marks	0 - 10	10 - 20	20 - 30	30 - 40	40 - 50	50 - 60
No. of students	6	8	14	16	4	2

Handwritten calculations and notes:

- \*\*\*\*\*
- $d + \left(\frac{n - CF}{CF}\right) \times h$
- $d + \left(\frac{\frac{n}{2} - EF}{EF}\right) \times h$
- 2/13
- 13.45
- 50

# INDIAN INSTITUTE OF HANDLOOM TECHNOLOGY

BARGARH/FULIA/GUWAHATI/JODHPUR/SALEM/VARANASI/CHAMPA KANNUR/KHITI GADAG/SPKMIHT VENKATGIRI

DIPLOMA IN HANDLOOM & TEXTILE TECHNOLOGY

FIRST SEMESTER (OLD SYLLABUS BACK PAPER) EXAMINATION – APRIL/MAY-2016

## 1.2 APPLIED MATHEMATICS

Time: 3 Hours

Max. Marks: 80

### PART-A

2x10=20

Answer the following questions.

1. a) Find the value of determinant  $\begin{vmatrix} 2 & -3 \\ 1 & -4 \end{vmatrix}$
- b) If  $A = \begin{bmatrix} 1 & -1 \\ 2 & 3 \end{bmatrix}$ ,  $B = \begin{bmatrix} 4 & 2 \\ -1 & -2 \end{bmatrix}$  then find AB
- c) Find the value of  $\sin 60^\circ \cdot \cos 30^\circ + \cos 60^\circ \cdot \sin 30^\circ$
- d) Evaluate:  $\frac{\cos 37^\circ}{\sin 53^\circ}$
- e) If  $y = x^3 - 5x$  find  $\frac{dy}{dx}$ .
- f) Differentiate  $(x-5)^7$  with respect to  $x$ .
- g) Integrate:  $\int (x^6 + x^2 + 5x) dx$
- h) Evaluate:  $\int \frac{1}{x\sqrt{x}} dx$ .
- i) Let A (3,-2) and B (6,2) then find |AB|.
- j) Find the mode of the data  
4, 5, 6, 7, 6, 7, 6, 5.

### PART B

2. Answer the following equations:

a) Evaluate:  $\begin{vmatrix} \sin^2 \theta & \cos^2 \theta & 1 \\ \cos^2 \theta & \sin^2 \theta & 1 \\ -10 & 12 & 2 \end{vmatrix}$

b) Solve the following equations using cramer's rule.

$$\begin{aligned} x + 2y + 3z &= 6 \\ 2x + 4y + z &= 7 \\ 3x + 2y + 9z &= 14 \end{aligned}$$

OR

c) If  $A = \begin{bmatrix} 1 & 2 & 3 \\ 6 & 7 & 8 \\ 6 & -3 & 4 \end{bmatrix}$  and  $B = \begin{bmatrix} 1 & 2 & 3 \\ 3 & 4 & 2 \\ 5 & 6 & 1 \end{bmatrix}$  then verify that  $[AB]^T = B^T A^T$

d) Find the inverse of matrix  $\begin{bmatrix} 1 & 2 & 3 \\ 2 & 1 & 1 \\ 1 & 1 & 2 \end{bmatrix}$

3. a) Prove that  $\frac{\sin \theta}{1 - \cos \theta} = \operatorname{cosec} \theta + \cot \theta$

b) Prove that  $\sqrt{\frac{1 - \sin \theta}{1 + \sin \theta}} = \sec \theta - \tan \theta$

OR

c) Show that  $\frac{\cot A - \tan A}{\cot A + \tan A} = \cos 2A$

d) If  $A + B + C = 180^\circ$  prove that

$$\cot A \cdot \cot B + \cot B \cdot \cot C + \cot C \cdot \cot A = 1$$

4  
8  
4  
8  
4

(8)

900  
53  
27

4. a) If  $y = \sqrt{\sec(2x+1)}$  then find  $\frac{dy}{dx}$ . 4

b) Differentiate  $\frac{e^x + e^{-x}}{x^2 + 1}$  with respect to  $x$ . 8

OR (7)

c) If  $y = \ln(e^{nx} + e^{-nx})$  find  $\frac{dy}{dx}$  4

d) Differentiate  $\frac{e^{3x^2}}{\ln \sin x}$  with respect to  $x$ . 8

OR

5. a) Evaluate  $\int 6x^3(x+5^2) dx$  4

b) Evaluate  $\int^2 (4x^3 - 5x^2 + 6x) dx$  8

OR (8)

c) Evaluate  $\int \sec^2 4x dx$  4

d) Evaluate  $\int x^2 e^{ax} dx$  8

6. a) Solve the following simultaneous linear equations. 4

$$3x - 7y = -10$$

$$-2x + y = 3$$

b) Show that the points  $(0, -1)$ ,  $(-2, 3)$ ,  $(6, 7)$  and  $(8, 3)$  are vertices of a rectangle. 8

OR

c) If the distance between the points  $(3, a)$  and  $(6, 1)$  is 5, find the value of  $a$ . 4

d) Find the mean of the following grouped frequency distribution. 8

Marks	0 - 10	10 - 20	20 - 30	30 - 40	40 - 50	8
No. of Students	6	12	18	9	5	

\*\*\*\*\*

$$\sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$$

$$\sqrt{(6 - 3)^2 + (1 - a)^2}$$

$$3^2 + 1^2 - 2ab + a^2$$

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DIPLOMA IN HANDLOOM & TEXTILE TECHNOLOGY  
FIRST YEAR (2014 REGULATION) EXAMINATION - NOV/DEC -2016

1.2 APPLIED MATHEMATICS

Time : 3 Hours

Max. Marks : 80

PART - A

Q.1. Answer the following questions

02x10=20

- a. If  $\begin{vmatrix} x & 2 \\ 18 & x \end{vmatrix} = \begin{vmatrix} 6 & 2 \\ 18 & 6 \end{vmatrix}$ , then find x.
- b. Find the value of x, y and z from the following equations.  
$$\begin{bmatrix} x+y & 2 \\ 5+z & xy \end{bmatrix} = \begin{bmatrix} 6 & 2 \\ 5 & 8 \end{bmatrix}$$
- c. Find the value of  $\frac{\tan 25^\circ + \tan 20^\circ}{1 - \tan 25^\circ \cdot \tan 20^\circ}$
- d. Express in the form of a product :  $\sin 4\theta + \sin 2\theta$
- e. Find  $\frac{dy}{dx}$ , if  $y = (9\sqrt{x} + x^2)$
- f. Differentiate :  $\frac{e^x}{\sin x}$  with respect to x.
- g. Integrate :  $\int (\sin x + \cos x) dx$
- h. Evaluate:  $\int_0^{\pi/4} \sec^2 x dx$
- i. Find the solution of the equation :  $x + 2y = 4$  and  $x - 2y = 0$
- j. Find the mean of the first six prime numbers

PART - B

Q.2. Answer following questions.

- a. If  $A = \begin{bmatrix} 1 & 0 \\ 1 & 1 \end{bmatrix}$ ,  $B = \begin{bmatrix} 0 & 2 \\ 1 & 0 \end{bmatrix}$  and  $C = \begin{bmatrix} 0 & 0 \\ -1 & 2 \end{bmatrix}$  04  
Verify that  $A + (B+C) = (A+B) + C$
  - b. Solve the following equations by using CRAMER'S Rule 08  
 $7x + 3y - 4z = 6$   
 $2x - 5y + 6z = 3$   
 $x + y + 2z = 4$
- OR
- c. Find AB and BA, Where 04  
 $A = \begin{bmatrix} 1 & 2 & 3 \\ 4 & 5 & -1 \end{bmatrix}$  and  $B = \begin{bmatrix} 1 & 2 \\ 3 & 4 \\ -1 & 1 \end{bmatrix}$
  - d. Solve the following equations by using matrix inversion method 08  
 $2x - 5y + 3z = -19$   
 $7x + 2y + 6z = 1$   
 $4x + 5y + 4z = 11$

Q.3.

a. Prove that

$$\frac{\sin(A-B)}{\cos A \cos B} + \frac{\sin(B-C)}{\cos B \cos C} + \frac{\sin(C-A)}{\cos C \cos A} = 0$$

b. Prove that

$$\cos 20^\circ \cos 40^\circ \cos 60^\circ \cos 80^\circ = \frac{1}{16}$$

OR

c. Prove that

$$\frac{\sin \theta + \sin 2\theta + \sin 3\theta}{\cos \theta + \cos 2\theta + \cos 3\theta} = \tan 2\theta$$

d. If  $A + B + C = 180^\circ$ , then prove that

$$\sin A + \sin B - \sin C = 4 \sin \frac{A}{2} \sin \frac{B}{2} \cos \frac{C}{2}$$

Q.4.

a. By using product rule, find  $\frac{dy}{dx}$ ,

$$\text{if } y = (1 + \sqrt{x} + x)(2 - x^2 + 7x)$$

b. By using quotient rule, find  $\frac{dy}{dx}$ ,

$$\text{if } y = \frac{\sqrt{x} + \log x}{1+x^3}$$

OR

c. Differentiate :  $xe^x \cos x$  with respect to  $x$

d. By using quotient rule, find  $\frac{dy}{dx}$ ,

$$\text{if } y = \frac{x \cos x}{(2x+1) \sin x}$$

Q.5.

a. Evaluate :

$$\int \left(x + \frac{1}{\sqrt{x}}\right) \left(\sqrt{x} - \frac{1}{\sqrt{x}}\right) dx$$

b. Evaluate :

$$\int \frac{2x+3}{x^2+x+1} dx$$

OR

c. Evaluate :

$$\int \sin 9x \cdot \sin 11x dx$$

d. Evaluate :

$$\int \frac{dx}{3x^2-4x-5}$$

Q.6.

a. Solve the following simultaneous linear equations

$$5x - 3y = -30$$

$$2x + 4y = 70$$

b. Prove that the points A (3, 4), B (9, 8), C (5, 2) and D (-1, -2) are vertices of a Rhombus.

OR

c. Prove that the points A (1, 1), B (-2, 7) and C (3, -3) are collinear.

d. Find the missing frequency in the following distribution if N is 100 and median is 32.

C.I	0 - 10	10 - 20	20 - 30	30 - 40	40 - 50	50 - 60	Total
f	10	$f_1$	25	30	$f_2$	10	100



1.2 APPLIED MATHEMATICS

Time: 3 Hours

Max. Marks: 80

PART - A

Q.1. Answer the following questions

02x10=20

a. In the determinant  $\begin{vmatrix} 4 & 7 & 6 \\ -2 & 0 & -1 \\ 1 & 4 & 2 \end{vmatrix}$ , what is the cofactor of 0?

b. Find the value of x, y, z and t from the following equations.

$$\begin{bmatrix} x & 3x - y \\ 2x - z & 3y - t \end{bmatrix} = \begin{bmatrix} 3 & 2 \\ 5 & 7 \end{bmatrix}$$

c. Find the value of :  $\frac{1 - \tan^2 15^\circ}{1 + \tan^2 15^\circ}$

d. Express the sum (or) difference of the given expressions :  $\cos 7x \cos 5x$

e. Find  $\frac{dy}{dx}$ , if  $y = \frac{1}{x^3} - \frac{1}{x}$

f. Find  $\frac{dy}{dx}$ , if  $y = e^x \sin x$

g. Integrate :  $\int (\sec 2x \tan 2x) dx$

h. Evaluate:  $\int_1^2 (4x^3 - 5x^2) dx$

i. Find the solution of the equations :  $2x + y = 4$  and  $3x - y = 0$

j. Find the median of the data : 4, 5, 6, 7, 6, 2, 3, 8

PART - B

Q.2. Answer following questions.

a. For what value of 'p' is the matrix  $\begin{bmatrix} 4 & -3 & -1 \\ 2 & 4 & 6 \\ 3 & p & -4 \end{bmatrix}$  singular. 04

b. Prove that

$$\begin{vmatrix} a^2 + 1 & ab & ac \\ ba & b^2 + 1 & bc \\ ca & cb & c^2 + 1 \end{vmatrix} = 1 + a^2 + b^2 + c^2 \quad 08$$

OR

c. Find the value of  $\begin{bmatrix} x & y & z \end{bmatrix} \begin{bmatrix} a & h & g \\ h & b & f \\ g & f & c \end{bmatrix} \begin{bmatrix} x \\ y \\ z \end{bmatrix}$  04

d. Solve the following equations by using CRAMER'S Rule 08

$$\begin{aligned} x + 2y + 3z &= 6 \\ 2x + 4y + z &= 7 \\ 3x + 2y + 9z &= 14 \end{aligned}$$

- Q.3. a. If  $A + B = 45^\circ$ , then prove that  $(\cot A - 1)(\cot B - 1) = 2$  04  
 b. Prove that  $\sin 20^\circ \sin 40^\circ \sin 60^\circ \sin 80^\circ = \frac{3}{16}$  08

OR

- c. Prove that  $\frac{1 - \cos 3\theta}{1 - \cos \theta} = (1 + 2 \cos \theta)^2$  04  
 d. If  $A + B + C = 180^\circ$ , then prove that  $\cos^2 A + \cos^2 B + \cos^2 C = 1 - 2 \sin A \sin B \cos C$  08

- Q.4. a. By using product rule, find  $\frac{dy}{dx}$ , if  $y = (2x^2 - 5)(\sqrt{x} + 1) \log x$  04  
 b. By using quotient rule, find  $\frac{dy}{dx}$ , if  $y = \frac{x \cos x}{(2x+1) \sin x}$  08

OR

- c. Find  $\frac{dy}{dx}$ , if  $y = e^{3x} \log x \sin 3x$  04  
 d. Differentiate  $\frac{e^{x^2} \log(\sec x)}{\tan x}$  w.r.to 'x'. 08

- Q.5. a. Evaluate:  
 $\int \frac{\sin x}{1 - \sin x} dx$  04

- b. Evaluate:  
 $\int \frac{dx}{x^2 - 3x - 4}$  08

OR

- c. Evaluate:  
 $\int e^{2x} \sin x dx$  04

- d. Evaluate:  
 $\int \frac{4x-3}{x^2+3x+8} dx$  08

- Q.6. a. Solve the following simultaneous linear equations 04  
 $5x + 7y = 30$   
 $-3x + 10y = -18$

- b. Prove that the points A (1, 2), B (5, 4), C (3, 8) and D (-1, 6) are the vertices of a square 08

OR

- c. Prove that the points A (2, 0), B (11, 6) and C (-4, -4) are collinear. 04

- d. The frequency distribution given below shows the heights of 60 students of a class.  
 If mean of the data is 157, Find the missing frequencies x and y 08

Height(in cm)	144-148	148-152	152-156	156-160	160-164	164-168	Total
Number of students	x	8	15	y	16	6	60

# INDIAN INSTITUTE OF HANDLOOM TECHNOLOGY

BARGARI/GUWAHATI/FULIA/JODHPUR/SALEM/VARANASI/CHAMPA/KANNUR/KHITI GADAG/SPKM

VENKATAGIRI

DIPLOMA IN HANDLOOM & TEXTILE TECHNOLOGY

ANNUAL EXAMINATION APRIL/MAY-2017 (2014-REGULATION)

Time : 3 Hours  
FIRST YEAR

Max. Marks : 80

1.2 APPLIED MATHEMATICS

## Part - A

10 x 2=20 Marks

- 1 Solve  $\begin{vmatrix} 4 & 5 \\ 3 & x \end{vmatrix} = 1$
- 2 If  $A = \begin{bmatrix} 2 & 3 & 1 \\ 0 & -1 & 5 \end{bmatrix}$ ,  $B = \begin{bmatrix} 1 & 2 & -1 \\ 0 & 1 & 3 \end{bmatrix}$  Find  $A - 2B$
- 3 Find the value of  $\frac{\cos 30^\circ + \sin 60^\circ}{1 + \cos 60^\circ + \sin 30^\circ}$
- 4 Find the value of  $\frac{\tan 4A - \tan 3A}{1 + \tan 4A \tan 3A}$
- 5 If  $y = 5 \sin x - e^x + \log x$ , find  $\frac{dy}{dx}$
- 6 Differentiate  $\log(x^3 + 1)$  with respect to  $x$
- 7 Evaluate :  $\int \sec 2x \tan 2x \, dx$
- 8 Integrate :  $\int (x^6 + x^2 + 2) \, dx$
- 9 Find the Median of the observation 4, 7, 3, 6, 8, 5, 9
- 10 Let  $A(3, -2)$  and  $B(6, 2)$  then find  $|AB|$

## PART-B

12 x 5= 60 Marks

- 11 A) Show that  $\begin{vmatrix} 1 & 1 & 1 \\ a & b & c \\ a^3 & b^3 & c^3 \end{vmatrix} = (a-b)(b-c)(a-b)(a+b+c)$  (4)
- B) Solve the following using Cramer's rule :  $x + y + z = 3$ ,  $2x - y + z = 2$ ,  $3x + 2y - 2z = 3$  (8)

(Or)

- C) If  $A = \begin{bmatrix} 1 & 2 & 2 \\ 2 & 1 & 2 \\ 2 & 2 & 1 \end{bmatrix}$ , Prove that  $A^2 - 4A - 5I = 0$  (4)
  - D) Find the inverse of matrix  $\begin{bmatrix} 1 & 2 & 3 \\ 2 & 1 & 4 \\ 1 & 0 & 2 \end{bmatrix}$  (8)
- 12 A) Prove that  $\sin(45 + A) \sin(45 - A) = \frac{\cos 2A}{2}$  (4)

- B) If  $A + B + C = 180^\circ$  Prove that  $\cot A \cdot \cot B + \cot B \cdot \cot C + \cot C \cdot \cot A = 1$  (8)

(Or)

- C) If  $(A + B) = 45^\circ$ , Prove that  $(1 + \tan A)(1 + \tan B) = 45^\circ$  (4)

- D) Prove that  $\sin 20 \sin 40 \sin 60 \sin 80 = \frac{3}{16}$  (8)

- 13 A) Differentiate  $y = e^x \log x$  with respect to  $x$  (4)

- B) Find  $\frac{dy}{dx}$ , when  $y = \frac{\sqrt{x}-1}{\sqrt{x}+1}$  with respect to  $x$  (8)

(Or)

- C) If  $y = \frac{1}{1+x^2-2x}$  then find  $\frac{dy}{dx}$  (4)

- D) Differentiate  $\frac{e^x + \cos x}{1 - \sin x}$  with respect to  $x$  (8)

- 14 A) Evaluate  $\int (4x^3 - 5x^2 + 6x) dx$  (4)

- B) Evaluate  $\int \frac{\cos x}{3+5 \sin x} dx$  (8)

(Or)

- C) Evaluate :  $\int \frac{1}{4x^2-9} dx$  (4)

- D) Evaluate :  $\int \frac{x+2}{x^2+4x-3} dx$  (8)

- 15 A) Solve the following simultaneous linear equations (4)

$$8x + 5y = 9, 3x + 2y = 4$$

- B) Show that the points (2, 2), (8, 4), (5, 7) and (-1, 1) are the vertices of a rectangle. (8)

(Or)

- C) Find the value of 'a' So that the points (1, 4), (2, 7), (3, a) are collinear (4)

- D) Find the mean of the following grouped frequency distribution : (8)

Marks	0 - 20	20 - 40	40 - 60	60 - 80	80 - 100
Number of Students	7	11	10	9	13

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# INDIAN INSTITUTE OF HANDLOOM TECHNOLOGY

BARGARH/GUWAHATI/FULIA/JODHPUR/SALEM/VARANASI/CHAMPA/KANNUR/KHTI-GADG/SPKM-IIHT-VENKATAGIRI

## DIPLOMA IN HANDLOOM AND TEXTILE TECHNOLOGY

ANNUAL EXAMINATION - April / May - 2018

(Regulation 2014)

Year / Semester: 1<sup>st</sup> Year

Time: 3 Hours

Subject Code & Name: 1.2 & Applied Mathematics

Max. Marks: 80

PART - A

(2 X 10 = 20)

Answer the following questions:

1. Find the value of  $x \begin{vmatrix} 2 & 4 \\ -1 & x \end{vmatrix} = 0$
2. If  $A = \begin{bmatrix} 1 & -1 \\ 2 & 1 \end{bmatrix}$ ,  $B = \begin{bmatrix} 2 & 3 \\ -4 & 5 \end{bmatrix}$  then find AB
3. Find the value of  $\frac{\tan 4A - \tan 3A}{1 + \tan 4A \tan 3A}$
4. Find the value of  $3 \sin 10^\circ - 4 \sin 10^\circ$
5. If  $y = x^4 + 1$  find  $\frac{dy}{dx}$
6. Differentiate: if  $y = \sqrt{\log x}$  with respect to  $x$
7. Evaluate:  $\int \cos 2x dx$
8. Evaluate:  $\int \frac{1}{x^3} dx$
9. If the arithmetic mean of data 7, 8,  $x$ , 11, 14 is 9 then find the value of  $x$
10. Find the median of data 4, 8, 1, 5, 6, 3, 7, 2, 10

PART - B

5 X (4 + 8) = 60

Answer the following questions:

11. (a) Show that  $\begin{vmatrix} 1 & a+b & a^2+b^2 \\ 1 & b+c & b^2+c^2 \\ 1 & c+a & c^2+a^2 \end{vmatrix} = (a-b)(b-c)(c-a).$  (4)

(b) Find the inverse of the matrix:  $\begin{bmatrix} 1 & 1 & -1 \\ 2 & 1 & 0 \\ -1 & 2 & 3 \end{bmatrix}$  (8)

(OR)

(c) If  $A = \begin{bmatrix} 3 & -2 \\ 2 & 1 \end{bmatrix}$ ,  $B = \begin{bmatrix} 1 & 2 \\ 3 & 4 \end{bmatrix}$  and  $C = \begin{bmatrix} 2 & 3 \\ 4 & -1 \end{bmatrix}$  then Show that  $A(BC) = (AB)C.$  (4)

(d) Solve the equations by using Cramer's Rule: (8)

$$4x + y - 3z = 3, 2x + 3y - 2z = 6, x + y + z = 4$$

12. (a) Prove that :  $\frac{\cos(A+B)}{\cos A \cos B} = 1 - \tan A \tan B$  (4)

(b) If  $A + B = 45^\circ$ , Prove that  $(1 + \tan A)(1 + \tan B) = 2$ ,

Hence find the value of  $\tan\left(22\frac{1}{2}^\circ\right)$ . (8)

(OR)

(c) Find the value of  $\sin 40^\circ \cos 10^\circ - \cos 40^\circ \sin 10^\circ$  (4)

(d) If  $A + B + C = 180^\circ$  Prove that  $\cot A \cot B + \cot B \cot C + \cot C \cot A = 1$  (8)

13. (a) If  $y = 7 \cos x + 9 \log x - 3x^2 + \frac{1}{x^2} + 1$  then find  $\frac{dy}{dx}$  (4)

(b) Find  $\frac{dy}{dx}$  if  $y = (x^2 - 4)(2x^2 - 7)$  (8)

(OR)

(c) Differentiate  $y = 8x^3 - 5x^2 + 6x - 7$  with respect to  $x$ . (4)

(d) Find the differentiation of the function  $\sqrt{\frac{1+x}{1-x}}$  with respect to  $x$ . (8)

14. (a) Evaluate :  $\int \frac{5}{x^4} dx$  (4)

(b) Evaluate :  $\int \frac{1}{1+\sin x} dx$  (8)

(OR)

(c) Evaluate :  $\int x(x-1)^2 dx$  (4)

(d) Evaluate :  $\int \frac{\tan^{-1} x}{\cos^2 x} dx$  (8)

15. (a) Solve the following simultaneous equations :  $8x + 5y = 9$ ,  $3x + 2y = 4$  (4)

(b) Verify that the points  $(3,0)$ ,  $(4,5)$ ,  $(-1, 4)$  and  $(-2,-1)$  are the vertices of rhombus (8)

(OR)

(c) Verify that the points  $(2,-2)$ ,  $(-3, 8)$  and  $(-1, 4)$  are collinear. (4)

(d) Find the mean of the following grouped frequency distributions: (8)

Marks	0 - 20	20 - 40	40 - 60	60 - 80	80 - 100
Number of Students	5	8	6	15	5

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GWA - 3

INDIAN INSTITUTE OF HANDLOOM TECHNOLOGY

BARGARH/GUWAHATI/TELEHA/JOIBIPUR/SALEM/VARANASI/CHAMPA/KANSUR/KHITLA/ADLAG/SHYAM-SHRI/AYENKAT/AGRI

DIPLOMA IN HANDLOOM AND TEXTILE TECHNOLOGY

SEMESTER EXAMINATION - April / May - 2018

(Regulation 2011)

Year / Semester: I Semester

Time: 3 Hours

Subject Code & Name: I.2 & Applied Mathematics

Max. Marks: 80

PART - A

2 X 10 = 20

Answer the following questions:

1. Solve  $\begin{vmatrix} 1 & 2 \\ 3 & x \end{vmatrix} = 1$
2. If  $A = \begin{bmatrix} 3 & 1 \\ 4 & 2 \end{bmatrix}$ ,  $B = \begin{bmatrix} 2 & -2 \\ 1 & 5 \end{bmatrix}$  Find  $A - 2B$
3. Find the value of  $1 - 2 \sin^2(22 \frac{1}{2})$
4. Find the value of  $\sin 75^\circ$
5. If  $y = x^4 - 5x$ , find  $\frac{dy}{dx}$
6. Find  $\frac{dy}{dx}$  if  $y = \sqrt{2x + 1}$
7. Evaluate:  $\int 5x^4 dx$
8. Integrate:  $\int \cos 4x dx$
9. Find the Mode of the observation 5, 3, 4, 8, 4, 3, 4, 8, 2, 6
10. If A (3, -2) and B (6, 2) then find distance between A and B

PART - B

5 X (4 + 8) = 60

Answer the following questions:

11. (a) Show that  $\begin{vmatrix} 1 & 1 & 1 \\ x & y & z \\ x^2 & y^2 & z^2 \end{vmatrix} = (x - y)(y - z)(z - x)$  (4)
- (b) Solve the following using Cramer's rule:  $x + y + z = 3$ ,  $2x - y + z = 2$ ,  $3x + 2y - 2z = 3$  (8)
- (OR)
- (c) If  $A = \begin{bmatrix} 2 & 3 \\ 0 & 1 \end{bmatrix}$ ,  $B = \begin{bmatrix} 3 & 4 \\ 2 & 1 \end{bmatrix}$ , Prove that  $(A + B)^T = A^T + B^T$  (4)
- (d) Find the inverse of matrix  $\begin{bmatrix} 2 & -5 & 3 \\ 7 & 2 & 6 \\ 4 & 5 & 4 \end{bmatrix}$  (8)

12. (a) Find the value of  $\cos 75^\circ \cos 15^\circ - \sin 75^\circ \sin 15^\circ$  (4)

(b) If  $A + B + C = 180^\circ$  Prove that  $\cot A \cot B + \cot B \cot C + \cot C \cot A = 1$  (8)

(OR)

(c) Show that  $\frac{\sin 3A - \sin A}{\cos A - \cos 3A} = \cot 2A$  (4)

(d) Prove that  $\cos 3x = 4 \cos^3 x - 3 \cos x$  (8)

13. (a) Differentiate  $y = e^x \log x$  with respect to  $x$  (4)

(b) Find  $\frac{dy}{dx}$ , when  $y = \frac{\sqrt{x} - 1}{\sqrt{x} + 1}$  with respect to  $x$  (8)

(OR)

(c) If  $y = \frac{1}{1 + x^2 - 2x}$  then find  $\frac{dy}{dx}$  (4)

(d) Differentiate,  $\frac{e^x + \cos x}{1 - \sin x}$  with respect to  $x$  (8)

14. (a) Evaluate  $\int (e^x + 5) dx$  (4)

(b) Evaluate:  $\int \sqrt{1 + \sin 2x} dx$  (8)

(OR)

(c) Evaluate:  $\int \frac{1}{4x^2 - 9} dx$  (4)

(d) Evaluate  $\int \frac{\cos x}{3 + 5 \sin x} dx$  (8)

15. (a) Solve the following simultaneous equations :  $8x + 6y = 56, 8x - 6y = 8$  (4)

(b) Show that the points  $(2, -2), (8, 4), (5, 7)$  and  $(-1, 1)$  are vertices of a rectangle. (8)

(OR)

(c) Find the value of  $a$  so that the points  $(-1, 4), (2, 7), (3, a)$  are collinear. (4)

(d) Find the mean of the following grouped frequency distributions: (8)

Marks	0 - 10	10 - 20	20 - 30	30 - 40	40 - 50
Number of Students	7	10	15	8	10

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