## CR-2485

# M. Sc. (First Semester) Examination, 

Nov.-Dec. 2018

## CHEMISTRY

## Paper : Fifth (a) <br> (Mathematics for Chemists)

Time Allowed : Three hours
Maximum Marks : 40
Note : Attempt questions of all two sections as directed.

## Section-A

> (Short Answer Type Questions) 5x3=15

Note : Attempt all the five questions. Each question carries 3 marks.

1. Find the value of $a .(b x c)$ where $a=2 i-3 j+k, b=i-j+2 k, c=2 i+j-k$

Or
If $A=\left[\begin{array}{ccc}1 & 2 & -3 \\ 4 & 1 & 5 \\ -3 & -2 & 2\end{array}\right], B=\left[\begin{array}{ccc}3 & -1 & 2 \\ 4 & 2 & 5 \\ 2 & 0 & 3\end{array}\right]$. Find the value of the matrix $A B$
2. Find the differential coefficient of $\quad f(x)=\left(\frac{2 x+3}{x^{2}+5}\right)$ with respect to x .

Or

Find the maximum and minimum values of
$2 x^{3}-15 x^{2}+36 x+10$
3. Evaluate

$$
\int \frac{d x}{(1-\sin x)}
$$

$\qquad$

## Or

Write the relation between cartesian and polar coordinates.
4. Solve $\left(1-x^{2}\right)(1-y) d x=x y(1+y) d y$.
Or

Solve the differential equation

$$
\frac{d^{2} y}{d x^{2}}+2 \frac{d y}{d x}+y=0
$$

5. In how many ways 11 players out of 16 cricket players can be selected.

Or
One card is drawn from a well-shuffled deck of 52 cards. Calculate the probability that the card will be :
(i) a diamond
(ii) an ace
(ii) a black card
(i.e. a club or a spade)

## Section-B

Note : Attempt all the five questions. Each question carries 05 marks.
6. Find the Divergence of
$f=i x^{2}+j y^{2}-k z$
Or

Find the Adjoint of the matrix A where

$$
A=\left[\begin{array}{ccc}
1 & 1 & 3 \\
0 & 1 & -1 \\
2 & 0 & 4
\end{array}\right]
$$

7. Find the differential coefficient of

$$
F(x)=(\sin x)^{x} \text { with respect to } x \text {. }
$$

Or
Show that the right circular cone of a given surface (including the ends) and maximum valume is such that its height is equal to the diameter of the base.
8. Evaluate the integral

$$
\int e^{x} \sin x d x
$$

Or

Write the relation between cartesian and cylindrical coordinates.
9. Solve
$\left(x^{3}-3 x y^{2}\right) d x=\left(y^{3}-3 x^{2} y\right) d y$
Or
Solve

$$
\left(1+x^{2}\right) \frac{d y}{d x}+2 x y=\cos x
$$

10. Fit a straight line to the following data taking $x$ as the independent variable

| $x$ | 0 | 1 | 2 | 3 | 4 |
| :---: | :---: | :---: | :---: | :---: | :---: |
| $y$ | 1.0 | 1.8 | 3.3 | 4.5 | 6.3 |

Or
How many permutations can be made out of the letter of the word "BUSINESS". How many of these will begin with B end with N ?

