CR-2485

M. Sc. (First Semester) Examination,

Nov.-Dec. 2018

CHEMISTRY

Paper : Fifth (a)

(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.(bxc) where

a= 2i – 3j+k, b=i- j +2k, c = 2i+j-k

Or

If $A=\begin{bmatrix} 1 & 2 & -3 \\ 4 & 1 & 5 \\ -3 & -2 & 2 \end{bmatrix}$, $B=\begin{bmatrix} 3 & -1 & 2 \\ 4 & 2 & 5 \\ 2 & 0 & 3 \end{bmatrix}$. Find the value of the matrix AB

2. Find the differential coefficient of $f(x)=\left(\frac{2x+3}{x^2+5}\right)$ with respect to x.

Or

Find the maximum and minimum values of

$2x^3 - 15x^2 + 36x + 10$

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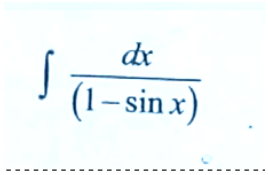
3. Evaluate



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

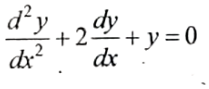
Or

Write the relation between cartesian and polar coordinates.

4. Solve $(1- x^2)(1- y)dx = xy(1+y)dy$.

Or

Solve the differential equation



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

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

(Long Answer Type Questions) 5x5=25

Note : Attempt all the five questions. Each question carries 05 marks.

6. Find the Divergence of

$f = ix^2 + jy^2 - kz$

Or

Find the Adjoint of the matrix A where

$$A = \begin{bmatrix} 1 & 1 & 3 \\ 0 & 1 & -1 \\ 2 & 0 & 4 \end{bmatrix}$$

7. Find the differential coefficient of

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

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

$$\int e^x \sin x \, dx$$

Or

Write the relation between cartesian and cylindrical coordinates.

9. Solve

$(x^3 - 3xy^2)dx = (y^3 - 3x^2y)\,dy$

Or

Solve

$$\left(1+x^2\right)\frac{dy}{dx}+2xy=\cos x$$

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?