



JAO-003-1271001

Seat No. \_\_\_\_\_

M. Sc. (Sem. I) (CBCS) (E.C.I.)

(W.E.F. 2016) Examination

November - 2019

Foundation of Science & Mathematics : Paper - 1

Faculty Code : 003

Subject Code : 1271001

Time :  $2\frac{1}{2}$  Hours]

[Total Marks : 70

**Instructions :**

- (1) All questions carry equal marks.
- (2) Figures on right hand side indicate marks.

1 Answer the following :

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(1) Evaluate  $\begin{vmatrix} 2 & 1 & 3 \\ 1 & 1 & 5 \\ 2 & -1 & 4 \end{vmatrix}$

(2) Expand  $(a + b)^4$

(3) What is a vector and a scalar ?

(4) Find  $\lim_{x \rightarrow 1} \frac{x^3 - 1}{x - 1}$

(5) Give the definition of distance and displacement.

(6) Solve  $\sin \frac{3\pi}{4} = \underline{\hspace{2cm}}$

(7) Fill in the blank  $\int x^3 dx = \underline{\hspace{2cm}} + c$

(8) Solve  $\frac{d}{dx}(e^{2x} + 5)$

(9) What is a variable speed and uniform speed ?

(10) Fill in the blank  $\sin \alpha + \sin \beta = \underline{\hspace{2cm}}$  .

- 2 Answer the following : (any two)
- (1) Find the coefficient of  $x^2y^2$  in the expansion of  $(2x + y)^4$ . 7
- (2) What is displacement time graph ? What are their types ? 7  
Explain any one type in brief.
- (3) Solve equation  $\int (e^{4x} + \sin x + 7 \tan x) dx$ . 7

3 Answer the following :

- (1) Evaluate  $\lim_{x \rightarrow 0} \frac{\sin 3x - \tan 5x + 4x}{x}$  7
- (2) Find the extreme value of  $f(x) = 2x^2 - 15x^2 + 36x + 1$  7

**OR**

3 Answer the following :

- (1) Write a note on acceleration and average velocity. 5
- (2) Define the force. What are contact force and force at distance ? 5
- (3) Define velocity, uniform velocity and variable velocity. 4

4 Answer the following :

- (1) Evaluate  $\int \frac{1 - \sin x}{\cos^2 x} dx$ . 7
- (2)  $y = \frac{ax + b}{cx + d}$  then find  $\frac{dy}{dx}$  7

5 Answer the following : (any two)

- (1) Write on an acceleration time graph. 7
- (2) (a) Evaluate  $\cos^{-1} \frac{1}{2} + \tan^{-1} \infty + \sec^{-1} \sqrt{2}$ . 7  
(b) Evaluate  $\sin 15^\circ$
- (3) Simplify the  $\log(\log x^2) - \log(\log x)$ . 7

- (4) Prove that  $\begin{vmatrix} 1 & a & bc \\ 1 & b & ac \\ 1 & c & ab \end{vmatrix} = (a - b)(b - c)(c - a)$ . 7