

2021

INTERNAL EXAMINATION

MATHEMATICS (General)

Paper Code: MATH-G-DC-3/GE-3

[CBCS]

Full Marks: 18

Time: One Hours

*The figures in the margin indicate full marks.
Notations and symbols have their usual meanings.*

(Group-A)

- 1) Answer the following questions. $4 \times 2 = 8$
- i) Write down the condition for maxima and minima for functions of several variables.
- ii) Define Linear span of a vector space.
- iii) Define collinear vectors and what is the condition for collinearity.
- iv) If $x = r \cos \theta$, $y = r \sin \theta$, then find the value of $\frac{\partial(x,y)}{\partial(r,\theta)}$.

(Group-B)

2. Answer the following questions

- i) (a) If $\phi = x - y$. Find $|\nabla\phi|$ at the point $(1, -1, 0)$. [2]
- (b) Find the directional derivative of $\phi = 4xy - x^2z$ at $(0, -1, 1)$ in the direction $\mathbf{i} - 3\mathbf{j} + \mathbf{k}$. [3]
- ii) Show that the points A, B, C whose position vectors are respectively $2\vec{i} + 4\vec{j} - 3\vec{k}$, $4\vec{i} + 5\vec{j} + \vec{k}$ and $3\vec{i} + 6\vec{j} - 3\vec{k}$ form a right angled triangle. [5]