B.E (chemical) 1st Year
(Common with MBA & FT 1st Year)

Mathematics-1

Total = 25 Marks

1. If $u = \log(x^3 + y^3 + z^3 - 3xyz)$ show that, $\left(\frac{\partial}{\partial x} + \frac{\partial}{\partial y} + \frac{\partial}{\partial z}\right)^2 u = \frac{-9}{(x^1+y^1+z^1)^2}$

— (5)

(CO- Analyse functions of Several variable & their applications)

2. If z is homogeneous function of degree 'n' in x and y, then show that

$$x^2\frac{\partial^2 z}{\partial x^2} + 2xy\frac{\partial^2 z}{\partial x\,\partial y} + y^2\frac{\partial^2 z}{\partial y^2} = n(n-1)z$$

— (5)

(CO- Analyse functions of Several variable & their applications)

3. If $x+y+z=0$, then find maximum of $x^m y^n z^p$.

— (5)

4. Show that rectangular solid of maximum volume that can be incribed in a sphere is a Cube?

— (5)

5. Given $\sin u = \frac{x^2y^2}{x+y}$, then show that

$$x\frac{\partial u}{\partial x} + y\frac{\partial u}{\partial y} = 3\tan u.$$

— (5)