RAMAKRISHNA MISSION VIDYAMANDIRA

(Residential Autonomous College under University of Calcutta)

FIRST YEAR

B.A./B.SC. SECOND SEMESTER (January – June) 2013

Mid-Semester Examination, March 2013

Date : 07/03/2013 **MATHEMATICS (General)**

Time : 12 noon – 1 pm Paper : II Full Marks : 25

[Use Separate Answer Books for each group]

Group - A

1. Answer **any two** questions : [2×5]

   a) Find the translation which transforms the equation : $x^2+y^2-2x+14y+20=0$ into $x^2+y^2-30=0$

   b) Test whether the equation $x^2+6xy+9y^2+4x+12y-5=0$ represents a pair of parallel straight lines. If so, find the distance between them.

   c) Reduce the equation $5x^2-6xy+5y^2-4x-4y-4=0$ to its canonical form. Hence find the nature of the curve.

Group - B

2. Answer **any one** question : [1×3]

   a) Define a monotone increasing sequence of real numbers. Give an example of a sequence which is monotone increasing but not strictly. Define a null sequence.

   b) Prove that a convergent sequence of real numbers can't have more than one limit.

3. Answer **any one** question : [1×4]

   a) Evaluate $\lim\limits_{x\to 0}\left(\dfrac{\tan x}{x}\right)^{\frac{1}{x}}$

   b) Find the points of local maximum and local minimum of the function
   $f(x)=12x^5-45x^4+40x^3+1,\ x\in\mathbb{R}$

Group - C

4. Answer **any one** question : [1×4]

   a) Evaluate : $\int\dfrac{\sin x\,dx}{3\cos x+2\sin x}$

   b) Find the value of $\int\dfrac{dx}{(x^2+a^2)(x+b)}$

5. Answer **any one** : [1×4]

   a) Solve : $x\dfrac{dy}{dx}-y=x\sqrt{x^2+y^2}$

   b) Solve : $\dfrac{dy}{dx}=\dfrac{2x-y}{6x-5y}$

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