

RAMAKRISHNA MISSION VIDYAMANDIRA

(Residential Autonomous College affiliated to University of Calcutta)

FIRST YEAR [BATCH 2016-19]

B.A./B.Sc. SECOND SEMESTER (January – June) 2017

Mid-Semester Examination, March 2017

Date : 18/03/2017

MATH FOR ECONOMICS (General)

Time : 12 noon – 1 pm

Paper : II

Full Marks : 25

[Use a separate Answer Book for each Group]

Group – A

1. Let M be the set of all real $m \times n$ matrices. Show that M forms a vector space over $\mathbb{R}$ (set of all reals) with respect to usual matrix addition and scalar multiplication of matrix. [1]

Answer any three questions from Question nos. 2 to 5 :

[3×4]

2. Examine if the set S is a subspace of $\mathbb{R}^3$ where $S = \{(x, y, z) \in \mathbb{R}^3 : x + 2y - z = 1, 2x - y + z = 2\}$.
3. Extend the set $S = \{(1, 0, 1, 0), (0, 1, 0, 1)\}$ to obtain a basis of the vector space $\mathbb{R}^4$.
4. Find the dimension of the subspace S of $\mathbb{R}^3$ where $S = \{(x, y, z) \in \mathbb{R}^3, x + 2y = z, 2x + 3z = y\}$.
5. Determine the conditions for which the system of equations has—
a) only one solution, b) no solution, c) many solutions
where the system of equations is $x + y + z = b, 2x + y + 3z = b + 1, 5x + 2y + az = b^2$.

Group – B

Answer any three questions from Question nos. 6 to 10 :

[3×4]

6. Find the approximate value of the following by the method of differential : $\log_{10} 4.04$, given that $\log_{10} 4 = 0.6021$ and $\log_{10} e = 0.4343$.
7. If $y = \sin Kx + \cos Kx$, show that $y_n = K^n \{1 + (-1)^n \sin 2Kx\}^{1/2}$ where $y_n = \frac{d^n y}{dx^n}$.
4. If $y = e^{m \sin^{-1} x}$ show that $(1 - x^2)y_{n+2} - (2n + 1)xy_{n+1} - (n^2 + m^2)y = 0$. Also find y_n , when $x = 0$, where $y_n = \frac{d^n y}{dx^n}$.
5. Find a and b in order that $\lim_{x \rightarrow 0} \frac{x(a \cos x + 1) - b \sin x}{x^3}$ is finite and equal to 1.
6. If $y = \frac{ax + b}{(x - 1)(x - 4)}$ has a turning value $(2, -1)$, find a and b and also show that the turning value is a maximum.