RAMAKRISHNA MISSION VIDYAMANDIRA

(Residential Autonomous College under University of Calcutta)

SECOND YEAR

B.A./B.Sc. FOURTH SEMESTER (January – June) 2015

Mid-Semester Examination, March 2015

Date : 20/03/2015 **MATHEMATICS (General)**

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

Group – A

1. Answer **any one** : [1×2]

   a) Find the principal value of the improper integral $\int_0^2 \frac{dx}{x-1}$. [2]

   b) Examine the convergence of the improper integral $\int_2^4 \frac{dx}{(x-4)^2}$. [2]

2. Answer **any one** : [1×4]

   a) Evaluate the improper integral $\int_{-\infty}^{\infty} \frac{xdx}{x^4+1}$. [4]

   b) Use μ-test to find the convergence of the improper integral $\int_0^1 \frac{dx}{x^{1/2}(1-x)^{1/2}}$. [4]

Group – B

3. Answer **any one** : [1×5]

   a) Find the orthogonal trajectories of the family of curves given by $\frac{x^2}{a^2}+\frac{y^2}{a^2+\lambda}=1$, λ being a parameter. [5]

   b) Find the equation of the orthogonal trajectories of the system of curves $r = c\sin^2\theta$, where c is a parameter. [5]

Group – C

Answer any two questions : [2×7]

4. a) If A and B are two independent events then prove that $\bar{A}$ and $\bar{B}$ are also independent events. [3]

   b) State the Baye's theorem. The chance that a doctor will diagnose a certain disease correctly is 60%. The chance that a patient will die by his treatment after correct diagnose is 40% and the chance of death by wrong diagnose is 70%. A patient of the doctor who had the disease dies. What is the probability that the disease was diagnosed correctly. [1+3]

5. a) Draw a suitable Pie diagram to represent the following data :

Country	Production ('000 tones)
India	403
Ceylon	225
Japan	85
Other Countries	314

[3]

   b) Given the following frequency distribution :

Age in Years	:	15-19	20-24	25-29	30-34	35-39
No. of unemployed	:	365	214	63	41	23

Find the number of unemployed persons whose ages lie between 23 and 37 years. [4]

6. a) Find the mean for the following frequency distribution :

Age in Years	:	40-44	45-49	50-54	55-59	60-64
No. of persons	:	17	25	30	20	8

[3]

b) Draw the histogram of the following frequency distribution :

Annual Sales (Rs'000)	:	0-20	20-40	50-100	250-500	500-1000
No. of firms	:	18	57	69	28	19

[4]

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