

# RAMAKRISHNA MISSION VIDYAMANDIRA

(Residential Autonomous College affiliated to University of Calcutta)

SECOND YEAR [BATCH 2015-18]

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

Mid-Semester Examination, March 2017

Date : 17/03/2017

MATHEMATICS (General)

Time : 12 noon – 1 pm

Paper : IV

Full Marks : 25

1. Examine the convergence of  $\int_0^{\infty} \frac{dx}{(1+x)\sqrt{x}}$  and find its value if possible. [4]

Answer any two questions from Question nos. 2 - 4 : [2×3]

2. Show that  $\Gamma(n+1) = n\Gamma(n)$ .

3. Evaluate  $\int_0^{\pi/2} \int_{\pi/2}^{\pi} e^x \cos(y-x) dy dx$ .

4. Evaluate  $\int_a^b (x-a)^3 (b-x)^2 dx$  using Beta function.

Answer any one question from Question nos. 5 & 6 : [1×7]

5. In the construction of a house, the chance that the design is faulty is 10%. Also the chance that the house collapses if the design is faulty is 95% and otherwise it is 45%. It is seen that the house collapsed. What is the probability that it is due to faulty design?
6. The distribution function F of a continuous random variable X is given by

$$f(x) = \begin{cases} 0, & x < 0 \\ x(2-x), & 0 \leq x < 1 \\ 1, & x \geq 1 \end{cases}$$

Find the pdf of the random variable X and find  $P\left(0 < x \leq \frac{1}{4}\right)$  and  $P\left(x \geq \frac{1}{2}\right)$ .

Answer any one question from Question nos. 7 & 8 : [1×8]

7. a) Give the definition and examples of secondary data used in the statistics. [1+1]  
b) Represent the data given in the following table using a multiple bar diagram. [3]

| Department              | Number of day Scholars | Number of resident scholars |
|-------------------------|------------------------|-----------------------------|
| Humanities              | 62                     | 50                          |
| Science                 | 54                     | 22                          |
| Commerce                | 12                     | 21                          |
| Business Administration | 20                     | 12                          |

- c) The age-distribution of the patients admitted to a hospital in a particular day is as follows— [3]

| Age groups (in years) | Frequency |
|-----------------------|-----------|
| 30 - 35               | 1         |
| 35 – 40               | 2         |
| 40 – 45               | 8         |
| 45 – 50               | 7         |
| 50 – 55               | 2         |
| Total                 | 20        |

Calculate the frequency density for each frequency. Also draw a histogram for the above distribution.

8. Find the mean deviation about the mean and mean deviation about median of the following table— [8]

|           |    |    |    |    |    |       |
|-----------|----|----|----|----|----|-------|
| x         | 10 | 11 | 12 | 13 | 14 | Total |
| Frequency | 3  | 12 | 18 | 12 | 3  | 48    |

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