

RAMAKRISHNA MISSION VIDYAMANDIRA

(Residential Autonomous College affiliated to University of Calcutta)

SECOND YEAR [BATCH 2016-19]

B.A./B.Sc. FOURTH SEMESTER (January – June) 2018

Mid-Semester Examination, March 2018

Date : 16/03/2018

Time : 1 pm – 2 pm

MATHEMATICS (General)

Paper : IV

Full Marks : 25

[Use a separate Answer Book for each group]

Group – A

[10 marks]

Answer any one question from Question Nos. 1 & 2 :

[1×5]

1. a) Show that $\int_0^{\pi/2} \sin^4 \theta \cos^6 \theta d\theta = \frac{3\pi}{512}$.

[3]

b) Evaluate Cauchy principal value of $\int_{-1}^1 \frac{dx}{x^3}$.

[2]

2. a) Evaluate : $\int_{-\infty}^{\infty} 5^{-x^2} dx$.

[3]

b) Show that $B(m, n) = B(n, m)$.

[2]

Answer any one question from Question Nos. 3 & 4 :

[1×5]

3. Solve : $(D^2 - 2D + 1)y = x^2 e^{3x}$ where $D \equiv \frac{d}{dx}$.

4. Find the solution of $\frac{d^2 y}{dx^2} + 4y = 8 \cos 2x$, given that $y(0) = 0$ and $\left. \frac{dy}{dx} \right|_{x=0} = 0$.

Group – B

[15 marks]

(Answer any three questions)

[3×5]

5. Compute the mode from the following frequency distribution.

[5]

Output in units	No. of workers
300 – 309	9
310 – 319	20
320 – 329	24
330 – 339	38
340 – 349	48
350 – 359	27
360 – 369	17
370 – 379	6

6. Find the mean deviation of the following series. [5]

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

7. There are 2 identical boxes. The first box contains 5 white, 7 red balls and the second box contains 5 white, 5 red balls. One box is chosen at random and a ball is drawn from it. The ball turns out to be white. What is the probability that it is drawn from the first box? [5]

8. The probability mass function f of a discrete random variable is zero, except at the points $x = 0, 1, 2$ and $f(0) = C, f(1) = 2C - 3C^2, f(2) = 4C - 1$.

a) Determine the value of C [2]

b) Find $P(X > 0 | X < 2)$. [3]

9. Evaluate the distribution function of a continuous random variable X having probability density functions.

$$f(x) = \begin{cases} \frac{x}{3}, & 0 < x \leq 1 \\ \frac{5}{27}(4-x), & 1 < x \leq 4 \\ 0, & \text{elsewhere} \end{cases} \quad [5]$$

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