# RAMAKRISHNA MISSION VIDYAMANDIRA

**(Residential Autonomous College affiliated to University of Calcutta)**

**B.A./B.Sc. FOURTH SEMESTER TAKE-HOME TEST/ASSIGNMENT, JULY 2020**

**SECOND YEAR (ARREAR)**

Date : 12/07/2020 **MATHEMATICS (General)**

Time : 11am - 1pm **Paper : IV** Full Marks : 40

## Instructions to the Candidates

- Write your Name, College Roll no, Subject and Paper Number on the top of the Answer Script and on the text body of the mail.
- Read the instructions given at the beginning of each paper/group/unit carefully.
- Only handwritten (by blue/black pen) answer-scripts will be admissible.
- Each paper/group must be answered in a single booklet.
- All the pages of your answer scripts must be numbered serially by hand.
- In the last page of your answer-scripts, please mention the total number of pages written so that we can verify it with that of the scanned copy of the scripts sent by you.
- For an easy scanning of the answer scripts and also for getting better image, students are advised to write the answers in single side and they must give a minimum 1 inch margin at the left side of each paper.
- After the completion of the test, you should scan the entire answer scripts by using Clear Scan : Indy Mobile App /other Scanner devices and make a file in your own name and send or share them as a PDF file to [redacted]

---

**Group - A** (Integral Calculus II)

**Answer any two questions from this group.** **[6 x 2 = 12 marks]**

1. (a) Check whether the improper integral $\int_a^b \frac{dx}{(x-a)\sqrt{(b-x)}}$ convergent. [3]

   (b) Evaluate $\int_0^\infty e^{-4x}x^{\frac{3}{2}}dx$. [3]

2. Find the volume and the area of the surface generated when the arc of the parabola $y^2 = 4ax$ bounded by its latus rectum revolved about $x$-axis. [6]

3. Find the area bounded by $y^2 = 4ax$ and $x^2 = 4ay$. [6]

**Group-B** (Ordinary Differential Equation 2)

**Answer any two questions from this group.** **[4 × 2 =8]**

4. Solve: $\frac{d^2y}{dx^2} + y = x^2 \sin 2x$. [4]

5. Solve: $x^2\frac{d^2y}{dx^2} - 3x\frac{dy}{dx} + 5y = x^2 \sin(\ln x)$ . [4]

6. Show that the system of confocal conics: $\frac{x^2}{a^2+q} + \frac{y^2}{b^2+q} = 1$, is self orthogonal. [4]

**Group-C** (Probability theory)

**Answer all questions from this group.** **[6 + 9 + 5 =20 marks]**

7. Give the brief idea of primary data and secondary data. Also discuss about the methods of data collection. [3 + 3]

8. A sample of 280 undergraduate students of Vidyamandira was asked to give their opinion regarding the chance of Kolkata's win in the IPL 2018 prior to game. Each student was to respond either to 'very high' or 'very poor' or cannot 'comment' on the issue. The following data were obtained. [4 + 5]

| Responses | Number of students |
|---|---|
| Very high | 152 |
| Very Poor | 51 |
| Can not comment | 77 |

Draw a pie chart for the obtained data and give your opinion on the basis of the pie chart.

9. The joint probability distribution of 2 discrete random variables is

$$f(x,y) = \begin{cases} \frac{1}{4}, & x = 1, \quad y = 0. \\ \frac{1}{4}, & x = 2, \quad y = 3. \\ \frac{1}{2}, & x = 3, \quad y = 5. \\ 0, & \text{elsewhere.} \end{cases}$$

Obtain [5]

(a) the marginal distribution of Y,

(b) cov(X,Y).

—×—