# Institutional Reviews and Implementation of Teaching Learning Reforms

## Reform 1 – Blooms Taxonomy

**IDHAYA COLLEGE FOR WOMEN, KUMBAKONAM**
**Accredited with A+ Grade by NAAC 1st Cycle**
**Recognized by 2(f )and 12(B) of UGC Act 1956**

**Department of Mathematics**

**Academic Year 2023 - 2024**

**Lesson Plan**

**For the period November 2023 to April 2024**

**Name of the Staff: Mrs.M. Sujitha** **Subject Name : Stochastic Processes**

**Class: I M.Sc., Mathematics** **Subject Code : P22MAE2C**

CO1: Acquire the knowledge about the concept of Markov Chain and Queuing system. (K3)

CO2: Understand the methods of birth and death queues with finite and infinite capacity. (K4)

CO3: Develop the ability of Standard Brownian Motion. (K4)

CO4: Gain understanding on the Renewal process, Cumulative process and Semi-Markov process. (K4)

CO5: Apply different methods to solve birth and death queues. (K5)

| Date | Topic | Hrs | CO & Blooms Level | Teaching Pedagogy / Activity | Tools / Aids | Evaluation Technique |
|---|---|---|---|---|---|---|
| UNIT - I 11.12.23 | Stochastic Processes | 1 | CO1/ K1, K2 | Lecture Method | Chalk and Board | Assignment |
| 12.12.23 | Some notions | 1 | CO1/ K1, K3 | Lecture Method | Chalk and Board | |
| 13.12.23 | Specification of Stochastic Processes | 1 | CO1/ K1, K2,K3 | Lecture Method | Pictorial representation | |
| 14.12.23 | Specification of Stochastic Processes | 1 | CO1/ K2, K3 | Lecture Method | Chalk and Board | |
| 15.12.23 | Stationary Process | 1 | CO1/ K1,K2, K3 | Group Discussion & Lecture Method | ICT | Test |
| 18.12.23 | Markov Chains | 1 | CO1/ K2, K3 | Lecture Method | Chalk and Board | |
| 19.12.23 | Definitions | 1 | CO1/ K2, K3 | Lecture Method | Chalk and Board | |

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|---|---|---|---|---|---|---|
| 20.12.23 | Examples | 1 | CO1/ K3, K4 | Group Discussion Method | Pictorial representation of functions | Seminar |
| 21.12.23 | Higher Transition Probabilities | 1 | CO1/ K1,K2, K3 | Lecture Method | ICT | Assignment |
| 22.12.23 | Higher Transition Probabilities | 1 | CO1/ K2, K3 | Group Discussion & Lecture Method | Chalk and Board | |
| 23.12.23 | Generalization on Independent Bernoulli Trails | 1 | CO1/ K2, K3 | Group Discussion & Lecture Method | Chalk and Board | |
| 03.01.24 | Generalization on Independent Bernoulli Trails | 1 | CO1/ K1, K2, K3 | Lecture Method | ICT | Test |
| **UNIT - II** 04.01.24 | Markov Chains | 1 | CO2 / K2,K3 | Lecture Method | Chalk and Board | |
| 05.01.24 | Classification of States | 1 | CO2/ K2,K3 | Lecture Method | ICT | |
| 06.01.24 | Classification of Chains | 1 | CO2/ K2, K3 | Lecture Method | Chalk and Board | |
| 08.01.24 | Determination of Higher transition Probabilities | 1 | CO2/ K2, K3 | Lecture Method | Chalk and Board | Seminar |
| 10.01.24 | Determination of Higher transition Probabilities | 1 | CO2/ K2, K3, K4 | Group Discussion & Lecture Method | ICT | |
| 11.01.24 | Stability of Markov System | 1 | CO2/ K2, K3, K4 | Lecture Method | Chalk and Board | Test |
| 12.01.24 | Reducible Chains | 1 | CO2/ K2, K3, K4 | Lecture Method | Chalk and Board | |
| 13.01.24 | Reducible Chains | 1 | CO2/ K2, K3, K4 | Lecture Method | ICT | |
| 18.01.24 | Markov Chains with continuous state space | 1 | CO2/ K2, K3, K4 | Lecture Method | Chalk and Board | Seminar |
| 19.01.24 | Markov Chains with continuous state space | 1 | CO2/ K2, K3, K4 | Lecture Method | Chalk and Board | |

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| **Unit - III** 22.01.24 | Markov process with Discrete state space | 1 | CO3/ K1, K2,K3 | Group Discussion & Lecture Method | Chalk and Board | Seminar |
| 23.01.24 | Markov process with Discrete state space | 1 | CO3/ K2, K3 | Lecture Method | ICT | Test |
| 24.01.24 | Poisson process | 1 | CO3/ K2, K3, K4 | Lecture Method | Chalk and Board | |
| 27.01.24 | Extensions | 1 | CO3/ K2, K3, K4 | Lecture Method | Chalk and Board | Seminar |
| 29.01.24 | Poisson process | 1 | CO3/ K2, K3, K4 | Lecture Method | ICT | |
| 31.01.24 | Related distribution | 1 | CO3/ K2, K3, K4 | Lecture Method | ICT | |
| 01.02.24 | Generalization of poisson process | 1 | CO3/ K2, K3, K4 | Group Discussion & Lecture Method | Chalk and Board | |
| 02.02.24 | Birth and Death process | 1 | CO3/ K2, K3, K4 | Lecture Method | Chalk and Board | Test |
| 03.02.24 | Markov process with discrete state space | 1 | CO4/ K2, K3, K4 | Lecture Method | ICT | |
| 05.02.24 to 08.02.24 | I - Continuos Internal Assessment | 4 | – | Lecture Method | Chalk and Board | |
| **UNIT - IV** 09.02.24 | Renewal process and theory | 1 | CO4/ K1, K2, K3 | Lecture Method | ICT | Seminar |
| 12.02.24 | Markov process with discrete state space | 1 | CO4/ K1, K2, K3 | Lecture Method | Chalk and Board | |
| 13.02.24 | Renewal process in continuous Time | 1 | CO4/ K1, K2, K3 | Lecture Method | Chalk and Board | Test |
| 15.02.24 | Renewal equation | 1 | CO4/ K1, K2, K3 | Group Discussion & Lecture Method | ICT | |
| 16.02.24 | Stopping time | – | CO4/ K1, K2, K3 | Lecture Method | Chalk and Board | |
| 19.02.24 | Wald's equation | 1 | CO4/ K1, K2, K3 | Lecture Method | Chalk and Board | Seminar |

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| 20.02.24 | Renewal theorems | 1 | CO4/ K1, K2, K3 | Group Discussion & Lecture Method | ICT | Seminar |
| **Unit - V** 22.02.24 | Branching process | 1 | CO5/ K2, K3, K4 | Lecture Method | Chalk and Board | Seminar |
| 23.02.24 | Introduction | 1 | CO5/ K2, K3, K4 | Lecture Method | Chalk and Board | |
| 26.02.24 | Properties of generating function of Branching process | 1 | CO5/ K2, K3, K4 | Group Discussion & Lecture Method | Chalk and Board | Test |
| 27.02.24 | Properties of generating function of Branching process | 1 | CO5/ K2, K3, K4 | Group Discussion & Lecture Method | Chalk and Board | |
| 28.02.24 | Probability of extinction | 1 | CO5/ K2, K3, K4 | Lecture Method | Chalk and Board | Seminar |
| 02.03.24 | Probability of extinction | 1 | CO5/ K1, K2, K3 | Lecture Method | Chalk and Board | |
| 04.03.24 | Distribution of the total number of progency | 1 | CO5/ K1, K2, K3 | Lecture Method | Chalk and Board | |
| 05.03.24 | Conditional Limit Laws due to Kolmogrov | 1 | CO5/ K2, K3, K4 | Group Discussion & Lecture Method | Chalk and Board | Test |
| 06.03.24 | Yaglow | 1 | CO5/ K2, K3, K4 | Lecture Method | Chalk and Board | |
| 07.03.24 | Classical Galton | 1 | CO5/ K2, K3, K4 | Group Discussion & Lecture Method | Chalk and Board | Seminar |
| 09.03.24 | Bellmann - Harris Process | 1 | CO5/ K2, K3, K4 | Lecture Method | Chalk and Board | |
| 11.03.24 to 19.03.24 | Model Examination (Revision) | 6 | – | Lecture Method | Chalk and Board | Test |
| 20.03.24 | Test | 1 | CO1/ K1, K2, K3 | Lecture Method | Chalk and Board | |
| 21.03.24 | Revision | 1 | CO1/ K1, K2, K4 | Lecture Method | Chalk and Board | |
| 22.03.24 | Test | 1 | CO1/ K1, K2, K5 | Lecture Method | Chalk and Board | |

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| 23.03.24 | Revision | 1 | CO2/ K2, K3, K4 | Lecture Method | Chalk and Board | Seminar |
| 26.03.24 | Revision | 1 | CO2/ K2, K3, K5 | Lecture Method | ICT | |
| 27.03.24 | Revision | 1 | CO3/ K2, K3, K4 | Lecture Method | ICT | |
| 02.04.24 | Revision | 1 | CO3/ K2, K3, K5 | Lecture Method | ICT | Test |
| 03.04.24 | Revision | 1 | CO3/ K2, K3, K6 | Lecture Method | Chalk and Board | |
| 04.04.24 | Revision | 1 | CO4/ K2, K3, K4 | Lecture Method | Chalk and Board | |
| 05.04.24 | Revision | 1 | CO4/ K2, K3, K5 | Lecture Method | Chalk and Board | |
| 10.04.24 | Revision | 1 | CO5/ K1, K2, K3 | Lecture Method | PPT | |
| 12.04.24 | Revision | 1 | CO5/ K1, K2, K3 | Lecture Method | Chalk and Board | |

**K1 - Remember, K2 - Understand, K3 - Apply, K4 - Analyze, K5 - Evaluate, K6 - Create.**

**Reference:**


1. J. Medhi, Stochastic Processes, New age International Publishers, New Delhi- Second edition.

2. Samuel Karlin, Howard M. Taylor, A first course in stochastic processes,Academic press, Second Edition. 1975.

3. Narayanan Bhat, Elements of Applied Stochastic Processes, John Wiley, 1972.

4. S.K. Srinivasan and K. Mehata, Stochastic Processes, Tata McGraw Hill, 1976.

5. N.V. Prabhu, Stochastic Processes, Macmillan(NY).

6. Robert G, Gallager, Stochastic Processes: Theory for Applications, Cambridge University Press, 2013.


**Signature of the Subject Incharge**

**Signature of the HOD**

**Signature of the Principal**

Principal,
Idhaya College for Women,
Kumbakonam - 612 001.

# Log Book

**IDHAYA COLLEGE FOR WOMEN, KUMBAKONAM**

**Accredited with A+ Grade by NAAC 1st Cycle**

**Recognized by 2(f) & 12(B) of UGC Act 1956**

**Academic Year 2023-2024**

**Department of Mathematics**

**Even Semester - Log Book**

**Subject** : STOCHASTIC PROCESSES **Class** : I-M.SC., MATHS

**Subject Code** : P22MAE2C **Sub Incharge** : MRS. M. SUJITHA

| S.No | Date | Hour | Topic Taught | Signature of the Subject Incharge |
|---|---|---|---|---|
| 1. | DEC-23 11/12/23 | 3&5 | UNIT-I: Stochastic processes | |
| 2. | 12/12/23 | 4 | Some notions | |
| 3. | 13/12/23 | 3 | Specification of stochastic | |
| 4. | 14/12/23 | 4 | processes | |
| 5. | 15/12/23 | 5 | Stationary process | |
| 6. | 18/12/23 | 3&5 | Markov chains | |
| 7. | 19/12/23 | 4 | Definitions | |
| 8. | 20/12/23 | 3 | examples | |
| 9. | 21/12/23 | 4 | Higher Transition Probabilities | |
| 10. | 22/12/23 | 5 | Higher Transition Probabilities | |
| 11. | 23/12/23 | 4 | Generalization of independents | |
| 12. | JAN-24 03/01/24 | 3&5 | Bernoulli trails. | |
| 13. | 04/01/24 | 4 | UNIT-II: Markov chains | |
| 14. | 05/01/24 | 3 | classification of States | |
| 15. | 06/01/24 | 4 | Chains | |
| 16. | 08/01/24 | 5 | Determination of higher | |
| 17. | 10/01/24 | 3&5 | transition Probabilities | |
| 18. | 11/01/24 | 4 | Stability of Markov System | |
| 19 | 12/01/24 | 3 | Reducible chains | |
| 20. | 13/01/24 | 3 | Reducible chains | |
| 21. | 18/01/24 | 4 | Markov chain with continued | |

| S.No | Date | Hour | Topic Taught | Signature of the Subject Incharge |
|---|---|---|---|---|
| 22. | 19/01/24 | 5 | Continuous state space | |
| 23. | 22/01/24 | 3&5 | UNIT-III: Markov process with Discrete | |
| 24. | 23/01/24 | 4 | (Theory) state space. | |
| 25. | 24/01/24 | 3 | (Renewal process) Poisson process | |
| 26. | 27/01/24 | 4 | extensions | |
| 27. | 29/01/24 | 5 | Poisson process | |
| 28. | 31/01/24 | 3&5 | Related distribution | |
| 29. | FEB-24 01/02/24 | 4 | Generalization of poisson | |
| 30. | 02/02/24 | 3 | Process, Birth and Death process | |
| 31. | 03/02/24 | 5 | UNIT-IV: Markov process with discrete state | |
| 32. | 05/02/24 | 5 | Revision Space | |
| 33. | 07/02/24 | 3&5 | Test | |
| 34. | 08/02/24 | 4 | Test | |
| 35. | 09/02/24 | 3 | Renewal Process | |
| 36. | 12/02/24 | 4 | Theory | |
| 37. | 13/02/24 | 5 | Renewal Process | |
| 38. | 15/02/24 | 3&5 | Renewal Process in Continous | |
| 39. | 16/02/24 | 4 | Time. | |
| 40. | 19/02/24 | 4 | Renewal equation | |
| 41. | 20/02/24 | 5 | Stoping time | |
| 42. | 22/02/24 | 3&5 | Wald's equation | |
| 43. | 23/02/24 | 4 | Renewal theorems. | |
| 44. | 26/02/24 | 3 | UNIT-V: Branching Process, Introduction | |
| 45. | 27/02/24 | 4 | properties of generating | |
| 46. | 28/02/24 | 5 | functions of Branching Process | |
| 47. | MAR-24 02/03/24 | 3&5 | Probability of extinction | |
| 48. | 04/03/24 | 4 | Distribution of the total | |

| S.No | Date | Hour | Topic Taught | Signature of the Subject Incharge |
|---|---|---|---|---|
| 49. | 05/03/24 | 3 | number of Progeny. | |
| 50. | 06/03/24 | 4 | Coditional Limit Laws due to | |
| 51. | 07/03/24 | 5 | Kolmogrov and due to yaglow | |
| 52 | 09/03/24 | 4 | classical Galton-Bellman-Harris Process | |
| 53. | 11/03/24 | 5 | Revision | |
| 54 | 12/03/24 | 4 | Test | |
| 55. | 14/03/24 | 4 | Test | |
| 56. | 15/03/24 | 5 | Revision | |
| 57. | 18/03/24 | 5 | University Question Revision | |
| 58. | 19/03/24 | 4 | Test | |
| 59. | 20/03/24 | 3 | Revision | |
| 60. | 21/03/24 | 4 | Revision | |
| 61. | 22/03/24 | 5 | Test | |
| 62. | 23/03/24 | 4 | Test | |
| 63. | 26/03/24 | 3&5 | Test | |
| 64. | 27/03/24 | 4 | University question Revision | |
| 65. | 02/04/24 | 3&5 | Test | |
| 66. | 03/04/24 | 4 | Revision | |
| 67. | 04/04/24 | 3 | Revision | |
| 68. | 05/04/24 | 4 | Revision | |
| 69. | 10/04/24 | 4 | Tests | |
| 70. | 12/04/24 | 4 | Revision | |

**Total Hours:** 82

**Signature of the HOD**

**Signature of the Principal**

Principal,
Idhaya College for Women,
Kumbakonam - 612 001.

# Question Paper

**IDHAYA COLLEGE FOR WOMEN, KUMBAKONAM**

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| Register Number | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|

**Model Examination**
**Even Semester - March 2024**
**Department of Mathematics**

**Class** : III B.Sc. Maths — **Date & Session** : 14.03.2024 (FN)

**Subject** : Dynamics — **Max. Marks** : 75

**Subject Code** : 16SCCMM14 — **Time** : 3 Hrs

**Section – A**
**Answer ALL questions**

**(i) Two Marks** **(5 ×2 = 10)**

| | | | | |
|---|---|---|---|---|
| 1. | Define angular velocity. | CO1 | K1 | 2 |
| 2. | Define Variable acceleration. | CO1 | K1 | 2 |
| 3. | Describe the greatest height attained by a projectile? | CO2 | K1 | 2 |
| 4. | Derive the expression for time of flight. | CO2 | K1 | 2 |
| 5. | Write down Newton's Experimental law. | CO3 | K1 | 2 |
| 6. | Define Impact & Impulse. | CO3 | K1 | 2 |
| 7. | Define Simple Pendulum. | CO4 | K1 | 2 |
| 8. | Define Simple Harmonic motion. | CO4 | K1 | 2 |
| 9. | Define areal velocity of the particle. | CO5 | K1 | 2 |
| 10. | Write down the differential equations of the central orbit. | CO5 | K1 | 2 |

**Section – B**
**Answer ALL questions** **(5 × 5 = 25)**

| | | | | |
|---|---|---|---|---|
| 11. | (a) Describe relative acceleration.<br>(or)<br>(b) If a point moves in a straight line with uniform acceleration and covers successive equal distances in times $t_1, t_2, t_3$, then prove that $\frac{1}{t_1}+\frac{1}{t_2}+\frac{1}{t_3}=\frac{3}{t_1+t_2+t_3}$ | CO1 | K2<br><br><br><br>K3 | 5<br><br><br><br>5 |
| 12. | (a) If the greatest height attained by a projectile is one quanter of its range on the horizontal plane, show that the angle of projection is 45°.<br>.(or)<br>(b) Prove that the relation $gT^2 = 2R\tan\alpha$, where T is the time of the flight, R is the horizontal range and $\alpha$ be the angle of projection of a particle projected from the ground. | CO2 | K3<br><br><br><br>K3 | 5<br><br><br><br>5 |
| 13. | (a) Find the loss of kinetic energy due to oblique impact of two smooth | | K3 | 5 |

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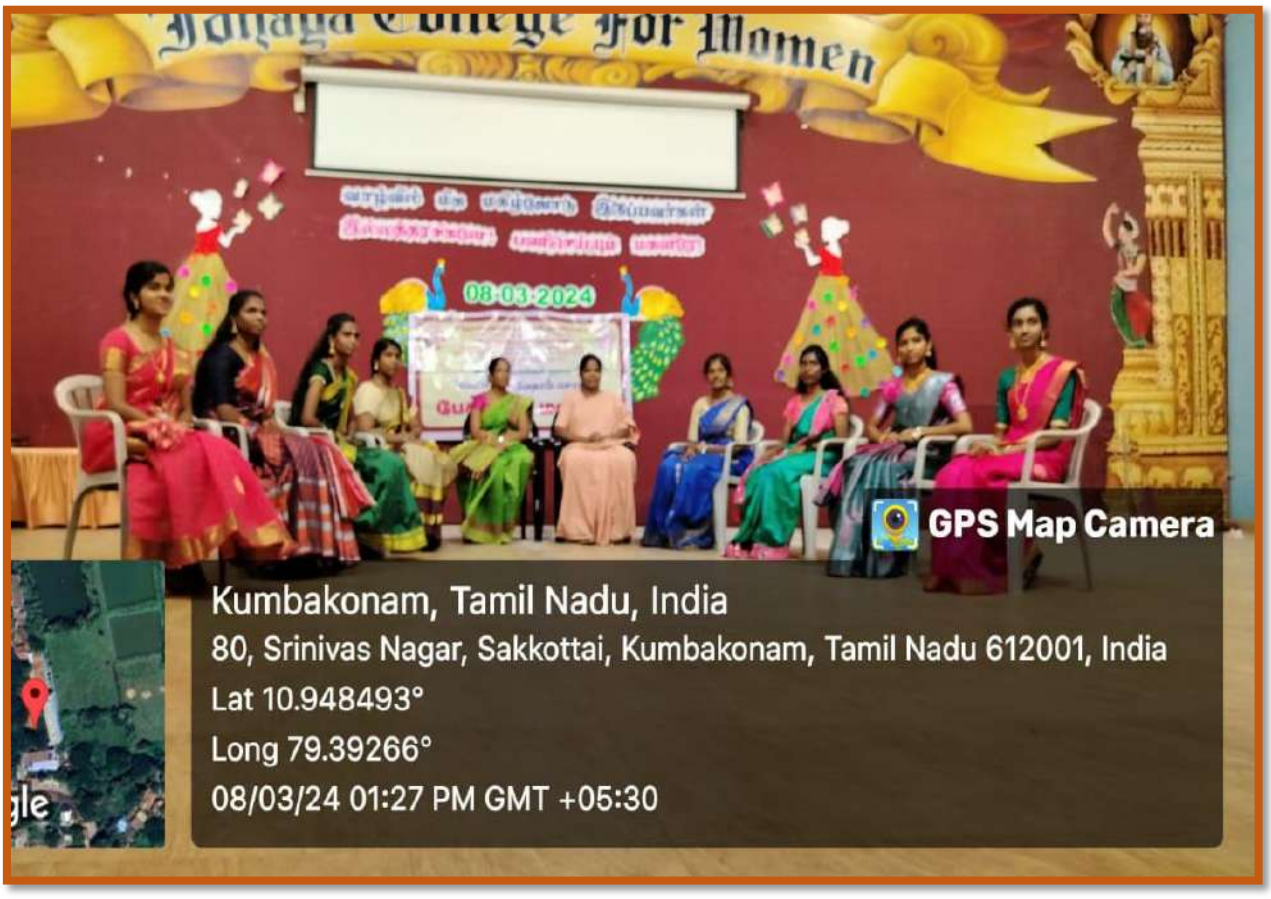
|---|---|---|---|---|
| | spheres.<br>(or)<br>(b) A ball is thrown from a point on a smooth horizontal ground with a speed V at angle α to the horizon. If e be the coefficient of restitution, show that the total time for which the ball rebounds on the ground is $\frac{2V \sin \alpha}{g(1-e)}$ and the horizontal distance travelled by it is $\frac{V^2 \sin 2\alpha}{g(1-e)}$. | CO3 | K3 | 5 |
| 14. | (a) If the displacement of a moving point at any time be given by an equation of the form x = a cos wt + b sin wt, show that the motion is a simple harmonic motion. If a=3, b=4, w=2 determine the amplitude.<br>(or)<br>(b) A particle is moving with S.H.M and while making an oscillation from one extreme position to the other, its distances from the Centre of oscillation at 3 consecutive seconds are $x_1, x_2$ and $x_3$. Prove that the period of oscillation is $\frac{2\pi}{cos^{-1}\left(\frac{x_1+x_3}{2x_2}\right)}$. | CO4 | K3<br>K3 | 5<br>5 |
| 15. | (a) Find the law of force towards the pole under which the curve $r^n = a^n \cos n\theta$ can be described?<br>(or)<br>(b) Examine the polar equation to the equiangular spiral. | CO5 | K3<br>K4 | 5<br>5 |
| | **Section – C**<br>**Answer any THREE questions** **(3×10 = 30)** | | | |
| 16. | The speed of a train increases at a constant rate α from 0 to v, and then remains constant for an interval and finally decreases to 0 at a constant rate β. If s is the total distance described, Prove that the total time T is occupied is $T = \frac{s}{v} + \frac{v}{2s}\left(\frac{1}{\alpha} + \frac{1}{\beta}\right)$ | CO1 | K3 | 10 |
| 17. | Show that the greatest height which a particle with initial velocity V can reach on a vertical wall at a distance 'a' from the point of projection is $\frac{v^2}{2g} - \frac{ga^2}{2v^2}$. | CO2 | K3 | 10 |
| 18. | A particle falls from a height h upon a fixed horizontal plane. If 'e' be the coefficient of restitution, show that the whole distance described before the particle has finished rebounding is $h\left(\frac{1+e^2}{1-e^2}\right)$. Show that the whole time taken is $\frac{1+e}{1-e}\sqrt{\frac{2h}{g}}$. | CO3 | K3 | 10 |
| 19. | Prove that the composition of two simple harmonic motions of the same period in the same straight line is also a simple harmonic motion. | CO4 | K3 | 10 |
| 20. | Derive the differential equation of central orbits in polar coordinates. | CO5 | K3 | 10 |

******* All the Best *******

# Reform 2 – Enhancing LSRW Skills

## Listening


# Speaking – Speaker's Forum

# Reading


GPS Map Camera
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Google


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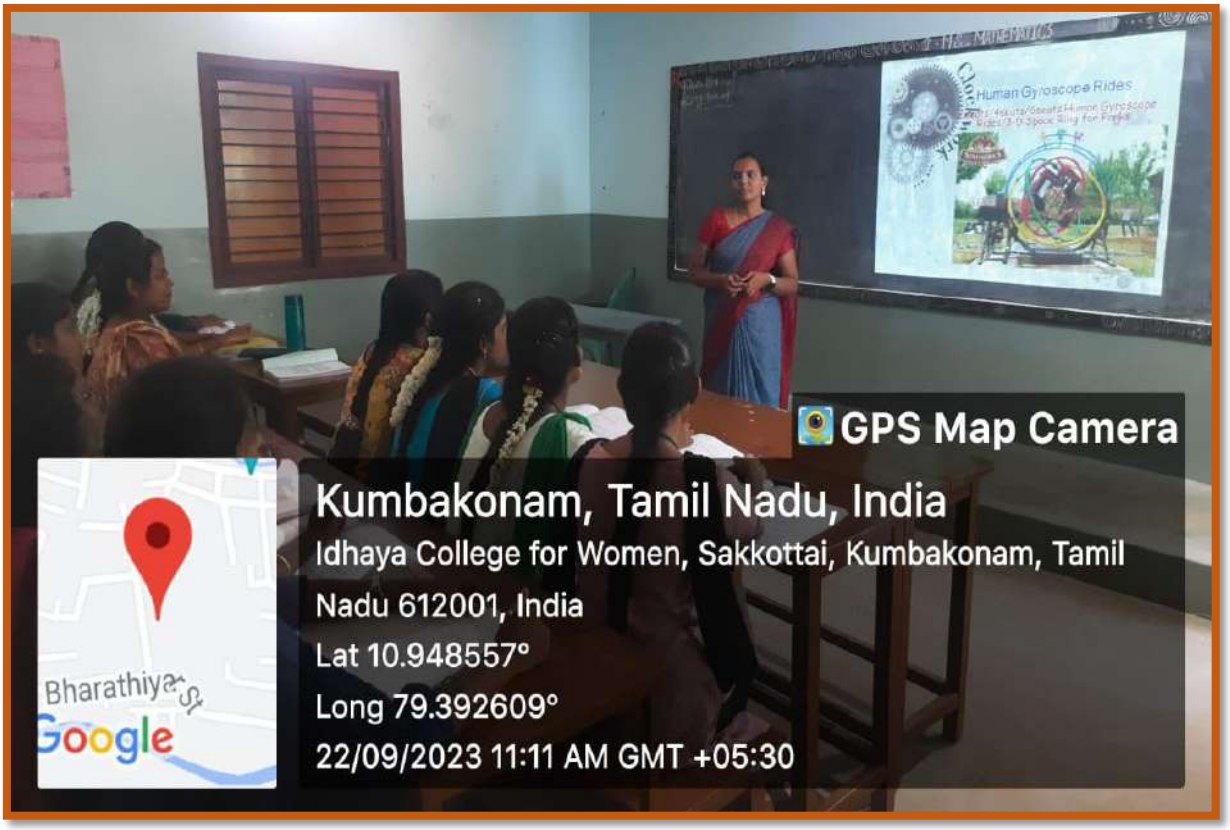
## Writing – Writer's Forum

# Book Launching


# ICT Classrooms





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Google


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Kumbakonam, Tamil Nadu, भारत
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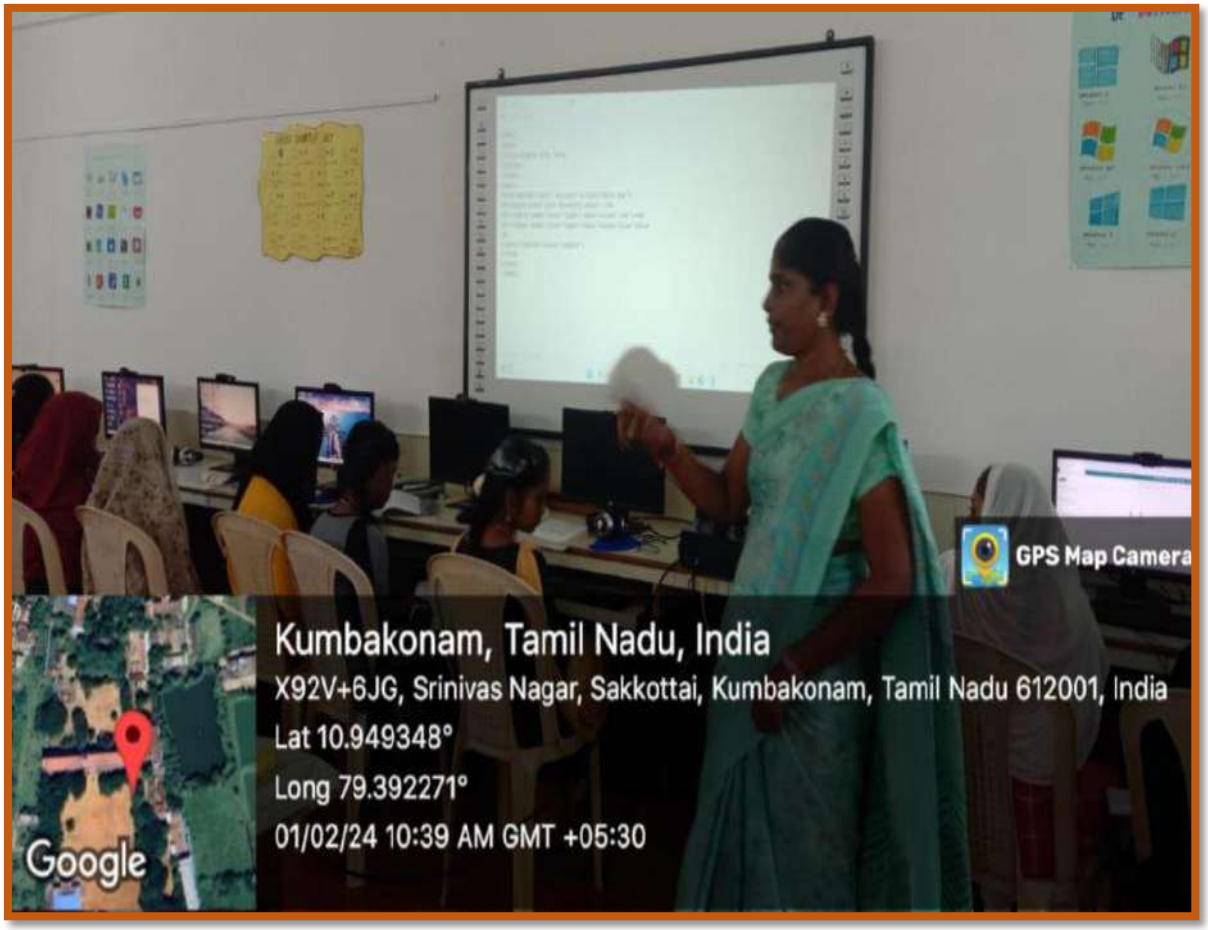
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