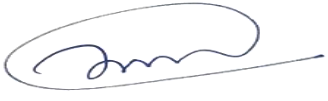





Scheme of Examination - THIRD SEMESTER

Sr No	Course Code	Course Title	Hours per Week			Credits	Maximum Marks		
			L	T	P		Continual Assessment	End Sem Examination	Total
1	AS301T	Applied Mathematics – III	3	1	-	4	30	70	100
2	AI301T	Data Structures	4	-	-	4	30	70	100
3	AI301P	Data Structures Lab	-	-	2	1	25	25	50
4	AI302T	Fundamentals of Artificial Intelligence	3	1	-	4	30	70	100
5	AI302P	Fundamentals of Artificial Intelligence Lab	-	-	2	1	25	25	50
6	AI303T	Computer Networking	3	1	-	4	30	70	100
7	AI304P	Object Oriented Programming Lab	-	-	2	1	25	25	50
8	H 102	Universal Human Values – 2	3	-	-	3	30	70	100
9	AI305P	Sports, Yoga, & Career Development *	-	-	2	0	-	-	-
Total			16	3	8	22	220	380	650

* Career Development (Interpersonal Skills, Aptitude, and Logical Thinking)

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THIRD SEMESTER

Course Code	Course Name	Th	Tu	Pr	Credits	Evaluation		
						CA	ESE	Total
AS301T	Applied Mathematics III	3	1	-	4	30	70	100

Course Objectives	Course Outcomes
<p>This course is intended</p> <ul style="list-style-type: none"> To familiarize the students with concepts in linear algebra To provide students standard concepts of statistics. 	<p>Students will be able to</p> <ul style="list-style-type: none"> Identify Engineering problems related to Matrices: Eigen value & Eigen vectors & Functions of Matrices. Apply various concepts of vector spaces. Demonstrate the concepts of advanced linear algebra. Use statistical methods and tools in engineering problems. Recognize the optimization formulations.

Unit I	[8Hrs]
Linear dependence of vectors, Characteristics equation, Eigen values and Eigen vectors, Reduction to diagonal form, Reduction of quadratic form to canonical form by orthogonal transformation, Sylvester's theorem.	
Unit II	[8Hrs]
Vector Space, Subspaces, Linear Dependence/Independence, Basis, dimension, Linear transformation, Range Space and Rank, Null Space and Nullity, Rank nullity theorem, Matrix Representation of a linear transformation, Linear Operators on R^n and their representation as square matrices, Invertible linear operator, Inverse of nonsingular matrices.	
Unit III	[7Hrs]
Inner Product Spaces, Norm, Orthonormal sets, Gram Schmidt orthogonalization process, projections, positive definite matrices, and Singular Value Decomposition.	
Unit IV	[7Hrs]
Mean, Median, Mode, Mean deviation, Standard deviation, Hypothesis, Null hypothesis, Alternative hypothesis, Testing a hypothesis, t-test, F-test and Chi square test. One way and two way analysis of variance (ANOVA).	
Unit V	[6Hrs]
Continuous optimization, Optimization using Gradient descent, Constrained optimization and Lagrange's multipliers, Convex optimization, Simplex method.	

Text Books

S.N	Title	Authors	Edition	Publisher
1	Higher Engineering Mathematics	B.S. Grewal	40th Edition	Khanna Publication
2	Linear Algebra	Hoffman and Kunze	2 nd edition	Prentice Hall of India, New Delhi
3	Convex optimization.	Stephen Boyd and Lieven Vandenberghe	-	Cambridge University Press

Reference Books

S.N	Title	Authors	Edition	Publisher
1	A Text Book of applied Mathematics	P.N. Wartikar & J.N. Wartikar	2 nd edition	Poona Vidyarthi Griha Prakashan
2	A text book of Engineering Mathematics	N. P. Bali & M. Goyal	6 th edition	Laxmi Publication
3	Probability, Statistics with Reliability, Queuing and Computer Science Applications	K.S. Trivedi.	2 nd edition	PHI
4	Linear Algebra	Seymour Lipschutz et al.	3 rd edition	Schaum outline series
5	Advanced Engineering Mathematics by	Erwin Kreyszig	8th Edition	Wiley India

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ARTIFICIAL INTELLIGENCE

THIRD SEMESTER

Course Code	Course Name	Th	Tu	Pr	Credits	Evaluation		
						CA	ESE	Total
AI301T	Data Structures	4	-	-	4	30	70	100

Course Objectives	Course Outcomes
<p>This course is intended</p> <ul style="list-style-type: none"> To make students understand efficient storage structures of data for an easy access. To differentiate between linear & non linear data structures and its respective benefits To give emphasis on design and implementation of abstract data structures. To develop application using data structures and algorithm and analysis 	<p>Students will be able to</p> <ul style="list-style-type: none"> Select appropriate data structures based on the specified problem definition and analysis the algorithm. Use different algorithms for performing operations like sorting, searching, insertion and deletion of data on various data structures. Develop, manipulate and integrate stack and queue algorithm. Implement Algorithm for link list to solve problems like sorting, searching, insertion and deletion of data Design advance data structure using non linear data structures.

Unit I	[8Hrs]
Introduction: Basic Terminologies: Elementary Data Organizations, Data Structures, Need of Data Structure, Abstract Data type, Analysis of Algorithms: RAM Model, Analysis of Iterative and Recursive Algorithms, Asymptotic Notations, Apriori analysis, Time and space complexity, Asymptotic notations.	
Unit II	[8Hrs]
Searching and sorting Techniques: Importance of searching. Searching: Sequential, Binary; Sorting : Bubble sort, selection sort, quick sort, Merge sort, heap sort, Shell sort; performance analysis and comparison.	
Unit III	[10Hrs]
Stacks and Queues: Definition and Terminology, ADT Stack and its operations, Stack using Pointers. Applications of Stacks: Expression Conversion and evaluation. ADT queue and its operation, Types of Queue: Simple Queue, Circular Queue, Priority Queue, Double ended queue (dequeue): Application of queues	
Unit IV	[10Hrs]
Linked Lists: Singly linked lists: Representation in memory, Operation on linked list, Algorithms of several operations: Traversing, Searching, Insertion into, Deletion from linked list; Linked representation of Stack and Queue, Types of linked list: Singly linked list, Circular linked list, Doubly linked list, Circular doubly linked list; header node linked lists, Application of Linked Lists.	
Unit V	[8Hrs]
Trees: Basic Tree Terminologies, Different types of Trees: Binary Tree, Threaded Binary Tree, Binary Search Tree, AVL Tree, B Tree, B+ Tree; Tree traversals algorithm, Tree operations on each of the trees. Applications of all trees. Graph: Basic Terminologies and Representations, Graph search and traversal algorithms: Depth First search and Breadth First Search Algorithms, Spanning trees: Minimal cost spanning tree and Shortest path algorithm (Single Source-all pairs).	

Text Books

S.N	Title	Authors	Edition	Publisher
1	Fundamentals of Data Structures in C++	E. Horowitz, D. Mehta, S. Sahni,	2nd edition, 2008.	Silicon Press
2	Programming with C and Data structures	R.S. Bichkar	1st edition, 2014.	Universities Press

Reference Books

S.N	Title	Authors	Edition	Publisher
1	Data Structures and Algorithm in Java	Goodrich, Tamassia	6th edition.	Wiley publication
2	Introduction to Algorithms	T. H. Cormen, C. E. Leiserson, R. L. Rivest, C. Stein	3rd edition, 2009	MIT Press
3	Murach's Java Programming	J. Murach	4th edition, 2012.	Shroff Publishers

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Course Code	Course Name	Th	Tu	Pr	Credits	Evaluation		
						CA	ESE	Total
AI301P	Data Structures Lab	-	-	2	1	25	25	50

Course Objectives	Course Outcomes
<p>This course is intended</p> <ul style="list-style-type: none">To develop skills to design and analyze simple linear and non linear data structures.To strengthen the ability to the students to identify and apply the suitable data structure for the given real world problemTo gain knowledge in practical applications of data structures.	<p>Students will be able to</p> <ul style="list-style-type: none">Execute functions to implement linear and non-linear data structure operationsDesign and analyze the time and space efficiency of the data structureChoose appropriate linear / non-linear data structure operations for solving a given problemImplement Algorithm for link list to solve problems like sorting, searching, insertion and deletion of dataUse the non-linear data structure operations for a given problem

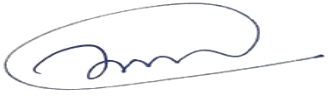

Expt. No.	List of the experiment
1	Programs will be based on searching .
2	Programs will be based on sorting i) Bubble sort ii) Selection sort iii)Quick sort vi) Insertion sort vii) Merge sort viii)Heap sort.
3	Programs will be based on stack and its operations using i) Arrays ii) Linked list(Pointers).
4	Programs will be based on Queue and its operations using i) Arrays ii) Linked list(Pointers).
5	Programs will be based on singly, doubly & circular linked list and its operations like i) Creation ii) Insertion iii) Deletion iv) Traversal.
6	Programs will be based on binary tree and its operations.
7	Write a program to implement the tree traversal methods
8	Write a program for shortest path diagram.
9	Micro project based on the syllabus.

Text Books

S.N	Title	Authors	Edition	Publisher
1	Fundamentals of Data Structures in C++	E. Horowitz, D. Mehta, S. Sahni,	2nd edition, 2008.	Silicon Press
2	Programming with C and Data structures	R.S. Bichkar	1st edition, 2014.	Universities Press

Reference Books

S.N	Title	Authors	Edition	Publisher
1	Data Structures and Algorithm in Java	Goodrich, Tamassia	6th edition, 014.	Wiley publication
2	Introduction to Algorithms	T. H. Cormen, C. E. Leiserson, R. L. Rivest, C. Stein	3rd edition, 2009	MIT Press
3	Murach's Java Programming	J. Murach	4th edition, 2012	Shroff Publishers
4	A Simplified Approach to Data Structures	V. Goyal, L. Goyal, P. Kumar	1st Edition, 2014	Shroff Publishers

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Course Code	Course Name	Th	Tu	Pr	Credits	Evaluation		
						CA	ESE	Total
AI302T	Fundamentals of Artificial Intelligence	3	1	-	4	30	70	100

Course Objectives	Course Outcomes
<p>This course is intended</p> <ul style="list-style-type: none"> To gain the basics of one of the most fascinating and fastest growing areas of Computer Science To formulate artificial intelligence problems corresponding to different applications. To apply artificial intelligence search strategies/ algorithms to solve the problems. To learn the applications and existing systems of Artificial Intelligence in different areas. 	<p>Students will be able to</p> <ul style="list-style-type: none"> Demonstrate fundamental knowledge to the students so that they can understand AI. Comprehend the basic AI problem solving strategies. Analyze the applicability of various searching Techniques. Distinguish between various search strategies. Learn different knowledge representation techniques.

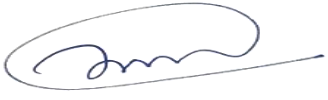

Unit I	[5Hrs]
Introduction to AI: Definition of AI, history & importance of AI, current status, scope, agents, environments, Turing test concept, Task domain of AI, AI Characteristics, Introduction to Production system. AI Problems and its state space search, Introduction to intelligent agents. Case study: Google Duplex (or latest one.)	
Unit II	[10Hrs]
AI Problems and its Formulations: Defining the problems as a state space search and representation, Production systems, Production characteristics, Production system characteristics, and Issues in the design of search problems, Additional problems. Specialized production system, Problem solving methods -Problem graphs, Matching, Indexing and Heuristic functions.	
Unit III	[6Hrs]
Uniformed Search Strategies: Breadth-first search, Depth-first search, Comparing uniformed search techniques. Related Algorithms.	
Unit IV	[8Hrs]
Informed search strategies: Generate-and-test, Hill climbing, best-first search, problem reduction, constraint satisfaction, Mean-ends analysis. Search and optimization (gradient descent)	
Unit V	[7Hrs]
Introduction Knowledge Representation: Brief about Issues in knowledge representation, Approaches to knowledge representation. Comparison between various KR.	
Case study of AI Systems: MYCIN, Dendral, RI and others.	

Text Books

S.N	Title	Authors	Edition	Publisher
1	Artificial Intelligence	Elaine Rich, Kevin Knight, & Shivashankar B Nair	Third edition	McGraw Hill
2	Artificial Intelligence: A Practical Approach	Rajiv Chopra	First Edition	S Chand & Co Ltd
3	A First Course in Artificial Intelligence	Deepak Khemani	Sixth edition	McGraw Hill Education
4	Artificial Intelligence A modern approach	Stuart Russell, and Peter Norvig	Second Edition	Pearson

Reference Books

S.N	Title	Authors	Edition	Publisher
1	Fuzzy Logic with Engineering application (Third edition) Timothy J.Rose	Timothy J.Rose	Third edition	Wiley

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Course Code	Course Name	Th	Tu	Pr	Credits	Evaluation		
						CA	ESE	Total
AI302P	Fundamentals of Artificial Intelligence Lab	-	-	2	1	25	25	50

Course Objectives	Course Outcomes
<p>This course is intended</p> <ul style="list-style-type: none">To implement the theoretical concepts of Artificial intelligenceTo compare the efficiency of various AI search algorithms.	<p>Students will be able to</p> <ul style="list-style-type: none">Comprehend and explore Python programming language.Demonstrate basic AI problem solving strategies.Implement the applicability of various searching Techniques.Evaluate and implement various knowledge representation techniques.Implement real time AI based applications.

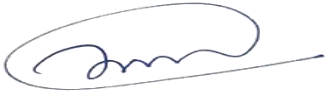

Expt. No.	List of the experiment
1	Programs will be based on AI Problems.
2	Programs will be based on Production systems.
3	Programs will be based on uninformed search.
4	Programs will be based on informed search.
5	Programs will be based on constraint satisfaction.
6	Programs will be based on heuristic search procedure.
7	Micro project based on the syllabus.

Text Books

S.N	Title	Authors	Edition	Publisher
1	Artificial Intelligence	Elaine Rich, Kevin Knight, & Shivashankar B Nair	Third edition	McGraw Hill
2	Artificial Intelligence: A Practical Approach	Rajiv Chopra	First Edition	S Chand & Co Ltd
3	A First Course in Artificial Intelligence	Deepak Khemani	Sixth edition	McGraw Hill Education
4	Artificial Intelligence A modern approach	Stuart Russell, and Peter Norvig	Second Edition	Pearson

Reference Books

S.N	Title	Authors	Edition	Publisher
1	A Classical Approach to Artificial Intelligence	Munesh Chandra Trivedi	Second Edition	Khanna Publishing House, Delhi.
2	Artificial Intelligence	Saroj Kaushik	First Edition	Cengage Learning India, 2011 5.
3	Artificial Intelligence: Foundations for Computational Agents	David Poole and Alan Mackworth	Second Edition	Cambridge University Press 2010

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Course Code	Course Name	Th	Tu	Pr	Credits	Evaluation		
						CA	ESE	Total
AI303T	Computer Networking	3	1	-	4	30	70	100

Course Objectives	Course Outcomes
<p>This course is intended</p> <ul style="list-style-type: none"> To delivers the fundamentals of computer network To discuss and focuses on network architectures, protocols and applications, techniques for encoding and modulation. 	<p>Students will be able to</p> <ul style="list-style-type: none"> Describe the components and infrastructure that form the basis for most computer networks. Outline the various real-world networks. Learn and compare the various protocols models along with addressing scheme. Classify and Illustrate the different techniques for digital data transmissions at physical layer and routing at network layer. Analyze and Design simple computer networks.

Unit I	[8Hrs]
Introduction to Computer Networking Concepts: Layered Network Protocol Architectures; Personal, Local, Metropolitan and Wide Area Networks; Telecommunications and Cellular Networks overview. Physical Layer: Basics of communications; Physical media types and their important bandwidth and bit-error-rate characteristics; Wired and Wireless media including copper cables, optical fiber and wireless.	
Unit II	[7Hrs]
Data Link Layer and Logical Link Control (LLC) sub-layer: Framing; Error control including Bit-parity, CRC and Hamming Codes; Reliable transmission and Automatic Repeat Request (ARQ) protocols including Stop-and-Wait, Go-back-N, Selective Repeat. Performance analysis of ARQ protocols. Example protocols such as HDLC and PPP.	
Unit III	[7Hrs]
Medium Access Control (MAC) sub-layer: Shared media systems; Bus, Star and Ring topologies; TDMA, FDMA, CSMA, CSMA/CD, Ethernet and IEEE 802.3; IEEE 802.11 including CSMA/CA protocols; Performance analysis; Shared and Switched Ethernet; Related protocols such as ICMP, NAT, ARP and RARP.	
Unit IV	[7Hrs]
Network Layer: Internet Protocol (IP) suite; Hierarchical network architectures; IPv4 and IPv6 addressing and headers; Routing protocols including distance-vector and link-state approaches; Interior and Exterior Gateway Protocol concepts; Routing Algorithms including Dijkstra's algorithm and distributed Bellman-Ford algorithm; Example protocols: OSPF, RIP, BGP.	
Unit V	[7Hrs]
Transport Layer: Reliable end-to-end transmission protocols; UDP header; Details of TCP header and operation including options headers and congestion control; TCP variants such as Reno, Tahoe, Vegas, Compound and CUBIC. Application Layer: Socket Interface and Socket programming; Example protocols such as DNS, SMTP, FTP, and HTTP.	

Text Books

S.N	Title	Authors	Edition	Publisher
1	Computer Networking - A top-down approach.	Kurose and Ross,	Seventh Edition	Pearson, 2017
2	Computer Networks	Andrew S. Tanenbaum	Fifth Edition	Pearson Education India, 2013
3	Computer Networks, A Systems Approach	Peterson and Davie	5th ed	Elsevier, 2011

Reference Books

S.N	Title	Authors	Edition	Publisher
1	Computer Networks: An Open Source Approach	Ying-Dar Liu, Ren-Hung Hwang, Fred Baker	Second Edition	McGraw-Hill, 2011.
2	Unix Network Programming	W.Richard Stevens, Bill Fenner and Andrew R	Third Edition,	Addison-Wesley Professional, 2003

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THIRD SEMESTER

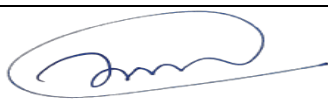

Course Code	Course Name	Th	Tu	Pr	Credits	Evaluation		
						CA	ESE	Total
AI304P	Object Oriented Programming Lab	-	-	2	1	25	25	50

Course Objectives	Course Outcomes
<p>This course is intended</p> <ul style="list-style-type: none">To strengthen problem solving ability by using the characteristics of an object-oriented approach.To design applications using object oriented features	<p>Students will be able to</p> <ul style="list-style-type: none">Articulate the principles of object oriented programming using C++Learn function overloading, constructor overloading, operator overloading, polymorphism & its uses in programming.Implement inheritance concepts and its use for application development.Analyze of dynamic memory allocation and its use for software developmentImplement concept of file handling in real life problemsImplement a project for real world problems

Expt. No.	List of the experiment
1	Fundamental of constructs in C++ including Classes and Objects
2	Constructors and Destructors
3	Types of Overloading
4	Types of inheritance
5	Pointers and Inheritance
6	Virtual Functions
7	File streams
8	Micro project based on the Object Oriented Programming concepts.

Reference Books

S.N	Title	Authors	Edition	Publisher
1	Object –oriented Programing Using C++ and Java	Ramesh Vasappanavar, Anand Vasappanavar, Gautam Vasappanavar	1 st Edition	PEARSON
2	Mastering C++	A.R.Venugopal, Rajkumar, T. Ravishanker	2 nd Edition	TMH
3	Computer Science A Structured Approach Using C++	Behrouz A. Forouzan, Richard F. Gilberg	2 nd Edition	CENGAGE Learning

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Course Code	Course Name	Th	Tu	Pr	Credits	Evaluation		
						CA	ESE	Total
H102	Universal Human Values-2	3	-	-	3	30	70	100

Course Objectives	Course Outcomes
<p>This course is intended</p> <ul style="list-style-type: none"> Development of a holistic perspective based on self-exploration about themselves (human being), family, society and nature/existence. Understanding (or developing clarity) of the harmony in the human being, family, society and nature/existence Strengthening of self-reflection. Development of commitment and courage to act 	<p>Students will be able to</p> <p>By the end of the course, students are expected to become more aware of themselves, and their surroundings (family, society, nature); they would become more responsible in life, and in handling problems with sustainable solutions, while keeping human relationships and human nature in mind. They would have better critical ability. They would also become sensitive to their commitment towards what they have understood (human values, human relationship and human society). It is hoped that they would be able to apply what they have learnt to their own self in different day-to-day settings in real life, at least a beginning would be made in this direction.</p>

Unit I	[6Hrs]
Purpose and motivation for the course, recapitulation from Universal Human Values-I ,Self-Exploration–what is it? - Its content and process; ‘Natural Acceptance’ and Experiential Validation- as the process for self-exploration, Continuous Happiness and Prosperity- A look at basic Human Aspirations , Right understanding, Relationship and Physical Facility- the basic requirements for fulfilment of aspirations of every human being with their correct priority , Understanding Happiness and Prosperity correctly- A critical appraisal of the current scenario , Method to fulfil the above human aspirations: understanding and living in harmony at various levels.	
Unit II	[6Hrs]
Understanding human being as a co-existence of the sentient ‘I’ and the material ‘Body’ , Understanding the needs of Self (‘I’) and ‘Body’ - happiness and physical facility , Understanding the Body as an instrument of ‘I’ (I being the doer, seer and enjoyer) ,Understanding the characteristics and activities of ‘I’ and harmony in ‘I’ , Understanding the harmony of I with the Body: Sanyam and Health; correct appraisal of Physical needs, meaning of Prosperity in detail , Programs to ensure Sanyam and Health.	
Unit III	[6Hrs]
Understanding values in human-human relationship; meaning of Justice (nine universal values in relationships) and program for its fulfilment to ensure mutual happiness; Trust and Respect as the foundational values of relationship , Understanding the meaning of Trust; Difference between intention and competence , Understanding the meaning of Respect, Difference between respect and differentiation; the other salient values in relationship , Understanding the harmony in the society (society being an extension of family): Resolution, Prosperity, fearlessness (trust) and co-existence as comprehensive Human Goals , Visualizing a universal harmonious order in society- Undivided Society, Universal Order- from family to world family.	
Unit IV	[6Hrs]
Understanding the harmony in the Nature , Interconnectedness and mutual fulfilment among the four orders of nature- recyclability and self-regulation in nature , Understanding Existence as Co-existence of mutually interacting units in all-pervasive space ,Holistic perception of harmony at all levels of existence. Include practice sessions to discuss human being as cause of imbalance in nature (film “Home” can be used), pollution, depletion of resources and role of technology etc.	
Unit V	[6Hrs]
Natural acceptance of human values , Definitiveness of Ethical Human Conduct , Basis for Humanistic Education, Humanistic Constitution and Humanistic Universal Order , Competence in professional ethics: a. Ability to utilize the professional competence for augmenting universal human order b. Ability to identify the scope and characteristics of people friendly and eco-friendly production systems, c. Ability to identify and develop appropriate technologies and management patterns for above production systems. , Case studies of typical holistic technologies, management models and production systems , Strategy for transition from the present state to Universal Human Order: a. At the level of individual: as socially and ecologically responsible engineers, technologists and managers b. At the level of society: as mutually enriching institutions and organizations ,Sum up	

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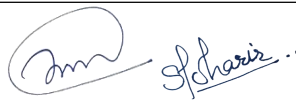

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Text Books

S.N	Title	Authors	Edition	Publisher
1	Human Values and Professional Ethics	Gaur, Sangal, Bagaria	2010	Excel Books, New Delhi

Reference Books

S.N	Title	Authors	Edition	Publisher
1	Jeevan Vidya: Ek Parichaya	A Nagaraj	1999	Jeevan Vidya Prakashan, Amarkantak.
2	Human Values	A.N. Tripathi	2004	New Age Intl. Publishers, New Delhi
3	The Story of My Experiments with Truth	M. K Gandhi		

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