



**APJ ABDUL KALAM TECHNOLOGICAL
UNIVERSITY**

CET Campus, Thiruvananthapuram, Kerala-695016

SYLLABUS: MCA (INTEGRATED)

SEMESTER V

Course No	Master of Computer Applications (Integrated) Course (semester 5)	Hours / week			IA marks	ESE Marks	Total	Credits	Exam slot
		L	T	P					
INMCA301	Mathematics for Computer Applications	3	1	-	40	60	100	4	A
INMCA303	Introduction to E-Commerce	3	1	-	40	60	100	4	B
INMCA305	Introduction to RDBMS and SQL	3	1	-	40	60	100	4	C
INMCA307	IT Infrastructure Management	3	1	-	40	60	100	4	D
INMCA309	Introduction to Operations Research	4	-	-	40	60	100	4	E
INMCA331	RDBMS Lab	-	-	4	100		100	1	S
INMCA333	Scripting Lab	-	-	6	100		100	1	T
TOTAL		16	4	10	400	300	700	22	

Course Code	Course Name	L-T-P-Credits	Year of Introduction
INMCA 301	MATHEMATICS FOR COMPUTER APPLICATIONS	3-1-0-4	2016

Course Objectives

This course aims to give a basic understanding of different mathematical concepts and techniques used in computer applications.

Syllabus

Matrix operations, Solution of linear equations, Eigenvalues and Eigenvectors, Group theory, Lattices and Boolean algebra, Simulation, Fuzzy Sets, Fuzzy Logic.

Expected Outcome

At the end of the course, students would be able to

- solve any given system of linear equations;
- find the Eigenvalues and Eigenvectors of a matrix;
- solve problems using algebraic structures;
- familiar with Lattices and Boolean algebra;
- simulate the operation of a dynamic system and make improvement according to the simulation results;
- use the concepts of Fuzzy Sets and Fuzzy Logic;

References

1. C. L. Liu, “Elements of Discrete Mathematics”, Second Edition, McGraw–Hill Int. editions, 1988.
2. Erwin Kreyszig, “Advanced Engineering Mathematics”, Tenth Edition, Wiley.
3. J.P Trembly, R Manohar, “Discrete Mathematical Structures with Applications to Computer Science”, Tata McGraw–Hill Pub.Co.Ltd, New Delhi, 2003.
4. Kenneth H.Rosen, “Discrete Mathematics and its Applications”, Fifth Edition, Tata McGraw – Hill Pub. Co. Ltd., New Delhi, 2003.
5. Ralph. P. Grimaldi, “Discrete and Combinatorial Mathematics: An Applied Introduction”, Fourth Edition, Pearson Education Asia, Delhi, 2002.
6. Taha.H.A, “Operation Research: An Introduction”, McMillan publishing Co., 1982.
7. Timothy J. Ross, “Fuzzy Logic with Engineering Applications”, McGraw Hill, 1995.

MOOC References

- Matrices: <http://nptel.ac.in/courses/122104018/>
- Discrete Mathematics: <http://nptel.ac.in/courses/111107058/32#>
- System modeling and simulation: <https://www.youtube.com/watch?v=-gYcZt5iKPA>
- <http://nptel.ac.in/courses/108104049/13>



Course Plan			
Module	Contents	Hours	End Sem. Exam. Mark
I	System of Linear Equations: Linear System of Equations, Elementary row operations, Row Echelon form, Linear independence, Rank of a matrix, Solution of Linear Systems by Gauss Elimination Method, Homogeneous Linear Systems. [Ref 2 - 7.3 – 7.5]	9	15%
II	Matrix Eigenvalue Problem : Eigenvalues and Eigenvectors, Cayley Hamilton Theorem, Diagonalization of a matrix, Quadratic forms- Principal axis theorem(without proof) [Ref 2 – 8.1, 8.3 & 8.4]	9	15%
FIRST INTERNAL EXAMINATION			
III	Group Theory: Groups, Definition and elementary properties, Subgroups, Homomorphism and Isomorphism, Generators - Cyclic Groups, Cosets and Lagrange's Theorem. Algebraic systems with two binary operations- Rings, Fields-Sub rings, Ring Homomorphism.[Ref 3 – 3.5]	10	20%
IV	Lattices and Boolean algebra: Lattices –Sub lattices – Complete lattices – Bounded Lattices - Complemented Lattices – Distributive Lattices – Lattice Homomorphisms. Boolean algebra – Sub algebra, Direct product and Homomorphisms. [Ref 3 – 4.1, 4.2]	9	15%
SECOND INTERNAL EXAMINATION			
V	Simulation: Simulation concepts, Simulation of a Queuing system using event list, Pseudo-Random Numbers, basic ideas of Monte-Carlo simulation, Simulation of Inventory System. [Ref 6 – 16.1 - 16.5]	10	20%
VI	Fuzzy Sets and Fuzzy Logic: Introduction to classical sets - properties, Operations and relations; Fuzzy sets, Membership, Uncertainty, Operations and properties, Fuzzy relations, Cardinalities, Membership functions. Fuzzification, Defuzzification methods, Membership value assignment, Development of rule base and decision making	9	15%

	system, Defuzzification to Crisp sets. [Ref 7 – Relevant sections of Chapter 2, 3, 4]		
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END SEMESTER EXAMINATION

Proofs of theorems and properties are not required.

QUESTION PAPER PATTERN

There will be two parts in the Question paper - **Part A and Part B.**

Part A will have 8 short answer questions of 3 marks each ($8 \times 3 \text{ M} = 24 \text{ M}$). There will be no choice questions.

Part B will have 6 essay questions one from each module of 6 marks each, with an alternative choice question from the same module ($6 \times 6\text{M}=36\text{M}$). The maximum number of sub part questions in Part B to be limited to 2.

The total marks assigned to questions in Part A (Short answer) and Part B (Essay) together from a single module will not exceed the marks assigned to that module specified in the course plan in the syllabus.



Course Code	Course Name	L-T-P-Credits	Year of Introduction
INMCA 303	INTRODUCTION TO E-COMMERCE	3-1-0-4	2016
<p>Course Objectives</p> <p>The purpose of this course is to understand & familiarize with the mechanism E-commerce of conducting business transactions through electronic media.</p>			
<p>Syllabus</p> <p>E-commerce, M-Commerce, E-business models, E-payment systems, E-security, E-Commerce and Law, E-Commerce Architecture and System Design.</p>			
<p>Expected Outcome</p> <p>At the end of this course, the student would be able to:</p> <ul style="list-style-type: none"> • Familiarize with the basics of e-commerce, m-commerce and to comprehend its potential; • To understand the security issues and laws; • Familiarize with architecture and system design; • Understand different e-business models; • To understand e-payment systems; 			
<p>References</p> <ol style="list-style-type: none"> 1. Nir Vulkan, “The economics of E Commerce A strategic guide to understanding and designing the online market place”, Princeton University Press,2003 2. P T Joseph S.J., “E-commerce an Indian Perspective”, Fifth Edition, PHI 3. Rajendra Kumar, “Information and Communication Technologies”, University Science Press, Laxmi Publications. 4. Ravi Kalkota, Andrew B. Whinston, “Electronic Commerce:A Manager's Guide”, Addison-Wesley Professional,1997 5. Zheng Qin, “Introduction to E-Commerce”, Springer, Tsinghua University Press. 			
<p>Web References</p> <ol style="list-style-type: none"> 6. http://wps.prenhall.com/bp_turban_ec_2012/207/53241/13629775.cw/content/index.html 			
<p>MOOC Reference</p> <ul style="list-style-type: none"> • Electronic Commerce - http://nptel.ac.in/courses/106108103/pdf/Lecture_Notes/LNm13.pdf • Electronic Commerce - http://nptel.ac.in/courses/106105084/35 • Electronic Commerce -https://www.class-central.com/tag/e-commerce • Electronic Commerce -http://www.worldwidelearn.com/business-course/ecommerce-course.htm 			

Course Plan			
Module	Contents	Hours	End Sem. Exam. Mark
I	Fundamentals of E-Commerce: Origin and development, Definitions, Advantages of e-commerce as compared with traditional system of commerce, The Impact of Computer Science upon the E-commerce, Impact of Communications Science upon the E-commerce, The Impact of Management Science upon E-commerce, Constitution of E-Commerce. [Ref 5] Auctions in E-commerce, types of auctions. [Ref 1], EDI- Definition & Applications, Advantages of EDI.[Ref 4]	9	15%
II	Categories of E-Commerce: business-to-business (B2B), business-to-consumer (B2C), business-to-government (B2G), government-to-government (G2G), consumer-to-consumer (C2C), M-Commerce. [Ref 5]	10	20%
FIRST INTERNAL EXAMINATION			
III	E-Commerce Architecture and System Design: E-commerce Architecture, E-commerce Security System, E-commerce Payment System, Architecture and Design Method of E-commerce Application System Software. [Ref 5]	10	20%
IV	Payment Technologies for E-Commerce: Online Bank, E-Payment Tools. [Ref 5], e-CRM:CRM, what is e-CRM, it's Applications[Ref 6]	9	15%
SECOND INTERNAL EXAMINATION			
V	Security Technologies in E-Commerce: Introduction to Security Problems in E-commerce, Reliability of E-commerce System, Hacking, Spoofing, Sniffing, Phishing, Denial of Service (DoS) attacks, Secure Payment Technology. [Ref 5]	9	15%
VI	E-Commerce and Law: The legal Problems in the Electronic Fund Transfer, Legal Problems Brought forth by Domain Names, Legal Systems Concerning the E-commerce Security, Legal Responsibilities for the Violation of E-commerce Security Laws, Consumer Rights Protection in E-commerce. [Ref 5]	9	15%

END SEMESTER EXAMINATION

QUESTION PAPER PATTERN

There will be two parts in the Question paper - **Part A and Part B.**

Part A will have 8 short answer questions of 3 marks each (8 X 3 M = 24 M). There will be no choice questions.

Part B will have 6 essay questions one from each module of 6 marks each, with an alternative choice question from the same module (6 x 6M=36M). The maximum number of sub part questions in Part B to be limited to 2.

The total marks assigned to questions in Part A (Short answer) and Part B (Essay) together from a single module will not exceed the marks assigned to that module specified in the course plan in the syllabus.



Course Code	Course Name	L-T-P-Credits	Year of Introduction
INMCA 305	INTRODUCTION TO RDBMS AND SQL	3-1-0-4	2016
<p>Course Objectives</p> <p>This course aims to provide an overview of the architecture, functions, and benefits of a relational database management system along with SQL and introduction to transaction processing.</p>			
<p>Syllabus</p> <p>Conventional file processing System, Structure of DBMS, Attributes, Entities, Entity Relationship Diagram (ERD), Relational algebra, Normal Forms, Structured Query Language, Introduction to PL/SQL, Transaction processing, Concurrency Control, Database Security and Authorization.</p>			
<p>Expected Outcome</p> <p>At the end of the course, students would be able to:</p> <ul style="list-style-type: none"> • understand the fundamentals of relational database systems including: data models, database architectures, and database manipulations; • understand the theories and techniques in developing database applications and be able to demonstrate the ability to build databases using enterprise DBMS products such as MySQL, MariaDB, Oracle or MsSQL; • understand new developments and trends in databases; 			
<p>References</p> <ol style="list-style-type: none"> 1. Bipin Desai, “An Introduction to Database System”, West Publishing Company, College & School Division, 1990. 2. Henry Korth and A. Silberschatz, “Database System Concepts”, Sixth Edition, McGraw-Hill, 2011. 3. Michael J. Folk, Greg, Riccardi, ‘File Structure’, Third Edition, Addison Wesley Longman, 1998. 4. Raghu Ramakrishnan and Johannes Gehrke, “Database Management Systems”, Third Edition, McGraw Hill, 2003. 			
<p>MOOC References</p> <ul style="list-style-type: none"> • http://nptel.ac.in/courses/106106095/ • http://nptel.ac.in/courses/106106093/ 			

Course Plan			
Module	Contents	Hours	End Sem. Exam. Mark
I	Introduction. Data, information, metadata, terminology of file, association between fields, entities and their attributes, Relationship- records and files, abstraction and data integration. [Ref 1] Conventional file processing System, Structure of DBMS. Advantages and Disadvantages of DBMS, Users of DBMS. [Ref 3]	10	20%
II	Data association – Entities, attributes and relationship among entities. Representation of association and relationship, Data model classification- Approaches to the relational model, Hierarchical model & network model with examples, Entity-Relationship model. Entity Relationship Diagram (ERD), Mapping ER model to Relational Model. [Ref 2]	10	20%
FIRST INTERNAL EXAMINATION			
III	Introduction to Relational Database: Attributes and domains, tuples, relation and their schemas, relation representation, keys- Super Key, Candidate Key, Primary Key, Foreign Key, relational operations, integrity rules. Relational algebra: basic operations, relational algebra queries, Pseudo columns – ROWID, ROWNUM, USER, UID, SYSDATE, Null values, TAB table, DUAL table. [Ref 3]	9	15%
IV	Relational schema and relational design, Functional Dependencies, Properties of Decomposition, Normal Forms: First Normal Form, Second Normal Form, Third Normal Form, Boyce Codd Normal Form, Fourth Normal Form, Fifth Normal Form. Dependency preservation, lossless design. [Ref 2]	9	15%
V	Structured Query Language -Overview of SQL, Basic Queries in SQL, Union, Intersect and Except, Nested Queries, Joins- Inner joins, Outer Joins, Left outer, Right outer, full outer joins. Aggregate Operators, Null Values, Number, String and Date Functions, Triggers and Views in SQL, Data control language statements – GRANT and REVOKE, Introduction to PL/SQL (basic concept).	9	15%

	Cursors, Trigger and functions. [Ref 2]		
SECOND INTERNAL EXAMINATION			
VI	Introduction to transaction processing, Transaction and system concepts, Desirable properties of transactions. [Ref 2] Concurrency Control: Locking techniques for concurrency control. Database Security and Authorization: Types of security, control measures, database security and the DBA. [Ref 4]	9	15%
END SEMESTER EXAMINATION			
QUESTION PAPER PATTERN			
<p>There will be two parts in the Question paper - Part A and Part B.</p> <p>Part A will have 8 short answer questions of 3 marks each (8 X 3 M = 24 M). There will be no choice questions.</p> <p>Part B will have 6 essay questions one from each module of 6 marks each, with an alternative choice question from the same module (6 x 6M=36M). The maximum number of sub part questions in Part B to be limited to 2.</p> <p>The total marks assigned to questions in Part A (Short answer) and Part B (Essay) together from a single module will not exceed the marks assigned to that module specified in the course plan in the syllabus.</p>			



Course Code	Course Name	L-T-P-Credits	Year of Introduction
INMCA 307	IT INFRASTRUCTURE MANAGEMENT	3-1-0-4	2016
<p>Course Objectives</p> <p>This course focuses on the basics of IT infrastructure management aspects along with basics of cyber ethics.</p>			
<p>Syllabus</p> <p>Introduction to Information Technology, IT Infrastructure, Storage Management, Security management, Cyber Ethics, Emerging trends in IT.</p>			
<p>Expected Outcome</p> <p>At the end of the course, students would be able to</p> <ul style="list-style-type: none"> • know about the emerging area of IT Infrastructure and Security Management; • have an understanding on Cyber Ethics; • to know about Emerging Trends in IT; 			
<p>References</p> <ol style="list-style-type: none"> 1. Manish Mahajan, Shikha Gupta, “IT TNFRASTRUCTURE & MANAGEMENT”, Acme Learning Private Limited, (2009). 2. Phalguni Gupta, Surya Prakash, Umarani Jayaraman, “IT INFRASTRUCTURE AND IT’S MANAGEMENT”, Tata McGraw Hill Education Private Limited, (2010). 			
<p>MOOC References</p> <ul style="list-style-type: none"> • http://searchcio.techtarget.com/definition/infrastructure-management 			

Course Plan			
Module	Contents	Hours	End Sem. Exam. Mark
I	Introduction to Information Technology: Introduction, Computer Fundamentals, Devices, Computer Data, Software, Network, Internet, Computing resources. [Ref 1]	9	15%
II	IT Infrastructure: Introduction, Requirements, IT system management, Process, Service Management process, Information System design, IT infrastructure library. [Ref 1]	9	15%
FIRST INTERNAL EXAMINATION			
III	Storage Management: Storage Management, Data protection basics, Backup and recovery, Disaster recovery, Space management, BMR, Data Retention, Database and Application Protection. [Ref 1]	10	20%
IV	Security Management: Introduction, Security, Computer security, Security Controls, Internet security, Managed Security, Security standards, Firewalls, Identity Management, Access management, Authentication and authorization, Access operation, Intrusion detection, Security Information management, Cryptography. [Ref 1]	10	20%
V	Cyber Ethics: Introduction, Ethics and softwares, Internet and ethics, Computer ethics, Ethical Issues, Intellectual property, The role of WIPO. [Ref 1]	10	15%
SECOND INTERNAL EXAMINATION			
VI	Emerging Trends in IT: Introduction, Electronic Commerce, The paperless Office, E-Governance, Mobile Communications, Bluetooth, GPS, Smart cards, New display technologies, Expert Systems, Neural Networks. [Ref 1]	8	15%
END SEMESTER EXAMINATION			
QUESTION PAPER PATTERN			
There will be two parts in the Question paper - Part A and Part B.			
Part A will have 8 short answer questions of 3 marks each (8 X 3 M = 24 M). There will be no choice			

questions.

Part B will have 6 essay questions one from each module of 6 marks each, with an alternative choice question from the same module (6 x 6M=36M). The maximum number of sub part questions in Part B to be limited to 2.

The total marks assigned to questions in Part A (Short answer) and Part B (Essay) together from a single module will not exceed the marks assigned to that module specified in the course plan in the syllabus.

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Course No.	Course Name	L-T-P Credits	Year of Introduction
INMCA 309	INTRODUCTION TO OPERATIONS RESEARCH	4-0-0-4	2016

Course Objectives

- To introduce Operations Research as a tool used to solve decision making problems in a wide range of areas.
- To impart different modeling techniques of real world problems and the various optimization techniques for solving these models.

Syllabus

Linear Programming model and various methods for solving the models- The transportation and assignment problems - Probabilistic models -game theory and queuing theory. Simulation models -the virtual running of a real world problem.

Expected Outcome

The students would be able to

- Construct a mathematical model of a real world problem which has many alternative solutions which makes the decision maker unable to take a decision;
- Learn about various optimization methods that are employed to solve these mathematical models to find a solution which is in the best interest of the decision maker;

References

1. Hamdy A.Taha, “Operations Research-An Introduction”, Prentice Hall of India
2. KantiSwarup, P.K.Gupta and Man Mohan “Operations Research”, Sultan Chand (2010).
3. Ravindran, Philips and Solberg, Wiley, “Operations Research”, Second edition (2007),Wiley.

Mooc Reference

- <http://www.nptelvideos.in/2012/12/fundamentals-of-operations-research.html>

Course Plan			
Module	Contents	Hours	End Sem. Exam. Mark
I	Introduction to O.R-Modeling in O.R -Solution methods for O.R-Methodology of O.R Linear Programming. Problem-Formulation-Graphical method-Simplex method-Big M method-Two phase method. [Ref 1 Sections 1.1,2.1-2.3.1-3.5]	8	15%
II	Duality in LPP-Statement of Duality theorems-Statement of complementary slackness theorem Solving LPP using duality-Dual simplex method. [Ref 1 Sections .7.1 and 4,4.1]	9	15%
FIRST INTERNAL EXAMINATION			
III	Transportation problem-Methods to find initial basic feasible solution-Northwest corner rule-Matrix minima method-Vogel's Approximation method. Solving a TP -MODI method –Degeneracy in TP-Unbalanced TP-Maximization in TP Assignment problem-Hungarian method of assignment-Maximization in assignment problem. [Ref 1 Sections .5.1,5.3 &5.4]	9	15%
IV	Game Theory-Two person zero sum game-Basic notions-saddle point-Maximin-Minimax principle. Games without saddle point-Mixed strategies-Algebraic method for solving two person zero sum game-Graphical method for 2xn and mx2 games-Dominance principle-Solving mxn game -using dominance-LPP method. [Ref 1 Section 13.4]	9	15%
V	Project scheduling by PERT/CPM - Difference between PERT and CPM - Constructing the network - critical path analysis - Float of an Activity - Three time Estimated for PERT - Project cost by CPM. [Ref 1 Section 6.5]	10	20%
SECOND INTERNAL EXAMINATION			

VI	<p>Queuing theory -Elements of a queuing system -Kendall's notation - Operating characteristics -Poisson process -Exponential distribution- mean and variance -Birth and death process.</p> <p>Queuing models based on Poisson process -Single server models with finite and infinite capacity-Multi server models with finite and infinite capacity. [Ref 1 Sections 15.5, 15.5.1-15.5.3]</p>	11	20%
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**END SEMESTER EXAMINATION
QUESTION PAPER PATTERN**

There will be two parts in the Question paper - **Part A and Part B.**

Part A will have 8 short answer questions of 3 marks each (8 X 3 M = 24 M). There will be no choice questions.

Part B will have 6 essay questions one from each module of 6 marks each, with an alternative choice question from the same module (6 x 6M=36M).The maximum number of sub part questions in **Part B** to be limited to 2.

The total marks assigned to questions in Part A (Short answer) and Part B (Essay) together from a single module, not to exceed the marks assigned to that module specified in the course plan in the syllabus.



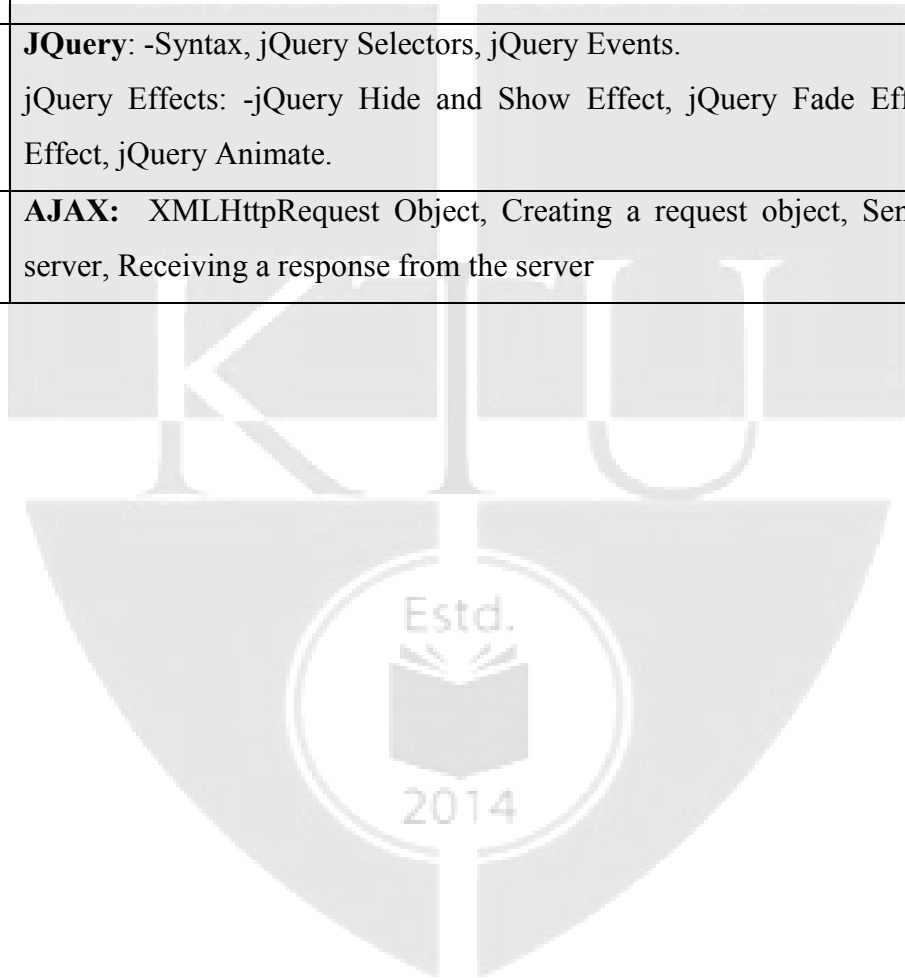
Course Code	Course Name	L-T-P-Credits	Year of Introduction
INMCA 331	RDBMS LAB	0-0-4-1	2016
This course aims to provide an overview of the architecture, functions, and benefits of a relational database management system along with SQL.			
Syllabus This is a companion course for the INMCA305 – Introduction to RDBMS and SQL. SQL, SQL Functions, Retrieving Data from Multiple Tables, Group by Functions, Sub-Queries, PL/SQL, Cursor, Triggers.			
Expected Outcome At the end of the course, students would be able to: <ul style="list-style-type: none"> understand the fundamentals of relational database systems including: data models, database architectures, and database manipulations; understand the theories and techniques in developing database applications and be able to demonstrate the ability to build databases using enterprise DBMS products such as MySQL, MariaDB, Oracle or MsSQL; 			
References <ol style="list-style-type: none"> Ashutosh Kumar Dubey, “Database Management Concepts”, Second Edition, KATSON Books, 2011. Bipin Desai, “An Introduction to Database System”, West Publishing Company, College & School Division, 1990. Henry korth and A. Silberschatz, “Database System Concepts”, Sixth Edition, McGraw-Hill, 2011. Raghu Ramakrishnan and Johannes Gehrke, “Database Management Systems”, Third Edition, McGraw Hill, 2003. 			
MOOC References <ul style="list-style-type: none"> Data Manipulation at Scale: Systems and Algorithms (https://www.coursera.org/learn/data-manipulation) Introduction to Databases (coursera) (https://class.stanford.edu/courses/DB/2014/SelfPlaced/about) Database Management Essentials (coursera) (https://www.coursera.org/learn/database-management) SQL(Stanford University) (https://lagunita.stanford.edu/courses/DB/SQL/SelfPaced/courseware) 			

Experiments	Contents
I	1. SQL*Plus and SQL <ol style="list-style-type: none"> a. Introduction b. Logging on to SQL*Plus and Leaving SQL*Plus c. Choosing and Describing Tables d. The System Dummy Table e. Selecting Columns f. Duplicate Information (DISTINCT) g. Sorting Information
II	Data Definition Language (DDL) <ol style="list-style-type: none"> a. Create, Drop Alter Keywords b. Tables c. Column d. Views e. Sequences Integrity Constraints <ol style="list-style-type: none"> a. Types of Constraint b. Referential Integrity c. Defining Constraints d. Integrity Constraints
III	Data Manipulation Language (DML) <ol style="list-style-type: none"> a. Insert, Update, Delete b. Commit, Rollback and Savepoints
IV	SQL Functions <ol style="list-style-type: none"> a. The Concatenation Operator b. Column Aliases c. String Functions d. Arithmetic Functions e. Date Functions Filtering Data Using Where <ol style="list-style-type: none"> a. Where Operators b. Where with Keywords c. Where and Logical Operators d. Where and Soundex

<p>V</p>	<p>Retrieving Data from Multiple Tables</p> <ol style="list-style-type: none"> a. Joining Tables (Equi-Joins) b. Aliases for Table Names c. Joining Tables (Non-Equi-Joins) d. Joining Tables (Outer Joins) e. Joining Tables (Inner Joins) <p>Group by Clause and Group by Functions</p> <ol style="list-style-type: none"> a. Group Function Examples b. Group Function with Having Clause c. Aggregate Functions <p>Sub-Queries</p> <ol style="list-style-type: none"> a. Basic Subqueries b. Multiple Column Subqueries c. Subqueries with Having Clause d. Correlated Subqueries
<p>VI</p>	<p>PL/SQL</p> <ol style="list-style-type: none"> a. Variables and type declarations b. Loop structure c. PL/SQL language commands d. PL/SQL Blocks e. Cursor/ cursor loops f. Triggers g. Functions h. Procedures
<p>*End Semester Examination will be conducted internally by the College.</p>	

Course Code	Course Name	L-T-P-Credits	Year of Introduction
INMCA 333	SCRIPTING LAB	0-0-6-1	2016
<p>Course Objectives</p> <p>This course aims to give a basic understanding of scripting languages to the students, along with various scripting libraries in use.</p>			
<p>Syllabus</p> <p>Demonstrate HTML5 tags for text, links, lists and web standards for images/videos/audios, Demonstrate Simple layouts, Illustrate HTML tags for tables, Demonstrate HTML5 tags for styles. JavaScript: Syntax Basics, JS Operators and JavaScript Implementations. JQuery: Syntax, jQuery Selectors, jQuery Events, jQuery Effects, jQuery Callbacks, jQuery and HTML. AJAX: XML Http Request Object, Creating a request object ,Sending a request to server, Receiving a response from the server</p>			
<p>Expected Outcome</p> <p>At the completion of this course student would be able to do the following:</p> <ul style="list-style-type: none"> • Use operators, variables, arrays, control structures, functions and objects in JavaScript; • Identify popular JavaScript Libraries; • Create dynamic styles; • Create animation on a web page; • Use regular expressions for form validation; 			
<p>References</p> <ol style="list-style-type: none"> 1. Ferguson, Russ, Heilmann and Christian, "Beginning JavaScript with DOM Scripting and Ajax", Second Editon, APRESS, 2013 2. "HTML5 Black Book", Second Edition, Dreamtech Press; 2016 			
<p>MOOC References</p> <ul style="list-style-type: none"> • https://alison.com/courses/JavaScript-and-jQuery • https://www.codecademy.com/learn/javascript • https://www.codeschool.com/courses/javascript-road-trip-part-1 • https://www.udacity.com/course/javascript-basics--ud804 			
<p>*End Semester Examination will be conducted internally by the College.</p>			

Experiments	Contents
I	HTML5: HTML5 skeleton, HTML5 tags for text, links, lists, Illustrate HTML5 tags and web standards for images (graphics), Simple layouts, HTML5 tags for tables, HTML5 tags for styles.
II	JAVASCRIPT:-Syntax Basics : JS Statements, JS Comments, JS Variables, JS Data types, JS Operators, JS Comparisons, JS Conditional Statements, JS Loops JS Events, JS Objects :String Functions, JS Math Functions, JS Date Functions, JS Array Functions and Property
III	JS User Defined Functions, JavaScript Implementations: Simple Calculator Using JavaScript, JS Validations using Object Functions, JS Validations using Regular Expression
IV	JQuery: -Syntax, jQuery Selectors, jQuery Events. jQuery Effects: -jQuery Hide and Show Effect, jQuery Fade Effect, jQuery Slide Effect, jQuery Animate.
V	AJAX: XMLHttpRequest Object, Creating a request object, Sending a request to server, Receiving a response from the server





APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY

CET Campus, Thiruvananthapuram, Kerala-695016

SYLLABUS: MCA (INTEGRATED)

SEMESTER VI

Course No	Master of Computer Applications (Integrated) Course (semester 6)	Hours / week			IA marks	ESE Marks	Total	Credits	Exam slot
		L	T	P					
INMCA302	Introduction to Software Engineering	3	1	-	40	60	100	4	A
INMCA304	Numerical Methods	3	1	-	40	60	100	4	B
INMCA306	Computational Sustainability	3	1	-	40	60	100	4	C
INMCA308	Open Source Platforms	3	1	-	40	60	100	4	D
INMCA312	Advanced Object Oriented Programming	3	1	-	40	60	100	4	E
INMCA332	Advanced Object Oriented Programming Lab	-	-	6	100		100	1	S
INMCA334	Open Source Platforms Lab	-	-	4	100		100	1	T
	TOTAL	15	5	10	400	300	700	22	

Course Code	Course Name	L-T-P-Credits	Year of Introduction
INMCA 302	INTRODUCTION TO SOFTWARE ENGINEERING	3-1-0-4	2016
<p>Course Objectives</p> <p>This course aims to introduce students to the basics of software engineering and to apply these basic theoretical principles to a software development project.</p>			
<p>Syllabus</p> <p>Introduction to Software engineering, Requirement Analysis and Modeling, Design, Software Quality, Testing, Maintenance and Reengineering</p>			
<p>Expected Outcome</p> <p>At the end of the course, students would be able to</p> <ul style="list-style-type: none"> • Explain the theory and foundations of software engineering; • Explain the different process models and choose the best model for their mini project; • Construct requirement models and to create a design that satisfies the requirements; 			
<p>References</p> <ol style="list-style-type: none"> 1. Elias M. Awad, “Systems Analysis and Design”, 2nd Edition, Galgotia Publications Pvt Ltd. 2. Pankaj Jalote, “An Integrated Approach to Software Engineering”, 3rd Edition, Narosa Publishing House. 3. Pressman, R.S, “Software Engineering: A Practitioner's Approach”, 7th Edition, McGraw-Hill International Edition, 2010. 4. Sommerville, “Software Engineering”, 7th Edition, Pearson Education, 2005. 			
<p>Web References</p> <ol style="list-style-type: none"> 5. http://www.guru99.com/automation-testing.html 			
<p>MOOC References</p> <ul style="list-style-type: none"> • http://nptel.ac.in/courses/106101061/5 			

Course Plan			
Module	Contents	Hours	End Sem. Exam. Marks
I	Introduction to Software engineering: Software, Characteristics of software, Types of Software, Software Product Vs Software Process, Software Engineering definition [Ref 3], Introduction to Software Development Life Cycle [Ref 1], Definition, Waterfall model, Incremental process models, Evolutionary process models, Introduction to agile development. [Ref 3],	10	20%
II	Requirement Analysis and Modeling: Introduction to requirement engineering, Requirement Engineering tasks [Ref 3], Feasibility Study [Ref 4], Requirement Specification: SRS document preparation. [Ref 2] Requirement Modeling: ER Diagrams, DFD [Ref 1]	10	15%
FIRST INTERNAL EXAMINATION			
III	Design: Software Design Definition, Design Concepts, Coupling, Types of Coupling, Cohesion, Types of Cohesion Software Architecture, Architectural Styles, User Interface Design- Golden Rules, The process of interface design, Interface Analysis. [Ref 3]	9	15%
IV	Software Quality: Software Quality-Garvin's Quality Dimensions, Review Techniques-Defect Amplification and Removal, Informal and Formal Reviews. Software Quality Assurance (SQA)-Elements, Task, Software Reliability. [Ref 3]	8	15%
V	Software Testing: Definition, Test characteristics, Test Plan, Test Cases, Types of testing, Black-Box Testing, White-Box Testing, Stress Testing, Performance Testing, [Ref 3] Introduction to Automation Testing. [Ref 5]	10	20%
SECOND INTERNAL EXAMINATION			
VI	Maintenance and Reengineering: Software Maintenance, Software Supportability, Challenges of maintenance phase, Reengineering, Business Process Reengineering, Software Reengineering, Reverse Engineering, Restructuring, Forward Engineering. [Ref 3]	9	15%

END SEMESTER EXAMINATION

QUESTION PAPER PATTERN

There will be two parts in the Question paper - **Part A and Part B.**

Part A will have 8 short answer questions of 3 marks each (8 X 3 M = 24 M). There will be no choice questions.

Part B will have 6 essay questions one from each module of 6 marks each, with an alternative choice question from the same module (6 x 6M=36M). The maximum number of sub part questions in **Part B** to be limited to 2.

The total marks assigned to questions in Part A (Short answer) and Part B (Essay) together from a single module will not exceed the marks assigned to that module specified in the course plan in the syllabus.



Course Code	Course Name	L-T-P-Credits	Year of Introduction
INMCA 304	NUMERICAL METHODS	3-1-0-4	2016
Course Objectives			
This course aims to give a basic understanding of computer based numerical methods.			
Syllabus			
Numerical solution of Linear and Non-Linear equations, Curve Fitting, Numerical integration and differentiation, Numerical solution of differential equation.			
Expected Outcome			
At the end of the course, students would be able to			
<ul style="list-style-type: none"> • Solve equations and find eigenvectors numerically; • Fit the best curve using experimental observations; • Understand the concepts of Interpolation; • Calculate a differential coefficient or a definite integral using an appropriate numerical method; • Solve an ordinary differential equation using an appropriate numerical method; • Solve partial differential equation; 			
References			
<ol style="list-style-type: none"> 1. B.S. Grewal and J.S. Grewal, “Numerical methods in Engineering and Science”, 6th Edition, Khanna Publishers, New Delhi, 2004. 2. C. F. Gerald and P.O. Wheatley, “Applied Numerical Analysis”, 6th Edition, Pearson Education Asia, New Delhi, 2006. 3. K Sankara Rao, “Numerical Methods for Scientists and Engineers” – 3rd Edition, Printice Hall of India Private Ltd, New Delhi, 2007. 4. M.K Jain, R.K Iyengar, R.K Jain, “Numerical Methods for Scientific and Engineering Computation”, New Age International Hill Publishers, New Delhi-1997. 5. S. C Chapra and R. P Canale, “Numerical Methods for Engineers”, 5th Edition, Tata McGraw-Hill, New Delhi, 2007. 6. T. Veerarajan and T. Ramachandran, “Numerical methods with programming in ‘C’ ”, Second Edition, Tata McGraw-Hill Publishing.Co.Ltd, 2007. 			
MOOC References			
<ul style="list-style-type: none"> • Numerical Methods and Computation: http://nptel.ac.in/courses/122102009/ 			

Course Plan			
Module	Contents	Hours	End Sem. Exam. Marks
I	Solution of equations, Eigenvalue and Eigenvector: Non-Linear: Bisection method, Fixed point iteration, Regula Falsi method, Newton- Raphson Method. Linear: Gauss-Seidel method, Jacobi Iteration method, Eigenvalues and Eigenvectors of a matrix by power method. [Ref 1 Sections 2.1,2.5,2.7-2.9,2.11(Aitken's method not required),2.12,2.13,3.5,4.11]	10	15%
II	Curve Fitting: Introduction, Least Square Method, Fitting Linear Equations, Fitting second degree polynomial function. [Ref 1 Sections 5.1,5.4-5.6]	9	15%
FIRST INTERNAL EXAMINATION			
III	Interpolation and Approximation: Newton's forward and backward Interpolation for equal intervals, Lagrange's and Newton's Interpolation for unequal Intervals, Gauss's Interpolation formula. [Ref 1 Sections 6.1.6.2,7.1-7.3,7.5,7.6,7.11- 7.14]	9	15%
IV	Differentiation and Integration: Differentiation using interpolation formulae –Numerical integration by trapezoidal and Simpson's 1/3 and 3/8 rules, Romberg's Integration. [Ref 1 Sections 8.1,8.2,8.4,8.5,8.7]	9	15%
V	Ordinary Differential Equations: Single step methods: Taylor series method, Euler method, Fourth order Runge – Kutta method. Multistep methods: Milne's and Adam's predictor and corrector method. [Ref 1 Sections 10.1,10.3,10.4,10.9,10.10]	10	20%
SECOND INTERNAL EXAMINATION			
VI	Partial Differential Equations: Finite difference solution of second order partial differential equation, Finite difference solution of one dimensional heat equation by explicit and implicit methods, One dimensional wave equation and two dimensional Laplace equation. [Ref 1 Sections 11.1,11.3,11.5,11.9,11.10,11.12]	9	20%
END SEMESTER EXAMINATION			

Proofs of theorems and properties are not required.

QUESTION PAPER PATTERN

There will be two parts in the Question paper - **Part A and Part B.**

Part A will have 8 short answer questions of 3 marks each (8 X 3 M = 24 M). There will be no choice questions.

Part B will have 6 essay questions one from each module of 6 marks each, with an alternative choice question from the same module (6 x 6M=36M). The maximum number of sub part questions in **Part B** to be limited to 2.

The total marks assigned to questions in Part A (Short answer) and Part B (Essay) together from a single module will not exceed the marks assigned to that module specified in the course plan in the syllabus.



Course Code	Course Name	L-T-P-Credits	Year of Introduction
INMCA 306	COMPUTATIONAL SUSTAINABILITY	3-1-0-4	2016
Course Objectives <ul style="list-style-type: none"> To have an increased awareness among students on issues in areas of sustainability To understand the role of technology within sustainable development. To know the methods, tools and incentives for sustainable product-service system development. To establish a clear understanding of the role and impact of various aspects of technological decisions on environmental, societal and economic problems. 			
Syllabus Sustainability – need and concept, challenges, Environment acts and protocols, global, regional and local environment issues. Natural resources and their pollution, carbon credits, zero waste concept. ISO 14000, Life Cycle Analysis, Environmental Impact Assessment studies, sustainable habitat, green buildings, green materials, Energy – conventional and renewable sources. Technology and sustainable development, sustainable urbanization. Industrial Ecology.			
Expected Outcome The student would be <ul style="list-style-type: none"> Able to understand the different types of environmental pollution problems and their sustainable solutions; Able to work in the area of sustainability for research and education; Having a broader perspective in thinking for sustainable practices by utilizing the knowledge and principles gained from this course; 			
References <ol style="list-style-type: none"> David T. Allen, David R. Shonnard, “Sustainable Engineering – Concepts, Design and Case Studies”, Pearson Education, Prentice Hall, First Edition, 2012. Dr. Swarnalatha K, Dr. Binu Sara Mathew, “Sustainable Engineering”, Orbit Publishers and Distributors, August, 2015. Shibu Krishnan, “Introduction to Sustainable Engineering”, PKC Books, First Edition, 2015. 			
MOOC References <ul style="list-style-type: none"> Introduction to Sustainability - https://www.coursera.org/learn/sustainability The Age of Sustainable Development - https://www.coursera.org/learn/sustainable-development Sustainability, Resilience and Society - https://www.edx.org/course/sustainability-resilience-society-uwashingtonx-anth378x 			

- Sustainability in Everyday Life - <https://www.edx.org/course/sustainability-everyday-life-chalmersx-chm002x-0>



Course Plan			
Module	Contents	Hours	End Sem. Exam. Marks
I	Sustainability: Introduction, Need and Concept of Sustainability Science; Social, Environmental and Economic Sustainability Concepts; Goals of Sustainability; [Ref 2] Challenges for Sustainable Development; [Ref 3,2] Nexus between Technology and Sustainable development; [Ref 3,2] Multilateral Environmental Agreements and Protocols; Clean Development Mechanism (CDM); Environmental legislations in India - Water Act, Air Act. [Ref 3,2]	10	15%
	Students may be assigned to do at least one project eg: a) Identifying/assessment of sustainability in your neighborhood in education, housing, water resources, energy resources, food supplies, land use, environmental protection etc. b) Identify the threads for sustainability in any selected area and explore solutions for the same.		
II	Environmental Issues : Air Pollutions – Sources and Types; Effects of Air Pollution; Control measures to reduce air pollution; Water pollution – Sources, Water Pollutants and its effects; Sustainable wastewater treatment; Solid waste – Sources, Impacts of solid waste; Zero Waste Concept; 3 R Concept of Waste Management; Global environmental issues- Resource Degradation, Climate Change, Global Warming, Ozone Layer Depletion; Regional and Local Environmental Issues; Carbon Credits and Carbon Trading; Carbon foot print. [Ref 3]	10	20%
	Students may be assigned to do at least one project for eg: a) Assessing the pollution status of a small area b) Programmes for enhancing public environmental awareness c) Observe a pond nearby and think about the different measures that can be adopted for its conservation		
FIRST INTERNAL EXAMINATION			

III	Environmental Management Tools: Environmental Management System and Standards; ISO 14000 series; Life Cycle Analysis (LCA) – Goal and Scope; Biomimicking; Environment Impact Assessment (EIA) - Procedures of EIA in India. [Ref 3]	9	15%
	Students may be assigned to do at least one project eg: a) Conducting LCA of products (eg. Aluminum cans, PVA bottles, cars etc. or activities (Comparison of land filling and open burning) b) Conducting an EIA study of a small project (eg. Construction of a building / E-waste management.)		
IV	Sustainable Engineering: Basic Concepts of sustainable habitat; Green Buildings, Green Materials for building construction, Material Selection for Sustainable design; Green Building Certification; Methods for increasing energy efficiency of buildings; Sustainable Cities; Sustainable Transport; Sustainable Pavements. [Ref 3]	10	20%
	Students may be assigned to do at least one project eg: a) Consider the design aspects of a sustainable building for your campus / sustainable computer lab design. b) Explore the different methods that can be adopted for maintaining a sustainable computer lab in your campus.		
V	Energy sources: Basic Concepts; Conventional and Non-Conventional sources of energy - Solar energy, Fuel cells, Wind energy, Hydro- electric power - Small hydro plants, Biofuels, Energy derived from oceans, Geothermal energy; Energy Conservation. [Ref 3]	9	15%
	Students may be assigned to do at least one project eg: a) Find out the energy savings that can be achieved by the installation of a solar panel for your computer lab. b) Conduct a survey on E-waste management in schools and colleges of Kerala.		
SECOND INTERNAL EXAMINATION			
VI	Applications of Sustainability: Green Engineering; Sustainable Urbanization; Sustainability Industrialization and Poverty	8	15%

	Reduction; Social and Technological Change for Sustainability; Sustainable Industrial Processes - Material selection; Pollution Prevention; Industrial Ecology; Industrial Symbiosis. [Ref 3]		
	<p>Students may be assigned to do at least one project eg:</p> <ol style="list-style-type: none"> Collect details for instances of climate change in your locality Find out the carbon credits you can gain by using a sustainable transport system (travelling in a cycle or carpooling from college to home) Have a debate on the topics like: Industrial Ecology is a Boon or Bane for Industries? /Are we scaring the people on Climate Change unnecessarily? /Technology enables Development sustainable or the root cause of unsustainability. 		

END SEMESTER EXAMINATION

QUESTION PAPER PATTERN

There will be two parts in the Question paper - **Part A and Part B.**

Part A will have 8 short answer questions of 3 marks each (8 X 3 M = 24 M). There will be no choice questions.

Part B will have 6 essay questions one from each module of 6 marks each, with an alternative choice question from the same module (6 x 6M=36M). The maximum number of sub part questions in **Part B** to be limited to 2.

The total marks assigned to questions in Part A (Short answer) and Part B (Essay) together from a single module will not exceed the marks assigned to that module specified in the course plan in the syllabus.

2014

Course Code	Course Name	L-T-P-Credits	Year of Introduction
INMCA 308	OPEN SOURCE PLATFORMS	3-1-0-4	2016
Course Objectives This course aims to give a basic understanding of open source platforms to the students, along with various technologies in practice.			
Syllabus Definition, specialities of open source platforms, concepts, standards. Learning programming languages like python, content management software, and open source tools.			
Expected Outcome At the end of the course, students would be <ul style="list-style-type: none"> • Exposed to the context and operation of free and open source software (FOSS) communities and associated software projects; • Able to learn open source languages; 			
References <ol style="list-style-type: none"> 1. Fadi Greek & James Hugh, “Open Source Technology and Policy”, First Edition, Cambridge University Press. 2. Jan Smith, Roman Joost, “GIMP for Absolute Beginners”, Apress, First Edition, 2012. 3. Kailash Vadera & Bhavyesh Gandhi, “Open Source Technology”, Laxmi Publications, New Delhi, 2009. 4. Olivier Lecarme, Karine Delvare, “The book of GIMP”, Pearson Education, 2013. 			
Web references <ol style="list-style-type: none"> 5. Case study, Libre office: http://www.libreoffice.org/. 6. Drupal: The guide to Planning and Building Web Site: Wrox Press - http://www.wrox.com/WileyCDA/WroxTitle/Drupal-The-Guide-to-Planning-and-Building-Websites.productCd-1118066863.html. 7. https://www.wrox.com/demo/Digging-Into-WordPress_DEMO.pdf 8. Perl Programming Tutorial - http://www.perl.org/books/beginning-perl/. 9. The Python Tutorial - http://docs.python.org/2/tutorial/. 			
MOOC References <ul style="list-style-type: none"> • https://www.coursera.org/learn/interactive-python-1#pricing • https://developers.google.com/edu/python/ • http://script.spoken-tutorial.org/index.php/Drupal • https://www.edx.org/course/introduction-computer-science-mitx-6-00-1x-8 			

- <http://www.learnpython.org/>
- <https://www.wp101.com/course/intro-wordpress/>

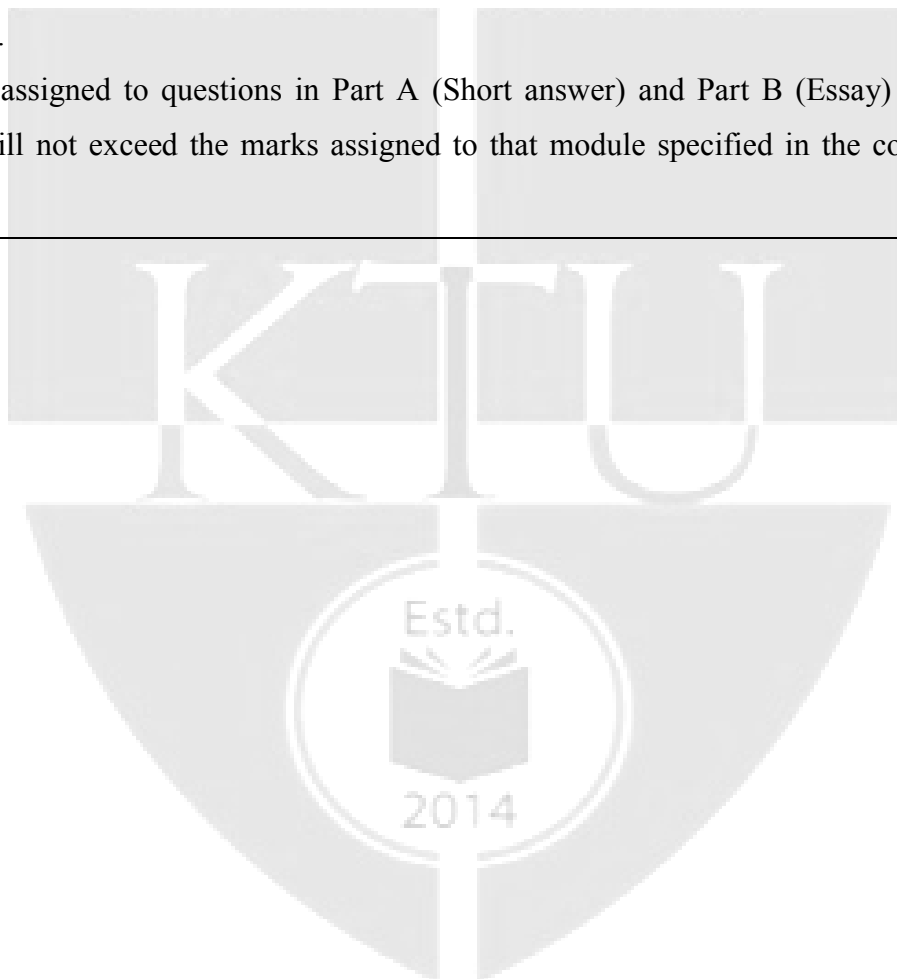


Course Plan			
Module	Contents	Hours	End Sem. Exam. Marks
I	Philosophy: Notion of Community, Guidelines for effectively working with FOSS community, Benefits of Community based Software Development, Requirements for being open, free software, open source software, Four degrees of freedom - FOSS Licensing Models - FOSS Licenses – GPL. [Ref 3]	9	15%
II	Ethics and Economics of Open Source: Open Source and Closed Source Software, Open Source Government, Ethics of Open Source and Social Impact, Share Software and Resources, Shared Software and Shared Sources. [Ref 3]	9	15%
FIRST INTERNAL EXAMINATION			
III	Programming Languages: Programming using languages like Python- Basics-variables, operators, control structures. [Ref 9]	10	20%
IV	Open Source Tools: Content management: Understanding working of Word Press and Drupal – Basics. [Ref 6,7]	10	20%
V	Open Source Tools: GIMP Basics, GIMP Windows and Dialogs: Toolbox, Image Window, Layers, The Dialogs for Color, Brushes, Patterns, Gradients, and Palettes. Loading, Saving and Creating New Images, RGB. [Ref 2, Chapter 2, 3, 4]	10	15%
SECOND INTERNAL EXAMINATION			
VI	Foss case studies: Libre office – Basics [Ref 5,7]	8	15%
END SEMESTER EXAMINATION			
QUESTION PAPER PATTERN			
<p>There will be two parts in the Question paper - Part A and Part B.</p> <p>Part A will have 8 short answer questions of 3 marks each (8 X 3 M = 24 M). There will be no choice questions.</p> <p>Part B will have 6 essay questions one from each module of 6 marks each, with an alternative choice question from the same module (6 x 6M=36M). The maximum number of sub part questions in Part B to be limited to 2.</p> <p>The total marks assigned to questions in Part A (Short answer) and Part B (Essay) together from a single module will not exceed the marks assigned to that module specified in the course plan in the syllabus.</p>			

Course Code	Course Name	L-T-P-Credits	Year of Introduction
INMCA 312	ADVANCED OBJECT ORIENTED PROGRAMMING	3-1-0-4	2016
Course Objectives <ul style="list-style-type: none"> To understand the concepts of object-oriented programming paradigms and develop skills in these paradigms using Java. It also provides an overview of characteristics of Java Applets , Exceptions, Multithreading, Streams, Networking etc. 			
Syllabus Java Basics - Arrays and Strings -Inheritance – Polymorphism – Interface – Packages - Exception Handling -Multithreaded Programming – Streams-Applets –Networking.			
Expected Outcome At the end of the course students would be able to <ul style="list-style-type: none"> Design the classes needed, given a problem specification; Implement the designed classes using the object oriented programming language; Learn how to test, verify, and debug object-oriented programs and create programs using object oriented principles; 			
References <ul style="list-style-type: none"> C. Thomas Wu, “An introduction to Object-oriented programming with Java”, Fourth Edition, Tata McGraw-Hill Publishing company Ltd. Cay S. Horstmann and Gary Cornell, “Core Java: Volume I – Fundamentals”, Eighth Edition, Sun Microsystems Press. Herbert Schildt, “Java The Complete Reference”, Seventh Edition, Tata McGraw-Hill Edition K. Arnold and J. Gosling, “The JAVA programming language”, Third edition, Pearson Education. Paul Deitel and Harvey Deitel, “Java, How to Program”, Tenth Edition, Pearson Education Rohit Khurana, “Programming with Java”, Vikas Publishing, 2014. Timothy Budd, “Understanding Object-oriented programming with Java”, Updated Edition, Pearson Education. Y. Daniel Liang, “Introduction to Java programming”, Seventh Edition, Pearson Education. 			
MOOC References: <ul style="list-style-type: none"> http://www.nptelvideos.com/java/java_video_lectures_tutorials.php 			

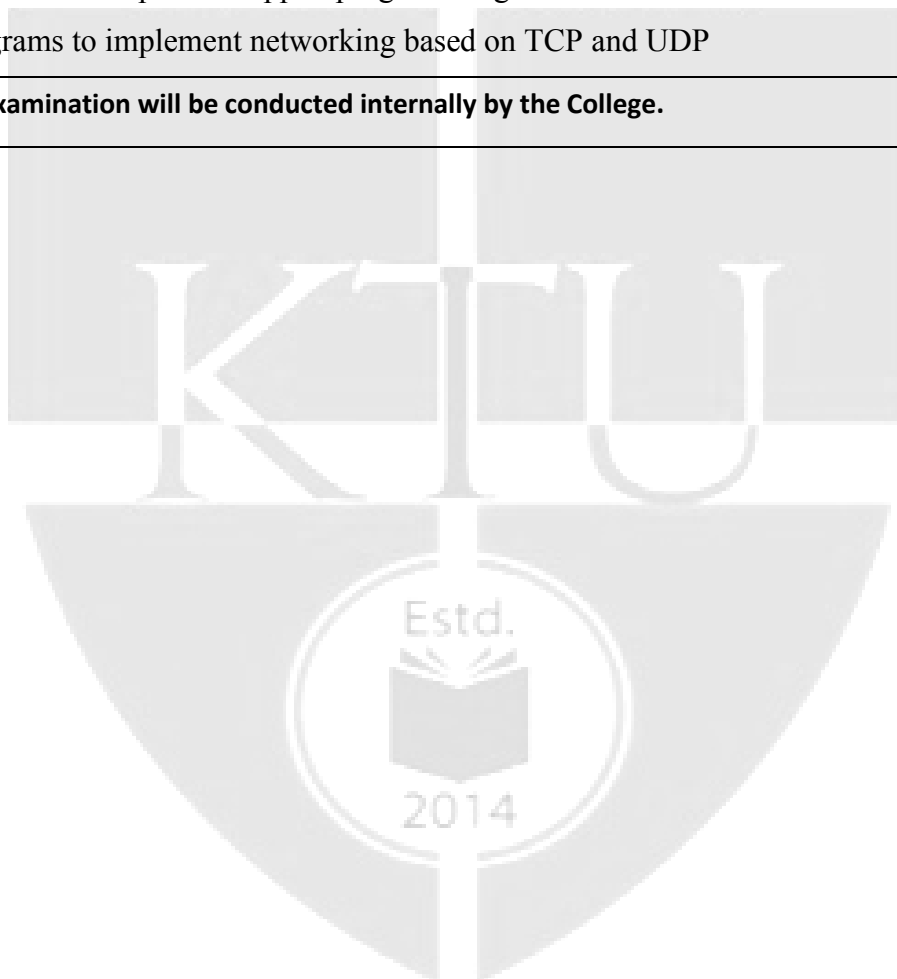
Course Plan			
Module	Contents	Hours	End Sem. Exam. Marks
I	<p>Introduction. Need for OOP paradigm, Procedural approach vs. Object-Oriented approach. Object Oriented concepts</p> <p>Java Basics: History of Java, Java features, data types, variables, operators, expressions, control statements, type conversion and casting, Concepts of - classes, objects, constructors, Access Specifiers (public, private, protected, friendly), Access Modifiers (static, final, abstract, native, synchronized), overloading methods, recursion, nested and inner classes. [Ref 3]</p>	9	15%
II	<p>Inheritance: Generalizations vs. Specialization, Inheriting data members and methods, Single and Multilevel inheritance, use of super and this keywords.</p> <p>Polymorphism- method overriding, dynamic method dispatch, abstract and final classes. [Ref 3]</p>	10	20%
FIRST INTERNAL EXAMINATION			
III	<p>Arrays and Strings: One dimensional arrays, Multidimensional arrays, exploring String class and methods, String Buffer class.</p> <p>Interface: creation and implementation of an Interface. Packages - creating and accessing a package, importing packages, creating user defined packages. [Ref 3]</p>	11	20%
IV	<p>Exception Handling: benefits of exception handling, exception hierarchy, usage of try, catch, throw, throws and finally, built-in exceptions, creating own exception sub classes. [Ref 3]</p> <p>Multithreaded Programming: thread life cycle, creating threads, thread priorities, synchronizing threads, Inter Thread Communication. [Ref 3]</p>	9	15%
V	<p>Working with I/O: Exploring Java I/O, Streams, Byte Streams, Character Streams, Random Access Files. [Ref 3]</p>	9	15%
SECOND INTERNAL EXAMINATION			
VI	<p>Applets – Applets and Applications, life cycle of an applet, passing parameters to an applet, HTML tags.</p>	8	15%

	<p>Working with Graphics, Colors.</p> <p>Networking: client-server model, Sockets, InetAddress, TCP sockets - ServerSocket and Socket classes, UDP Sockets – DatagramSocket, DatagramPackets.</p>		
END SEMESTER EXAMINATION			
QUESTION PAPER PATTERN			
<p>There will be two parts in the Question paper - Part A and Part B.</p> <p>Part A will have 8 short answer questions of 3 marks each (8 X 3 M = 24 M). There will be no choice questions.</p> <p>Part B will have 6 essay questions one from each module of 6 marks each, with an alternative choice question from the same module (6 x 6M=36M). The maximum number of sub part questions in Part B to be limited to 2.</p> <p>The total marks assigned to questions in Part A (Short answer) and Part B (Essay) together from a single module will not exceed the marks assigned to that module specified in the course plan in the syllabus.</p>			



Course Code	Course Name	L-T-P-Credits	Year of Introduction
INMCA 332	ADVANCED OBJECT ORIENTED PROGRAMMING LAB	0-0-6-6	2016
Course Objectives			
To understand the concepts of object-oriented programming and master it using JAVA.			
Syllabus			
Java Basics - Arrays and Strings -Inheritance – Polymorphism – Interface – Packages - Exception Handling -Multithreaded Programming – Streams-Applets –Networking.			
Expected Outcome			
At the end of the course students would be able to			
<ul style="list-style-type: none"> • Write, compile and execute Java programs; • Understand Java programming syntax, control structures and Java programming concepts; • Write and resolve programming problems using Java Language; • Build Java Application and Java Applet; 			
References			
<ol style="list-style-type: none"> 1. C. Thomas Wu, “An introduction to Object-oriented programming with Java”, Fourth Edition, Tata McGraw-Hill Publishing company Ltd. 2. Cay S. Horstmann and Gary Cornell, “Core Java: Volume I – Fundamentals”, Eighth Edition, Sun Microsystems Press. 3. Herbert Schildt, “Java The Complete Reference”, Seventh Edition, Tata McGraw-Hill Edition 4. K. Arnold and J. Gosling, “The JAVA programming language”, Third edition, Pearson Education. 5. Paul Deitel and Harvey Deitel, “Java, How to Program”, Tenth Edition, Pearson Education 6. Rohit Khurana, “Programming with Java”, Vikas Publishing, 2014. 7. Timothy Budd, “Understanding Object-oriented programming with Java”, Updated Edition, Pearson Education. 			
MOOC References			
<ul style="list-style-type: none"> • http://www.nptelvideos.com/java/java_video_lectures_tutorials.php 			

Module	Contents
I	Programs to introduce classes and objects Programs to implement constructors , access specifiers and overloading
II	Programs to implement different types of inheritance Programs to implement polymorphism
III	Programs based on strings and arrays. Programs to understand packages and interfaces
IV	Programs to demonstrate built in and user defined exceptions Programs to introduce multithreading
V	Programs to introduce java I/O and file access
VI	Programs to implement applet programming Programs to implement networking based on TCP and UDP
*End Semester Examination will be conducted internally by the College.	



Course Code	Course Name	L-T-P-Credits	Year of Introduction
INMCA 334	OPEN SOURCE PLATFORMS LAB	0-0-4-4	2016
<p>Course Objectives</p> <p>This course aims to give a basic understanding of open source platforms to the students, along with various technologies in practice.</p>			
<p>Syllabus</p> <p>This is a companion course to INMCA308- Open Source Platforms</p> <p>Definition, specialties of open source platforms, concepts, standards. Learning programming languages like python, content management software, and open source tools form the core content of this course.</p>			
<p>Expected Outcome</p> <p>At the end of the course, students would be able to</p> <ul style="list-style-type: none"> • Exposed to the context and operation of free and open source software (FOSS) communities and associated software projects; • Able to learn scripting language like Python; 			
<p>References</p> <ol style="list-style-type: none"> 1. Fadi Greek & James Hugh, “Open Source Technology and Policy”, First Edition, Cambridge University Press. 2. Jan Smith, Roman Joost, “GIMP for Absolute Beginners”, Apress, First Edition,2012 3. Kailash Vadera & Bhavyesh Gandhi, “Open Source Technology”, Laxmi Publications, New Delhi, 2009. 4. Olivier Lecarme, Karine Delvare, “The book of GIMP”, Pearson Education,2013 			
<p>Web references</p> <ol style="list-style-type: none"> 5. Case study, Libre office: http://www.libreoffice.org/ 6. Drupal: The guide to Planning and Building Web Site: Wrox Press - http://www.wrox.com/WileyCDA/WroxTitle/Drupal-The-Guide-to-Planning-and-Building-Websites.productCd-1118066863.html 7. Perl Programming Tutorial - http://www.perl.org/books/beginning-perl/. 8. The Python Tutorial - http://docs.python.org/2/tutorial/. 			
<p>MOOC References:</p> <ul style="list-style-type: none"> • https://www.coursera.org/learn/interactive-python-1#pricing • https://developers.google.com/edu/python/ • https://www.edx.org/course/introduction-computer-science-mitx-6-00-1x-8 			

- <http://www.learnpython.org/>
- <https://www.wp101.com/course/intro-wordpress/>



Module	Contents
I	Python programming <ul style="list-style-type: none"> - Variables and data types - Operators and expressions - Control structures - Strings [Ref 8]
II	Functions <ul style="list-style-type: none"> - Defining a function, calling a function, types of functions, function arguments. Input-Output <ul style="list-style-type: none"> - Printing on screen, Reading data from keyboard, Opening and closing file, Reading and writing files. [Ref 8]
III	Drupal / WordPress (Any one among these two) <ul style="list-style-type: none"> - Designing a site - Customizing [Ref 6]
IV	Drupal / WordPress <ul style="list-style-type: none"> - Content management - Adding features [Ref 6]
V	GIMP <ul style="list-style-type: none"> - Opening an image, Modifying an image, Saving an image - Loading, Saving and Creating New Images Image manipulations using toolbox [Ref 4]
VI	Libre Office <ul style="list-style-type: none"> - LibreOffice writer basics - LibreOffice calc basics - LibreOffice Impress – PowerPoint presentation basics. [Ref 5]
*End Semester Examination will be conducted internally by the College.	