University of Rajasthan Jaipur

SYLLABUS

M.Sc. (IT)

(Semester Scheme)

I & II Semester Examination 2020-21

III & IV Semester Examination 2021-22

Dy. Registrar (Acad.)
University of Rajasthan
Jaipur
M.Sc.(IT) Syllabus as per new scheme: credit based semester system (Four Semesters in two years) with continuous assessment (30% with non-inclusion in cumulative Grade Point Average (CGPA)).

To obtain a Master's Degree M.Sc.(IT), a candidate is required to earn 120 credits with grade E or higher. For each semester, there will be 36 credits. To earn credits for a paper, a candidate shall be required to obtain grade E or higher (or equivalent marks percentage) in the theory/practical examination. A candidate has to pass in the continuous assessment (internal) as well as in that paper separately. However, the grade point/marks obtained in the continuous assessment will not be included in Semester Grade Point Average (SGPA). In continuous assessment and End of Semester Examination (EoSE) separate grades will be awarded. The candidate will not be permitted to appear in EoSE of a particular credit (i) if he/she does not meet out 75% attendance requirement, or (ii) he/she fails to secure a Semester Grade Point Average (SGPA) of 1.5 in the continuous assessment.

The Credit Courses have been classified as:

a. Compulsory Core Courses (CCC)
b. Elective Core Courses (ECC)

A course is identified by a course code designated by a string of six alphanumeric characters and a course title. In a course code, the first three characters of the string indicate the degree/course name in short and the later three alphanumeric characters designate a particular course. In the case of compulsory core course, the fourth character indicates the semester numeric digit and in case of the elective core courses, the fourth character indicates the cluster of specialization. For compulsory or elective theory core courses, the fifth is '0', for laboratory core course, it is '1' and for project/seminar course, it is 2. The sixth digit indicates the number of the course in that category.

### M.Sc.(IT)-First Semester

<table>
<thead>
<tr>
<th>S. No.</th>
<th>Subject Code</th>
<th>Subject Title</th>
<th>Course Category</th>
<th>Credit</th>
<th>Contact Hours per Week</th>
<th>EoSE Duration(Hr)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>MIT 701</td>
<td>Programming with C</td>
<td>CCC</td>
<td>4</td>
<td>3 1 0</td>
<td>3 0</td>
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<tr>
<td>2</td>
<td>MIT 702</td>
<td>Operating Systems</td>
<td>CCC</td>
<td>4</td>
<td>3 1 0</td>
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<tr>
<td>3</td>
<td>MIT 703</td>
<td>Database Management Systems</td>
<td>CCC</td>
<td>4</td>
<td>3 1 0</td>
<td>3 0</td>
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<tr>
<td>4</td>
<td>MIT 704</td>
<td>Fundamentals of Information Technology</td>
<td>ECC</td>
<td>4</td>
<td>3 1 0</td>
<td>3 0</td>
</tr>
<tr>
<td>5</td>
<td>MIT 705</td>
<td>Data Communication and Computer Networks</td>
<td>ECC</td>
<td>4</td>
<td>3 1 0</td>
<td>3 0</td>
</tr>
<tr>
<td>6</td>
<td>MIT 706</td>
<td>Web Site Development</td>
<td>ECC</td>
<td>4</td>
<td>3 1 0</td>
<td>3 0</td>
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<tr>
<td>7</td>
<td>MIT 711</td>
<td>Programming in C Lab</td>
<td>CCC</td>
<td>4</td>
<td>0 0 6</td>
<td>0 4</td>
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<tr>
<td>8</td>
<td>MIT 712</td>
<td>DBMS Lab</td>
<td>CCC</td>
<td>4</td>
<td>0 0 6</td>
<td>0 4</td>
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<tr>
<td>9</td>
<td>MIT 713</td>
<td>Web Authoring Tools Lab</td>
<td>ECC</td>
<td>4</td>
<td>0 0 6</td>
<td>0 4</td>
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*End of Semester Examinations*
### M.Sc.(IT)-Second Semester

<table>
<thead>
<tr>
<th>S. No.</th>
<th>Subject Code</th>
<th>Subject Title</th>
<th>Course Category</th>
<th>Credit</th>
<th>Contact Hours per Week</th>
<th>End of Semester Examination</th>
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<tr>
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<td>L T P Thy P</td>
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<tr>
<td>1</td>
<td>MIT 801</td>
<td>Object Oriented Technology Using C++</td>
<td>CCC</td>
<td>4</td>
<td>3 1 0 3 0</td>
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<tr>
<td>2</td>
<td>MIT 802</td>
<td>Data Structures and Algorithms</td>
<td>CCC</td>
<td>4</td>
<td>3 1 0 3 0</td>
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<tr>
<td>3</td>
<td>MIT 803</td>
<td>Software engineering</td>
<td>CCC</td>
<td>4</td>
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<tr>
<td>4</td>
<td>MIT 804</td>
<td>Computer Graphics and Multimedia Technology</td>
<td>ECC</td>
<td>4</td>
<td>3 1 0 3 0</td>
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<tr>
<td>5</td>
<td>MIT 805</td>
<td>System Analysis and Design</td>
<td>ECC</td>
<td>4</td>
<td>3 1 0 3 0</td>
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<tr>
<td>6</td>
<td>MIT 806</td>
<td>Application Development Using .NET framework (ASP)</td>
<td>ECC</td>
<td>4</td>
<td>3 1 0 3 0</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>MIT 811</td>
<td>Programming in C++ Lab</td>
<td>CCC</td>
<td>4</td>
<td>0 0 6 0 4</td>
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<tr>
<td>8</td>
<td>MIT 812</td>
<td>Data Structure With C++ Lab</td>
<td>CCC</td>
<td>4</td>
<td>0 0 6 0 4</td>
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<tr>
<td>9</td>
<td>MIT 813</td>
<td>.NET (ASP) Lab</td>
<td>ECC</td>
<td>4</td>
<td>0 0 6 0 4</td>
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*End of Semester Examination*

### M.Sc.(IT)-Third Semester

<table>
<thead>
<tr>
<th>S. No.</th>
<th>Subject Code</th>
<th>Subject Title</th>
<th>Course Category</th>
<th>Credit</th>
<th>Contact Hours per Week</th>
<th>End of Semester Examination</th>
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<tbody>
<tr>
<td></td>
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<td>L T P Thy P</td>
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</tr>
<tr>
<td>1</td>
<td>MIT 901</td>
<td>Programming in Java</td>
<td>CCC</td>
<td>4</td>
<td>3 1 0 3 0</td>
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<tr>
<td>2</td>
<td>MIT 902</td>
<td>Data Warehousing &amp; Data Mining</td>
<td>CCC</td>
<td>4</td>
<td>3 1 0 3 0</td>
<td></td>
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<tr>
<td>3</td>
<td>MIT 903</td>
<td>E-Commerce Technologies</td>
<td>CCC</td>
<td>4</td>
<td>3 1 0 3 0</td>
<td></td>
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<tr>
<td>4</td>
<td>MIT 904</td>
<td>Principles of Management</td>
<td>ECC</td>
<td>4</td>
<td>3 1 0 3 0</td>
<td></td>
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<tr>
<td>5</td>
<td>Elective-II (Any One in Elective Group - I)</td>
<td>ECC</td>
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<td>3 1 0 3 0</td>
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<tr>
<td>6</td>
<td>Elective-II (Any One in Elective Group 2)</td>
<td>ECC</td>
<td>4</td>
<td>3 1 0 3 0</td>
<td></td>
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<tr>
<td>7</td>
<td>MIT 911</td>
<td>Programming in Java Lab</td>
<td>CCC</td>
<td>4</td>
<td>0 0 6 0 4</td>
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<tr>
<td>8</td>
<td>MIT 922</td>
<td>Mini Project</td>
<td>CCC</td>
<td>4</td>
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<tr>
<td>9</td>
<td>Elective 31 (Any One in Elective Group 3)</td>
<td>ECC</td>
<td>4</td>
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*End of Semester Examination*
### M.Sc.(IT)-Forth Semester

<table>
<thead>
<tr>
<th>S. No.</th>
<th>Subject Code</th>
<th>Subject Title</th>
<th>Course Category</th>
<th>Credit</th>
<th>Contact Hours per Week</th>
<th>EoSE * Duration(Hrs)</th>
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</thead>
<tbody>
<tr>
<td>1</td>
<td>MIT 921</td>
<td>Major Project: Minimum Four Months in an Organization approved by the Director/Head of the Centre/Department</td>
<td>CCC (PRJ)</td>
<td>36</td>
<td>0 0 42 0 4</td>
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*End of Semester Examination*

### Elective Core Courses:

<table>
<thead>
<tr>
<th>Elective Course Code</th>
<th>Course Category</th>
<th>Subject Title</th>
<th>Prerequisite</th>
<th>Semester</th>
</tr>
</thead>
<tbody>
<tr>
<td>MIT A01</td>
<td>ECC</td>
<td>Artificial Intelligence</td>
<td></td>
<td>III</td>
</tr>
<tr>
<td>MIT A02</td>
<td>ECC</td>
<td>Information Security and Cryptography</td>
<td></td>
<td>III</td>
</tr>
<tr>
<td>MIT B01</td>
<td>ECC</td>
<td>Advanced Java Programming</td>
<td></td>
<td>III</td>
</tr>
<tr>
<td>MIT B02</td>
<td>ECC</td>
<td>Wireless Technology</td>
<td></td>
<td>III</td>
</tr>
</tbody>
</table>

**Elective-2 (Any one)**

| MIT C01              | ECC             | Advance Java Programming Lab          | MIT B01      | III      |
| MIT C02              | ECC             | Wireless Technology Lab                | MIT B02      | III      |
Course Contents in Detail – M.Sc.(IT) I Semester

Note:
1. Papers MIT 701, MIT 702, MIT 703, MIT 711 and MIT 712 are compulsory(CCC) and Papers MIT 704, MIT 705, MIT 706 and MIT 713 are elective(ECC).
2. Continuous assessment(Internal) will be done by the concerned teacher on the basis of test papers, regularity in the class and performance of the student. Maximum marks in continuous assessment of each paper is 100.

MIT 701: Programming with C

Theory & Tutorial: 4 hours per week (4 Credits)
Examination: Theory Paper – 3 hours; Max. Marks – 100

Note:
1. Candidate has to attempt five questions in all. All questions carry equal marks.
2. Question No. 1 covering whole syllabus will consists of 10 short answer questions carrying 2 marks each.
3. Question No. 2 to 5, each of 20 marks, will be framed by taking one question from each unit. There will be an internal choice within the unit.

Unit-I

Problem solving with computers, Flow charts, Basic concepts of programming languages, programming domains.
C Character set, variables and constants, keywords, Type checking, Scope and lifetime data types.
Operators, Instructions, assignment statements, arithmetic expression, comment statements, simple input and output, Boolean expressions.

Unit-II

Control structures, decision control structure, loop control structure, case control structure. String and character handling, arrays and string processing, data validation examples.
Functions, function prototype, subroutines, scope and lifetime of identifiers parameter passing mechanism, recursion.

Unit-III

User defined data types, enumerated data types, unions, structures, array of structures,
Unions of structures. Storage class specifies, Pre processors header files and standard lib, Functions.
Pointer : Definition and uses of pointers, arithmetic, pointers and arrays, pointers and function, pointer to pointer, pointer to structures. Dynamic memory allocation.

Unit-IV

Console Input and Output functions, data files, operations on data files, text and binary files, formatted data files
Implementation of simple data structures: Stacks, Queues, Linked Lists, trees, searching and sorting algorithms.
Interaction with hardware, system calls, command line arguments, operations on bits, Bit-fields.
Graphics in C

Recommended reference books:
4. Deitel HM & Deitel JP; C How to program; 5th Edn; Pearson Pub.
5. Gottfried B.; Programming with C: Schaum Outlines; Tata Mc Graw Hill Edition
8. Deitel HM & Deitel JP; C How to Program; 5 Edn; Pearson Pub.

MIT 702: Operating Systems

Theory & Tutorial: 4 hours per week (4 Credits)
Examination: Theory Paper – 3 hours; Max. Marks – 100

Note:
1. Candidate has to attempt five questions in all. All questions carry equal marks.
2. Question No. 1 covering whole syllabus will consist of 10 short answer questions carrying 2 marks each.
3. Question No. 2 to 5, each of 20 marks, will be framed by taking one question from each unit. There will be an internal choice within the unit.

Unit—I

Necessity of an Operating system, Operating system structure, Evolution of Operating Systems (multiprogramming systems, batch systems, timesharing system, distributed system and Real-time system). Operating system structure, Operating system components and services.

DOS: Booting sequence, system files and commands, files and directories, overview of MS DOS commands, FDISK and Disk organization. Windows: Graphical User interfaces, Installation of Windows OS, Scan Disk, Task Bars, Task Manager, Toolbars, Settings, Control Panel and all features there in, files and Folder management, Windows Explorer, Installing and running Programs, Connecting computers, Sharing Resources, Compressing disks and partitions.

Unit—II

Process Management: Process concept, Process scheduling, Coordinating processes, Threads, Inter-process communication, CPU scheduling criteria, Scheduling algorithms, Multiple-processor scheduling.

Unit—III


Unit—IV

Introduction to UNIX: Unix File system, Kernel, Logging in and out, Directory, Redirecting input and output cat command, vi editor, Introduction to shell, sub-shell and their variables, shell scripts, meta-characters, sort, head, tail, split, cut, paste, find, tr, dd commands, grep and sed, UUCP, Unix and Networking, Accessing the Internet, Unix system administration.

Recommended books:
5. Forouzan B; Unix and Shell Programming; 9 Reprint; Cengage, 2009.
9. Jerry Joyce, Marianne Moon; MS Windows ; PHI

MIT 703: Database Management Systems

Theory & Tutorial: 4 hours per week (4 Credits)
Examination: Theory Paper – 3 hours; Max. Marks – 100

Note:
1. Candidate has to attempt five questions in all. All questions carry equal marks.
2. Question No. 1 covering whole syllabus will consists of 10 short answer questions carrying 2 marks each.
3. Question No. 2 to 5, each of 20 marks, will be framed by taking one question from each unit. There will be an internal choice within the unit.

Unit—I

Data and information Basic concepts, Problems of Early Information Systems, Advantages of a DBMS. Database Architecture. Three levels of the architecture- external, conceptual and internal level. Centralized and Distributed databases.

ER Model : entities, mapping constructs, E R diagram, reduction E R diagrams to tables, aggregation, design of an E-R database scheme.

Unit-III

Database query languages - Basic retrieval capability retrieval and explosion, update commands, QBEI, client server design. Standard Query Language- Basic SQL Query, Nested Queries Aggregate Operators, Null Values, Embedded SQL, Cursor, Dynamic SQL. Query optimization - Query evaluation plans, pipelined evaluation, iteration interface for operators and access methods, Relational Query Optimizer. Relational Data Integrity- Candidate keys, Candidate keys, Supper key and alternate keys. Foreign keys, foreign key rules, nulls.

Unit—IV


Databases and Tools: MS-Access SQL Visual Basic ORACLE wherever required these tools should be used.

Reference Books:
4. Ivan Bayross; SQL, SQLIPL 4 Edn; BPB, 2009
MIT 704: Fundamentals of Information Technology

Theory & Tutorial: 4 hours per week (4 Credits)
Examination: Theory Paper – 3 hours; Max. Marks – 100

Note:
1. Candidate has to attempt five questions in all. All questions carry equal marks.
2. Question No. 1 covering whole syllabus will consists of 10 short answer questions carrying 2 marks each.
3. Question No. 2 to 5, each of 20 marks, will be framed by taking one question from each unit. There will be an internal choice within the unit.

Unit-I

Defining IT, Information systems, Data and Information, Elements of Electronic data processing system, Transaction processing, Modes of transactions, IT Applications: IT in Business and industry, IT in home and play, IT in education and training IT in entertainment and the Arts, IT in Science, Engineering, and ethical issues in IT.


Unit-II

Representation of Data: Digital versus Analog, Digital number system (binary, octal, decimal and hexadecimal numbers), Conversion from one form to another, fractional numbers and signed numbers, Complements, Arithmetic operations on binary numbers, Fixed point and floating point representations.

Boolean algebra (addition, subtraction, multiplication and division), Logic Gates (NOT, OR, AND, NAND, NOR, XOR, XNOR), types Codes (ASCII, EBCDIC, Unicode), encoding and decoding.

Unit-III

Computer Components (Briefly overview): Mother Board (Special reference to Intel Chipset motherboard), CISC Micro Processors (Special reference to Pentium, AMD), RISC processors (Motorola, PowerPC, and 680x0 series), types of RAM, RAM, Flash, Cache; SDRAM, DDR, System clock, Buses (Data, Address, Control).


Storage devices: Storage types (Magnetic, Optical, Magneto-optical, Solid state), random versus sequential access, formatting, tracks and sectors, speed, storage capacity, Hard Disk (tracks, cylinders, sectors); Hard Drive Interfaces (IDE, EIDE, Fast SCSI, Fast/wide SCSI, Ultra SCSI; Hard Disk Cartridges, RAID). Optical Disks: plgs and lands, CD (ROM,R,W), DVD (ROM,R,RAM), Magnetic tapes (reel, streamers, DAT, DLT, stripe, Smart card). Modem (Fax/Data/Voice).
Unit- IV


Security issues in Internet — Bugs, Viruses, Anti-viruses, Firewalls etc. Internet threats to the society, Cyber laws and Legal issues.

Suggested Reference Books:
5. Malvino B.; Digital Computer Electronics; III Edn; TMJ.

MIT 705: Data Communication and Computer Networks

Theory & Tutorial: 4 hours per week (4 Credits)
Examination: Theory Paper – 3 hours; Max. Marks – 100

Note:
1. Candidate has to attempt five questions in all. All questions carry equal marks.
2. Question No. 1 covering whole syllabus will consists of 10 short answer questions carrying 2 marks each.
3. Question No. 2 to 5, each of 20 marks, will be framed by taking one question from each unit. There will be an internal choice within the unit.

Unit I


Optical fiber communication: Basic concept of light propagation, Fiber Cables, Light sources, Optical Detectors, Fiber cable losses, wave division multiplexing, fiber distributed data interface, the fiber channel.

Unit-II

Modulation: Principles of Modulation, AM and FM Modulator Circuits, Pulse Code. Modulation, signaling and decoding, Digital Band-pass modulation, Demodulation detection, signals and Noise,
Detection of Binary Signal in Gaussian Noise, Demodulation of shaped Pulses, Digital Band Pass Demodulation.

Internet model, OSI seven layer reference model, Functions of OSI layers, LAN technologies - protocols and standards, LAN hardware, TCP/IP (Protocols, architecture), Compare TCP/IP to the Open Systems Interconnection (OSI) reference model, Examine a number of TCP/IP application such as FTP, Telnet, DNS, DIICP etc. Examine addressing nd sub-netting, super-netting, and details of TCP massaging and signaling.

Unit-III

Internet : Internet Architecture, Internet pro and datagram, Routing protocols, UDP, Internet standard services, Networking Technologies, ISDN(Services, Channels, Layers, Broadband ISDN), Cable Modem System, SMDS, Frame relay, fast Ethernet, 100VG-anyLAN and Gigabit Ethernet, FDDI and CDDI, Asynchronous Transfer, SONET(architecture, layers, frame, applications), DWDM Switching and Virtual LAN, Non-ATM Virtual LANs, IEEE 802.10. VLAN standard, X.25 protocols, ATM (architecture, layers, classes, services).

Unit—IV

Networking and Internet Working Devices : Hubs, Switches, Repeaters, Bridges, Routers, Gateways and roles of these devices in communication.


Suggested Reference Books:
8. Fred Harshal, Data Communications Communications Networks, Pearson Education Asia.

MIT 706: Web Site Development

Theory & Tutorial: 4 hours per week ( 4 Credits)
Examination: Theory Paper 3 hours; Max. Marks 100

Note:
1. Candidate has to attempt five questions in all. All questions carry equal marks.
2. Question No. 1 covering whole syllabus will consists of 10 short answer questions carrying 2 marks each.
3. Question No. 2 to 5, each of 20 marks, will be framed by taking one question from each unit.

There will be an internal choice within the unit.

\[\text{Registrar (Academic)}\]
\[\text{University of Rajasthan}\]
\[\text{Jaipur}\]
Unit—I

World Wide Web: Elements of the Web, Web browser, viewing Pages with browsers, using a browser for mail, News and chat, Security and Privacy issues (cookies, firewalls, executable Applets and Scripts, blocking systems), Netscape navigator and features therein, Internet Explorer and Features therein, Active X controls, Dealing With web pages that contains ActiveX, Java and Java Scripts, Blogs and Twitters, Using search engines Subscription and channels.

Unit—II


Unit—III

Introduction of HTML and XHTML: introduction, markup language, editing HTML & XHTML common tags, headers, text styles, linking, images, formatting text, horizontal rules and more line breaks, unordered lists, nested and ordered lists, basic HTML/XHTML tables: intermediate tables and formatting, forms, more complex forms, internal linking, creating and using image maps.

Unit—IV


Introduction to scripting languages, role of scripting languages in web applications. Introduction to: Java script and PHP.

Recommended Books

5. 0. Robertson: Hands on HTML, BPB Publications.
Practical Examination

Each practical paper shall be of 4 hours duration on one day and carry 100 marks for the practical examination. The practical examination will involve 3 exercises, each of 20 marks, practical record of 15 marks and viva-voce examination of 25 marks.

MIT 711: Programming in C Lab

Examination: Practical
Exercises to be framed so as to cover the topics and tools covered in theory paper MIT 701.

MIT 712: Data Base Management System Lab

Practical Lab:
Examination: Practical Examination — 4 Hours Max. Marks — 100
Exercises to be framed so as to cover the topics and tools covered in theory paper MIT 703.

MIT 713 Web Site Design Lab

Practical Lab:
Examination: Practical Examination
Exercises to be framed so as to cover the topics and tools covered in theory paper MIT 706. Word processing, Spread sheet program, data processing, Presentation Program, Web Surfing and other Internet services.
Course Contents in Detail – M.Sc.(IT) II Semester

Note:
1. Papers MIT 801, MIT 802, MIT 803, MIT 811 and MIT 812 are compulsory(CCC) and Papers MIT 804, MIT 805, MIT 806 and MIT 813 are elective(ECC).
2. Continuous assessment(Internal) will be done by the concerned teacher on the basis of test papers, regularity in the class and performance of the student. Maximum marks in continuous assessment of each paper is 100.

MIT 801: OBJECT ORIENTED TECHNOLOGY USING C++

Theory & Tutorial: 4 hours per week (4 Credits)
Examination: Theory Paper – 3 hours; Max. Marks – 100

Note:
1. Candidate has to attempt five questions in all. All questions carry equal marks.
2. Question No. 1 covering whole syllabus will consists of 10 short answer questions carrying 2 marks each.
3. Question No. 2 to 5, each of 20 marks, will be framed by taking one question from each unit. There will be an internal choice within the unit.

Unit—I
C++ Basics : Preprocessors, Comments, Data types, Operators, Expressions, Loops and Decisions, Arrays and String handling, Modular Programming with Functions, Structure and Unions.

Unit—II
Pointers and Run time binding, Dynamic memory allocation, Storage class specifiers. Classes, Member functions, Objects, Arrays of objects, Pointers and Classes, Nested classes, Constructors, Destructors, Inline member functions, Friend Functions, Static member function. Inheritance, Single Inheritance, types of base classes, types of derivations, multiple inheritance, container classes, member access control.

Unit—III
Functions Overloading, Operator Overloading, polymorphism, early binding, polymorphism with pointers, Unary and Binary Operator Overloading, Overload Assignment Operator, Copy Constructor, Data Conversion between Objects of different classes, C++ Free Store. Virtual Function Virtual function, late binding, pure virtual functions, Abstract classes, Generic Programming with Templates, Friend functions, Overloaded Function Templates, Multiple Arguments function Template.

Unit—IV
Stream Computation with Console, Stream Computation with Files, opening and closing of files, stream state member functions, binary file operations, structures and file operations, classes and file operations, random access file processing, File operations using pointers. Exception handling : Exception handling mechanism, Throwing mechanism, Catching mechanism.

[Signature]
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JAIPUR
Points: Addresses and pointers, pointer & arrays, pointer & functions, use of pointers in strings, linked lists & memory management, and pointers to objects.

Recommended Books

2. Robert Lafore; Object Oriented Programming in C++; 4 Edition; Techmedia
4. Venugopal, Rajkumar; Mastering C++; Tata Megrow Hill, 2006.
6. Deitel and Deitel: How to Program C++, addison Wesley, Pearson Education Asia

MIT 802: Data Structures and Algorithms

Theory & Tutorial: 4 hours per week (4 Credits)
Examination: Theory Paper – 3 hours; Max. Marks – 100

Note:
1. Candidate has to attempt five questions in all. All questions carry equal marks.
2. Question No. 1 covering whole syllabus will consists of 10 short answer questions carrying 2 marks each.
3. Question No. 2 to 5, each of 20 marks, will be framed by taking one question from each unit. There will be an internal choice within the unit.

Unit-I

Algorithms, pseudo code, efficiency of algorithms, analyzing algorithms and problems, complexity measures, basic time analysis of an algorithm, space complexity. Data abstraction and basic data structures, data types and abstract data types.

Basic data structure – Arrays, Stack, Queues and their applications, linked and sequential representation of arrays, stacks & queue.

Unit-II

Linked lists, representation of linked list in memory. Insertion, deletion and searching of linked list, two way lists. Arithmetic expressions, Polish notations, dequeue and priority queues.

Trees: Basic concepts, linked representation, representation in continuous memory. Binary and N-ary trees. Searching, insertion and deletion in binary search tree, traversing algorithms using stacks, header nodes threads.
Unit-III

Graphs and their representations, sequential representation. Adjacent matrix, linked representation of graphs, operations on graph, traversing a graph. DFS and BFS algorithms. Heap structures, heap sort algorithm.

Unit-IV

Sorting and Searching: Use various data structures for searching and sorting, Internal and external sorting techniques, linear and binary search, Hash tables & Hashed searching, Bubble sort, Insertion sort, Selection sort, Merge sort, Radix sort, quick sort.

Recommended reference books:

4. Jean-Paul Tremblay and Paul G. Sorensen, An Introduction to Data structures with applications TMH Publishing Co. Ltd.
5. A. Michael Berman: Data Structures via C++ Oxford University Press.
6. Jean-Paul Tremblay and Paul G. Sorensen, An Introduction to Data Structures with application, TMH Publishing Co. Ltd.

MIT 803: Software Engineering

Theory & Tutorial: 4 hours per week (4 Credits)
Examination: Theory Paper – 3 hours; Max. Marks – 100

Note:
1. Candidate has to attempt five questions in all. All questions carry equal marks.
2. Question No. 1 covering whole syllabus will consists of 10 short answer questions carrying 2 marks each.
3. Question No. 2 to 5, each of 20 marks, will be framed by taking one question from each unit. There will be an internal choice within the unit.

Unit—I

Introduction to Software Engineering Software development and life cycle; Software engineering, knowledge engineering and end-user development approaches.
System Analysis: Abstraction, partitioning and projection; Software Requirements and Specifications methods and tools. Flow based, data based and object based analysis.

Unit—II

Software Project Management: Management spectrum, Project size and its categories; Planning a software project: Work breakdown structures; Integrating software design and project planning; Software project teams; Project monitoring and control, Project scheduling, Risk management.
Unit—III

Software Quality and Testing: Software quality assurance, Types of software testing, Debugging and Reliability—Concept of Software errors, faults, repair and availability. Program complexity analysis; Software quality and matrices.

Software cost and time estimation: Functions points, Issues in software cost estimation (Introduction to the Rayleigh curve), Algorithm cost models (COCOMO, Putnam-Slim, Watson and Felix). Other approaches to software cost and size estimation (S/W complexity, Delphi).

Unit—IV

Software Design: Various design concepts and notations; Process-oriented design (Gane & Sarson and Vourdon notations), Data-oriented design (Warnier-Orr, ER-modelling), Object-oriented design (Booch approach), Verification and validation methods; Documentation and Development procedures; Design matrices. Role of CASE tools in software design.


Reference Books:

MIT 804: Computer Graphics and Multimedia Technology

Theory & Tutorial: 4 hours per week (4 Credits)
Examination: Theory Paper – 3 hours; Max. Marks – 100

Note:
1. Candidate has to attempt five questions in all. All questions carry equal marks.
2. Question No. 1 covering whole syllabus will consists of 10 short answer questions carrying 2 marks each.
3. Question No. 2 to 5, each of 20 marks, will be framed by taking one question from each unit. There will be an internal choice within the unit.

Unit—I

Graphic Application and Hardware: Need of Graphics, Applications, Display and Input devices, Raster Scan system, Random Scan system, Graphic software.
Output Primitives: Line drawing algorithms — DDA algorithm, Bresenham’s algorithm; Circle Drawing Midpoint Algorithm, Ellipse Generating Midpoint Algorithm; Scan line polygon fill algorithm, Inside Outside tests, Boundary fill algorithm, Flood fill algorithm. Colour tables, Gray Scale levels, Fill attributes.

Unit-II

Geometric Transformations: Matrix representation and Homogeneous coordinates; Composite transformations, 2D and 3D Transformations Translation, Scaling, Rotation, Reflection and Shear, transformations and its characteristics.


Unit-III


Curves and Surface: Hermit Curves, Bezier Curves, B-Spline Curves. Properties and Continuity concepts.

Unit-IV

Image Processing: Capture and Storage of digital images; file formats, basic digital techniques like convolutions the holding and histogram manipulations, image enhancements, geometric manipulation and their applications the automatic identification and extraction of objects of interest.


References Books:
3. Ronger D.F.; Elements of Computer Graphics:
4. Giloi W K; Interactive Computer Graphics; PHI
7. RalfSteinmetz & Harried; Multimedia; Pearson, 2007
 MIT 805: System Analysis and Design

Theory & Tutorial: 4 hours per week (4 Credits)
Examination: Theory Paper – 3 hours; Max. Marks – 100

Note:
1. Candidate has to attempt five questions in all. All questions carry equal marks.
2. Question No. 1 covering whole syllabus will consists of 10 short answer questions carrying 2 marks each.
3. Question No. 2 to 5, each of 20 marks, will be framed by taking one question from each unit. There will be an internal choice within the unit.

Unit-I

System Concepts and the information systems Environment: The System concept Definition, System Central Objectives, Elements of a system, Environment, Boundaries and interfaces. Types of systems- Physical or Abstract systems, Open or Closed systems, Role, Need and Responsibility of System Analyst, Introduction to system Development approaches- Data Oriented and Object Oriented.
System Development Life Cycle : Linear or Waterfall Cycle, Linear cycle, phases of SW Development Life Cycle.
System planning and Analysis : Strategies for determining information requirement, Problem definition & Project initiation, Background analysis, Data and Fact Gathering Techniques, Feasibility Studies-Technical, Operational, economic, cost benefit analysis, Interface design tools, user interface evaluations.

Unit-II

Input/Output Forms Design : Requirement of forms design, User Interface Design, Input design, CRT Screen forms design, Output design.
Files organization and Database Design : Designing to Fields, Physical records, Physical files, Database design, Data Structures, Normalization, Introduction to CASE Tools, Features, advantages, and limitations of CASE tools.
System Implementation, Maintenance and documentation, testing, evaluation, maintenance Activities, Documentation, Document configuration, maintaining a configuration.

Unit-III

Introduction to MIS : Meaning and Role of MIS, Definition of MIS, System Approach to MIS, MIS Organization within a company. Concept of Balanced MIS, effectiveness and efficiency criteria.

Conceptual Design of MIS : Definition of problem, system objectives and system constraints, Analysis of information source, alternative system design and selection optimal system.
Detailed System Design and Implementation; Application of basic design concepts of MIS, involvement of end-user and role of MIS department and System Analyst, Role of Top Management during design and implementation.

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Unit-IV

System Evaluation: System evaluation review and update, Management and control of MIS function, Advanced MIS concept, Pitfalls in MIS development.


Recommended Books

6. Don Yeates, Maura Shields and David Helmy, System Analysis and Design Longman group limited.
7. Robert Mudrick; Management Information System; PHI.
8. W.S. Jawadkar; Management Information System; McGraw-Hill.

MIT 806: Application Development Using .NET Framework (ASP)

Theory & Tutorial: 4 hours per week (4 Credits)
Examination: Theory Paper – 3 hours; Max. Marks – 100

Note:
1. Candidate has to attempt five questions in all. All questions carry equal marks.
2. Question No. 1 covering whole syllabus will consists of 10 short answer questions carrying 2 marks each.
3. Question No. 2 to 5, each of 20 marks, will be framed by taking one question from each unit. There will be an internal choice within the unit.

Unit-I


Elements: Variable and constants, data types, declaration. Operators, types, precedence, Expressions. Program flow, Decision statements, if...then...else, select...case, Loop statements, while...and while, do...loop, for...next, for...each...next.

Types: Value data types, Structures, Enumerations, Reference data types, Single dimensional, Multi-dimensional arrays, jagged arrays and dynamic arrays.
Unit-II

Windows Programming: Creating windows forms, windows controls, Button, Check box, Combo box, Label, List box, Radio Button, Text box, Events, Click, close deactivate, Load, mousedown, mouseup.

Menus and Dialog Boxes : Creating menus, menu items, context menu, Using dialog boxes, show dialog() method.

ADO.NET : Architecture of ADO.NET, ADO.NET providers, Connection, Command, Data Adapter, Dataset, Connecting to Data Source, Accessing Data with Data set and Data reader, Create an ADO.NET application, Using Stored Procedures.

Unit-III

ASP.NET Features: Application of States and Structure; Change the Home Directory in IIS- Add a Virtual Directory in IIS- Set a Default Document for IIS – Change Log File Properties for IIS-Stop, Start, or Pause a Web Site.

Creating Web Controls: Web Controls, HTML Controls, Using Internist Control, Using Input Validation Controls, Selecting Controls for Applications, Data Controls and Adding web controls to a page.

Creating Web Forms: Server Controls, Types of Server Controls, Adding ASP.NET Code to a page.

Unit-IV


Web Services and WCF : Web Services protocol and standards – WSDL Documents-Overview of UDDI – Calling a Web Service from a Browser-Calling a Web Service by Using a proxy – Creating a simple web service – Creating and Calling a Web Service by Using Visual Studio .NET Architecture of WCF, WCF Client

Reference Books:

5. Steven Holzner; ASP.NET 4.0 (Cover C# & VB ) Black Book; Dreamtech Press.
6. Steven Holzner; .NET Programming Black Book; Dreamtech Press.
Practical Examination

Each practical paper shall be of 4 hours duration on one day and carry 100 marks for the practical examination. The practical examination will involve 3 exercises, each of 20 marks, practical record of 15 marks and viva-voce examination of 25 marks.

MIT 811: Programming in C++ Lab

Practical Lab
Examination: Practical Examination
Exercises to be framed so as to cover the topics and tools covered in theory paper MIT 801.

MIT 812: Data Structure with C++ Lab

Practical Lab
Examination: Practical Examination
Exercises to be framed so as to cover the topics and tools covered in theory paper MIT 802.

MIT 813: .NET (ASP) Lab

Practical Lab
Examination: Practical Examination — Exercises to be framed so as to cover the topics and tools covered in theory paper MIT 806.
Course Contents in Detail – M.Sc.(IT) III Semester

Note:
1. Papers MIT 901, MIT 902, MIT 903, MIT 911 and MIT 922 are compulsory (CCC) and Papers MIT 904, MIT 905, Elective-I, Elective-II and Elective-III are elective (ECC).
2. Continuous assessment (Internal) will be done by the concerned teacher on the basis of test papers, regularity in the class and performance of the student. Maximum marks in continuous assessment of each paper is 100.

MIT 901 : Programming in Java

Theory & Tutorial: 4 hours per week (4 Credits)
Examination: Theory Paper – 3 hours; Max. Marks – 100

Note:
1. Candidate has to attempt five questions in all. All questions carry equal marks.
2. Question No. 1 covering whole syllabus will consists of 10 short answer questions carrying 2 marks each.
3. Question No. 2 to 5, each of 20 marks, will be framed by taking one question from each unit. There will be an internal choice within the unit.

Unit—I

Introduction to OOP: Paradigms of Programming Languages - Basic concepts of Object Oriented Programming, Objects and Classes, Data abstraction and Encapsulation, Inheritance, Polymorphism, Dynamic binding, Message communication; Benefits of OOP; Application of OOPs.

Introduction to Java: History, Java features, Java Environment- JDK, APL Types of Java program, Creating and Executing a Java program; Java Tokens: Keywords, Character set, Identifiers, Literals, Separator; Java Virtual Machine (JVM); Command Line Arguments; Comments in Java program.

Elements: Constants, Variables, Data types, Scope of variables, Type casting. Operators- Arithmetic, Logical, Bit wise operator, Increment and Decrement, Relational, Assignment, Conditional, Special operator; Expressions, Evaluation of expressions.

Unit-II

Decision making and Branching: If statement and its types; switch statement; Decision making and Looping- While loop, do — While, for loop, break, labeled loop, continue Statement.

Arrays: One Dimensional Array, Multidimensional Array, Vectors, Wrapper classes; String Array, String Methods, String Buffer Class.

Class and objects: Defining a class, Methods, Creating objects, Accessing class members, Constructors, Method overloading, Static member: Nesting of Methods, this keyword, comparable, line input.
Inheritance: Defining a subclass, deriving a sub class, Single Inheritance, Multilevel Inheritance, Hierarchical Inheritance, Overriding methods, Final variables and methods, Final classes, Finalizer methods, Abstract methods and classes, Visibility Control- Public access, Private access, friend, protected. Interfaces- Multiple Inheritance, Defining interface, Extending interface, Implementing Interface, Accessing interface variables.

Unit — III

Packages: Java API Packages — System Packages, Naming Conventions, Creating & Accessing a Packages Finding Packages and CLASSPATH, Adding Class to a Packages, Hiding Classes.

JAVA Streams: Data Flow with Java Streams, Input Streams, Output Streams.

Exception Handling: Limitations of Error handling, Advantages of Exception Handling, Types of Errors, Basics of Exception Handling, try blocks, throwing an exception, catching an exception, finally statement, declaring and throwing custom Exceptions.

Multithreading: Creating Threads, Life of a Thread, Defining & Running Thread, Thread Methods, Thread Priority, Synchronization, Implementing run-able interface, Thread Scheduling.

Unit—IV


References/Text Books:

4. Cay S Horstmann, Gary Cornell; Core Java Vol I & II; The Sun Micro systems Press.
MIT 902: Data Warehousing & Data Mining

Theory & Tutorial: 4 hours per week (4 Credits)
Examination: Theory Paper – 3 hours; Max. Marks – 100

Note:
1. Candidate has to attempt five questions in all. All questions carry equal marks.
2. Question No. 1 covering whole syllabus will consist of 10 short answer questions carrying 2 marks each.
3. Question No. 2 to 5, each of 20 marks, will be framed by taking one question from each unit. There will be an internal choice within the unit.

Unit-I
Introduction to Data Warehousing: Introduction, Data Warehouse, importance and functions, Multidimensional Data Model, Data Marting and its usage, Cost of data marting, Metadata, Data Warehouse Architecture, Building a Data warehouse Implementation, Further Development, Planning and Project Management of Data Warehouse.

Unit-II
Data Mining: Data Warehousing to Data Mining, Evolution Analysis, Classification of Data Mining Systems, Architecture of data mining system, Major Issues in Data Mining, Data Preprocessing Needs Preprocessing the Data, Data Cleaning, Data Integration and Transformation, Data Reduction, Discretization and Concept Hierarchy Generation; Analysis of Attributes Relevance, Discriminating between Different Classes, Data Warehouse and OLAP Technology for Data Mining.

Unit-III
Association Rules: Association Rule Mining, Single-Dimensional Boolean Association Rules from Transactional Databases, Multi-Level Association Rules from Transaction Databases, Issues regarding classification & prediction, Different Classification Methods, Prediction.

Unit-IV
Clustering and Applications of Data Mining Cluster Analysis, Types of Data, Categorization of Major Clustering Methods, Partitioning Methods, Hierarchical Methods, Density-Based Methods, Model-Based Clustering Methods, Clustering High Dimensional Data, Data Mining Applications.
Future Trends: Multidimensional Analysis and Descriptive Mining of Complex Data Objects, Spatial Databases, Multimedia Databases, Web Mining, Spatial Data Mining, Temporal Mining, Applications and Trends in Data Mining.

Text/Reference Books:
3. Data Warehousing: Reema Thareja; Oxford
4. Data Mining introductory and advanced topics —MARGARET H DUNHAM, PEARSON EDUCATION.
5. Data Warehouse in Real World: Anthony, Pearson Education.
MIT 903: E-Commerce Technologies

Theory & Tutorial: 4 hours per week (4 Credits)
Examination: Theory Paper – 3 hours; Max. Marks – 100

Note:
1. Candidate has to attempt five questions in all. All questions carry equal marks.
2. Question No. 1 covering whole syllabus will consists of 10 short answer questions carrying 2 marks each.
3. Question No. 2 to 5, each of 20 marks, will be framed by taking one question from each unit. There will be an internal choice within the unit.

Unit-I


Electronic Data Interchange: Concepts of EDI and Limitation, Application of EDI, Disadvantages of EDT, EDI model; EDI Implementation, MIME and Value-Added Network, Internet-based EDT.

Unit-II


Electronic Payment Systems: Special features required in payment systems, Types of E-payment systems, E-Cash, E-cheque, credit card, Smart Card, Electronic Purses, e-Billing.

Unit-III


Unit- IV


Suggested Books:
MIT 904: Principles of Management

Theory & Tutorial: 4 hours per week (4 Credits)
Examination: Theory Paper – 3 hours; Max. Marks – 100

Note:
1. Candidate has to attempt five questions in all. All questions carry equal marks.
2. Question No. 1 covering whole syllabus will consist of 10 short answer questions carrying 2 marks each.
3. Question No. 2 to 5, each of 20 marks, will be framed by taking one question from each unit. There will be an internal choice within the unit.

Unit—I


Principles of management: Meaning, Definition, Principles, Development of Management Thought; Objective of Management, Management by Objective, Management by Exception, Modern Techniques of Management.

Unit—II

Coordination: Nature, Importance, Types and Techniques of Coordination.

Unit—III


Unit—IV

Leadership: Theories, Traits of Leaders, Styles, Quality of Leadership, Transformational of Leaders, Leadership and Management.

Control: Process of Control, Principles of Control, Techniques of Control, Limitations of Control, Process of Management Change and its effects.

Reference/Text Books
1. Prasad M I: Principles and Practice of Management, Sultan Chand & Sons.
MIT A01: Artificial Intelligence

Theory & Tutorial: 4 hours per week (4 Credits)
Examination: Theory Paper – 3 hours; Max. Marks – 100

Note:
1. Candidate has to attempt five questions in all. All questions carry equal marks.
2. Question No. 1 covering whole syllabus will consists of 10 short answer questions carrying 2 marks each.
3. Question No. 2 to 5, each of 20 marks, will be framed by taking one question from each unit.
   There will be an internal choice within the unit.

Unit-I
Foundations of AI ; scope, problems, and approaches of AT. Intelligent agents, reactive, deliberative, goal-driven, utility-driven, and learning agents ,Artificial Intelligence programming techniques


Unit-II
Knowledge Representation and Reasoning: ontologies, foundations of knowledge representation and reasoning, representing and reasoning about objects, relations, events, actions, time, and space; predicate logic, situation calculus, description logics, reasoning with defaults, reasoning about knowledge, sample applications.

Planning: planning as search, partial order planning, construction and use of planning graphs

Unit-III
Representing and Reasoning with Uncertain Knowledge: probability, connection to logic, independence, Bayes rule, bayesian networks, probabilistic inference, sample applications.


Unit-IV
Machine Learning and Knowledge Acquisition: learning from memorization, examples, explanation, and exploration, learning nearest neighbor, naive Bayes, and decision tree classifiers, Q-learning for learning action policies, applications.

Brief Survey of selected additional topics: perception, communication, interaction, and action; multiagent systems. Sample Applications of AI, student project presentations

Reference Text: Books:
2. Artificial Intelligence, Rich & Knight, 1st Ed.
3. Introduction to AI & Expert Systems, Penton, PHI
4. Neural Networks–A, Fuzzy Logic & Genetic Algorithms, Rajeshwar, PHI
MIT A02 : Information Security And Cryptography

Theory & Tutorial: 4 hours per week (4 Credits)
Examination: Theory Paper – 3 hours; Max. Marks – 100

Note:
1. Candidate has to attempt five questions in all. All questions carry equal marks.
2. Question No. 1 covering whole syllabus will consists of 10 short answer questions carrying 2 marks each.
3. Question No. 2 to 5, each of 20 marks, will be framed by taking one question from each unit.
   There will be an internal choice within the unit.

Unit - I


Modern techniques: Simplified DES, Block cipher principles, DES Standards, DES Strength, Differential & Linear Cryptanalysis, Block Cipher Design Principles, Block Cipher Modes of Operation.

Unit - II


Unit - III


Unit - IV


Reference/Text Books:
1. William Stallings; Cryptography and Network Security; Fifth Edition; Pearson Education.
2. Atul Kahate; Cryptography and Network Security; Tata McGrawHill.
3. Pachhaikar VK; Cryptography and Information Security; PHI Learning.
MIT B01: Advanced Java Programming

Theory & Tutorial: 4 hours per week (4 Credits)
Examination: Theory Paper – 3 hours; Max. Marks – 100

Note:
1. Candidate has to attempt five questions in all. All questions carry equal marks.
2. Question No. 1 covering whole syllabus will consists of 10 short answer questions carrying 2 marks each.
3. Question No. 2 to 5, each of 20 marks, will be framed by taking one question from each unit. There will be an internal choice within the unit.

Unit - I

Introduction to Advance Java Application: Networking with Java - Networking basics, Socket, port, Proxy servers, Internet addressing and URL, java.net – networking classes and interfaces, Implementing TCP/IP based Server and Client. Classes to be covered Socket, Server Socket, IP Address, URL connections;


Unit — II


Database Application: The JDBC Connectivity Model, Database Programming, Connecting to the Database Types of JDBC Drivers, Writing JDBC applications using select, insert, delete, update; Types of Statement objects (Statement, Prepared Statement and Callable Statement); ResultSet, ResultSetMetaData; Inserting and updating records, Connection Pooling.

Unit — III

Introduction to J2EE: J2EE Overview, Nee of J2EE, J2EE Architecture, J2EE APIs J2EE Containers.


Java Server Pages Technology: Basic JSP Architecture, Life Cycle of JSP (Translation, compilation) ,JSP Tags and Expressions , Role of JSP in MVC-2 ,JSP with Database ,JSP Implicit Objects ,Tag Libraries ,JSP Expression Language (EL), Using Custom Tag.

Unit — IV

Java Beans: Introduction to Java Bean ,Rules for writing a Simple Bean, Java Naming Directory Interface API ,Java Naming Directory Interface concept.


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List of Reference Text Books:


MIT B02: Wireless Technology

Theory & Tutorial: 4 hours per week (4 Credits)
Examination: Theory Paper – 3 hours; Max. Marks – 100

Note:
1. Candidate has to attempt five questions in all. All questions carry equal marks.
2. Question No. 1 covering whole syllabus will consists of 10 short answer questions carrying 2 marks each.
3. Question No. 2 to 5, each of 20 marks, will be framed by taking one question from each unit. There will be an internal choice within the unit.

Unit I


Unit II

Wireless Network Planning And Operation: Frequencies Management, Channel assignments, Frequency reuse System Capacity & its improvement. Handoffs & its types, roaming, Co-Channel & Adjacent Channel interference.

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Digital Cellular Networks: GSM Architecture & Interfaces, Signal Processing in GSM, Frame Structure of GSM, Channels used in GSM.

Unit III

Wireless LAN Technology: Overview, WLAN Technologies, Infrared LANs, Spread Spectrum LANs Narrowband, Microwave LANs IEEE 802.11- Architecture, Protocols, MAC layer, MAC frame, MAC Management.


Unit IV

Mobile Data Networks: Introduction, Data oriented CDPD Networks, GPRS.


Text/Reference Books:

1. Mobile communication Engg- Lee W.C.Y
2. Wireless Communication, Principles & Practice-T.S.Rappaport
3. Mobile Communication, Pearson Education- Schiller
5. Mobile communication -Rampanty

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