# MADHAV INSTITUTE OF TECHNOLOGY & SCIENCE, GWALIOR

(A Govt. Aided UGC Autonomous & NAAC Accredited Institute Affiliated to RGPV, Bhopal)

## Department of Information Technology

### Details of course where revision was carried out
### (Semester: Jul. –Dec. 2020)

| Course/Subject Name | Course Code | Year/ Date of Introduction | Year /Date of revision | Percentage of content added or replaced | Item No. | Page No. | Link of relevant documents / minutes |
|---|---|---|---|---|---|---|---|
| Networking with TCP/IP | 160711 | 2017 | 30/05/2020 | 5% | 02 | 03,11 | https://drive.google.com/file/d/1BeEzaHBgbCF3w36q7c6qgkVJP |
| Data Mining & Warehousing | 160712 | 2017 | 30/05/2020 | 5% | 02 | 03,13 | |

# MADHAV INSTITUTE OF TECHNOLOGY & SCIENCE, GWALIOR

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## Department of Information Technology

### Details of courses focused on employability / entrepreneurship / skill development (Semester: Jul. - Dec. 2020)

| Courses Name | Course Code | Activities/Content which have a bearing on increasing skill and employability | Item No. | Page No. | Link of relevant documents / minutes |
|---|---|---|---|---|---|
| Software Testing | 160713 | Purpose of Testing, Models for Testing, Testing Tactics, levels and Planning | 02 | 03,17 | https://drive.google.com/file/d/1BeEzaHBgbCF3w36q7c6qgkVJPzyrkZXJ/view?usp=sharing |
| Practical Machine Learning with Tensor Flow | 160751 | Tensorflow, Machine Learning, Demonstration of ML concepts with Deep Playground and Building, Monitoring & evaluating of Model. | 03 | 03 | |
| Scalable Data Science | 160752 | Memory-efficient data structures, Map-reduce and related paradigms, Linear Algebra | 03 | 03 | |
| Introduction to Internet of Things | 160753/IT0520H1 | Communication Protocols, Integration of Sensors and Actuators with Arduino, Implementation of IoT with Raspberry Pi, Industrial IoT | 03,05 | 03,04 | |
| Soft Computing | 900208 | Various Networks for Supervised Learning and Unsupervised Learning, Genetic Algorithm, Hybrid Soft Computing Techniques | 04 | 03,20 | |
| Network Security | 900209 | Conceptual understanding of network security principles, apply encryption techniques to secure data in transit across data networks, requirements of real-time communication security and issues related to the security of web services. | 04 | 03,22 | |
| Data Mining & Warehousing | 900210 | Data Warehouse and OLTP Technology, Methods for Data Pre-processing, Mining Association Rules in Large Databases, Classification & Predication and Cluster Analysis. | 04 | 03,24 | |
| R Programming | 900220 | Programming Using R, Mathematical and Statistical Concepts, Visualization of data | 04 | 03,26 | |
| Artificial Intelligence | 900221 | Production System, Knowledge Representation, Natural Language Processing, Speech Recognition, Computer Vision, Expert System | 04 | 03,28 | |

| | | | | | |
|---|---|---|---|---|---|
| Computer Networks | 900222 | basic taxonomy and terminology of the computer networking, detail knowledge about various layers, protocols and devices, deal with various networking problems. | 04 | 03,30 | |
| Introduction to Industry 4.0 and Industrial Internet of Things | IT0720H1 | Industry 4.0, Industrial IoT- Layers, IIoT Analytics, Security and Fog Computing, Various Industrial IoT Application Domains | 05 | 04 | |
| Deep Learning | IT0720H2 | feedforward neural networks, convolutional neural networks, recurrent neural networks and attention mechanisms, various optimization algorithms | 05 | 04 | |
| Big Data Computing | IT0720H3 | Big Data Enabling Technologies, Platforms, Storage Platforms for Large Scale Data, Streaming Platforms and Machine learning with Spark | 05 | 04 | |
| Object Oriented System Development using UML, Java and Patterns | IT0720M1 | Life Cycle Models for OO Development, Use Case Diagram, Class Diagram, Sequence Diagram, State chart diagram, design patterns (GRASP patterns, GoF patterns) | 05 | 04 | |
| Cloud computing | IT0720M2 | Service Management, Data Management, Resource Management in Cloud, Research trend in Cloud Computing, Fog Computing | 05 | 04 | |
| Computer Graphics | IT0720M3 | Objectand boundary representation, Modeling transformations,Removal of clipping and hidden surface, Graphics hardware and software | 05 | 04 | |
| Introduction to Operating Systems | IT0520M1 | Memory Management, Interrupts and Context Switching, Process Scheduling, Synchronization, Deadlocks, Operating System Security | 05 | 04 | |
| High-speed Networks | 630113 | Network engineering principles, design, routing, management, security, performance and use of industry standard tools. | 11(a) | 51 | |
| Soft Computing | 800105 | Various Networks for Supervised Learning and Unsupervised Learning, Genetic Algorithm, Hybrid Soft Computing Techniques | 11(a) | 90 | |
| Blockchain Technology | 800106 | Blockchain in Financial Software and Systems, Blockchain in Trade/Supply Chain, Blockchain for Government , Privacy and Security on Blockchain | 11(a) | 92 | |

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|---|---|---|---|---|---|
| Machine Learning using Python | 800107 | Python Programming, Data Processing and Visualization using Python, Learning Methods, Classification Methods | 11(a) | 94 | |
| Adhoc & Sensor Based Networks | 630115 | Design and implementation issues, infrastructure less networks, various communication protocols. | 11(a) | 75 | |
| Mobile Computing & M-Commerce | 630114 | Concept of General Packet Radio Services, Wireless LANs, Wireless Application Protocol (WAP), vision and services of third generation mobile communication and its quality. | 11(a) | 73 | |

# MADHAV INSTITUTE OF TECHNOLOGY & SCIENCE, GWALIOR

(A Govt. Aided UGC Autonomous & NAAC Accredited Institute Affiliated to RGPV, Bhopal)

## Department of Information Technology

### Details of New Course added (Semester : Jul. - Dec. 2020)

| Courses Name | Course Code | Activities/Content which have a bearing on increasing skill and employability | Item No. | Page No. | Link of relevant documents / minutes |
|---|---|---|---|---|---|
| Software Testing | 160713 | Purpose of Testing, Models for Testing, Testing Tactics, levels and Planning | 02 | 03,17 | https://drive.google.com/file/d/1BeEzaHBgbCF3w36q7c6qgkVJPzyrkZXJ/view?usp=sharing |
| Practical Machine Learning with Tensor Flow | 160751 | Tensorflow, Machine Learning, Demonstration of ML concepts with Deep Playground and Building, Monitoring & evaluating of Model. | 03 | 03 | |
| Scalable Data Science | 160752 | Memory-efficient data structures, Map-reduce and related paradigms, Linear Algebra | 03 | 03 | |
| Introduction to Internet of Things | 160753/IT0520H1 | Communication Protocols, Integration of Sensors and Actuators with Arduino, Implementation of IoT with Raspberry Pi, Industrial IoT | 03,05 | 03,04 | |
| Soft Computing | 900208 | Various Networks for Supervised Learning and Unsupervised Learning, Genetic Algorithm, Hybrid Soft Computing Techniques | 04 | 03,20 | |
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| R Programming | 900220 | Programming Using R, Mathematical and Statistical Concepts, Visualization of data | 04 | 03,26 | |
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|---|---|---|---|---|---|
| Computer Networks | 900222 | basic taxonomy and terminology of the computer networking, detail knowledge about various layers, protocols and devices, deal with various networking problems. | 04 | 03,30 | |
| Introduction to Industry 4.0 and Industrial Internet of Things | IT0720H1 | Industry 4.0, Industrial IoT- Layers, IIoT Analytics, Security and Fog Computing, Various Industrial IoT Appl'cation Domains | 05 | 04 | |
| Deep Learning | IT0720H2 | feedforward neural networks, convolutional neural networks, recurrent neural networks and attention mechanisms, various optimization algorithms | 05 | 04 | |
| Big Data Computing | IT0720H3 | Big Data Enabling Technologies, Platforms, Storage Platforms for Large Scale Data, Streaming Platforms and Machine learning with Spark | 05 | 04 | |
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| Cloud computing | IT0720M2 | Service Management, Data Management, Resource Management in Cloud, Research trend in Cloud Computing, Fog Computing | 05 | 04 | |
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| High-speed Networks | 630113 | Network engineering principles, design, routing, management, security, performance and use of industry standard tools. | 11(a) | 51 | |
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| Machine Learning using Python | 800107 | Python Programming, Data Processing and Visualization using Python, Learning Methods, Classification Methods | 11(a) | 94 | |
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| Mobile Computing & M-Commerce | 630114 | Concept of General Packet Radio Services, Wireless LANs, Wireless Application Protocol (WAP), vision and services of third generation mobile communication and its quality. | 11(a) | 73 | |
| Models and Techniques in Computer Graphics | 630117 | Procedural Models, Fractal Models, Grammar Based Models, Curve Representation, Various Hidden Surface Elimination Algorithm | 11(a) | 80 | |

MADHAV INSTITUTE OF TECHNOLOGY AND SCIENCE, GWALIOR – 474005
(A Govt. Aided UGC Autonomous & NAAC Accredited Institute Affiliated to R.G.P.V. Bhopal, M.P.)
Department of CSE & IT

D-MO 686
24.10.2020

# BOARD OF STUDIES (BoS) PROCEEDING
# IN
# COMPUTER SCIENCE & ENGINEERING
# AND
# INFORMATION TECHNOLOGY

*(Meeting Dated – 30th May, 2020)*

# Madhav Institute of Technology & Science, Gwalior-474 005

(A Govt. Aided UGC Autonomous & NAAC Accredited Institute Affiliated to RGPV, Bhopal)

Department of CSE & IT

**Minutes of Meeting of Board of Studies (BoS) in Computer Science & Engineering and Information Technology**

Date: 10/05/2020

The Meeting of Board of Studies (BoS) in Computer Science& Engineering and Information Technology was held on 10th May, 2020 (12.15 P.M. onwards) **through video conferencing**. During the meeting following were present

| | | |
|---|---|---|
| 1 | Dr. Akhilesh Tiwari, Professor & Head | Chairman |
| 2 | Dr. A. K. Solanki, Professor (Computer Science & Engineering), B.I.E.T. Jhansi (U.P.) | External Member (Academics)<br>***(Nominee of Hon'ble Vice Chancellor RGPV Bhopal)*** |
| 3 | Dr. Nanhay Singh, Professor & Head, Department of Computer Science & Engineering, Ambedkar Institute of Advanced Communication Technologies & Research (AIACTR), Delhi | External Member (Academics)<br>***(Nominee of Academic Council (AC), MITS Gwalior)*** |
| 4 | Dr. Virendra Prasad Vishwakarma, Professor, University School of Information and Communication Technology (USICT), Guru Gobind Singh Indraprastha University (GGSIPU), Delhi | External Member (Academics)<br>***(Nominee of Academic Council (AC), MITS Gwalior)*** |
| 5 | Dr. NishaChaurasia, Assistant Professor, Department of IT, Dr. B. R. Ambedkar National Institute of Technology (NIT) Jalandhar | External Member (Alumnus) |
| 6 | Dr. R. K. Gupta, Professor | Member |
| 7 | Dr. Manish Dixit, Professor | Member |
| 8 | Ms. Khushboo Agarwal, Assistant Professor | Member |
| 9 | Mr. Punit Kumar Johari, Assistant Professor | Member |
| 10 | Dr. Sanjiv Sharma, Assistant Professor | Member |
| 11 | Mr. Vikas Sejwar, Assistant Professor | Member |
| 12 | Mr. Abhilash Sonkar, Assistant Professor | Member |
| 13 | Ms. Jaimala Jha, Assistant Professor | Member |
| 14 | Mr. Jamvant Singh Kumare, Assistant Professor | Member |
| 15 | Ms. Neha Bhardwaj, Assistant Professor | Member |
| 16 | Mr. Rajeev Kumar Singh, Assistant Professor | Member |
| 17 | Mr. Mahesh Parmar, Assistant Professor | Member |
| 18 | Mr. R. R. Singh Makwana, Assistant Professor | Member |
| 19 | Mr. Amit Kumar Manjhvar, Assistant Professor | Member |
| 20 | Dr. R. S. Jadon, Professor (Computer Application) | Special Invitee member |
| 21 | Dr. Anshu Chaturvedi, Professor (Computer Application) | Member |

| | | |
|---|---|---|
| 22 | Mrs. Parul Saxena, Assistant Professor (Computer Application) | Member |

*In addition to above, faculty members engaged under TEQIP-III Project were also present.*

The following external members could not attend the meeting

| | | |
|---|---|---|
| 1. | Mr. Amitabh Shrivastava, Senior Consultant, TCS, Noida | External Member (Industry) |
| 2. | Dr. Kapil Sharma, Professor& Head, Department of Information Technology, Delhi Technological University (DTU), Delhi | External Member (Academics) ***(Nominated by DTU Delhi under twinning arrangement of TEQIP-III)*** |
| 3. | Dr. Dinesh Kumar Vishwakarma, Associate Professor, Department of Information Technology, Delhi Technological University (DTU), Delhi | External Member (Academics) ***(Nominated by DTU Delhi under twinning arrangement of TEQIP-III)*** |

**The following deliberations took place in the meeting:**

The minutes of previous BoS meeting held on 23rd November, 2019 were confirmed, followed by item-wise discussion (as per the agenda of the present BoS meeting), as follows

ITEM **CSEIT-1:** To propose the list of courses, which the students can opt from SWAYAM / NPTEL platform for *Seminar/Self Study in III & V Semester (during July-December 2020 Semester)*

**The courses to be offered under *Seminar/Self Study* through SWAYAM / NPTEL based learning platform for B.Tech III semester (2019 admitted batch) & B.Tech V Semester (2018 admitted batch) (CSE & IT), under flexible curriculum were discussed and finalized as per the following**

| B.Tech III Sem | | B.Tech V Sem | |
|---|---|---|---|
| Course ID: noc20-cs70 | Programming, Data Structures and Algorithms using Python | Course ID: noc20-cs86 | Demystifying Networking |
| Course ID: noc20-cs79 | Introduction to Haskell Programming | Course ID: noc20-cs74 | Reinforcement Learning |

**In continuation, it is discussed that above listed courses are to be made open, so that most preferred course from the majority of students, can be run under the course category *Seminar/Self Study*. Moreover, this will be compulsory to register for one online course using SWAYAM/NPTEL. Further, the evaluation will be based on attendance, assignments and presentations.**

ITEM **CSEIT-2:** To propose the list and syllabi for all *Departmental Elective (DE)* Courses of B Tech VII Semester (under the flexible curriculum) along with their COs

**The courses to be offered under Departmental Elective (DE-3) category (in**

| | |
|---|---|
| | offline mode) for B.Tech VII Semester, CSE & IT discipline (under flexib' curriculum) were discussed and finalized, as per the following deta: |

| DE-3 (B.Tech CSE): | DE-3 (B.Tech IT): |
|---|---|
| • Networking with TCP/IP<br>• Data Mining & Warehousing<br>• Distributed Systems | • Networking with TCP/IP<br>• Data Mining & Warehousing<br>• Software Testing |

**The syllabi of Courses along with their Course Outcomes (COs) is Annexed as Annexure-I**

***It is further discussed that the above mentioned list of courses may be expanded (if required) to accommodate the industrial demand and latest technological advancements.***

ITEM **CSEIT-3:** To propose the list of Courses from SWAYAM/NPTEL/MOOC Platform to be offered in *online mode under DE category* for credit transfer in the *VII Semester*

**The list of Departmental Elective (DE-4) courses to be offered from SWAYAM/NPTEL/MOOC based learning platform (in online mode) for B.Tech VII Semester, CSE & IT discipline (under flexible curriculum) were discussed and finalized, as per the following detail**

| DE-4 (B.Tech CSE / IT): |
|---|
| • Practical Machine Learning with Tensorflow<br>• Scalable Data Science<br>• Introduction to Internet of Things |

***In continuation, it is also discussed and recommended that the above mentioned list of Departmental Elective (DE) course may be kept dynamic and newly emerging courses may be inducted in line with the industrial need and emerging developments (as and when desired).***

ITEM **CSEIT-4:** To propose the Courses & Syllabi to be offered under *Open Category (OC)* Courses for VII semester students of other departments along with their COs

**The courses to be offered under Open Category (OC) Courses for B.Tech VII Semester (for the students of other departments) under flexible curriculum, were discussed and finalized, as per the following detail**

| OC-2: | OC-3: |
|---|---|
| • Soft Computing<br>• Network Security<br>• Data Mining & Warehousing | • R Programming<br>• Artificial Intelligence<br>• Computer Networks |

***It is further discussed that the Open Category (OC) courses are meant only for the students of other departments; therefore the above list of courses may be kept dynamic (as per the need and demand from other departments).***

<table>
<tr><td></td><td>The detailed syllabi (along with their COs) is Annexed as Annexure-II</td></tr>
<tr><td>ITEM CSEIT-5:</td><td>To propose the list of "Additional Courses" which can be opted for getting : (i) Honours (ii) Minor Specialization<br>[These will be completed through SWAYAM/NPTEL/MOOC based Platforms during V and VII semester]<br>The courses available on SWAYAM/NPTEL/MOOC based learning platforms for Honours and Minor Specialization were discussed and identified. The same is listed, as mentioned below<br><br>
<table>
<tr><th>B.Tech VII Semester (2017-18 admitted batch)</th></tr>
<tr><td>Additional Courses for "Honours" (Parent Department)</td></tr>
<tr><td>• Introduction to Industry 4.0 and Industrial Internet of Things<br>• Deep Learning<br>• Big Data Computing</td></tr>
<tr><td>Additional Courses for "Minor Specialization" (Other Departments)</td></tr>
<tr><td>• Object Oriented System Development using UML, Java and Patterns<br>• Cloud computing<br>• Computer Graphics</td></tr>
</table>
<br>
<table>
<tr><th>B.Tech V Semester (2018-19 admitted batch)</th></tr>
<tr><td>Additional Courses for "Honours" (Parent Department)</td></tr>
<tr><td>• Introduction to Internet of Things<br>• Data Science for Engineers<br>• The Joy of Computing using Python</td></tr>
<tr><td>Additional Courses for "Minor Specialization" (Other Departments)</td></tr>
<tr><td>• Introduction to Operating Systems<br>• Database Management System<br>• Object Oriented Analysis and Design</td></tr>
</table>
<br>It is further discussed that the above list of courses for B.Tech VII & B.Tech V Semester respectively for "Honours" and "Minor Specialization" (finalized from the pool of courses available on SWAYAM/NPTEL platform) are to be made open to all the students. Moreover, in the emergent situation, the above list may be expanded.</td></tr>
<tr><td>ITEM CSEIT-6:</td><td>To propose the syllabi of Mandatory Course (MC) titled "Intellectual Property Rights" (IPR) of VII semester under the flexible curriculum along with their COs<br><br>The course syllabi for Mandatory Course (MC) titled "Intellectual Property Rights" (IPR) of VII semester (under the flexible curriculum) has already been prepared at institution level. The same will be adopted by the department. Though this course will be taught by the coordinating department, the department of CSE & IT will arrange the departmental</td></tr>
</table>

| | |
|---|---|
| | **level activities, such as workshops on IPR and Patents, seminars and talk on the significance and role of patents to create awareness among the students and faculty members.** |
| ITEM **CSEIT-7:** | To propose the Experiment list/ Lab manual for *Laboratory Courses* to be offered in *VII semester*<br><br>**The experiment list and lab manual for the Laboratory Course (DLC-6) (Internet of Things) has already been finalized during the previous BoS meeting, dated 23rd November 2019 (under the ITEM CSEIT-7). Subsequently, the same was also approved by the Academic Council in its meeting held on 7th December 2020.** |
| ITEM **CSEIT-8:** | To explore and prepare the tentative list of Departmental Elective (DE) Courses (along with COs) for VIII semester (to be run through SWAYAM/NPTEL/MOOC based platform)<br><br>**The tentative list of Departmental Elective (DE) Courses for B.Tech VIII semester (CSE/IT) (under flexible curriculum) (to be run through SWAYAM/NPTEL/MOOC based platform), were discussed and same is detailed below** |

| **Tentative list of Departmental Elective (DE) Courses for B.Tech VIII semester** |
|---|
| **DE-5 (B.Tech CSE / IT):**<br>• **Social Networks**<br>• **Applied Natural Language Processing**<br>• **Deep Learning for Computer Vision** |

| | |
|---|---|
| ITEM **CSEIT-9:** | To explore and prepare the tentative list of courses to be offered under *Open Category (OC)* Courses for *VIII semester* students of other departments *(run through SWAYAM NPTEL MOOC' based platform)*<br><br>**The courses were explored tentatively and listed, as follows** |

| **OC-4 (To be opted by other department students)** | **OC-5 (To be opted by other department students)** |
|---|---|
| • **Introduction to Machine Learning**<br>• **Introduction to internet of things**<br>• **Scalable Data Science** | • **Deep Learning**<br>• **Big Data Computing**<br>• **Human Computer Interactions** |

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| ITEM **CSEIT-10:** | To discuss the analysis report of curriculum feedback from various stakeholders<br><br>**The detailed analysis report of feedback on curriculum and Course** |

| | |
|---|---|
| | **Outcomes (COs) from various stakeholders (students, alumni, faculty members, etc.) was presented and discussed. The house noticed and appreciated that most of the suggested courses (on emerging areas) / activities (from alumni) are in practice (at present) in the department. Moreover, it is discussed that the department will take necessary initiatives, wherever required.** |
| ITEM **CSEIT-11:** | Any other matters<br><br>(a) To discuss and propose new Scheme/Curriculum for M.Tech (CSE/IT/Cyber Security) Programmes<br><br>**The newly proposed scheme and curriculum for M.Tech (CSE/IT/Cyber Security) programmes were presented before the house. The provisions made therein related to SWAYAM/NPTEL/MOOC based courses, Electives (in offline mode and through SWAYAM/NPTEL) and Open Category courses (in offline mode and through SWAYAM/NPTEL) were discussed. The scheme / curriculum are Annexed as Annexure-III.**<br><br>(b) To discuss and propose new Scheme / curriculum for Two Years MCA Programme<br><br>**The newly proposed scheme and curriculum for two years MCA programme was presented before the house. The provisions made therein related to SWAYAM/NPTEL/MOOC based courses, Electives (offline mode / through SWAYAM/NPTEL/MOOC), Open Category (OC) course (offline mode / through SWAYAM/NPTEL/MOOC) were discussed and finalized with minor adjustments (as per the suggestions). The scheme / curriculum is Annexed as Annexure-IV.**<br><br>(c) To induct a new course in the Third Semester of current scheme of MCA programme<br><br>**Considering the recent development and industrial requirements (pertaining to programming practices), it was proposed to induct a new course "Programming in Python" in the existing scheme of Third Semester MCA (3 Years) programme (for 2018-19 & 2019-20 admitted batch). This course will be offered in place of the course "Computer Oriented Optimization". The proposal (along with the syllabi) was discussed and recommended by the house. The Syllabi of newly proposed course "Programming in Python", is Annexed as Annexure-V.**<br><br>(d) To discuss about the induction of InfyTQ certification courses (under the Infosys Campus Connect MoU) as Industry Elective courses / otherwise, as per the requirement raised by Infosys Ltd (for B.Tech III Year Students)<br><br>**To induct the InfyTQ certification courses based on emerging areas (as offered by Infosys) under InfyTQ certification initiatives (as part of Infosys Campus Connect program), it is desired to include / offer these courses, as listed below, as part of Electives / or the department may offer the same by creating Batches (separately) (by following all the requirements for the same). This is in the benefit of students, as these are based on emerging areas / current industrial practices. Therefore, the** |

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| | current list of Electives may be expanded to accommodate such courses.<br><br>List of Courses:<br><br>• Internet of Things<br>• Cloud Computing<br>• Python Programming<br>• Software Testing<br>• Machine Learning Using R<br>• Big Data<br>• Business Intelligence<br>• Agile Software Development<br>• Enterprise Application<br>• User Interface Technologies<br><br>Above listed courses are representative courses. Further the department has to identify the suitable courses to be offered under InfyTQ certification. Moreover, the curriculum for these courses will be followed as suggested by Infosys. |

Suggestions by Members:

- It was suggested that the tentatively decided course "Deep Learning for Computer Vision" for B.Tech VIII Semester under DE-5 (to be run through SWAYAM/NPTEL) may be replaced with other suitable course, as the prerequisite of this course may not be satisfied by all the students.
- It was suggested to re-examine the contents of course "Programming, Data Structures and Algorithms using Python" (to be run through SWAYAM/NPTEL) under Seminar/Self Study for B.Tech III Semester (CSE & IT). This is to ensure that the course has no prerequisite, which is not being satisfied by the concerning students.
- It was suggested to place the course "Operating Systems" as compulsory in the newly proposed scheme of two years MCA programme. Further, it is also discussed to slightly reduce the courses pertaining to business management and introduce IT specific courses (as per the need). Moreover, the house was in opinion that there should be the inculcation of one introductory course (if possible) regarding IT/Computer Science in the MCA I Semester.
- It was suggested that there should be the provision of Literature Study/Presentation in the newly proposed Scheme of M.Tech programmes (in lieu of self learning / presentation), in the I & II semester.

**Note**: *The minutes of Board of Studies (BoS) meeting were electronically circulated to all the internal and external members of BoS and they have consented (electronically) on the deliberation / resolution, recorded (as per above) against various agenda items.*

The meeting ended with vote of thanks to all the members

30.05.2020

**(Dr. Akhilesh Tiwari)**
Professor & Head,
Department of CSE & IT,
MITS Gwalior
**[Chairman, BoS]**

DEAN (ACADEMICS)
M.I.T.S
GWALIOR

## MADHAV INSTITUTE OF TECHNOLOGY & SCIENCE, GWALIOR

(A Govt. Aided UGC Autonomous & NAAC Accredited Institute Affiliated to RGPV, Bhopal)

### Scheme of Examination

### B.Tech. VII Semester (Computer Science & Engineering) *for batch admitted in Academic Session 2017-18*

| S. No. | Subject Code | Category | Subject Name & Title | Maximum Marks Allotted | | | | | | | Total Marks | Contact Hours per week | | | Total Credits |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Theory Slot | | | Practical Slot | | MOOCs | | | | | | |
| | | | | End Sem. | Mid Sem. Exam | Quiz/ Assignment | End Sem | Lab Work & Sessional | Assignment | Exam | | L | T | P | |
| 1. | DE | DE | Departmental Elective (DE-4) | 70 | 20 | 10 | - | - | - | - | 100 | 3 | - | - | 3 |
| 2. | DE | DE | Departmental Elective (DE-5) | | | | | | 25 | 75 | 100 | 3 | | - | 3 |
| 3. | OC | OC | Open Category (OC-2) | 70 | 20 | 10 | - | - | - | - | 100 | 3 | 1 | - | 3 |
| 4. | OC | OC | Open Category (OC-3) | 70 | 20 | 10 | - | - | - | - | 100 | 3 | - | - | 3 |
| 5. | 100008 | MC | Intellectual Property Rights (IPR) (MC) | 70 | 20 | 10 | - | - | - | - | 100 | 2 | - | - | 2 |
| 6. | 150701 | DLC | Departmental Lab (DLC-6) | - | - | - | 50 | 50 | - | - | 100 | - | - | 4 | 2 |
| 7. | 150702 | DLC | Summer Internship Project-III (04 weeks)-(Evaluation) (DLC-7) | - | - | - | 50 | 50 | - | - | 100 | - | - | 4 | 2 |
| 8. | 150703 | DLC | Creative Problem Solving (Evaluation) (DLC-8) | - | - | - | 25 | 25 | - | - | 50 | - | - | 2 | 1 |
| Total | | | | 280 | 80 | 40 | 125 | 125 | 25 | 75 | 750 | 11 | 1 | 10 | 17 |
| Additional Courses for obtaining Honours or minor Specialization in electronic stream | | | | Permitted to opt for maximum two additional courses for the award of Honours or Minor specialization | | | | | | | | | | | |

DE -3 (Through Traditional Mode)

| S. No. | Subject Code | Subject Name |
|---|---|---|
| 1 | 150711 | Natural Computing with DNA/ DP |
| 2 | 150712 | Data Mining & Warehousing |
| 3 | 150713 | Distributed Systems |

DE -4*

| S. No. | Subject Code | Subject Name |
|---|---|---|
| 1 | 150751 | Practical Machine Learning with Tensorflow |
| 2 | 150752 | Scalable Data Science |
| 3 | 150753 | Introduction to Internet of Things |

OC-2

| S. No. | Subject Code | Subject Name |
|---|---|---|
| 1 | 900208 | Soft Computing |
| 2 | 900209 | Network Security |
| 3 | 900210 | Data Mining & Warehousing |

OC-3

| S. No. | Subject Code | Subject Name |
|---|---|---|
| 1 | 900251 | R Programming |
| 2 | 900221 | Artificial Intelligence |
| 3 | 900222 | Computer Networks |

Course run through SWAYAM/NPTEL/ MOOC Learning Based Platform

DEAN (ACADEMICS)
M.I.T.S
GWALIOR

## MADHAV INSTITUTE OF TECHNOLOGY & SCIENCE, GWALIOR

(A Govt. Aided UGC Autonomous & NAAC Accredited Institute Affiliated to RGPV, Bhopal)

### Scheme of Examination

### B.Tech. VII Semester (Information Technology) *for batch admitted in Academic Session 2017-18*

| S. No. | Subject Code | Category | Subject Name & Title | Maximum Marks Allotted | | | | | | | Total Marks | Contact Hours per week | | | Total Credits |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Theory Slot | | | Practical Slot | | MOOCs | | | | | | |
| | | | | End Sem. | Mid Sem. Exam | Quiz/ Assignment | End Sem. | Lab Work & Sessional | Assignment | Exam | | L | T | P | |
| 1. | DE | DE | Departmental Elective (DE-3) | 50 | 20 | 10 | - | - | - | - | 100 | 3 | | | 3 |
| 2. | DE | DE | Departmental Elective (DE-4) | - | - | - | - | - | 25 | 75 | 100 | 3 | | | 3 |
| 3. | OE | OE | Open Category (OC-2) | 50 | 20 | 10 | - | - | - | - | 100 | 3 | 1 | - | 4 |
| 4. | OE | OE | Open Category (OC-3) | 50 | 20 | 10 | - | - | - | - | 100 | 3 | 1 | - | 4 |
| 5. | 100008 | MC | Intellectual Property Rights (IPR) (MC) | 50 | 20 | 10 | - | - | | | 100 | 2 | | | 2 |
| 6. | 168703 | DLC | Departmental Lab (DLC-6) | - | - | - | 50 | 50 | - | - | 100 | - | - | 4 | 2 |
| 7. | 160782 | DLC | Summer Internship Project-III (04 weeks) (Evaluation) (DLC-7) | - | - | - | 50 | 50 | | - | 100 | - | - | 4 | 2 |
| 8. | 168704 | DLC | Creative Problem Solving (Evaluation) (DLC-8) | - | - | - | 25 | 25 | - | - | 50 | - | - | 2 | 1 |
| Total | | | | 200 | 80 | 40 | 125 | 125 | 25 | 75 | 750 | 11 | 1 | 10 | 17 |
| Additional Courses for obtaining Honours or minor Specialization by desirous students | | | | Permitted to opt for maximum two additional courses for the award of Honours or Minor specialization | | | | | | | | | | | |

| DE -3 (Through Traditional Mode) | | |
|---|---|---|
| S. No. | Subject Code | Subject Name |
| 1 | 160711 | Networking with TCP IP |
| 2 | 160712 | Data Mining & Warehousing |
| 3 | 160713 | Software Testing |

| DE -4* | | |
|---|---|---|
| S. No. | Subject Code | Subject Name |
| 1 | 160731 | Practical Machine Learning with Tensorflow |
| 2 | 160732 | Scalable Data Science |
| 3 | 160733 | Introduction to Internet of Things |

| OC-2 | | |
|---|---|---|
| S. No. | Subject Code | Subject Name |
| 1 | 000258 | Soft Computing |
| 2 | 000309 | Network Security |
| 3 | 000210 | Data Mining & Warehousing |

| OC-3 | | |
|---|---|---|
| S. No. | Subject Code | Subject Name |
| 1 | 000220 | R Programming |
| 2 | 000221 | Artificial Intelligence |
| 3 | 000222 | Computer Networks |

Course run through SWAYAM/NPTEL/ MOOC Learning Based Platform

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**ANNEXURE – I**

# *Syllabi*
# *of*
# *Departmental Elective (DE) Courses*
## *B.Tech VII Semester*
## *(Computer Science & Engineering and Information Technology)*
## *Under Flexible Curriculum*
### *[ITEM-2]*

Department of Computer Science & Engineering and Information Technology

**NETWORKING WITH TCP/IP**
**150711/160711 (DE-3)**

## COURSE OBJECTIVES

- To build an understanding of the fundamental concepts of TCP/IP with computer networking
- To familiarize the student with the basic taxonomy and terminology of the TCP/IP area
- To understand the network traffic, congestion, controlling and resource allocation

---

**Unit-I**

**Introduction** : ARPANET, ISDN and Broadband ISDN, Protocols and Standards, Internet Administration , ATM Model, SONET & SDH, TCP/IP Protocol Suite, Network Addressing at various layer

**Unit-II**

**IP Layer:** Connection Oriented & Connection less Internet Working, IPV4 Addressing, Subnetting, Supernetting Delivery and Forwarding of IP Packets, IPv4,IPV6, ARP, RARP, ICMPv4, IGMP, Mobile IP, Unicast Routing Protocols (RIP, OSPF, and BGP), Multicasting and Multicast Routing Protocols

**Unit-III**

**TCP and UDP Layer:** TCP Reliable data transfer, Connection Establishment & Release, TCP Frame, Header Checksum, Sliding Window Concept for error control, congestion control and TCP timer, UDP Format, Pseudo header, Encapsulation, Checksum, Multiplexing & Demultiplexing Stream Control Transmission Protocol

**Unit- IV**

**Application Layer:** Client-Server Paradigm, DHCP, DNS, TELNET, FTP, TFTP, World Wide Web and HTTP, Electronic Mail SMTP, POP, IMAP, and MIME, SNMP, BOOTP

**Unit-V**

**Multimedia and Next Generation Protocol:** Voice over IP, Real Time Transport Protocol, IPv6 Addressing, IPv6 Protocol, ICMPv6, Firewall, PGP, HTTPS

## RECOMMENDED BOOKS

- Data and Computer Communication, W. Stalling, Pearson
- Internetworking with TCP/IP - Vol – I, D E Comer, PHI
- Data Communication & Networking, B A Forouzan
- ISDN and Broad band ISDN with Frame Relay & ATM, W Stalling
- LANs, Keiser

## COURSE OUTCOMES

After completion of this course, the students would be able to

CO1 define the concept of computer network and various layered architecture

CO2 compare the classless and class full addressing of IPV4

CO3 identify the different types of networking devices and their functions within a network

CO4 analyze various protocols of computer networks for assisting network design and implementation

CO5 design client server applications and communication model and protocols for communication

CO6 elaborate various TCP/IP protocol for achieving multimedia and security services

Department of Computer Science & Engineering and Information Technology

## DATA MINING & WAREHOUSING
## 150712/160712 (DE-3)

### COURSE OBJECTIVES

- To understand the value of data mining in solving real-world problems
- To gain understanding of algorithms commonly used in data mining tools
- To develop ability for applying data mining tools to real-world problems

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**Unit - I**

**Introduction:** Motivation, important, Data type for Data Mining Relational Databases, Data Ware-Houses Transactional Databases, Advanced Database System and Its Applications, Data Mining Functionalities Concept/Class Description, Association Analysis Classification & Prediction, Cluster Analysis, Outliner Analysis Classification of Data Mining Systems, Major Issues in Data Mining

**Unit - II**

**Data Warehouse and OLTP Technology for Data Mining:** Differences between Operational Database Systems & Data Warehouse, Multidimensional Data Model, Data Warehouse Architecture, Data Warehouse Implementation, Data Cube Technology, Emerging Scenario of Pattern Warehousing System

**Unit - III**

**Data Pre-processing:** Data Cleaning, Data Integration and Transformation, Data Reduction Discretization and Concept Hierarchy Generation Data Mining Primitives Languages and System Architectures, Concept Description, Characterization and Comparison Analytical Characterization

**Unit - IV**

**Mining Association Rules in Large Databases:** Association Rule Mining Market Basket Analysis, Basic Concepts, Mining Single Dimensional Boolean Association Rules from Transactional Databases The Apriori Algorithm, Generating Association Rules from Frequent Items, Improving the Efficiency of Apriori, other Algorithms &

their Comparison, Mining Multilevel Association Rules, Multidimensional Association Rules, Constraint Based Association Rule Mining.

Unit - V

**Classification & Predication and Cluster Analysis:** Issues Regarding Classification & Predication, Different Classification Methods, Predication, Cluster Analysis, Major Clustering Methods, Currently Available Tools, Case Study

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**RECOMMENDED BOOKS**

- Data Mining: Concepts and Techniques, Han and Kamber, Morgan Kaufmann Publications
- Data Mining Techniques, A. K. Pujari, Universities Press Pvt. Ltd.

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## COURSE OUTCOMES

After completion of this course, the students would be able to

CO1 classify various databases systems and data models of data warehouse

CO2 compare various methods for storing & retrieving data from different data sources/repository

CO3 apply pre-processing techniques for construction of data warehouse

CO4 analyse data mining for knowledge discovery & prediction

CO5 explain data mining methods for identification of association for transactional databases

CO6 develop various classification and clustering algorithms for data using data mining

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Department of Computer Science & Engineering and Information Technology

## DISTRIBUTED SYSTEMS
## 150713 (DE-3)

### COURSE OBJECTIVES

- To provide students contemporary knowledge of distributed systems.
- To equip students with skills to analyze and design distributed applications.
- To gain experience in the design and testing of a large software system, and to be able to communicate that design to others.

---

**Unit - I**

**Introduction to Distributed Systems:** Architecture for Distributed System, Goals of Distributed System, Hardware and Software Concepts, Distributed Computing Model, Advantages & Disadvantage Distributed System, Issues in Designing Distributed System.

**Unit -II**

**Distributed Share Memory:** Basic Concept of Distributed Share Memory (DSM), DSM Architecture & Its Types, Design & Implementations Issues in DSM System, Structure of Share Memory Space, Consistency Model and Thrashing.

**Unit - III**

**Distributed File System:** Desirable Features of Good Distributed File System, File Model, File Service Architecture, File Accessing Model, File Sharing Semantics, File Catching Scheme, File Application & Fault Tolerance.

**Unit - IV**

**Inter Process Communication and Synchronization:** Data Representation & Marshaling, Group Communication, Client Server Communication, RPC-Implementing RPC Mechanism, Stub Generation, RPC Messages. Synchronization - Clock Synchronization, Mutual Exclusion, Election Algorithms - Bully & Ring Algorithms.

Unit - V

**Distributed Scheduling and Deadlock** Distributed Scheduling- Issues in Load Distributing, Components for Load Distributing Algorithms, Different Types of Load Distributing Algorithms, Task Migration and its issues. Deadlock- Issues in deadlock detection & Resolutions, Deadlock Handling Strategy, Distributed Deadlock Algorithms. Case Study of Distributed System: Amoeba, Mach, Chorus.

## RECOMMENDED BOOKS

- Distributed Operating System Concept & Design, Sinha, PHI
- Distributed System Concepts and Design, Coulouris & Dollimore, Pearson Pub.
- Distributed Operating System, Andrew S. Tanenbaum, Pearson.

## COURSE OUTCOMES

After completion of this course, the students would be able to:

CO1 tell the basic elements and concepts related to distributed system technologies
CO2 demonstrate knowledge of the core architectural aspects of distributed systems
CO3 identify how the resources in a distributed system are managed by algorithm
CO4 examine the concept of distributed file system and distributed shared memory
CO5 compare various distributed system algorithms for solving real world problems
CO6 develop application for achieving various services of distributed system

Department of Computer Science & Engineering and Information Technology

## SOFTWARE TESTING
## 160713 (DE-3)

### COURSE OBJECTIVES

- To understand defects and various levels of testing
- To study about testing plan, management and its types
- To understand the testing automation and its challenges

---

**Unit-I**

**Introduction:** Overview, Objectives, Software Structure and Software Testing, Purpose of Testing, Testing vs. Debugging, Model for Testing, Taxonomy of Bugs, Mistakes, Bugs and Failures, Consequences of Bugs

**Unit –II**

**Testing Tactics:** Software Testing Fundamentals, Basic Path Testing, Control Structure Testing, Black-Box Testing, Graph Based testing methods, Equivalence Partitioning, Boundary Value Analysis, Orthogonal Testing, White Box Testing, Test Coverage – Traceability matrix

**Unit -III**

**Testing & Levels:** Overview, Objectives, Testing Levels, Unit Testing, Component Testing, Integration Testing, System Testing, Interoperability Testing, Performance Testing, Regression Testing, Acceptance Testing

**Unit -IV**

**Special Tests:** Introduction, Complexity Testing, Graphical User Interface Testing, Security Testing, Performance Testing, Volume and Stress Testing, Recovery Testing, Installation Testing, Requirement Testing

**Unit -V**

**Test Planning:** Introduction, Test Policy, Test Strategy, Test Planning, Quality Plan and Test Plan, Guidelines for developing the Test Plan, Test Estimation, Test Standards, Building Test Data and Test Cases, Essential Activities in testing, Test

Management Software, Test Log Document, Effective Test Cases, Test File, Building test Data, Rules and Responsibilities in Testing Life Cycle, Test Progress Monitoring

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**RECOMMENDED BOOKS**

- Software Testing, Techniques and Applications, Arun Khannur, Pearson Education
- Software Engineering, Roger S Pressman, Sixth Edition, Tata McGraw Hill
- Software Testing Principles, Techniques and Tools, M G Limaye, Tata McGraw Hill

---

**COURSE OUTCOMES**

After successful completion of the course students will be able to

CO1 define different types of defects and testing models
CO2 demonstrate methods of test generation from requirements
CO3 explain different types of testing
CO4 apply software testing techniques in commercial environments
CO5 examine various test plans and continuous quality improvement
CO6 choose the various test tools for automation

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ANNEXURE – II

# *Syllabi*
# *of*
# *Open Category (OC) Courses*
# *offered by Department of CSE & IT*
# *in B.Tech VII Semester*
# *Under Flexible Curriculum*

*[ITEM-4]*

Department of Computer Science & Engineering and Information Technology

## SOFT COMPUTING
## 900208 (OC-2)

### COURSE OBJECTIVES

- To provide the student with the basic understanding of neural networks and fuzzy logic fundamentals. Program the related algorithms and Design the required and related systems.
- To understand the fundamental theory and concepts of neural networks, neuro-modeling, several neural network paradigms and its applications.
- To understand the basics of an evolutionary computing paradigm known as genetic algorithms and its application to engineering optimization problems.

---

**Unit-I**

**Introduction and Fundamental Concept of ANN:** Basic models of Artificial Neural Networks, Terminologies of ANNs McCulloch-Pitts Neurons, Linear Separability, Hebb Network. **Supervised Learning Networks:** Introduction, Perceptron Networks, Back Propagation Networks, Radial Basis Function Networks, Hopefield networks

**Unit-II**

**Unsupervised Learning:** Fixed weight Competitive Nets, Kohonen Self-Organizing Map, Learning vector quantization, Counter propagation Networks, Adaptive Resonance Theory Network.

**Unit-III**

**Fuzzy Set Theory:** Fuzzy Sets, Fuzzy Membership Functions, Operations on Fuzzy Sets, Fuzzy Relations, Fuzzy rules, Fuzzy Reasoning. **Defuzzification:** Lembda-Cuts for Fuzzy sets (Alpha-Cuts), Lembda-Cuts for Fuzzy Relations. Fuzzy Inference System: Introduction, Mamdani Fuzzy Model, Takagi-Sugeno Fuzzy Model.

**Unit-IV**

**Introduction:** Biological Background, Traditional optimization and Search Techniques, Basic Terminologies in GA, Operators in Genetic Algorithm, Stopping Condition for

Genetic Algorithm Flow. Classification of Genetic Algorithm, Comparison with Evolutionary algorithm, Application of Genetic algorithm

**Unit-V**

**Hybrid Soft Computing Techniques:** Introduction, Neuro-fuzzy Hybrid system, Adaptive Neuro fuzzy inference system(ANFIS), Genetic Neuro Hybrid system, Application of Soft Computing Techniques

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**RECOMMENDED BOOKS**

- Principles of Soft Computing, S. N. Sivanandam and S. N. Deepa , Wiley
- Neural Networks, Fuzzy Logic and Genetic Algorithms: Synthesis and Applications-S. Rajasekaran & G.A. Vijayalakshmi Pai, PHI
- Introduction to Soft Computing Neuro-Fuzzy and Genetic Algorithms, Samir Roy and Udit Chakraborty, Pearson.
- Neural Networks and Learning Machines-Simon Haykin PHI
- Fuzzy Logic and Engineering Application, Tomthy Ross, TMH

---

**COURSE OUTCOMES**

After completion of this course, the students would be able to:

CO1 define basic concepts of neural network and fuzzy systems.
CO2 compare solutions by applying various soft computing approaches on a given problem.
CO3 develop and train different supervised and unsupervised learning.
CO4 classify various nature inspired algorithms according to their application aspect.
CO5 compare the efficiency of various hybrid systems.
CO6 design a soft computing model for solving real world problems.

---

Department of Computer Science & Engineering and Information Technology

**NETWORK SECURITY**
**900209 (OC-2)**

## COURSE OBJECTIVES

- To provide conceptual understanding of network security principles, issues, challenges and mechanisms.
- To understand how to apply encryption techniques to secure data in transit across data networks.
- To explore the requirements of real-time communication security and issues related to the security of web services.

---

**Unit-I**

**Security:** Principles and Attacks. **Basic Number Theory:** Prime Number, Congruence's, Modular Exponentiation, Fundamentals of Cryptography, Steganography, Cryptanalysis, Code Breaking, Block Ciphers and Steam Ciphers, Substitution Ciphers, Transposition Ciphers, Caesar Cipher, Play-Fair Cipher, Hill Cipher, Cipher Modes of Operation.

**Unit-II**

**Cryptography:** Symmetric Key Cryptography, Public Key Cryptography, Principles of Public Key Cryptosystem, Classical Cryptographic Algorithms: DES, RC4, Blowfish, RSA, Distribution of Public Keys and Key Management, Diffie-Hellman Key Exchange.

**Unit-III**

**Hash Functions:** Hash Functions, One Way Hash Function, SHA (Secure Hash Algorithm) **Authentication:** Requirements, Functions, Kerberos, Message Authentication Codes, Message Digest: MD5, SSH (Secure Shell), Digital Signatures, Digital Certificates.

**Unit -IV**

**IP & Web Security Overview:** SSL (Secure Socket Layer), TLS (Transport Layer Security), SET (Secure Electronic Transaction) **IDS (Intrusion Detection System):** Statistical Anomaly Detection and Rule-Based Intrusion Detection, Penetration Testing, Risk Management **Firewalls:** Types, Functionality and Polices

**Unit -V**

**Phishing:** Attacks and Its Types, Buffer Overflow Attack, Cross Site Scripting, SQL Injection Attacks, Session Hijacking **Denial of Service Attacks:** Smurf Attack, SYN Flooding, Distributed Denial of Service **Hacker:** Hacking and Types of Hackers, Footprinting, Scanning Types: Port, Network, Vulnerability), Sniffing in Shared and Switched Networks, Sniffing Detection & Prevention, Spoofing

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**RECOMMENDED BOOKS**

- Cryptography and Network Security, William Stallings, Pearson Education
- Cryptography and Network Security, Atul Kahate, McGraw Hill Education
- Incident Response and Computer Forensics, Kevin Mandia, Chris Prosise, Tata McGraw Hill

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## COURSE OUTCOMES

After completion of the course students would be able to

CO1 define various aspects of network security
CO2 illustrate fundamentals of number theory and cryptography
CO3 apply security mechanisms to achieve principles of network security
CO4 analyze the cause for various existing network attacks
CO5 examine the vulnerabilities in applications over internet
CO6 develop a secure protocol for achieving various network security services

---

Department of Computer Science & Engineering and Information Technology

## DATA MINING & WAREHOUSING
## 900210 (OC-2)

### COURSE OBJECTIVES

- To understand the value of data mining in solving real-world problems.
- To gain understanding of algorithms commonly used in data mining tools.
- To develop ability for applying data mining tools to real-world problems.

---

**Unit - I**

**Introduction:** Motivation, Important, Data Type for Data Mining: Relational Databases, Data Ware-Houses, Transactional Databases, Advanced Database System and Its Applications, Data Mining Functionalities Concept/Class Description, Association Analysis Classification & Prediction, Cluster Analysis, Outliner Analysis Classification of Data Mining Systems, Major Issues in Data Mining.

**Unit - II**

**Data Warehouse and OLTP Technology for Data Mining:** Differences between Operational Database Systems, & Data Warehouse, Multidimensional Data Model, Data Warehouse Architecture, Data Warehouse Implementation Data Cube Technology, Emerging Scenario of Pattern Warehousing System.

**Unit - III**

**Data Pre-processing:** Data Cleaning, Data Integration and Transformation, Data Reduction Discretization and Concept Hierarchy Generation. Data Mining Primitives Languages and System Architectures, Concept Description, Characterization and Comparison Analytical Characterization.

**Unit - IV**

**Mining Association Rules in Large Databases:** Association Rule Mining: Market Basket Analysis, Basic Concepts, Mining Single Dimensional Boolean Association Rules from Transactional Databases: The Apriori Algorithm, Generating Association Rules from Frequent Items, Improving the Efficiency of Apriori, Other Algorithms & their Comparison, Mining Multilevel Association Rules, Multidimensional Association Rules, Constraint Based Association Rule Mining.

Unit - V

**Classification & Predication and Cluster Analysis:** Issues Regarding Classification & Predication, Different Classification Methods, Predication, Cluster Analysis, Major Clustering Methods, Currently Available Tools, Case Study

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**RECOMMENDED BOOKS**

- Data Mining: Concepts and Techniques, Han and Kamber, Morgan Kaufmann Publications
- Data Mining Techniques, A. K. Pujari, Universities Press Pvt. Ltd

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**COURSE OUTCOMES**

After completion of this course, the students would be able to

CO1 classify various databases systems and data models of data warehouse

CO2 compare various methods for storing & retrieving data from different data sources/repository

CO3 apply pre-processing techniques for construction of data warehouse

CO4 analyse data mining for knowledge discovery & prediction

CO5 explain data mining methods for identification of association for transactional databases

CO6 develop various classification and clustering algorithms for data using data mining

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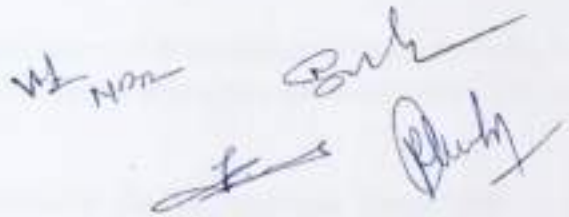

Department of Computer Science & Engineering and Information Technology

## R PROGRAMMING
## 900220 (OC-3)

### COURSE OBJECTIVES

- To understand the critical programming language concepts
- To perform data analysis using R commands
- To make use of R loop functions and debugging tools

---

**Unit-I**

**Introduction to R**: R Commands, Objects, Functions, Simple Manipulations, Matrices and Arrays, Factors, Lists, Data Frames

**Unit-II**

**Programming Using R**: Introduction, Function Creation, Scripts, Logical Operators, Conditional Statements, Loops in R, Switch Statement, Creating List and Data Frames, List and Data Frame Operations, Recursive List

**Unit-III**

**Object- Oriented Programming in R**: Introduction, S3 Classes, S4 Classes, References Classes, Debugging Principle in R, Import and Export Data from CSV, SAS and ODBC

**Unit-IV**

Mathematical and Statistical Concepts, Hypothesis Testing, Different Statistical Distribution, Regression, Time Series Analysis

**Unit-V**

**Graphics in R**: Basic Plots, Labelling and Documenting Plots, Adjusting the Axes, Specifying Colour, Fonts and Sizes, Plotting symbols, Customized Plotting, Packages in R for Windows, Linus and Mac

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### RECOMMENDED BOOKS

- "R for Beginners", Sandip Rakshit, Tata Mc Graw Hill Education
- "R programming for Data Science", Roger D. Peng, Leam publishing

## COURSE OUTCOMES

After completion of this course, the students would be able to

CO1 define basic programming constructs used in R

CO2 explain the various commands used in R.

CO3 apply various concept of programming for controlling the flow of data using R.

CO4 analyze the concept of concept of object oriented programming in R.

CO5 choose appropriate packages of R programming for dealing various tasks

CO6 predict results from the datasets using R commands

Department of Computer Science & Engineering and Information Technology

## ARTIFICIAL INTELLIGENCE
## 900221 (OC-3)

### COURSE OBJECTIVES

- To enhance the capability of analysis for Machine learning and fuzzy logic
- To apply the mathematical concepts in designing and executing the knowledge representation and problem solving
- To design the mathematical model and rule formation for production system

---

**Unit-I**

**Introduction:** Definition, Scope, Task and Objectives of Artificial Intelligence, AI Problems, Applications of AI. The Importance of AI, AI and related fields. Problems, Problem Spaces and Production System. Components of Production System, Characteristics of Production Systems, Types of Production System. Control Strategies, Application of Production Systems, water-jug, 8 – Puzzle and other advance Problems.

**Unit-II**

**Searching:** The Blind and Informed Searches, Breadth First Search, Depth First Search and their implementation using Open and Closed list, Heuristic estimation and evaluation, Hill climbing and their Problems, Best First Search, Searching And-Or Graphs, A * search, AO * search.

**Unit-III**

**Knowledge Representation:** General Concept, Introduction, Definition and Importance of Knowledge, Approaches to Knowledge Representation, Issues in Knowledge Representation, Procedural and Declarative Knowledge, Forward Versus Backward Reasoning, Knowledge Representation Techniques: Logics, Propositional Logic, Predicate Logic.

**Unit-IV**

Semantic Nets, Partition Semantic Nets, Frames, Conceptual Dependencies, Scripts, Bay's Theorem, Fuzzy Logic, Game Playing: Min – Max Search Procedure.

**Unit-V**

Planning, Understanding, Natural Language Processing, Speech Recognition, Computer Vision, Expert System and Expert System Cell

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**RECOMMENDED BOOKS**

- Artificial Intelligence, Rich & Knight
- Introduction to Artificial Intelligence and Expert Systems, Dan W. Patterson, PHI publication

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## COURSE OUTCOMES

After successful completion of the course students will be able to:

CO1 outline the basic concepts of intelligent methods.
CO2 summarize various algorithms used in artificial intelligence.
CO3 identify the appropriate search methods to solve specific problems.
CO4 analyze the performance of knowledge representation methods used in artificial intelligence.
CO5 examine machine learning methods and robotics for listing their applications.
CO6 design game playing techniques by applying programming methods of puzzle solving techniques.

---

Department of Computer Science & Engineering and Information Technology

## COMPUTER NETWORKS
## 900222 (OC-3)

### COURSE OBJECTIVES

- Familiarize the student with the basic taxonomy and terminology of the computer networking.
- Provide detail knowledge about various layers, protocols and devices that facilitate networking.
- Enable Students to deal with various networking problems such as flow control, error control and congestion control.

---

**Unit-I**

**Introduction:** Computer Network, Types- LAN,MAN & WAN, Data Transmission Modes- Serial & Parallel, Simplex, Half Duplex & Full Duplex, Synchronous & Asynchronous Transmission, Transmission Medium- Guided & Unguided, Cables- Twisted Pair, Coaxial Cable & Optical Fiber, Networking Devices-Repeaters, Hub, Switch, Bridge, Router, Gateway and Modem, Performance Criteria- Bandwidth, Throughput, Propagation Time & Transmission Time, Network Standardization- OSI Reference Model & TCP/IP Reference Mode

**Unit-II**

**Physical Layer:** Network Topologies- Bus, Ring, Star & Mesh, Line Coding- Unipolar, Polar and Bipolar, Switching- Circuit Switching, Message Switching & Packet Switching, Multiplexing: FDM – Frequency Division Multiplexing, WDM – Wavelength Division Multiplexing & TDM – Time Division Multiplexing

**Unit-III**

**Data Link Layer:** Introduction, Design Issues, Services, Framing, Error Control, Flow Control, ARQ Strategies, Error Detection and Correction, Parity Bits, Cyclic Redundant Code (CRC), Hamming Codes, MAC Sub Layer- The Channel Allocation Problem, Pure ALOHA ,Slotted ALOHA, CSMA ,CSMA/CD, IEEE 802.3, IEEE 802.4 and IEEE 802.5

**Unit-IV**

**Network Layer & Transport Layer:** Introduction, Design Issues, Services, Routing- Distance Vector Routing, Hierarchical Routing & Link State Routing, Shortest Path Algorithm- Dijkstra's Algorithm & Floyd–Warshall's Algorithm, Flooding, Congestion Control- Open Loop & Closed Loop Congestion Control, Leaky Bucket & Token Bucket Algorithm, Connection Oriented & Connectionless Service, IP Addressing

**Unit-V**

**Presentation, Session& Application Layer:** Introduction, Design Issues, Presentation Layer- Translation, Encryption- Substitutions and Transposition Ciphers, Compression- Lossy and Lossless, Session Layer – Dialog Control, Synchronization, Application Layer- Remote Login, File Transfer & Electronic Mail

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**RECOMMENDED BOOKS**

- Data Communication and Networking, Behrouz A. Forouzan, McGraw Hill
- Computer Networks, Andrew S. Tanenbaum, Pearson Education India
- Computer Networks and Internets, Douglas E. Comer, Pearson India

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## COURSE OUTCOMES

After completion of this course, the students would be able to

CO1 explain the fundamental concepts of computer network
CO2 illustrate the basic taxonomy & terminologies of computer network
CO3 Identify various parameter for affecting the performance of computer network
CO4 analyze the concepts of communication using various layer of OSI model
CO5 evaluate the performance of computer network in congestion and Internet
CO6 design the network environment and applications for implementation of computer networking concept

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ANNEXURE – III

# *Scheme and Syllabi*
# *for*
# *M.Tech (Computer Science & Engineering/ Information Technology/ Cyber Security) Programmes*
*[ITEM 11(a)]*

MADHAV INSTITUTE OF TECHNOLOGY AND SCIENCE, GWALIOR - 474005
(A Govt. Aided UGC Autonomous Institute Affiliated to R.G.P.V. Bhopal, M.P.)

**Master of Technology (Computer Science & Engineering)** ( SEMESTER – I) **Recommended W.E.F JULY 2020**

## Scheme of Examination

| S. No. | Subject Code | Subject Name | Maximum Marks Allotted | | | | | | | Total Marks | Contact Periods per week | | | Total Credits |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Theory Slot | | | Practical Slot | | MOOCs | | | | | | |
| | | | End Sem. | Mid Sem. | Quiz/ Assignment | End Sem. | Lab work/ sessional | Assignment | Exam | | L | T | P | |
| 1. | 620111 | Database Systems | 70 | 20 | 10 | - | - | - | - | 100 | 3 | - | - | 3 |
| 2. | 620112 | Distributed Computing | 70 | 20 | 10 | - | - | - | - | 100 | 3 | - | - | 3 |
| 3. | 620113 | High-speed Networks | 70 | 20 | 10 | - | - | - | - | 100 | 3 | - | - | 3 |
| 4. | DE | Departmental Elective-I | 70 | 20 | 10 | - | - | - | - | 100 | 3 | - | - | 3 |
| 5. | OE | Open Category Course (OC-1) | 70 | 20 | 10 | - | - | - | - | 100 | 3 | - | - | 3 |
| 6. | 620121 | Lab-I | - | - | - | 100 | 50 | - | - | 150 | - | - | 4 | 4 |
| 7. | 620122 | Self-Learning Presentation | - | - | - | - | 100 | - | - | 100 | - | - | 2 | 2 |
| | | Total | 350 | 100 | 50 | 50 | 150 | | | 750 | 15 | | 6 | 21 |

Open Category course (OC -1) will have to be opted from the pool of open courses. This course will be based on interdisciplinary aspects.
During labs, students have to perform practical assignments/ minor projects related to theory subjects/theoretical concepts of respective semester using recent technologies / languages / tools etc.
Self learning / presentation through SWAYAM / NPTEL (Registration in a course will be compulsory for students but assessment will be based on internal seminar presentations)

| DE -I | |
|---|---|
| Subject Code | Subject Name |
| 620114 | Mobile Computing & M-Commerce |
| 620115 | Adhoc & Sensor Based Networks |
| 620116 | Network Security |
| 620117 | Computer Architecture and Parallel Processing |

| OE -I | |
|---|---|
| Subject Code | Subject Name |
| 620118 | Soft Computing |
| 620119 | Blockchain Technology |
| 620120 | Machine Learning using Python |

DEAN (ACADEMICS)
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## Master of Technology (Computer Science & Engineering) [Scheme/Sem: II] Recommended W.E.F JULY 2020

### Scheme of Examination

| S. No. | Subject Code | Subject Name | Maximum Marks Allotted | | | | | | | Total Marks | Contact Periods per week | | | Total Credits |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Theory Slot | | | Practical Slot | | MOOCs | | | L | T | P | |
| | | | End sem | Mid sem | Quiz/ Assignment | End Sem | Lab work/ sessional | Assignment | Exam | | | | | |
| 1. | 620211 | Algorithms Design Techniques and Analysis | 70 | 20 | 10 | - | - | | | 100 | 3 | - | - | 3 |
| 2. | 620212 | Advanced Topics in Data Mining & Warehousing | 70 | 20 | 10 | - | - | | | 100 | 3 | - | - | 3 |
| 3. | 620213 | Image Processing and Retrieval Techniques | 70 | 20 | 10 | - | - | - | - | 100 | 3 | - | - | 3 |
| 4. | DE | Departmental Elective-II | - | - | - | - | - | 25 | 75 | 100 | 3 | - | - | 3 |
| 5. | OC | Open Category Course (OC-2) | 70 | 20 | 10 | - | - | - | - | 100 | 3 | - | - | 3 |
| 6. | 620221 | Lab-II | - | - | - | 90 | 60 | - | - | 150 | - | - | 4 | 4 |
| 7. | 620222 | Self Learning Presentation | - | - | - | - | 100 | - | - | 100 | | | 2 | 2 |
| | | Total | 280 | 80 | 40 | 90 | 160 | 25 | 75 | 750 | 15 | | 6 | 21 |

*Elective-II course will run through SWAYAM / NPTEL /MOOC based learning platform (with credit transfer facility).*
Open Category course will have to be opted from the pool of open courses. This course will be based on interdisciplinary aspects. [This course may be run through SWAYAM/NPTEL based platform *(with credit transfer facility)* and accordingly, OC-2 pool may be created from the list of SWAYAM/NPTEL courses].
*During labs, students have to perform practical/assignments/ mini-projects related to theory subjects/theoretical concepts of respective semester using recent technologies / languages / tools etc.*
Self learning / presentation through SWAYAM / NPTEL (Registration in a course will be compulsory for students but assessment will be based on internal seminar presentation).

DE-2 (Tentative)

| Subject Code | Subject Name |
|---|---|
| 620214 | Internet of Things |
| 620215 | Deep Learning |
| 620216 | Cloud Computing |
| 620217 | Social Networking |

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**Master of Technology (Computer Science & Engineering)** (Semester III) **Recommended W.E.F JULY 2020**

## Scheme of Examination

| S. No. | Subject Code | Subject Name | Maximum Marks Allotted | | | | | | | Total Marks | Contact Hours per week | | | Total Credits |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Theory Slot | | | Practical Slot | | MOOCs | | | | | | |
| | | | End sem. Exam. | Mid sem. | Quiz/ Assignment | End Sem. /Practical Viva | Sessional Work/ Practical Record/ Assignment/ Quiz/ Presentation | Assignment | Exam | | L | T | P | |
| 1. | 620311 | Dissertation Part-I *(Literature Review, Problem Formulation, Comprehensive survey paper etc.)* | - | - | - | 150 | 100 | - | - | 250 | - | - | 10 | 10 |
| 2. | OC | MOOC Course | - | - | - | - | - | 25 | 75 | 100 | - | - | 02 | 02 |
| | | Total | - | - | - | 150 | 100 | 25 | 75 | 350 | - | - | 12 | 12 |

*MOOC courses will be treated as the course of open nature and will be decided by concerning department / BoS.*

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**Master of Technology (Computer Science & Engineering)** (Semester-IV) **Recommended W.E.F JULY 2020**

**Scheme of Examination**

| S. No. | Subject Code | Subject Name | Maximum Marks Allotted | | | | | Total Marks | Contact Hours per week | | | Total Credits |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Theory Slot | | | Practical Slot | | | | | | |
| | | | End sem. Exam. | Mid sem. | Quiz/ Assignment | End Sem. /Practical Viva | Sessional Work/ Practical Record/ Assignment/ Quiz/ Presentation | | L | T | P | |
| 1. | 620405 | Dissertation Part-II | - | - | - | 300 | 200 | 500 | - | - | 14 | 14 |
| | | Total | - | - | | 300 | 200 | 500 | - | | 14 | 14 |

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## Master of Technology (Information Technology) (Semester – I) Recommended W.E.F JULY 2020

### Scheme of Examination

| S. No. | Subject Code | Subject Name | Maximum Marks Allotted | | | | | | | Total Marks | Contact Periods per week | | | Total Credits |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Theory Slot | | | Practical Slot | | MOOCs | | | L | T | P | |
| | | | End Sem. | Mid Sem. | Quiz/ Assignment | End Sem. | Lab work/ sessional | Assignment | Exam | | | | | |
| 1. | 630111 | Database Systems | 70 | 20 | 10 | - | - | - | - | 100 | 3 | - | - | 3 |
| 2. | 630112 | Distributed Computing | 70 | 20 | 10 | - | - | - | - | 100 | 3 | - | - | 3 |
| 3. | 630113 | High-speed Networks | 70 | 20 | 10 | - | - | - | - | 100 | 3 | - | - | 3 |
| 4. | DE | Departmental Elective-I | 70 | 20 | 10 | - | - | - | - | 100 | 3 | - | - | 3 |
| 5. | OC | Open Category Course (OC-1) | 70 | 20 | 10 | - | - | - | - | 100 | 3 | - | - | 3 |
| 6. | 630125 | Lab-I | - | - | - | 90 | 60 | - | - | 150 | - | - | 4 | 4 |
| 7. | 630122 | Self Learning/ Presentation | - | - | - | - | 100 | | | 100 | - | - | 2 | 2 |
| | | Total | 350 | 100 | 50 | 90 | 160 | - | - | 750 | 15 | | 6 | 21 |

Open Category course (OC -1) will have to be opted from the pool of open courses. This course will be based on interdisciplinary aspects.
During labs, students have to perform practical/assignments/ minor projects related to theory subjects/theoretical concepts of respective semester using recent technologies / languages / tools etc.
Self learning / presentation through SWAYAM / NPTEL (Registration in a course will be compulsory for students but assessment will be based on internal seminar presentation).

| DE-1 | |
|---|---|
| Subject Code | Subject Name |
| 630114 | Mobile Computing & AI Connection |
| 630115 | Adhoc & Sensor Based Networks |
| 630116 | Information Security & Systems |
| 630117 | Models and Techniques in Computer Graphics |

| OC-1 | |
|---|---|
| Subject Code | Subject Name |
| 800052 | Soft Computing (800052) |
| 800104 | Blockchain Technology (800104) |
| 800107 | Machine Learning using Python (800107) |

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**Master of Technology (Information Technology)** (Semester-II) **Recommended W.E.F JULY 2020**

## Scheme of Examination

| S. No. | Subject Code | Subject Name | Maximum Marks Allotted | | | | | | | Total Marks | Contact Periods per week | | | Total Credits |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Theory Slot | | | Practical Slot | | MOOCs | | | L | T | P | |
| | | | End sem | Mid sem | Quiz/ Assignment | End Sem | Lab work/ sessional | Assignment | Exam | | | | | |
| 1. | 630211 | Algorithms Design Techniques and Analysis | 70 | 20 | 10 | - | - | | | 100 | 3 | - | - | 3 |
| 2. | 630212 | Advanced Topics in Data Mining & Warehousing | 70 | 20 | 10 | - | - | - | - | 100 | 3 | - | - | 3 |
| 3. | 630213 | Image Processing and Retrieval Techniques | 70 | 20 | 10 | - | - | - | - | 100 | 3 | - | - | 3 |
| 4. | DE | Departmental Elective-II | - | - | - | - | - | 25 | 75 | 100 | 3 | - | - | 3 |
| 5. | OC | Open Category Course (OC-2) | 70 | 20 | 10 | - | - | - | - | 100 | 3 | - | - | 3 |
| 6. | 630221 | Lab-II | - | - | - | 50 | 50 | - | - | 150 | - | - | 4 | 4 |
| 7. | 630222 | Self Learning Presentation | - | - | - | - | 100 | - | - | 100 | - | - | 2 | 2 |
| | | Total | 280 | 80 | 40 | 50 | 150 | 25 | 75 | 750 | 15 | - | 6 | 21 |

Elective-II course *will run through SWAYAM / NPTEL /MOOC based learning platform (with credit transfer facility).*
Open Category course will have to be opted from the *pool* of open courses. This course will be based on interdisciplinary aspects. (This course may be run through SWAYAM/NPTEL *based platform (with credit transfer facility) and accordingly*, OC-2 pool may be created from the list of SWAYAM/NPTEL courses).
During labs, students have to perform practical/assignments/ minor projects related to theory subjects/theoretical concepts of respective semester using recent technologies / languages / tools etc.
Self learning / presentation through SWAYAM / NPTEL (Registration in a course will be compulsory for students but assessment will be based on internal seminar presentation).

DE-2 (Tentative)

| Subject Code | Subject Name |
|---|---|
| 630214 | Internet of Things |
| 630215 | Deep Learning |
| 630216 | Cloud Computing |
| 630217 | Social Networking |

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**Master of Technology (Information Technology)** (Semester III) **Recommended W.E.F JULY 2020**

## Scheme of Examination

| S. No. | Subject Code | Subject Name | Maximum Marks Allotted | | | | | | | Total Marks | Contact Hours per week | | | Total Credits |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Theory Slot | | | Practical Slot | | MOOCs | | | | | | |
| | | | End sem. Exam. | Mid sem. | Quiz/ Assignment | End Sem. /Practical Viva | Sessional Work/ Practical Record/ Assignment/ Quiz/ Presentation | Assignment | Exam | | L | T | P | |
| 1. | 670711 | Dissertation Part I *(Literature Review, Problem Formulation, Synopsis, survey paper etc.)* | - | - | - | 150 | 100 | - | - | 250 | - | - | 10 | 10 |
| 2. | OC | MOOC Course | - | - | - | - | - | 25 | 75 | 100 | - | | 02 | 02 |
| | | Total | - | - | - | 150 | 100 | 25 | 75 | 350 | | | 12 | 12 |

* MOOC course will be treated as the course of open nature and will be decided by concerning department / BoS.

DEAN (ACADEMICS)
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**Master of Technology (Information Technology)** (Semester-IV) **Recommended W.E.F JULY 2020**

## Scheme of Examination

| S. No. | Subject Code | Subject Name | Maximum Marks Allotted | | | | | Total Marks | Contact Hours per week | | | Total Credits |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Theory Slot | | | Practical Slot | | | | | | |
| | | | End sem. Exam. | Mid sem. | Quiz/ Assignment | End Sem. /Practical Viva | Sessional Work/ Practical Record/ Assignment/ Quiz/ Presentation | | L | T | P | |
| 1. | 630405 | Dissertation Part-II | - | - | - | 300 | 200 | 500 | - | - | 14 | 14 |
| | | Total | - | - | - | 300 | 200 | 500 | - | - | 14 | 14 |

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## Master of Technology (Cyber Security) (Semester – I) **Recommended W.E.F JULY 2020**

## Scheme of Examination

| S. No. | Subject Code | Subject Name | Maximum Marks Allotted | | | | | | | Total Marks | Contact Periods per week | | | Total Credits |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Theory Slot | | | Practical Slot | | MOOCs | | | | | | |
| | | | End Sem. | Mid Sem. | Quiz/ Assignment | End Sem. | Lab work/ sessional | Assignment | Exam | | L | T | P | |
| 1. | 640111 | Database Security and Privacy | 70 | 20 | 10 | - | - | - | - | 100 | 3 | - | - | 3 |
| 2. | 640112 | Distributed Computing | 70 | 20 | 10 | - | - | - | - | 100 | 3 | - | - | 3 |
| 3. | 640113 | High-speed Networks | 70 | 20 | 10 | - | - | - | - | 100 | 3 | - | - | 3 |
| 4. | DE | Departmental Elective-I | 70 | 20 | 10 | - | - | - | - | 100 | 3 | - | - | 3 |
| 5. | OC | Open Category Course (OC-1) | 70 | 20 | 10 | - | - | - | - | 100 | 3 | - | - | 3 |
| 6. | 640121 | Lab-I | - | - | - | 90 | 60 | - | - | 150 | - | - | 4 | 4 |
| 7. | 640122 | Self-Learning / Presentation | - | - | - | - | 100 | - | - | 100 | - | - | 2 | 2 |
| | | **Total** | **350** | **100** | **50** | **90** | **160** | - | - | 750 | 15 | - | 6 | 21 |

**Open Category course (OC-1) will have to be opted from the pool of open courses. This course will be based on interdisciplinary aspects.**

**During labs, students have to perform practical/assignments/ minor projects related to theory subjects/theoretical concepts of respective semester using recent technologies / languages / tools etc.**

**Self learning / presentation through SWAYAM / NPTEL (Registration in a course will be compulsory for students but assessment will be based on internal seminar presentation).**

| DE-1 | |
|---|---|
| **Subject Code** | **Subject Name** |
| 640114 | Cyber Law and Emerging Jurisprudence |
| 640115 | Cloud Computing and Security |
| 640116 | E-Commerce Security |
| 640117 | Biometric Systems and Biometric Image Processing |

| OC-1 | |
|---|---|
| **Subject Code** | **Subject Name** |
| 640118 | Soft Computing |
| 640119 | Blockchain Technology |
| 640120 | Machine Learning using Python |

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## Master of Technology (Cyber Security) (Semester-II) **Recommended W.E.F JULY 2020**

## Scheme of Examination

| S. No. | Subject Code | Subject Name | Maximum Marks Allotted | | | | | | | Total Marks | Contact Periods per week | | | Total Credits |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Theory Slot | | | Practical Slot | | MOOCs | | | | | | |
| | | | End sem | Mid sem | Quiz/ Assignment | End Sem | Lab work/ sessional | Assignment | Exam | | L | T | P | |
| 1. | 640211 | Cyber Crime Investigations and Digital Forensics | 70 | 20 | 10 | - | - | - | - | 100 | 3 | - | - | 3 |
| 2. | 640212 | Advanced Topics in Data Mining & Warehousing | 70 | 20 | 10 | - | - | - | - | 100 | 3 | - | - | 3 |
| 3. | 640213 | Information Security & Systems | 70 | 20 | 10 | - | - | - | - | 100 | 3 | - | - | 3 |
| 4. | DE | Departmental Elective-II | - | - | - | - | - | 25 | 75 | 100 | 3 | - | - | 3 |
| 5. | OC | Open Category Course (OC-2) | 70 | 20 | 10 | - | - | - | - | 100 | 3 | - | - | 3 |
| 6. | 640221 | Lab-II* | - | - | - | 90 | 60 | - | - | 150 | - | - | 4 | 4 |
| 7. | 640222 | Self Learning / Presentation | - | - | - | - | 100 | - | - | 100 | | | 2 | 2 |
| | | Total | 280 | 80 | 40 | 90 | 160 | 25 | 75 | 750 | 15 | - | 6 | 21 |

* **Elective-II course** *will run through SWAYAM / NPTEL /MOOC based learning platform (with credit transfer facility).*

** **Open Category course will have to be opted from the pool of open courses. This course will be based on interdisciplinary aspects. [This course may be run through SWAYAM/NPTEL based platform** *(with credit transfer facility)* **and accordingly, OC-2 pool may be created from the list of SWAYAM/NPTEL courses].**

* **During labs, students have to perform practical/assignments/ minor projects related to theory subjects/theoretical concepts of respective semester using recent technologies / languages / tools etc.**

* **Self learning / presentation through SWAYAM / NPTEL (Registration in a course will be compulsory for students but assessment will be based on internal seminar presentation).**

| DE-2 (Tentative) | |
|---|---|
| Subject Code | Subject Name |
| 640214 | Internet of Things |
| 640215 | Deep Learning |
| 640216 | Cloud Computing |
| 640217 | Social Networking |

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**Master of Technology (Cyber Security)** (Semester-IV) **Recommended W.E.F JULY 2020**

## Scheme of Examination

| S. No. | Subject Code | Subject Name | Maximum Marks Allotted | | | | | Total Marks | Contact Hours per week | | | Total Credits |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Theory Slot | | | Practical Slot | | | | | | |
| | | | End sem. Exam. | Mid sem. | Quiz/ Assignment | End Sem. /Practical Viva | Sessional Work/ Practical Record/ Assignment/ Quiz/ Presentation | | L | T | P | |
| 1. | 6-00405 | Dissertation Part-II | - | - | - | 300 | 200 | 500 | - | - | 14 | 14 |
| | | Total | - | - | - | 300 | 200 | 500 | - | - | 14 | 14 |

DEAN (ACADEMICS)
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# *Syllabi*
# *of*
# *Departmental Core (DC) Courses*
## *M.Tech I Semester*
## *(Computer Science & Engineering/ Information Technology/ Cyber Security)*

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Department of Computer Science & Engineering and Information Technology

## DATABASE SYSTEMS
## 620111/630111

**UNIT I**

Review of Databases: Characteristics & Implications of Database Approach, Data Models, Architectures, Database Languages & Interfaces, Classification of DBMS, Data Independence. ER-Models, High Level Conceptual Data Models, Relationships, ER-Diagrams, Design Issues

**UNIT II**

Object Oriented and Extended Relational Databases: Concepts of Object Oriented Databases, Object Identity, Object Structure and Type Constructors, Encapsulation of Operations, Methods & Persistence, Type Hierarchies and Inheritance, Object Database Standards, Object Definition Language, Object Query Language and Object Database Conceptual Design

**UNIT III**

Distributed Databases: Concepts, Fragmentation, Replication, Allocation Techniques for Distributed Database Design, Types of Distributed Database Systems, Query Processing, Concurrency Control and Recovery, Distributed Databases in Oracle

**UNIT IV**

Transaction Processing: Introduction, Transaction and System Concepts, Properties of Transactions, Schedules & Recoverability, Serializability of Schedules, Transaction Support in SQL, Concurrency Control Techniques: Locking Techniques, Time Stamp Ordering, Multi Version Concurrency, Validation Concurrency, Locks for Concurrency Control

**UNIT V**

Image and Multimedia Databases: Modeling and Storage of Image and Multimedia Data, Data Structures- R-Tree, k-d Tree, Quad Trees, Content Based Retrieval: Color Histograms, Textures, etc., Image Features, Spatial and Topological Relationships, WEB Database: Accessing Databases through WEB, WEB Servers, XML Databases, Commercial Systems, Mobile Databases, Case Study: Oracle Xi

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**Recommended Books:**

1. Elmarsi, Navathe, Somayajulu, Gupta, "Fundamental of Database Systems", 4th Edition, Pearson Education, 2007
2. R. Ramakrishanan, "Database Management Systems", McGraw Hill International Editions, 1998
3. Date, Kannan, Swamynathan, "An Introduction to Database Systems", 8th Edition Pearson Education, 2007
4. Silberschatz, Korth, Sudarshan, "Database System Concepts", Megraw Hill, 6th Edition, 2006

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## COURSE OUTCOMES

After completion of this course, the students would be able to

CO1 recall the fundamental of RDBMS, DBMS storage structures and access techniques

CO2 illustrate the basic concepts of relational data model, entity-relationship model, relational database design, relational algebra and SQL.

CO3 make use of various concurrency control mechanisms for error free transaction processing

CO4 analyze various types of databases

CO5 design ER-models to represent simple database application scenarios and improve the database design by normalization

CO6 propose the improved data-intensive application using DBMS APIs program

Department of Computer Science & Engineering and Information Technology

## DATABASE SECURITY AND PRIVACY
## 640111

**UNIT I**

DBMS concepts: introduction, Data Models, Entities and Attributes, Relationships, E-R Diagram, Relational Data Models Domains Tuples, Attributes, Keys, Relational Database, Schemas, Integrity Constraints, Relational Algebra and Relational Calculus, Functional Dependencies and Normalization for Relational Database Hash-Based Indexing: Static Hashing, Extendible hashing, Linear hashing, Comparisons, Query Processing and Optimization Distributed databases Client/Server Database Fragmentation, Replication, Location & Fragment transparency, Distributed Query processing and Optimization.

**UNIT II**

Database Protection: Integrity, Constraints in Query-by-Example, Security in Query-by-Example Concurrent Operations on the Database: Basic Concepts, Simple Transaction Model, Model with Read- and Write-Locks, Read-only, Write-only Model Concurrence for Hierarchically Structured Items, Protection against Crashes, Optimistic Concurrency Control

**UNIT III**

Security Principle E-mail Security, Database Recovery Criteria, Database Security, Develop Continuity and Recovery Plans, Physical and Environmental Security, Security Plan for Implementation Goals of Database Security, Access Control, Statistical Database Security.

**UNIT IV**

Security Perimeter, Relationship between a Security Policy and Security Model, State Machine Models, Confidentiality and Integrity Models, Bell-laPadula Model, Biba Model, Bell-LaPadula ersus Biba, Clark-Wilson Model, Information Flow Model, Noninterference Model, Brewer and Nash Model, Graham-Denning and Harrison-Ruzzo-Ullman Models, Access Matrix Models

**UNIT V**

Security Management, Data/ Information, Protecting Password File, Access Control Structure, Software Security, Element of Information Security, Steps for Better Security, Malicious Software, System Security Assurance Concepts, Importance of Information System

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**Reference Books:**

1. R. Elmasri, S. Navathe, Fundamentals of Database System, Pearson Education
2. C. J. Date, An Introduction to data base Systems, Volume 1, Pearson Education
3. Database Systems, SK Singh, pearson education

4 H. F. Korth and A. Silberschatz. Database Concepts, TMH.
5 Godbole, "Information system security", Willey
6 Cole Krutz & Conley "Network security" Willey
7 CISSP Certification, "Security Models and Architecture", CISSP

## COURSE OUTCOMES

After completion of this course, the students would be able to:

CO1 recall the basic concepts of database management system and indexing used in database management system.
CO2 explain various terminology used in database protection.
CO3 apply various database security principles like Email security, database recovery etc.
CO4 analyze the different security parameters used for database security.
CO5 evaluate different database security principles and parameters for database security measures.
CO6 design a secure and robust database for an information system.

Department of Computer Science & Engineering and Information Technology

## DISTRIBUTED COMPUTING
**620112/630112/640112**

**UNIT I**

Introduction To Distributed System, Communication: Layered Protocols, Client Server Protocols, RPC, Group Communication, Coordination, Synchronization & Consistency: Logical Clocks, Physical Clocks, Mutual Exclusion, Election Algorithms, Atomic Broadcast, Sequential Consistency, Transaction, Distributed Consensus, Threads: Thread Synchronization, Implementation Issues and Threads Vs RPC

**UNIT II**

Models Of Distributed Computing: Client Server and RPC, RPC Architecture, Exceptions, Underlying Protocols, IDL, Marshalling Etc, Group Models and Peer to Peer Groups for Service Replication/ Reliability, Groups For Parallelism/ Performance, Client/ Server Vs. Peer-To-Peer, Multicast, Atomic Broadcast.

**UNIT III**

Distributed File System: Security, Naming/ Location Transparency, R/W Semantics, Cache Coherence, Replication. Distributed Shared Memory: DSM Architecture, Consistency Models and Relation to Caching, Release Consistency, Comparison with Message Passing and RPC.

**UNIT IV**

Fault Tolerant Distributed Systems: Introduction, Dependability, Faults Vs. Errors Vs. Failure, Space Time and Value Redundancy, Fault Tolerant Architecture, Failure Detection Algorithms, Partitioning, FT Consensus

**UNIT V**

Distributed Multimedia System: Introduction, Characteristics, And Resource Management: Stream Adaptation, Security: Introduction, Security Techniques, Cryptographic Algorithms, Authentication and Access Control, Case Study: CORBA, MACH

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**Recommended Books:**

1. Andrew S Tanenbaum, Distributed Systems: Principles and Paradigms, Pearson
2. Pradeep K. Sinha, Distributed Operating Systems, PHI

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## COURSE OUTCOMES

After completion of this course, the students would be able to

CO1 demonstrate knowledge of the basic elements and concepts related to distributed system technologies

CO2 summarize various architectures used to design distributed systems

CO3 build distributed systems using various inter process communication techniques

CO4: analyze a problem and form a distributed system to work towards a solution.
CO5: explain various distributed algorithms, such as logical clocks and leader election.
CO6: propose own reflections and attitudes in regard to the area of research.

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Department of Computer Science & Engineering and Information Technology

## HIGH-SPEED NETWORKS
## 620113/630113/640113

**UNIT I**

Review of Networking and Networking Protocols, TCP/IP Model, OSI Model, Internet Protocols and Addressing, Routing and Internetworking: Network-Layer Routing, Congestion Control at Network Layer, Logical Addressing: IPv4 Addresses, IPv6, Multicasting Techniques and Protocols

**UNIT II**

Transport and End-to-End Protocols: Transport Layer, Transmission Control Protocol (TCP), User Datagram Protocol (UDP), Mobile Transport Protocols, TCP Congestion Control, Application Layer: Principles of Network Applications, Web and HTTP, File Transfer: FTP, Electronic Mail in the Internet, Domain Name System (DNS)

**UNIT III**

Optical Networks and WDM Systems: Overview of Optical Networks, Basic Optical Networking Devices, Large-Scale Optical Switches, Optical Routers, Wavelength Allocation in Networks: WDM Network elements: Optical line terminals and amplifiers

**UNIT- IV**

ATM-based Services and Applications, ATM Switching, ATM Transmission, Wireless ATM and mobile ATM, Security in ATM network, VPNs: Introduction, Tunneling and Overlay Networks: Virtual Private Networks (VPNs), Overlay Networks – VoIP

**UNIT- V**

Mobile Ad-Hoc Networks: Overview of Wireless Ad-Hoc Networks, Routing in Ad-Hoc Networks, Routing Protocols for Ad-Hoc Networks – Wireless Sensor Networks: Sensor Networks and Protocol Structures

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**Recommended Books:**

1 Data Communications and Networking, Behrouz A. Forouzan, Fourth Edition, Tata McGraw Hill, 2007
2 Computer Networks, Andrew S. Tanenbaum, Fourth Edition, Prentice Hall
3 Adhoc Wireless Networks: Architecture & protocols, Sivaram Murthy, PHI
4 Optical Networks: Third Generation Transport Systems, Uyless Black, Pearson
5 Optical Networks: A Practical Perspective, Rajeev Ramaswami and N. Sivarajan, Morgan Kaufmann
6 ATM Networks: Concepts, Protocols, Applications, Rainer Handel, Huber and Schroder, Pearson

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## COURSE OUTCOMES

After completion of this course, the students would be able to

CO1 recall the understanding of network engineering principles for network, system and service management.

CO2 classify the theoretical and practical concepts behind the design of multi-constained applications and the need for service integration.

CO3 apply the knowledge of Advanced Network Engineering including design, routing, management, security, performance and ability to understand and use industry standard tools used.

CO4 solve the problems associated with network design, routing, management, security and performance.

CO5 analyze the concepts underlying different protocols, QoS architectures and mechanisms and their main characteristics and functionality.

CO6 assess the network management issues and devise adequate network management solutions using industry design techniques/possible research opportunities.

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# *Syllabi*
# *of*
# *Departmental Core (DC) Courses*
## *M.Tech II Semester*
## *(Computer Science & Engineering/ Information Technology/ Cyber Security)*

Department of Computer Science & Engineering and Information Technology

## ALGORITHMS DESIGN TECHNIQUES AND ANALYSIS
## 620211/630211

**UNIT I**

**Introduction:** Asymptotic Notations and Basic Efficiency Classes, Mathematical Analysis of Recursive and Non-recursive Algorithms, Empirical Analysis of Algorithms. Brute Force and Exhaustive Search- Sequential Search and Brute-Force String Matching, Closest-Pair and Convex-Hull Problems.

**UNIT II**

**Decrease-and-Conquer:** Topological Sorting, Fake-Coin Problem, Russian Peasant Multiplication, Josephus Problem, Computing a Median and the Selection Problem, Game of Nim. **Transform-and-Conquer:** 2-3 Trees, Horner's Rule and Binary Exponentiation, Computing the Least Common Multiple, Counting Paths in a Graph.

**UNIT III**

**Space and Time Trade-Offs:** Sorting by Counting, Input Enhancement in String Matching, Boyer-Moore Algorithm, Open Hashing (Separate Chaining), Closed Hashing (Open Addressing), B-Trees.

**UNIT IV**

**Iterative Improvement:** Simplex Method, Maximum-Flow Problem, Maximum Matching in Bipartite Graphs, Stable Marriage Problem. **Limitations of Algorithm Power:** Lower-Bound Arguments, Trivial Lower Bounds, Information-Theoretic Arguments, Adversary Arguments, Problem Reduction, Decision Trees, Decision Trees for Sorting, Decision Trees for Searching a Sorted Array.

**UNIT V**

Introduction to P, NP, NP-Hard and NP-Complete, P and NP Problems - Partition problem, Bin-packing problem, NP-Complete Problems.

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**Recommended Books:**

1. Introduction to Design and Analysis of Computer Algorithms, 3rd Edition, Anany Levitin, Pearson Education
2. Fundamentals of Computer Algorithms, Horowitz & Sahani, Universities press.
3. Introduction to Algorithms, Coremen Thomas, Leiserson CE, Rivest RL, PHI
4. Design & Analysis of Computer Algorithms, Ullmann, Pearson.
5. Algorithm Design, Michael T Goodrich, Robarto Tamassia, Wiley India

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## COURSE OUTCOMES

After completion of this course, the students would be able to:

CO1 outline the basics of algorithms and data structures

CO2 interpret mathematical foundation in analysis of algorithms

CO3 describe the working of different algorithmic design techniques
CO4 compare the various algorithm design techniques
CO5 select appropriate algorithm design techniques for solving problems
CO6 design algorithms to solve real world engineering problems

Department of Computer Science & Engineering and Information Technology

## CYBER CRIME INVESTIGATIONS AND DIGITAL FORENSICS
## 640211

**UNIT I**

INTRODUCTION: Introduction and Overview of Cyber Crime, Nature and Scope of Cyber Crime, Types of Cyber Crime: Social Engineering, Categories of Cyber Crime, Property Cyber Crime

**UNIT II**

CYBER CRIME ISSUES: Unauthorized Access to Computers, Computer Intrusions, White collar Crimes, Viruses and Malicious Code, Internet Hacking and Cracking, Virus Attacks, Pornography, Software Piracy, Intellectual Property, Mail Bombs, Exploitation ,Stalking and Obscenity in Internet, Digital laws and legislation, Law Enforcement Roles and Responses.

**UNIT III**

INVESTIGATION: Introduction to Cyber Crime Investigation, Investigation Tools, eDiscovery, Digital Evidence Collection, Evidence Preservation, E-Mail Investigation, E-Mail Tracking, IP Tracking, E-Mail Recovery, Hands on Case Studies, Encryption and Decryption Methods, Search and Seizure of Computers, Recovering Deleted Evidences, Password Cracking

**UNIT IV**

DIGITAL FORENSICS: Introduction to Digital Forensics, Forensic Software and Hardware, Analysis and Advanced Tools, Forensic Technology and Practices, Forensic Ballistics and Photography, Face, Iris and Fingerprint Recognition, Audio Video Analysis, Windows System Forensics, Linux System Forensics, Network Forensics

**UNIT V**

LAWS AND ACTS: Laws and Ethics, Digital Evidence Controls, Evidence Handling Procedures, Basics of Indian Evidence ACT IPC and CrPC , Electronic Communication Privacy ACT, Legal Policies.

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**Recommended Books:**

1. Nelson Phillips and Enfinger Steuart, "Computer Forensics and Investigations", Cengage Learning, New Delhi, 2009
2. Kevin Mandia, Chris Prosise, Matt Pepe, "Incident Response and Computer Forensics ", Tata McGraw -Hill, New Delhi, 2006
3. Robert M Slade," Software Forensics", Tata McGraw - Hill, New Delhi, 2005
4. Bernadette H Schell, Clemens Martin, "Cybercrime", ABC — CLIO Inc, California, 2004
5. "Understanding Forensics in IT ", NIIT Ltd, 2005

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## COURSE OUTCOMES

After completion of this course, the students would be able to

CO1 list various cyber crimes and various categories.
CO2 explain different cybercrime issues and investigation techniques.
CO3 identify various tools used in digital forensics.
CO4 discover cyber laws and acts.
CO5 determine the limitations imposed by data privacy laws.
CO6 design tools for faithful preservation of data on disks for analysis.

Department of Computer Science & Engineering and Information Technology

## ADVANCED TOPICS IN DATA MINING & WAREHOUSING
## 620212/630212/640212

**UNIT I**

Introduction- Motivation, Importance, Functionalities, Basic DM (Data Mining) Vs KDD, DM Applications, Data Warehousing, Evolution of Data Warehousing, Data Warehousing Concepts, Benefits of Data Warehousing, Comparison of OLTP and Data Warehousing, Data Warehousing, Data Warehousing Architecture, Distributed Data Warehouse, Problems of Data Warehousing

**UNIT II**

Data Pre-Processing, Data Cleaning, Missing Values, Noisy Data, Data Cleaning, Data Integration and Transformation, Data Transformation, Data Reduction, Discretization and Concept Hierarchy Generation.

**UNIT III**

Mining Frequent Patterns, Association, Correlation: Basic Concepts, Efficient Frequent Itemset Mining Method- Apriori Algorithm, Its Variants & other Algorithm for finding Frequent Itemsets using Candidate Generation, Generating Association Rules from Frequent Itemsets, Representative Rules, Improving the Efficiency of Apriori & other Algorithms, Mining Frequent Itemsets without Candidate Generation, Mining Frequent Itemsets using Vertical Data Layout, Maximal Frequent Item Set Mining, Issue Related to the Design of Efficient & Flexible Algorithms.

**UNIT IV**

Mining Various Kinds of Association Rules, Constraint-Based Association Mining, Classification and Prediction, Cluster Analysis, Graph Mining, Social Network Analysis, Knowledge Discovery through Statistical Techniques, and Knowledge Discovery through Neural Networks, Fuzzy Technology & Genetic Algorithms.

**UNIT V**

Web Content Mining, Web Structure Mining, Web Usage Mining, Spatial Mining, and Temporal Mining, Social Impacts of Data Mining, Data Mining System Products and Associated Design issues, future trends in Data Mining, Emerging Scenario of Pattern Warehousing System, Case Study –WEKA, SPSS

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**Recommended books:**

1. Jiwei han and micheline kamber,"data mining: concept and techniques", harcout india private limited, 2001
2. Margaret h. Dunham, "data mining: introductory and Advanced topic" pearson education, 2003

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**COURSE OUTCOMES**

After completion of this course, the students would be able to

CO1 explain the concepts of data warehousing and data mining
CO2 translate the data needed for data mining using pre- processing techniques
CO3 apply appropriate data mining methods like classification, clustering or frequent pattern mining on large data sets
CO4 analyse advanced data mining topics like Web Mining, Spatial and Temporal Mining
CO5 measure the performance of various data mining algorithms
CO6 test real data sets using popular data mining tools such as WEKA, SPSS

Department of Computer Science & Engineering and Information Technology

## IMAGE PROCESSING AND RETRIEVAL TECHNIQUES
## 620213/630213

**UNIT I**

Introduction to Image Processing Systems, Digital Image Fundamentals - Image model, Relationship between Pixels, Imaging Geometry, Camera Model, Introduction to FT, DFT and FFT, Walsh Transformation, Hadamard Transformation, Histogram.

**UNIT II**

Image Preprocessing, Images Transformations, Brightness Transformation, Geometric Transformations, Image Smoothing, Neighborhood Averaging, Median Filtering, Low Pass Filters, Average of Multiple Images, Image Sharpening by Differentiation Technique, High Pass Filtering.

**UNIT III**

Image Restoration - Degradation Models for Continuous Function, Effect of Diagonalization, on-Degradation, Algebraic approach to Restoration, Interactive Restoration, Gray Level Interpolation, Inverse & Wiener Filter, FIR Wiener Filter, Filtering using Image Transforms.

**UNIT IV**

Image Encoding, Mapping, Quantizer and Coder. Image Segmentation, Detection of Discontinuation, Point Detection, Line Detection, Edge Detection, Boundary Extraction, Region Representation.

**UNIT V**

Object Recognition, Pattern Recognition, Knowledge Representation, Statistical Pattern Recognition, Classification Principles, Classifier Learning, Neural Nets, Syntactic Pattern Recognition, Recognition as Graph Matching, Optimization Techniques in Recognition.

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**Recommended Books:**

1. "Digital Image Processing" by Gonzalez & Wood.
2. "Digital Image Processing" by A. K. Jain.

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## COURSE OUTCOMES

After completion of this course, the students would be able to

CO1 recall the fundamental concepts of a digital image processing system.
CO2 categorize various compression techniques.
CO3 compare various compression techniques.
CO4 evaluate the techniques for image enhancement and image restoration.
CO5 interpret image segmentation and representation techniques.
CO6 elaborate image segmentation and representation techniques.

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Department of Computer Science & Engineering and Information Technology

## INFORMATION SECURITY & SYSTEMS
## 640213

**UNIT I**

Security goals, security Attacks (Interruption, Interception, Modification and Fabrication), security services (Confidentiality, Authentication, Integrity, Non-repudiation, access control and Availability) and mechanisms. A model for inter-network security, Internet standards and RFCs, mathematical tools for cryptography. Introduction to number theory, prime & relative prime numbers, modular arithmetic,Fermat's & Euler's Theorems, testing for primality, Chinese remainder theorem, Discrete logarithms.

**UNIT II**

Conventional encryption, Principles & Algorithms (DES, AES, RC4), Block Cipher Modes of operation, Location of encryption devices, Key Distribution, public key cryptography principles. Public key cryptography Algorithms (RSA, RABIN, ELGAMAL, Diffie-Hellman, ECC), Key Distribution.

**UNIT III**

Approaches for Message Authentication, Secure Hash function (SHA-512, WHIRLPOOL) and HMAC. Digital Signatures. Comparison, Process. Need for Keys. Signing the Digest, Services, Attacks on Digital Signatures. Kerberos, X.509, Directory Authentication Services.

**UNIT IV**

Network Management: Basic concepts of SNMP, SNMPv1, Community facility and SNMPv3, OS Security, OS security functions, separation, memory protection, Access control, Trusted Operating system, MAC, DAC, Trusted Path, Trusted Computing Base.

**UNIT V**

Viruses and related threats, Anatomy of virus, Virus count-measures, Software Flaws Buffer Overflow, Incomplete Mediation, Race conditions, Malware Brain, Morris Worms, Code Red, Malware Detection, Firewalls: Design Principles, Types of Firewalls, Firewall Architectures, Trusted Systems, Operating system security, Network security, security for network servers, web security and security for mobile code technologies such as Java and JavaScripts. Intrusion Detection Techniques to provide privacy in Internet Application and protecting digital content (music, video, software) from unintended use.

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**Recommended Books:**

1. Network security essentials (Applications and Standards) by William Stallings, Pearson Education

2 Information security principles & Practice, Mark Stamp, WILEY INDIA, 2006
3 Cryptography and Network security, Fourth Edition, Stallings, PHI/Pearson
4 Cryptography and Network security by Behrouz A. Forouzan, TMH 2007
5 Network Security the complete reference, Robert Bragg, Mark Rhodes, TMH
6 Computer Security Basics by Rick Lehtinen, Deborah Russell & G.T. Gangemi Sr. SPD O' REILLY 2006
7 Modern Cryptography by Wenbo Mao, Pearson Education 2007

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## COURSE OUTCOMES

After completion of this course, the students would be able to

CO1: define computer security and basics of cryptography
CO2: demonstrate different data encryption algorithms and keys used during encryption techniques
CO3: identify the various security attacks and threats
CO4: analyse evaluation criteria for AES, Triple DES and Traffic Confidentiality
CO5: explain SSL and TSL, Firewall, Digital Signatures and its standards & schemes, and the enhancements made to IPv4 by IPsec
CO6: discuss various web security considerations

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# *Syllabi*
# *of*
# *Departmental Elective (DE) Courses*
## *M.Tech I Semester*
## *(Computer Science & Engineering)*

Department of Computer Science & Engineering and Information Technology

## MOBILE COMPUTING & M-COMMERCE
## 620114

**UNIT I**

Review Of Personal Communication Services (PCS), Basic Concepts of Cellular Systems, Global System for Mobile Communication (GSM), Protocols, Handover, Data Services, and Multiple Division Techniques

**UNIT II**

General Packet Radio Services (GPRS) GPRS Architecture, GPRS Network Nodes Mobile Data Communication: Wlans (Wireless Lans) IEEE 802.11 Standard, Mobile IP, Wireless Application Protocol (WAP), Mobile Internet Standard, WAP Gateway and Protocols, Wireless Markup Languages (WML)

**UNIT III**

Third Generation (3G) Mobile Services: Introduction to International Mobile Telecommunications 2000 (IMT 2000) Vision, Wideband Code Division Multiple Access (W-CDMA), And CDMA 2000, Quality Of Services In 3G

**UNIT IV**

Wireless Local Loop (WLL): Introduction to WLL Architecture, WLL Technologies Global Mobile Satellite Systems: Case Studies of IRIDIUM and GLOBALSTAR Systems, Bluetooth Technology, Wi-Fi and Wi-Max

**UNIT V**

M-Commerce: Introduction, Emerging Applications, Different Players in M-Commerce, M-Commerce Life Cycle, Mobile Financial Services, Mobile Entertainment Services, Management of M-Commerce Services, Emerging Issues in M-Commerce, Future Trends in M-Commerce Services

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**Recommended Books:**

1. "Wireless and Mobile Networks Architecture," by Yi -Bing Lin & Imrich Chlamatac, John Wiley & Sons, 2001.
2. "Mobile & Personnel Communication Systems and Services", By Raj Pandya, Prentice Hall India, 2001
3. "Wireless Communication- Principles and practices," 2nd Ed., Theodore S. Rappaport, Pearson Education Pvt. Ltd, 2003
4. "Mobile communications," J. Schiller, Pearson Education Pvt. Ltd., 2002.
5. "The Wireless Application Protocol," Singhal & Bridgman et. al. Pearson Education, 2004

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## COURSE OUTCOMES

After completion of this course, the students would be able to

CO1 define the basic concepts and principles in mobile computing
CO2 explain the concept of General Packet Radio Services, Wireless LANs, Wireless Application Protocol (WAP)
CO3 identify vision, services of third generation mobile communication and its quality
CO4 analyze the architecture, technologies inter-networking challenges and solutions in wireless local loop
CO5 evaluate the concepts of M- commerce for applicability to selected examples and business cases
CO6 discuss the services, emerging issues and future trends in M-Commerce

Department of Computer Science & Engineering and Information Technology

## ADHOC & SENSOR BASED NETWORKS
## 620115

**UNIT I**

Introduction to Mobile Adhoc Networks, Technologies for Ad Hoc Network, Issues in Ad hoc wireless Networks, IEEE 802.11 Architecture and protocols, Protocol for Adhoc Wireless Network, Issues and classification of MAC protocol.

**UNIT II**

Transport layer & Security protocols: Issues in designing transport layer protocols, TCP over Adhoc Wireless Networks, Network Security Attacks and Key management.

**UNIT III**

Wired Sensor Networks. Basic Sensor Network Architectural Elements, Applications of Sensor Networks, Comparison with Adhoc Wireless Networks, Challenges and Hurdles. Architecture of WSNs, Hardware components, Operating systems and execution environments, some examples of sensor nodes, Network Architecture, Sensor networks scenarios, Optimization goals, Design principles for WSNs.

**UNIT IV**

Communication protocols: Physical Layer and Transceiver design considerations in WSNs, Fundamentals of (wireless) MAC protocol, Address and name management in wireless sensor networks, Localization and positioning.

**UNIT V**

Routing Protocols-Dynamic Source Routing (DBR), Adhoc Distance Vector (AoDV) routing, Multicasting Routing issues. Data Dissemination and Gathering, Routing Challenges and Design Issues in Wireless Environment, Routing Strategies in Wireless Sensor Networks, QoS in wireless sensor networks, Coverage and deployment.

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**Recommended Books:**

1. Ad HOC Wireless Networks: Architectures & Protocols by C Siva Ram Murty & BS Manoj 2nd Ed. Pearson Education.
2. Adleshein & Gupta, "Fundamentals of Mobile and Pervasive Computing", TMH, 2005.
3. Handbook of Ad Hoc wireless network, By Mohamed Illayas, CRC press.
4. Protocols and Architectures for Wireless Sensor Networks, By Holger Karl, John Wiley & Sons.
5. Wireless Sensor Networks Technology, Protocols, and applications by Kazem Sohraby, Daniel Minoli, Taieb Znati, John Willey & Sons.

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## COURSE OUTCOMES

After completion of this course, the students would be able to

CO1 list various design and implementation issues and available solutions of mobile adhoc

networks

| | |
|---|---|
| CO2 | summarize the basics of infrastructure less networks and their importance in the future directions for wireless communications |
| CO3 | model different adhoc and sensor networks |
| CO4 | analyze various technologies associated with adhoc networks |
| CO5 | determine various parameters associated with adhoc & sensor based networks |
| CO6 | develop adhoc and sensor networks using network simulation tools |

Department of Computer Science & Engineering and Information Technology

## NETWORK SECURITY
## 620116

**UNIT I**

Introduction to security attacks, services and mechanism, introduction to cryptography. Conventional Encryption: Conventional encryption model, classical encryption techniques- substitution ciphers and transposition ciphers, cryptanalysis, steeography, stream and block ciphers. Modern Block Ciphers: Block ciphers principals, Shannon's theory of confusion and diffusion, fiestal structure, data encryption standard(DES), strength of DES, differential and linear crypt analysis of DES, block cipher modes of operations, triple DES, IDEA encryption and decryption, strength of IDEA, confidentiality using conventional encryption, traffic confidentiality

**UNIT II**

Introduction to graph, ring and field, prime and relative prime numbers, modular arithmetic, Fermat's and Euler's theorem, primality testing, Euclid's Algorithm, Chinese Remainder theorem, discrete logarithms. Principals of public key crypto systems, RSA algorithm, security of RSA, key management, Diffie-Hellman key exchange algorithm, introductory idea of Elliptic curve cryptography, ElGamal encryption

**UNIT III**

Message Authentication and Hash Function: Authentication requirements, authentication functions, message authentication code, hash functions, birthday attacks, security of hash functions and MACS, MD5 message digest algorithm, Secure hash algorithm(SHA). Digital Signatures: Digital Signatures, authentication protocols, digital signature standards (DSS).

**UNIT IV**

IP Security: Architecture, Authentication header, Encapsulating security payloads, combining security associations, key management. Web Security: Secure socket layer and transport layer security, Secure Electronic Transaction (SET). System Security: Intruders, Viruses and related threads, firewall design principals, trusted systems.

**UNIT V**

Authentication Applications: Kerberos and X.509, directory authentication service, electronic mail security-pretty good privacy (PGP), S/MIME. Security in WLAN: Security mechanisms: WEP, WPA, Radius, CHAP, EAP, 802.11i

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**Recommended Books:**

1. William Stallings, "Cryptography and Network Security", Second edition, Prentice Hall, 1999
2. Atul Kahate, "Cryptography and Network Security," TMH
3. William Stallings, "Cryptography and Network Security", Third Edition, Pearson Ed.

4 Introduction to network Security, Krawetz, Cengage

## COURSE OUTCOMES

After completion of this course, the students would be able to

CO1 define computer security and basecs of cryptography

CO2 demonstrate different data encryption algorithms and keys used during encryption techniques

CO3 identify the various security attacks and threats

CO4 analyse evaluation criteria for AES, Triple DES and Traffic Confidentiality

CO5 explain SSL and TSL, Firewall, Digital Signatures and its standards & schemes and the enhancements made to IPv4 by IPsec

CO6 discuss various web security considerations

Department of Computer Science & Engineering and Information Technology

## COMPUTER ARCHITECTURE AND PARALLEL PROCESSING
## 620117

**UNIT I**

Review. Evolution of computer architecture Needs of parallelism. Parallelism in Uniprocessor system. Parallel Computer Structures Pipeline computers, Array Computers, Multiprocessor Systems. Performance of Parallel computers, Dataflow and new trends, Architectural Classification schemes, Application of Parallel Processing

**UNIT II**

Conditions of Parallelism, Program Partitioning and Scheduling, Program flow Mechanisms, System Interconnect Architectures, Performance metrics and Measures. Scalability, Analysis and approaches. Linear Pipeline processors, Nonlinear Pipeline processors, Instruction pipeline design, Arithmetic pipeline design, supersealar pipeline design

**UNIT III**

Advanced processor technology, Superscalar and vector processors, Memory hierarchy technology, Bus system, Cache Memory Organization, Shared-Memory organization, Sequential and weak consistency models, Weak consistency models

**UNIT IV**

Multiprocessor system interconnects, Cache coherence and synchronization mechanism, Message-passing mechanism, Vector processing principles, Multivector multiprocessors, compound vector processing, SIMD computer organizations, latency-Hiding techniques, Principles of multithreading, Scalable and multithreaded architectures, Dataflow and hybrid architectures

**UNIT V**

Parallel programming models, Parallel languages and compilers, Dependence analysis of data arrays, code optimization and scheduling, Loop parallelization and pipelining, Trends in parallel systems, Overview of technology, Forms of parallelism, Case studies Cray line Sun UltraSpare T2 processor, AMD Opteron, Intel Pentium processors

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**Recommended Books:**

1. Kai Hwang & Naresh Jotwani, "Advanced Computer Architecture", TMH
2. J P. Hayes, "Computer Architecture and Organization", MGH
3. Hwang & Briggs, "Computer Architecture and Parallel Processing", MGH
4. Kain, "Advance Computer Architecture - A System Design Approach", PHI Learning
5. M J. Flynn, "Computer Architecture, Pipelined and Parallel Processor Design", Narosa Publishing
6. V. Rajaraman & C S R. Murthy," Parallel Computer", PHI Learning

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## COURSE OUTCOMES

After completion of this course, the students would be able to

CO1 compare the organization and operation of current generation parallel computer systems

CO2 explain pipelining and its speed advantage and pipelined logic

CO3 apply concept and principle of cache memory and virtual memory to high-performance computer architecture

CO4 examine the challenges faced in the implementation of high performance system

CO5 evaluate various multiprocessing configurations

CO6 design the overall organization of cache and virtual memories

# *Syllabi*
# *of*
# *Departmental Elective (DE) Courses*
## *M.Tech I Semester*
## *(Information Technology)*

Department of Computer Science & Engineering and Information Technology

## MOBILE COMPUTING & M-COMMERCE
### 6.30114

**UNIT I**

Review of Personal Communication Services (PCS), Basic concepts of cellular systems, Global system for Mobile Communication (GSM), Protocols, Handover, Data Services, and Multiple Division Techniques

**UNIT II**

General Packet Radio Services (GPRS) GPRS architecture, GPRS Network nodes Mobile Data Communication WLANs (Wireless LANs) IEEE 802.11 standard, Mobile IP, Wireless Application Protocol (WAP) The Mobile Internet standard, WAP Gateway and Protocols, Wireless Markup Languages (WML)

**UNIT III**

Third Generation (3G) Mobile Services Introduction to International Mobile Telecommunications 2000 (IMT 2000) vision, Wideband Code Division Multiple Access (W-CDMA), and CDMA 2000, Quality of services in 3G

**UNIT IV**

Wireless local Loop (WLL) Introduction to WLL architecture, WLL technologies Global Mobile Satellite Systems Case studies of IRIDIUM and GLOBALSTAR systems Bluetooth technology, Wi-Fi and Wi-Max

**UNIT V**

M-Commerce Introduction, Emerging applications, different players in M-Commerce M-Commerce life cycle, Mobile financial services, Mobile entertainment services, Management of M-Commerce services, Emerging issues in M-Commerce, Future trends in M-Commerce services

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**Recommended Books:**

1. "Wireless and Mobile Networks Architecture," by Yi -Bing Lin & Imrich Chlamatac, John Wiley & Sons, 2001
2. "Mobile & Personnel Communication Systems and Services", By Raj Pandya, Prentice Hall India, 2001
3. "Wireless Communication- Principles and practices," 2nd Ed , Theodore S Rappaport, Pearson Education Pvt Ltd, 2003
4. "Mobile communications," J. Schiller, Pearson Education Pvt Ltd , 2002
5. "The Wireless Application Protocol," Singhal & Bridgman et. al ,Pearson Education, 2004

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**COURSE OUTCOMES**

After completion of this course, the students would be able to

CO1 define the basic concepts and principles in mobile computing
CO2 explain the concept of General Packet Radio Services, Wireless LANs, Wireless Application Protocol (WAP)
CO3 identify vision, services of third generation mobile communication and its quality
CO4 analyze the architecture, technologies inter-networking challenges and solutions in wireless local loop
CO5 evaluate the concepts of M-commerce for applicability to selected examples and business cases
CO6 discuss the services, emerging issues and future trends in M-commerce

Department of Computer Science & Engineering and Information Technology

## ADHOC & SENSOR BASED NETWORKS
**630115**

**UNIT I**

Introduction to Mobile Adhoc Networks, Technologies for Ad Hoc Network, Issues in Ad hoc Wireless Networks, IEEE 802.11 Architecture and Protocols, Protocol for Adhoc Wireless Network, Issues and Classification of MAC Protocol

**UNIT II**

Transport Layer & Security Protocols: Issues in Designing Transport Layer Protocols, TCP over Adhoc Wireless Networks, Network Security Attacks and Key Management

**UNIT III**

Wired Sensor Networks: Basic Sensor Network Architectural Elements, Applications of Sensor Networks, Comparison with Ad Hoc Wireless Networks, Challenges and Hurdles, Architecture of WSNs, Hardware Components, Operating Systems and Execution Environments, Some Examples of Sensor Nodes, Network Architecture, Sensor Networks Scenarios, Optimization Goals, Design Principles for WSNs

**UNIT IV**

Communication protocols: Physical Layer and Transceiver Design Considerations in WSNs, Fundamentals of (wireless) MAC Protocol, Address and Name Management in Wireless Sensor Networks, Localization and Positioning

**UNIT V**

Routing Protocols-Dynamic Source Routing (DBR), Adhoc Distance Vector (AoDV) routing, Multicasting: Routing issues, Data Dissemination and Gathering, Routing Challenges and Design Issues in Wireless Environment, Routing Strategies in Wireless Sensor Networks, QoS in Wireless Sensor Networks, Coverage and Deployment

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**Recommended Books:**

1. Ad HOC Wireless Networks: Architectures & Protocols by C Siva Ram Murty & BS Manoj 2nd Ed. Pearson Education
2. Adleshem & Gupta, "Fundamentals of Mobile and Pervasive Computing", TMH, 2005
3. Handbook of Ad Hoc wireless network, By Mohamed Illayas, CRC press
4. Protocols and Architectures for Wireless Sensor Networks, By Holger Karl, John Wiley & Sons
5. Wireless Sensor Networks Technology, Protocols, and applications by Kazem Sohraby, Daniel Minoli, Taieb Znati, John Willey & Sons

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## COURSE OUTCOMES

After completion of this course, the students would be able to

CO1 list various design and implementation issues, and available solutions of mobile adhoc networks

CO2 summarize the basics of infrastructure less networks and their importance in the future directions for wireless communications

CO3 model different adhoc and sensor networks

CO4 analyze various technologies associated with adhoc networks

CO5 determine various parameters associated with adhoc & sensor based networks

CO6 develop adhoc and sensor networks using network simulation tools

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MADHAV INSTITUTE OF TECHNOLOGY AND SCIENCE, GWALIOR – 474005
(A Govt. Aided UGC Autonomous Institute Affiliated to R.G.P.V. Bhopal, M.P.)

**Master of Technology (Cyber Security)** (Semester-III) **Recommended W.E.F JULY-2020**

## Scheme of Examination

| S. No. | Subject Code | Subject Name | Maximum Marks Allotted | | | | | | | Total Marks | Contact Hours per week | | | Total Credits |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Theory Slot | | | Practical Slot | | MOOCs | | | | | | |
| | | | End sem. Exam. | Mid sem. | Quiz/ Assignment | End Sem. /Practical Viva | Sessional Work/ Practical Record/ Assignment/ Quiz/ Presentation | Assignment | Exam | | L | T | P | |
| 1. | 640311 | Dissertation Part-I *(Literature Review Problem Foundation Synopsis survey paper, etc.)* | - | - | - | 150 | 100 | - | - | 250 | - | - | 10 | 10 |
| 2. | OC | MOOC Course | - | - | - | - | - | 25 | 75 | 100 | - | - | 02 | 02 |
| | | Total | - | - | - | 150 | 100 | 25 | 75 | 350 | - | - | 12 | 12 |

MOOC course will be treated as the course of open nature and will be decided by concerning department / BoS.

DEAN (ACADEMICS)
MITS
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Department of Computer Science & Engineering and Information Technology

## INFORMATION SECURITY & SYSTEMS
## 630116

**UNIT I**

Security Goals, Security Attacks (Interruption, Interception, Modification and Fabrication), Security Services (Confidentiality, Authentication, Integrity, Non-Repudiation, Access Control and Availability) and Mechanisms. Model for Inter-Network Security. Internet Standards and Rfcs. Mathematical Tools for Cryptography. Introduction to Number Theory, Prime & Relative Prime Numbers, Modular Arithmetic, Fermat's & Euler's Theorems, Testing for Primality, Chinese Remainder Theorem, Discrete Logarithms

**UNIT II**

Conventional Encryption, Principles & Algorithms (DES, AES, RC4), Block Cipher Modes of Operation, Location of Encryption Devices, Key Distribution, Public Key Cryptography Principles, Public Key Cryptography Algorithms (RSA, RABIN, ELGAMAL, Diffie-Hellman, ECC), Key Distribution

**UNIT III**

Approaches for Message Authentication, Secure Hash function (SHA-512, WHIRLPOOL) and HMAC, Digital Signatures: Comparison, Process, Need for Keys, Signing the Digest, Services, Attacks on Digital Signatures, Kerberos, X.509, Directory Authentication Services

**UNIT IV**

Network Management: Basic Concepts of SNMP, SNMPv1, Community Facility and SNMPv3, OS Security, OS Security Functions, Separation, Memory Protection, Access Control, Trusted Operating System, MAC, DAC, Trusted Path, Trusted Computing Base

**UNIT V**

Viruses and Related Threats, Anatomy of Virus, Virus Conter-Measures, Software Flaws: Buffer Overflow, Incomplete Mediation, Race Conditions, Malware Brain, Morris Worms, Code Red, Malware Detection, Firewalls: Design Principles, Types of Firewalls, Firewall Architectures, Trusted Systems, Operating System Security, Network Security, Security for Network Servers, Web Security and Security for Mobile Code Technologies Such as Java and Javascripts, Intrusion Detection Techniques to Provide Privacy in Internet Application and Protecting Digital Content (Music, Video, Software) from Unintended use

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**Recommended Books:**

1. Network security essentials (Applications and Standards) by William Stallings, Pearson Education

2 Information security principles & Practice, Mark Stamp, WILEY INDIA, 2006.
3 Cryptography and Network security, Fourth Edition, Stallings, PHI/Pearson
4 Cryptography and Network security by Behrouz A. Forouzan, TMH 2007
5 Network Security the complete reference, Robert Bragg, Mark Rhodes, TMH
6 Computer Security Basics by Rick Lehtimen, Deborah Russell & G.T. Gamgemi Sr SPD O' REILLY 2006
7 Modern Cryptography by Wenbo Mao, Pearson Education 2007

## COURSE OUTCOMES

After completion of this course, the students would be able to

CO1 define computer security and basics of cryptography
CO2 demonstrate different data encryption algorithms and keys used during encryption techniques
CO3 identify the various security attacks and threats
CO4 analyse evaluation criteria for AES, Triple DES and Traffic Confidentiality
CO5 explain SSL and TSL, Firewall, Digital Signatures and its standards & schemes and the enhancements made to IPv4 by IPsec
CO6 discuss various Web Security considerations

Department of Computer Science & Engineering and Information Technology

## MODELS AND TECHNIQUES IN COMPUTER GRAPHICS
630117

**UNIT I**

Introduction to Computer Graphics & Graphics Systems: Random and Raster Scan Display, Scan Conversion: Line, Circle and Ellipse Generation Algorithms. Windowing and Clipping Operations: Cohen Lad Sutherland Subdivision Line Clipping, Mid-Point Subdivision, Cyrus-Beck and Liang-Barsky Line Clipping, Polygon Clipping Algorithm.

**UNIT II**

3D transformations: Translation, Rotation, Scaling & other Transformations, Rotation about an Arburary Axis, Reflection through an Arbitrary Plane, Parallel and Perspective Projection, Computation of Vanishing Point.

**UNIT III**

Computations and Polygons, Point inclusion Problem, Polygon Filling, Polygon Intersection, Rendering & Visualization, Shading: Gouraud and Phong, Illumination Model, Raytracing, Color Models.

**UNIT IV**

Curves: Curve Representation, Parametric Cubic Curve, Parametric Bicubic Surfaces, Bezier Curves, B-Spline Curves, end Conditions for Periodic B-Spline Curves, Rational B-Spline Curves, Hidden Surface Elimination Algorithm: Z-Buffer Algorithm, Back Face Detection, Scan-Line Algorithm, Area Subdivision Algorithm.

**UNIT V**

Advanced Modeling Techniques: Procedural Models, Fractal Models, Grammar Based Models, Particle Systems: Animation: 3D Animation, Morphing, Simulation of Key Frames.

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**Recommended Books:**

1. Hearn, Baker - "Computer Graphics ( C version 2nd Ed )" Pearson Education
2. Foley, Vandam, Feiner, Hughes - "Computer Graphics principles (2nd Ed ) - Pearson Education
3. D. F. Rogers, J. A. Adams - "Mathematical Elements for Computer Graphics (2nd Ed )"- TMH
4. Z. Xiang, R. PlastockSchaum's outlines Computer Graphics (2nd Ed )" -TMH
5. W. M. Newman, R F. Sproull - "Principles ofInteractive computer Graphics" - TMH

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## COURSE OUTCOMES

After completion of this course, the students would be able to

CO1 recall the basic concepts used in computer graphics
CO2 illustrate various algorithms to scan, transformations, area filling, clipping
CO3 apply various curve and modelling techniques
CO4 analyze different clipping, rasterization and hidden surface elimination algorithm
CO5 compare the application of various types of transformations and animation techniques
CO6 design applications in graphics by using various types of viewing and shading techniques.

# *Syllabi*
# *of*
# *Departmental Elective (DE) Courses*
## *M.Tech I Semester*
## *(Cyber Security)*

Department of Computer Science & Engineering and Information Technology

## CYBER LAW AND EMERGING JURISPRUDENCE
## 640114

**UNIT I**

Introduction, defining Cyber Space, Cyber Law and IT Act 2000, Jurisdiction in Cyber Space, Contracts, Electronic Contracts, Cyber Contracts and Indian Legal Position

**UNIT II**

Faith in Cyber World, Digital Signature and Electronic Signature, Electronic Governance, Internet Governance

**UNIT III**

Cyber Crimes: Introduction to Cyber Crimes, Law Relating to Cyber Crimes: Procedural Law & Other Laws relating to Cyber-crime, Evidence Act

**UNIT IV**

International Laws and Cyber Crimes: Cyber Crime in International Perspective

**UNIT V**

Case Laws: study of Landmark Cases relating to Cyber Crime (1) Hacking (2) Obscenity, Pornography (3) Cyber Stalking (4) Cyber terrorism (5) Identity Theft

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**Recommended Books:**

1. The Indian Cyber law with Cyber glossary, Suresh T. Vishwanathan, New Delhi: Bharat Law House 2000
2. Law of Cyber Crimes and Information technology law, S. V. JogaRao, 2007
3. Cyber law, Cyber crime Internet and E-Commerce, Vimlendu Tayal,
4. Information technology law and Practice, Vakul Sharma
5. Internet Law Text and Materials, Chris Reed

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## COURSE OUTCOMES

After completion of this course, the students would be able to

CO1 define the cyber space environment and operational approaches

CO2 explain the key terms and concepts in cyber law, domain theft, intellectual property and cyber crimes

CO3 identify computer technologies, digital evidence collection and secure governance methods

CO4 categorize cyber laws in accordance to International perspective

CO5 survey landmark cases related to cyber crimes

CO6 conclude the cases based on the nature of cyber crime

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Department of Computer Science & Engineering and Information Technology

## CLOUD COMPUTING AND SECURITY
## 640115

**UNIT I**

Cloud Computing fundamental: Cloud Computing definition, Cloud types: Public, Private and Hybrid clouds. Cloud Services: SaaS, PaaS, IaaS. Benefits and challenges of Cloud Computing. Business agility: benefits and challenges to Cloud Architecture. Cloud Deployment models. Cloud Applications and Development environments for service development: Amazon, Azure, Google app etc.

**UNIT II**

Security Concepts: Confidentiality, Privacy, Integrity, Authentication, non-repudiation, Availability, Access Control, defense in depth. Least privilege in respect to SaaS, PaaS, IaaS.

**UNIT III**

Infrastructure, data and storage security: Network level, Host level and Application level, Aspect of data security: Data Security Mitigation. Provider Data and its Security.

**UNIT IV**

Privacy concern in the Cloud: Data life cycle, changes to privacy risk management and compliance in relation to cloud computing-International laws and regulations. System security-storage consideration. Backup and recovery-virtualization system vulnerabilities.

**UNIT V**

Security Management in the Cloud: Security management standards - SaaS, PaaS and IaaS, Availability management, Access Control, Data Security and Storage in the Cloud.

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**Recommended Books:**

1. Bill Wilder, Cloud Architecture Patterns. [ISBN: 1449319777]
2. Tim Mather, Cloud Security and Privacy. [ISBN: 0596802765]
3. Rajkumar Buyya, Christian Vecchiola, S. Thamarai Selvi, Mastering cloud computing

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## COURSE OUTCOMES

After completion of this course, the students would be able to

CO1 list different terminologies used in cloud computing
CO2 explain the security threats and their respective prevention techniques available
CO3 build models for addressing the security issues of cloud computing
CO4 analyse various cloud computing models for identifying key challenges in cloud computing security
CO5 examine the virtualization concept in installing procedure of real world cloud based applications
CO6 discuss platform as service using available cloud of various vendors

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Department of Computer Science & Engineering and Information Technology

## E-COMMERCE SECURITY
**640116**

**UNIT I**

Introduction to E-Commerce. Operating system services, Advantages and Disadvantages of E-Commerce, developer services, application services, Store Services, client Services, type of E-commerce solutions, Direct Marketing and Selling, Supply chain integration, Corporate Procurement.

**UNIT II**

Business Models for E-commerce. E-Business Models based on Relationship of Transaction Parties, Brokerage Model, Aggregator Model Info-mediary Model Community Model, Value Chain Model Manufacturer Model, Advertising Model, Subscription Model. E-Marketing - Identifying Web Presence Goals, Browsing Behaviour Model, Building Customer Relationship Based on One- to -One Marketing, E-Branding, elements of Branding, Spiral Branding.

**UNIT III**

Electronic Data Interchange: Evolution uses, Benefits, Working of EDI, EDI Standards (Includes Variable Length EDI Standards) Cost Benefits Analysis of EDI, Electronic Trading Networks, EDI components, File Types, EDI Services, EDI Software, Business Approach of EDI, EDIFACT (Overview, Structure, EDIFACT Software) Business Future of EDI, EDI Administration, EDI Security, Digital Signatures, Digital Certificates, Cryptography export restrictions, Secure Socket Layer (SSL), Secure Electronic Transaction (SET) Smart Cards and its applications, WAP, WAP architecture, WAP programming model.

**UNIT IV**

Electronic payment security. Electronic Payment systems – Electronic Commerce, Offline versus Online, Debit versus Credit, Macro versus Micro, Payment Instrument, Electronic Wallet, Smart Cards, Electronic Payment Security, Payment Security Services – Payment Transaction Security, Digital Money Security, Electronic Cheque Security, Availability and Reliability, Electronic Payment Framework.

**UNIT V**

Security on the Web and Mobile. Network and Website Security Risks, HTTP Cache Issues, HTTP Client Authentication, Web Transaction Security, Web Server Security, Web Client Security, Mobile Agent Security – mobile agent, Security Issues, Protecting Platforms from Hostile Agents, Smart Card Security, Firewall Concepts, Firewall Components, Benefits of an Internet Firewall, Enterprise – wide Security Framework, Secure Physical Infrastructure.

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**Recommended Books:**

1. E-Commerce An Indian Perspective P. T. Joseph S. j. PHI

2. Electronic Commerce: Greenstein, Merylin, Tata Mc Graw Hill
3. E-Commerce Business, Technology, Society, Kenneth C. Laudon, Carol Guerico Traver, Pearson Education

## COURSE OUTCOMES

After completion of this course, the students would be able to

CO1 explain the facts and ideas of e- commerce
CO2 compare the different business models for e- commerce
CO3 categorize the issues of security on the web and mobile
CO4 divide the electronic payment security into different payment systems
CO5 determine different security methods for enhancing security of web and mobile
CO6 elaborate the architecture of electronic data interchange

Department of Computer Science & Engineering and Information Technology

## BIOMETRIC SYSTEMS AND BIOMETRIC IMAGE PROCESSING
## 640117

**UNIT I**

Introduction: Biometric Fundamentals, Biometric Technologies, Biometrics Vs Traditional Techniques, Characteristics of a Good Biometric System, Benefits of Biometrics, Key Biometric Processes: Verification, Identification and Biometric Matching, Performance Measures in Biometric Systems, FAR, FRR, FTE, EER and ATV Rate, applications of Biometric Systems, Security and Privacy issues. Physiological Biometrics: Leading Technologies: Finger-Scan, Facial-Scan, Iris-Scan, Voice-Scan, Components, Working Principles, Competing Technologies, Strengths and Weaknesses, other Physiological Biometrics: Hand- an, Retina-Scan, Components, Working Principles, Competing Technologies, Strengths and Weaknesses, Automated Fingerprint Identification Systems.

**UNIT II**

Behavioral Biometrics: Leading Technologies, Signature-Scan, Keystroke Scan, Components, Working Principles, Strengths and Weaknesses. Privacy and Standards in Biometrics: Assessing the Privacy Risks of Biometrics, Designing Privacy-Sympathetic Biometric Systems, Need for Standards, Different Biometric Standards.

**UNIT III**

Fundamentals Of Image Processing: Digital Image Representation, Fundamental Steps in Image Processing, Image Enhancement: Spatial Domain Methods, Frequency Domain Methods, Image Segmentation: Pixel Classification by Thresholding, Histogram Techniques, Smoothing and Thresholding, Gradient Based Segmentation: Gradient Image, Boundary Tracking, Laplacian Edge Detection.

**UNIT IV**

Fingerprint Biometrics: Fingerprint Patterns, Fingerprint Features, Fingerprint Image, Width between Two Ridges, Fingerprint Image Processing, Minutiae Determination, Fingerprint Matching: Fingerprint Classification, Matching Policies.

**UNIT V**

Iris Biometrics: Ms System Architecture: Definitions and Notations, Iris Recognition: Iris Location, Doubly Dimensionless Projection, Iris Code: Comparison - Coordinate System: Head Tilting Problem, Basic Eye Model, Searching Algorithm, Texture Energy Feature.

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**Recommended Books:**

1. Anil K. Jain, Patrick Flynn, Arun A. Ross: "Handbook of Biom ethos", Springer, 2008.
2. Anil K. Jain, Arun A. Ross, Karthik Nandakumar, introduction to Biometrics", Springer, 2011.
3. Samir Nanavati, Michael Thieme, Raj Nanavati, "Biometrics — Identity Verification in

a Network World", Wiley-dreamtech India Pvt Ltd, New Delhi, 2003.
4 Paul Reid, "Biometrics for Network Security", Pearson Education, New Delhi, 2004.
5 John R Vacca, "Biometric Technologies and Verification Systems" Elsevier Inc. 2007
6 David D. Zhang, "Automated Biometrics Technologies and Systems", Kluwer Academic Publishers, New Delhi, 2000
7 Rafael C Gonzalez, Richard E Woods, Steven L Eddins, "Digital Image Processing", Pearson Education, New Delhi, 2009

## COURSE OUTCOMES

After completion of this course, the students would be able to:

CO1 define various biometric technologies along with their basic features and other parameters.
CO2 explain the state-of-the-art in biometric technologies and explore the currently available biometric systems.
CO3 identify the issues related to fingerprint and iris technology and plan a mechanism to solve them.
CO4 analyze the fundamental concepts of digital image processing and their applications in biometric systems.
CO5 compare and contrast various physiological and behavioral biometrics approaches.
CO6 design large scale biometric identification systems for real world security systems.

# *Syllabi*
# *of*
# *Open Category (OC) Course*
# *in M.Tech*
# *(offered under Department of CSE & IT)*

Department of Computer Science & Engineering and Information Technology

## SOFT COMPUTING
## 620118/630118/640118

### COURSE OBJECTIVES

- To provide the student with the basic understanding of neural networks and fuzzy logic fundamentals, Program the related algorithms and Design the required and related systems.
- To understand the fundamental theory and concepts of neural networks, neuro-modeling, several neural network paradigms and its applications.
- To understand the basics of an evolutionary computing paradigm known as genetic algorithms and its application to engineering optimization problems.

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Unit-I

**Introduction and Fundamental Concept of ANN:** Basic models of Artificial Neural Networks, Terminologies of ANNs McCulloch-Pitts Neurons, Linear Separability, Hebb Network, **Supervised Learning Networks:** Introduction, Perceptron Networks, Back Propagation Networks, Radial Basis Function Networks, Hopefield networks.

Unit-II

**Unsupervised Learning:** Fixed weight Competitive Nets, Kohonen Self-Organizing Map, Learning vector quantization, Counter propagation Networks, Adaptive Resonance Theory Network.

Unit-III

**Fuzzy Set Theory:** Fuzzy Sets, Fuzzy Membership Functions, Operations on Fuzzy Sets, Fuzzy Relations, Fuzzy rules, Fuzzy Reasoning, **Defuzzification:** Lembda-Cuts for Fuzzy sets (Alpha-Cuts), Lembda-Cuts for Fuzzy Relations, Fuzzy Inference System: Introduction, Mamdani Fuzzy Model, Takagi-Sugeno Fuzzy Model.

Unit-IV

**Introduction:** Biological Background, Traditional optimization and Search Techniques, Basic Terminologies in GA, Operators in Genetic Algorithm, Stopping Condition for

Genetic Algorithm Flow, Classification of Genetic Algorithm, Comparison with Evolutionary algorithm, Application of Genetic algorithm

**Unit-V**

**Hybrid Soft Computing Techniques:** Introduction, Neuro-fuzzy Hybrid system, Adaptive Neuro fuzzy inference system(ANFIS), Genetic Neuro Hybrid system, Application of Soft Computing Techniques

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**RECOMMENDED BOOKS**

- Principles of Soft Computing, S. N. Sivanandam and S. N. Deepa , Wiley
- Neural Networks, Fuzzy Logic and Genetic Algorithms: Synthesis and Applications-S Rajasekaran & G.A. Vijayalakshmi Pai, PHI
- Introduction to Soft Computing Neuro-Fuzzy and Genetic Algorithms, Samir Roy and Udit Chakraborty, Pearson
- Neural Networks and Learning Machines-Simon Haykin PHI
- Fuzzy Logic and Engineering Application, Tomthy Ross, TMH

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**COURSE OUTCOMES**

After completion of this course, the students would be able to

CO1 define basic concepts of neural network and fuzzy systems
CO2 compare solutions by applying various soft computing approaches on a given problem
CO3 develop and train different supervised and unsupervised learning
CO4 classify various nature inspired algorithms according to their application aspect
CO5 compare the efficiency of various hybrid systems
CO6 design a soft computing model for solving real world problems

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## BLOCKCHAIN TECHNOLOGY
## 620119/630119/640119

**Unit -I**

**Introduction to Blockchain:** History: Digital Money to Distributed Ledgers. **Design Primitives:** Protocols, Security, Consensus, Permissions, Privacy

**Unit-II**

Blockchain Architecture and Design. **Basic crypto primitives:** Hash, Signature, Hashchain to Blockchain, Basic consensus mechanisms

**Unit-III**

**Consensus:** Requirements for the Consensus Protocols, Proof of Work (PoW), Scalability Aspects of Blockchain Consensus Protocols, **Permissioned Blockchains** Design Goals, Consensus Protocols for Permissioned Blockchains

**Unit -IV**

**Use Case I:** Blockchain in Financial Software and Systems (FSS): Settlements, KYC, Capital Markets, Insurance, **Use Case II:** Blockchain in Trade/Supply Chain: Provenance of Goods, Visibility, Trade/Supply chain finance, Invoice Management/Discounting, etc, **Use Case III:** Blockchain for Government: Digital Identity, Land Records and other kinds of Record Keeping between Government Entities, Public Distribution System / Social Welfare Systems

**Unit -V**

Blockchain Cryptography, Privacy and Security on Blockchain. **Case Studies:** Comparing Ecosystems - Bitcoin, Hyperledger

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**RECOMMENDED BOOKS**

- Blockchain, Melanie Swa, O'Reilly
- Blockchain: From Concepts to Execution, DebaganiMohanty
- Zero to Blockchain, Bob Dill, David Smits

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**COURSE OUTCOMES**

After completion of the course students would be able to:

CO1 define the basic key concepts and elements related to blockchain technology
CO2 interpret the needs /significances of blockchain technology
CO3 identify the requirements for the consensus protocol
CO4 examine the privacy and security issues in blockchain
CO5 compare various use cases of blockchain technology for performance analysis and defining application domains

CO6 explain the importance of blockchain technology in the fields other than financial system, like trade/supply chain management and other governmental services

Department of Computer Science & Engineering and Information Technology

## MACHINE LEARNING USING PYTHON
## 620120/630120/640120

**COURSE OBJECTIVES:**

- To learn the basic construct of python programming for implementing various Machine Learning algorithms.
- To understand the basic concepts of Machine Learning.
- To use Machine Learning concepts and algorithms for real-world problem solving.

---

**Unit – I**

**Introduction to Python Programming:** Setting up Programming Environment, Running Python Programs from a Terminal, Variables and Simple Data Types: Numeric, String, List, Tuple, Dictionary, Set, Boolean, Conditional Statements and Loops, Lambda Functions, Various inbuilt Functions, Read Write Operations in Files, using Python Packages and Modules.

**Unit – II**

**Data Processing and Visualization:** Introduction to Pandas, Installation, Reading CSV Files and Performing Various Operations: Slicing, Merging, Concatenation on Various Datasets. Introduction to Numpy, Vector Representation, Basic Operations on N-Dimensional Matrices using Numpy. Data Visualization using Matplotlib, Plotting Various Types of Graphs: Line, Bar, Scatter, Histogram and Pie-Charts.

**Unit – III**

**Introduction to Machine Learning:** Basic Principles, Applications, Challenges, Supervised, Unsupervised and Reinforcement Learning Approaches. Basic Steps of Machine Learning: Data Collection, Data Preparation, Choosing a Learning Model, Training a Model, Evaluation of Model, Parameter Tuning and Prediction.

**Unit – IV**

**Supervised Learning:** Linear Regression, Gradient Descent, Features, Overfitting, Regularization and Complexity, Training, Validation, Testing Data, Performance Matrices: Mean Squared Error(MSE), Root-Mean-Squared-Error(RMSE), Mean-Absolute-Error(MAE), $R^2$ or Coefficient of Determination, Multivariate Regression, Applications of Regression. **Classification:** Binary, Multi-Class and Multi-Label Classification, Applications: Logistic Regression, K-Nearest Neighbour, Decision Trees, Random Forests, Support Vector Machines and Neural Networks, Comparison Matrix.

**Unit – V**

**Unsupervised Learning:** Clustering and Association Problems: Applications, K-

Means, DBSCAN, Principal Component Analysis, Apriori Algorithm for Association Rule Learning Problems. Machine Learning Model Building on Various Datasets available on Kaggle and UCI Repositories using Python Machine Learning Library Scikit-Learn

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**RECOMMENDED BOOKS:**


- John Hunt. A Beginners Guide to Python 3 Programming. Springer. 1st Edition. 2019
- Learn Python the Hard Way. 3rd Edition
- Python Crash Course: A Hands-On, Project-Based Introduction to Programming. By Eric Matthes
- Andreas C. Müller, Sarah Guido. Introduction to Machine Learning with Python. O'Reilly Media, Inc. 2016
- Aurélien Géron. Hands-On Machine Learning with Scikit-Learn and TensorFlow. O'Reilly Media, Inc. 2017


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**COURSE OUTCOMES:**

After completion of this course, the students would be able to

**CO1.** define basic concepts of machine learning.

**CO2.** summarize various concepts of python programming, data processing and visualization.

**CO3.** apply machine learning algorithms to solve real world problems using python programming.

**CO4.** compare machine learning algorithms for applicability and performance analysis.

**CO5.** assess various open source datasets and estimate the most suitable machine learning model for prediction process.

**CO6.** build machine learning models on open source datasets using python machine learning library.

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ANNEXURE – IV

# *Scheme and Syllabi*
# *for*
# *Two Year M.C.A. Programme*
*[ITEM 11(b)]*

## Guidelines / Abbreviations for Two Years MCA Programme (Effective from July 2020)

**Abbreviations used**

| | |
|---|---|
| L | Lecture |
| T | Tutorial |
| P | Practical |
| BSC | Basic Science Courses |
| DC | Departmental Core |
| DE | Departmental Elective |
| BM | Business Management |
| OC | Open Category |
| DLC | Departmental Laboratory Courses |
| MOOC | Massive Open Online Courses |

**Definition of Credit**

| | |
|---|---|
| 1 Hr. Lecture (L) per week | 1 credit |
| 1 Hr. Tutorial (T) per week | 1 credit |
| 2 Hours Practical(Lab)/week | 2 credit |

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Master of Computer Applications (MCA) (2 Year Programme) (Semester – I) **Recommended W.E.F JULY 2020**

## Scheme of Examination

| S. no. | Course Category | Subject Code | Subject Name | Maximum Marks Allotted | | | | | | | Total Marks | Contact Periods per week | | | Total Credits |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Theory Slot | | | Practical Slot | | MOOC s | | | | | | |
| | | | | End sem | Mid sem | Quiz/ Assignment | End Sem | Lab work/ sessional | Assignment | Exam | | L | T | P | |
| 1. | BSC | 680111 | Mathematical Foundations | 70 | 20 | 10 | - | - | - | - | 100 | 3 | - | - | 3 |
| 2. | DC | 680112 | Data Structures and Algorithms | 70 | 20 | 10 | - | - | - | - | 100 | 3 | 1 | - | 4 |
| 3. | DC | 680113 | Database Management System | 70 | 20 | 10 | - | - | - | - | 100 | 3 | 1 | - | 4 |
| 4 | DC | 680114 | Operating System | 70 | 20 | 10 | - | - | - | - | 100 | 3 | 1 | - | 4 |
| 5. | HM | 680115 | Management Function and Oral & Written Communication | 70 | 20 | 10 | - | - | - | - | 100 | 3 | - | - | 3 |
| 6 | DLC | 680116 | Lab-I (Object Oriented Programming Lab) | - | - | - | 90 | 60 | - | - | 150 | - | - | 6 | 6 |
| 7. | DLC | 680117 | Lab-II (DBMS Lab) | - | - | - | 60 | 40 | - | - | 100 | - | - | 2 | 2 |
| | | | Total | 350 | 100 | 50 | 150 | 100 | | | 750 | 15 | 3 | 8 | 26 |

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**Master of Computer Applications (MCA) (2 Year Programme)** (Semester-II) ***Recommended W.E.F. JULY 2020***

## Scheme of Examination

| S. No. | Course Category | Subject Code | Subject Name | Maximum Marks Allotted | | | | | | | Total Marks | Contact Periods per week | | | Total Credits |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Theory Slot | | | Practical Slot | | MOOCs | | | | | | |
| | | | | End sem | Mid sem | Quiz/ Assignment | End Sem | Lab work/ sessional | Assignment | Exam | | L | T | P | |
| 1. | DC | 680213 | Software Engineering | 70 | 20 | 10 | - | - | - | - | 100 | 3 | 1 | - | 4 |
| 2. | DC | 680212 | Internet of Things (IoT) | 70 | 20 | 10 | - | - | - | - | 100 | 3 | 1 | - | 4 |
| 3. | DC | 680213 | Computer Networks | 70 | 20 | 10 | - | - | - | - | 100 | 3 | 1 | - | 4 |
| 4. | DE | DE | Departmental Elective-I | 70 | 20 | 10 | - | - | - | - | 100 | 3 | - | - | 3 |
| 5. | BM | DE (BM) | Departmental Elective-II (BM) | 70 | 20 | 10 | - | - | - | - | 100 | 3 | - | - | 3 |
| 6. | DLC | 680223 | Lab-III (Java Programming Lab) | - | - | - | 90 | 60 | | | 150 | - | - | 6 | 6 |
| 7. | DLC | 680224 | Lab-IV (Illustrate Programming Laboratory | - | - | - | 60 | 40 | - | - | 100 | | | 7 | 7 |
| | | | **Total** | **350** | **100** | **50** | **150** | **100** | - | - | **750** | **15** | **3** | **8** | **26** |

*Elective-I course will run through Department List of Elective, as decided by respective BoS / Department. Moreover, this may also be run through SWAYAM/NPTEL/MOOC based Learning Platform (with credit transfer facility) (if required) to address the technological advancements and diverse application orientation. The need is to be assessed by the department BoS.*

*Elective-II course will run through Department List of Electives (for Business Management), as decided by BoS / Department.*

*List of Electives will remain dynamic and may be kept updated, considering the industrial demand / current practices.*

| DE-1 (Tentative) | |
|---|---|
| **Subject Code** | **Subject Name** |
| 680214 | Computer Architecture and Organization |
| 680215 | Computer Graphics and Multimedia |
| 680216 | Web Technology |
| 680217 | Machine Learning with Python |

| DE-2 (BM) | |
|---|---|
| **Subject Code** | **Subject Name** |
| 680218 | Managerial Economics |
| 680219 | Corporate Planning |
| 680220 | MIS Framework and Implementation |
| 680221 | Management of Software Projects |
| 680222 | Organizational Behavior |

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Master of Computer Applications (MCA) (2 Year Programme) (Semester-III): **Recommended W.E.F JULY 2020**

## Scheme of Examination

| S. No. | Course Category | Subject Code | Subject Name | Maximum Marks Allotted | | | | | | | Total Marks | Contact Hours per week | | | Total Credits |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Theory Slot | | | Practical Slot | | MOOCs | | | | | | |
| | | | | End sem. Exam. | Mid sem. | Quiz/ Assign. | End Sem. /Practical Viva | Sessional Work / Practical Record/ Assignment etc. | Assignment | Exam | | L | T | P | |
| 1. | DC | 680311 | Artificial Intelligence and Applications | 70 | 20 | 10 | - | - | - | - | 100 | 3 | 1 | - | 4 |
| 2. | DM | 680312 | Management Support Systems | 70 | 20 | 10 | - | - | - | - | 100 | 3 | - | - | 3 |
| 3. | DC | 680313 | Data Mining and Warehousing | 70 | 20 | 10 | - | - | - | - | 100 | 3 | - | - | 3 |
| 4. | DE | DE | Departmental Elective-III (MOOC*) | - | - | - | - | - | 25 | 75 | 100 | 3 | - | - | 3 |
| 5. | OC | OC | Open Category Course | 70 | 20 | 10 | - | - | - | - | 100 | 3 | - | - | 3 |
| 6. | TEC* | 680322 | Minor Project | - | - | - | 50 | 100 | - | - | 150 | - | - | 06 | 06 |
| 7. | DLC | 680323 | Lab-V (Python Programming Lab) | - | - | - | 60 | 40 | - | - | 100 | - | - | 04 | 04 |
| | | | Total | 280 | 80 | 40 | 150 | 100 | 25 | 75 | 750 | 15 | 1 | 10 | 26 |

*Elective-III (MOOC) will run through SWAYAM / NPTEL. MOOC based learning platform with credit transfer facility. MOOC course will be treated as the course of open nature and will be decided by concerning department / BoS.

*Open Category course will have to be opted from the pool of open courses. This course will be based on interdisciplinary aspects. (This course may be run through SWAYAM/NPTEL based platform with credit transfer facility and accordingly, OC pool may be created from the list of SWAYAM/NPTEL courses)

List of Electives will remain dynamic and may be kept updated, considering the industrial demand / current practices.

| DE-3 (Tentative) | |
|---|---|
| Subject Code | Subject Name |
| 680314 | Cloud Computing |
| 680315 | Data Analytics using R |
| 680316 | Big Data Computing |
| 680317 | Deep Learning for Computer Vision |
| 680318 | Human Computer Interaction |

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(A Govt. Aided UGC Autonomous Institute Affiliated to R G P V, Bhopal, M P.)

Master of Computer Applications (MCA) (2 Year Programme) (Semester IV) **Recommended W.E.F JULY 2020**

## Scheme of Examination

| S.No. | Course Category | Subject Code | Subject Name | Maximum Marks Allotted | | | | | Total Marks | Contact Hours per week | | | Total Credits |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Theory Slot | | | Practical Slot | | | | | | |
| | | | | End sem. Exam. | Mid sem. | Quiz/ Assignment | End Sem. /Practical Viva | Sessional Work/ Practical Record/ Assignment/ Quiz/ Presentation | | L | T | P | |
| 1. | SEMINAR/ SELF STUDY | 600403 | Self Learning Presentation/ Seminar | - | - | - | - | 100 | 100 | - | - | 2 | 2 |
| 2. | DLC | 600406 | System Development Project Internship | - | - | - | 700 | 200 | 900 | - | - | 20 | 20 |
| | | | Total | | | | 800 | 300 | 1000 | | | 22 | 22 |

*Self learning / presentation through SWAYAM / NPTEL (Registration in a course will be compulsory for students but assessment will be based on external seminar presentation)

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# *Syllabi*
# *of*
# *M.C.A. I Semester*

# Mathematical Foundations
## 680111 (BSC)

**Objective:**

- To understand the basic discrete mathematical structures
- To develop understanding of boolean mathematics
- To understand recurrence relations and its usage in computer science

**UNIT-I**

Sets Relations and Functions: Sets, Subsets, Power-Sets, Complement, Union and intersection, Demorgan's law, Cartesian products, Relations, relational Matrices, properties of relations, equivalence relation, Functions: Injection, Surjection, Bijection, Composition of Functions, Permutations, Cardinality, the characteristic functions and Mathematical induction.

**UNIT-II**

Lattices: Partial order set, Hasse diagrams, upper bounds, lower bounds, Maximal and minimal element, first and last element ,Lattices, sub lattices , Isotonicity, distributive inequality, lattice homomorphism, lattice isomorphism, complete lattice, complemented lattice, distribution lattice.

**UNIT-III**

Groups and Fields: Groups: Group axioms-permutation groups, Subgroups, Co-sets, Normal Subgroups, semi groups, Lagrange theorem, fields, minimal polynomials, reducible polynomials, primitive polynomial roots, applications.

**UNIT-IV**

Graphs: Finite graphs, incidence and degree, isomorphism, subgraphs and union of graphs, Connectedness, Walks paths and circuits Eulerian graphs, Trees properties of trees, pendant vertices in a tree, Center of tree Spanning trees and Cutvertices, Binary tree Matrix representation of graph, Incidence, Adjacency matrices and their properties, Applications of graphs in Computer Science.

**UNIT-V**

Discrete Numeric function and Recurrence relation: Introduction to discrete numeric functions and generating functions introduction to recurrence relations and recursive algorithms, Linear recurrence relations with constant coefficients, homogeneous solutions, particular solutions and total solutions.

**Books:**

1. J.P.Trembley & R.P.Manohar "Discrete Mathematical Structure with applications to Computer Science
2. Nersingh Deo: Graph Theory C.L. Liu Discrete Mathematics
3. C.L. Liu: Discrete Mathematics
4. D.K. Jain: Discrete Structures

**Course outcomes:**

Student would be able to

CO1: understand the basic concept of set theory, lattices, graph theory, discrete numeric function and algebraic structure.

CO2: describe basic knowledge of course content and distinguish between them in terms

of their applications

CO3 implement the course content to related engineering applications and problems faced in real life

CO4 apply the concepts of mathematics to the suitable technique for relevant industries and contribution to the society

CO5 analyze the set theory, lattices, graph theory, discrete numeric function and algebraic structure to examine the real world problem

CO6 design analytical skills and interpret applications of engineering beneficial in real time troubleshooting

# Data Structures and Algorithms
## 680112 (DC-1)

**Objective:**

- To understand the abstract data types stack, queue, deque, trees, lists etc.
- To be able to design efficient algorithms using various data structures.
- To understand design techniques the time complexity of algorithms.

UNIT-I

**Prerequisites:** Array, Structure, pointers, pointer to structure, functions, parameter passing, recursion.

**Stack and Queue:** contiguous implementations of stack, various operations on stack, various polish notations-infix, prefix, postfix, conversion from one to another-using stack, evaluation of post and prefix expressions. Contiguous implementation of queue. Linear queue, its drawback, circular queue, various operations on queue, linked implementation of stack and queue- operations.

UNIT-II

**General List:** list and it's contiguous implementation, it's drawback, singly linked list-operations on it, doubly linked list-operations on it, circular linked list, linked list using arrays.

**Trees**: definitions-height, depth, order, degree, parent and children relationship etc. Binary Trees- various theorems, complete binary tree, almost complete binary tree. Tree traversals-preorder, inorder and post order traversals, their recursive and non recursive implementations, expression tree- evaluation, linked representation of binary tree-operations. Threaded binary trees, forests, conversion of forest into tree. Heap-definition.

UNIT-III

**Searching, Hashing and Sorting**: requirements of a search algorithm, sequential search, binary search, indexed sequential search, interpolation search, hashing-basics, methods, collision, resolution of collision, chaining. Internal sorting- Bubble sort, selection sort, insertion sort, quick sort, merge sort on linked and contiguous list, shell sort, heap sort, tree sort.

**Graphs:** related definitions, graph representations- adjacency matrix, adjacency lists, adjacency multilist, traversal schemes- depth first search, breadth first search. Minimum spanning tree, shortest path algorithm, kruskal & dijkstra algorithm.

**Trees:** Miscellaneous features Basic idea of AVL tree- definition, insertion & deletion operations, basic idea of B-tree- definition, order, degree, insertion & deletion operations.

B-tree- definitions, comparison with B-tree, basic idea of string processing.

UNIT-IV

**Time Complexity:** models of computation, algorithm analysis, order architecture, time space complexities, computing the average and worst case analysis.

UNIT-V

**Divide and conquer:** Structure of divide-and-conquer algorithms, examples, Binary search, quick sort, Strassen Multiplication. Analysis of divide and conquer run time recurrence relations. **Graph searching and Traversal:** Overview, Traversal methods (depth first and breadth first search).

**Books:**

1. Kruse R.L. Data Structures and Program Design in C, PHI
2. TennenBaum A.M. & others. Data Structures using C & C++, PHI
3. Horowitz & Sawhaney. Fundamentals of Data Structures, Galgotia Publishers
4. Ullman "Analysis and Design of Algorithm" TMH
5. Goodman "Introduction to the Design & Analysis of Algorithms, TMH-2002
6. Sara Basse, A. V. Gelder, "Computer Algorithms." Addison Wesles
7. T. H. Cormen, Leiserson, Rivest and Stein. "Introduction of Computer algorithm." PHI

**Course Outcomes:**

Student would be able to

CO1 describe the stack, queue, link list.

CO2 analyze worst-case running times of algorithms using asymptotic analysis.

CO3 synthesize familiar with advanced data structures such as balanced search trees, hash tables, priority queues, tree traversal techniques

CO4 describe several sorting algorithms including quick sort, merge sort and heap sort

CO5 organize some graph algorithms such as shortest path and minimum spanning tree

CO6 evaluate different data structures techniques and pick an appropriate data structure for a design situation

# Database Management Systems
## 680113 (DC-2)

**Objectives:**

- To describe key concepts, issues, and operational terminology
- To understand the relationships of key components behind concepts such as hardware, networks, data storage, operating systems, and software programs
- To normalize any problem using $1^{st}$,$2^{nd}$,$3^{rd}$,$4^{th}$,$5^{th}$ normal form

**UNIT-I**

**Introduction:** Advantage of DBMS approach, various view of data, data independence, schema and sub-schema, primary concepts of data models, Database languages, transaction management, Database administrator and users, data dictionary, overall system architecture

**ER model:** basic concepts, design issues, mapping constraint, keys, ER diagram, weak and strong entity sets, specialization and generalization, aggregation, inheritance, design of ER schema, reduction of ER schema to tables

**UNIT-II**

**Domains, Relations and Keys:** domains, relations, kind of relations, relational database, various types of keys, candidate, primary, alternate and foreign keys

**Relational Algebra & SQL:** The structure, relational algebra with extended with extended operations, modifications of Database, idea of relational calculus, basic structure of SQL, set operations, aggregate functions, null values, nested sub queries, derived relations, views, modification of Database, join relations, DDL in SQL

**UNIT-III**

**Functional Dependencies and Normalization:** basic definitions, trivial and non trivial dependencies, closure set of dependencies and of attributes, irreducible set of dependencies, introduction to normalization, non loss decomposition, FD diagram, first, second, third Normal forms, dependency preservation, BCNF, multivalued dependencies and fourth normal form, Join dependency and fifth normal form

**UNIT-IV**

**Transaction, concurrency and Recovery:** basic concepts, ACID properties, Transaction states, implementation of atomicity and durability, concurrent executions, basic idea of serializability, basic idea of concurrency control, basic idea of deadlock, failure classification, storage structure types, stable storage implementation, data access, recovery and atomicity- log based recovery, deferred Database modification, immediate Database modification, checkpoints

**UNIT-V**

**Distributed Database:** basic idea, distributed data storage, data replication, data fragmentation- horizontal vertical and mixed fragmentation

**Emerging Fields in DBMS:** object oriented Databases-basic idea and the model, object structure, object class, inheritance, multiple inheritance, object identity, data warehousing- terminology, definitions, characteristics, data mining and it's overview, Database on www, multimedia Databases-difference with conventional DBMS, issues, similarity based retrieval, continuous media data, multimedia data formats, video servers

**Storage structure and file organizations:** overview of physical storage media, magnetic disks-performance and optimizations, basic idea of RAID, file organizations, organization of records in files, basic concepts of indexing, ordered indices, basic idea

of B-tree and B+-tree organization

**Books:**

1. Database System Concepts – A. Silberschatz, H.F. Korth, Sudersan, MGH Publication
2. An introduction to Database Systems – C.J. Date 6th ed.
3. Fundamentals of Database systems – L. elmasri & Navathe III ed.
4. An introduction to Database systems – B.C. Desai

**Course Outcomes:**

Student would be able to

CO1 differentiate database systems from file systems by enumerating the features provided by database systems and execute various SQL queries.

CO2 define the terminology, features, classifications, and characteristics embodied in database systems.

CO3 design principles for logical design of databases, including the E-R method and improve the database design by normalization.

CO4 evaluate the principles of storage structure and recovery management.

CO5 identify the issues of transaction processing and concurrency control.

CO6 analyze an information storage problem and derive an information model expressed in the form of an entity relation diagram and other optional analysis forms, such as a data dictionary, file and page organizations, indexing methods including B tree, and hashing.

## Operating Systems
## 680114 (DC-3)

Objectives:

- To learn the fundamentals of Operating Systems.
- To understand the intrinsic of basic services provided by the operating system like process management, processor management, memory management, deviocc management and information management.
- To gain knowledge on Distributed operating system concepts that includes architecture, Mutual exclusion algorithms, Deadlock detection algorithms and agreement protocols

UNIT-I

**Introduction:** Evolution of operating systems, Types of operating systems, Different views of operating system, operating system concepts and structure

**Processes:** The process concept, systems programmer's view of processes, operating system services for processes management, scheduling algorithms, Performance evaluation

UNIT-II

**Memory Management:** Memory management without swapping or paging, swapping , virtual memory, page replacement algorithms, modeling paging algorithms, design issues for paging system, segmentation

UNIT-III

**Interprocess communication and synchronization:** The need for interprocess synchronization, mutual exclusion, semaphores, hardware support for mutual exclusion, queuing implementation of semaphores, classical problems in concurrent programming, critical region and conditional critical region, monitors messages

UNIT-IV

**Deadlocks:** Deadlock prevention, deadlock avoidance

**File system:** File systems, directories, file system implementation security and protection mechanism

**Input/Output:** Principles of I/O Hardware: I/O devices, device controllers, direct memory access, Principles of I/O software: Goals interrupt handlers, device drivers, and device independent I/O software, User space I/O software

UNIT-V

**Disks:** Disk hardware, scheduling algorithms, Error handling, track-at-a time caching RAM disk

**Clocks:** clock hardware, memory mapped terminals, I/O software

**Distributed file system:** Design, implementation and trends

**Performance measurement:** monitoring and evaluation introduction, important trends affecting performance issues, why performance monitoring and evaluation are needed, performance measures, evaluation techniques, bottlenecks and saturation, feedback loops

**Case studies:** MS-DOS, MS Windows and Linux (Unix) Operating System.

Books:

1 Deitel "An introduction to operating systems" Addison Wesley Publishing Company 1984

2 Milenkovic M "Operating Systems – concepts and design" McGraw Hill International Edition – Computer science series 1992

3. Peterson, Silberschatz "Operating System Concepts" Addison Wesely Publishing Company, 1989
4. Tanenbaum A.S "Modern Operating System" Prentice Hall of India Pvt Ltd 1995

**Course Outcomes:**

Student would be able to

CO1 evaluate different structures for operating systems
CO2 analyze theory and implementation of processes, resource control (concurrency etc.)
CO3 distinguish system calls for managing processes, memory and the file system
CO4 demonstrate the Mutual exclusion, Deadlock detection and agreement protocols of Distributed operating system
CO5 apply the various resource management techniques for distributed systems
CO6 discover the different features of real time and mobile operating systems

## Management Functions and Oral & Written Communication
## 680115 (BM-1)

**UNIT-I**

Definition - Management - Role of managers - Evolution of Management thought - Organization and the environmental factors – Trends and Challenges of Management in Global Scenario

PLANNING Nature and purpose of planning - Planning process - Types of plans – Objectives - - Managing by objective (MBO) Strategies - Types of strategies - Policies - Decision Making - Types of decision - Decision Making Process - Rational Decision Making

ORGANIZING Nature and purpose of organizing - Organization structure - Formal and informal groups organization - Line and Staff authority - Departmentation - Span of control - Centralization and Decentralization - Delegation of authority - Staffing - Selection and Recruitment - Orientation - Career Development - Career stages - Training - - Performance Appraisal

**UNIT-II**

DIRECTING Creativity and Innovation - Motivation and Satisfaction - Motivation Theories - Leadership Styles - Leadership theories - Communication - Barriers to effective communication - Organization Culture - Elements and types of culture - Managing cultural diversity

CONTROLLING Process of controlling - Types of control - Budgetary and non-budgetary control Q techniques - Managing Productivity - Cost Control – Purchase Control – Maintenance Control - Quality Control - Planning operations

**UNIT-III**

Communication: Meaning, Nature, Process, Medium and Media, and Elements of Communication. Importance of Effective Communication, Communication Situation, Barriers to Communication, Communication Window, Objectives of Communication. Types of Communication: Verbal and Non-Verbal, Oral and Written, merits and demerits of Oral and written Communication, Horizontal and Vertical Communication, Formal and informal communication, Grapevine Communication. Negotiation: Utility and Styles, Creativity.

**UNIT-IV**

Communication Skills: Listen, Speak, Read and Write, improving Communication Skills. Speaking: Presentation, Conducting, Use of Aids – Visual and Audio-visual, Group Discussion, Meetings, Interview, Telephonic Conversations, Seminar, Debates, Speech, Body Language.

**UNIT-V**

Writing: Mechanics of Writing, Paragraph Writing, Letters: Essentials of Writing Letters, Types of Official Letters, Letters of complaints enquiry, order, and Informative Applications. Job Applications, Drafting Bio Data, Précis writing.

Writing Reports: Mechanics of Report Writing, Types of Report, Technical Report, Organising a report Precise Writing, Advertisement and Comprehension.

**Books:**

1. Stoner, Freeman & Gilbert Jr - Management (Prentice Hall of India, 6th Edition)

2. Koontz Harold & Weihrich Heinz - Essentials of management (Tata Mc Graw Hill, 5th Edition 2008)
3. Robbins & Coulter - Management (Prentice Hall of India, 9th Edition)
4. Robbins S. P. and Decenzo David A. - Fundamentals of Management Essential Concepts and Applications (Pearson Education, 6th Edition)
5. Communication Skills for Engineers – Pearson Education
6. Technical Communication – Oxford University Press
7. Effective Business communication – Tata McGraw Hill
8. Business Communication – OUP, Tata McGraw
9. Practical English Grammar by Thomson Martinet – Oxford University Press
10. Study Listening, Speaking Reading, Writing a series by Cambridge University Press
11. Communication Skills for Technical Students Farhathullah, T M Orient Longman
12. English for Engineers & Technologists (Combined Vol 1 and Vol 2) Orient Longman

**Course outcomes:**

Student would be able to:

CO1. demonstrate the roles, skills and functions of management

CO2. analyze the complexities associated with management of human resources in the organizations and integrate the learning in handling these complexities

CO3. demonstrate knowledge and comprehension of major text and traditions in language as well as its social, cultural, and historical context

CO4. read a variety of text critically and analytically so as to demonstrate in written and/or speech the interpretation of those texts

CO5. evaluate and interpret text written in English assessing the results in written and oral arguments using appropriate material for support.

CO6. develop professional work habits including those necessary for effective collaboration and cooperation with others

## Object Oriented Programming Lab
## 680116 (DLC-1)

Data Types. Constant & Variable. Operators & expressions. Priority & associatively of operators.

Control Constructs- if-else, for while, do-while, Case statement. Arrays. Formatted & unformatted I/O. Type modifiers & storage classes. Ternary operator. Type conversion & type casting. Special constructs-Break, continue, exit (), goto & labels.

Functions. Arguments. Return Value. Parameter passing- call by value, call by reference, Return statement, Scope, visibility and life-time rules for various types of variable, static variable. Calling a function. Recursion – basics, comparison with iteration, tail recursion, when to avoid recursion, examples

Overview of object oriented programming, evolution, features, comparison with procedural languages, applications, advantages. C++ basics, data types, Operators, loops and decisions, structures and functions, references

Object model, OOD, OOA, abstraction, encapsulation, modularity, hierarchy , state, behavior and relationship among objects. Object oriented design, identifying classes and objects, object diagrams

Course outcomes:

Student would be able to
CO1 Adhere to object oriented programming constructs

CO2 Implement inheritance, polymorphism, encapsulation, abstraction

CO3 Modify existing codes and classes as per the requirement of software development

CO4 Construct programming solutions to a broad range of query problems

CO5 Develops object oriented application system as part of a team in industry

CO6 Design the classes and constructs for real time software as per societal needs

## Database Management Laboratory
## 680117 (DLC-2)

Basic structure of SQL, set operations, aggregate functions, null values, nested sub queries, derived relations, views, modification of Database, join relations, DDL in SQL. Creation of a database and writing SQL queries to retrieve information from the database. Performing insertion, deletion, modifying, altering, updating and viewing records based on conditions. Queries (along with sub Queries) using ANY, ALL, IN, EXISTS, NOTEXISTS, UNION, INTERSET, Constraints. Creation of Views, Creating an Employee database to set various constrainis. Creating relationships between the databases. Case Study using real life database applications.

**Course outcomes:**

Student would be able to

CO1 **Design** database application system as part of a team

CO2 **Solve** queries using SQL

CO3 **Design** an information model expressed in the form of an entity relation diagram

CO4 **Adapt** normalization theory for a database

CO5 **Implement** data definition language for the schema using a DBMS

CO6 **Construct** database application system solutions to a broad range of query problems

# *Syllabi*
# *of*
# *Departmental Core (DC) Courses*
## *M.C.A. II Semester*

# Software Engineering
## 680211 (DC-4)

**COURSE OBJECTIVES**

- To understand the basic concepts of software engineering logical process modeling and operational terminology
- To understand the software process models
- To draw DFDs using specific rules and components to depict logical process models

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**UNIT - I Introduction to Software Engineering:**
Definition, Software Characteristics and Elements of system, The System Development Life Cycle, The Role of System Analyst, Types of Requirement- Functional and Non-functional Requirements, User and System Requirements, Requirement Elicitation Methods, Requirement Analysis Methods, Requirement Documentation (SRS), Requirement Validation, Requirement Management

**UNIT - II Software Process Models:**
Software, Software Myths, Software Engineering - A Layered Technology, Software Process Models, The Linear Sequential Model, The Prototyping Model, The RAD Model, Evolutionary Software Process Models, Fourth Generation Techniques

**UNIT - III Design Concept, Principle and Methods:**
Design Fundamentals, Design Principles, Effective Modular Design, Design Representations, Real Time Design, Object Oriented Design, Coupling and Cohesion, Risk analysis

**UNIT - IV Software Metrics, Project Management and Estimation:**
Metrics in Process and Project domains, Software Measurement, Software Quality Metrics, **Project Management**- Basics-People,Product, Process, Project, **Estimation**- Software Project Estimation, Decomposition Techniques- Function Point Estimation, Line of Code (LOC) based estimation, Empirical Estimation, COCOMO Model, Project Scheduling Techniques

**UNIT - V Software Quality Assurance and Testing:**
Definitions, Quality Concepts, Software Quality Assurance, Software Reviews, Formal Technical Reviews, Formal Approaches to SQA, Software Testing Life Cycle (STLC), Test Case Design, Strategic Approach to Software Testing- Verification & Validation, Strategic issues, Criteria for completion of Testing, Unit Testing, Integration Testing, Validation Testing, System Testing, Black Box Testing Techniques, White Box Testing Techniques, Acceptance Testing

**BOOKS**

- Software Engineering by Sommerville, Pearson
- Software Engineering, A Practitioner's Approach, by Roger S. Pressman, McGraw Hill
- Software Engineering by K.K. Agrawal & Yogesh Singh, New Publication
- Software Engineering by Rajib Mall

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**Course Outcomes:**
After completion of this course, the students would be able to
CO1: design and mapping of different real world problems using software engineering concepts

CO2: evaluate software models with respect to their accuracy and needs of the customer requirement

CO3: design test cases and SQA of a software system

CO4: identify and how to use various cost estimation techniques used in software engineering

CO5: design a system, component, or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability

CO6: evaluate as an effective member or leader of software engineering teams and manage time, processes and resources effectively by prioritizing competing demands to achieve personal and team goals

# Internet of Things
## 680212 (DC-5)

**Unit I**

Introduction & Concepts: Introduction to Internet of Things, Architecture, Physical Design of IOT, Logical Design of IOT, Four Pillars of IoT, Applications, IOT Enabling Technologies, IOT components, Basics of Networking.

**Unit II**

Sensors, actuators, types of sensors, IOT service oriented Architecture, IOT associated technologies, IOT Communication Protocols: IEEE 802.15.4, Zigbee, 6LoWPAN, Wireless Hart, AMQP, MQTT, COAP, NFC, XMPP, SOAP, REST, HTTP, Routing protocols.

**Unit III**

Developing Internet of Things & Logical Design using Python: Introduction, IOT Design Methodology, Installing Python, Python Data Types & Data Structures, Control Flow, Functions, Modules, Packages, File Handling, Date/ Time Operations, Classes, Introduction to Raspberry Pi, Introduction to Arduino Programming, Integration of Sensors and Actuators with Arduino, Raspberry Pi & arduino devices.

**Unit IV**

Sensor Networks, Ubiquitous Computing, data storage in IOT, IOT Cloud Based Services, Interoperability in IoT, cloud Computing, Fog Computing, Edge computing, Data Analytics overview.

**Unit V**

Security and privacy in the internet of things: concepts, IoT security overview, security framework for IoT, Privacy in IOT networks, IoT Robustness and reliability, governing internet of things: issues, Approaches and new paradigms. IOT Case studies: Home Automation, Cities, Environment, Energy, Retail, Logistics, Agriculture, Industry, Health & Life Style.

**Books:**

1. Rajkamal,"Internet of Things", Tata McGraw Hill publication.

2. Vijay Madisetti and Arshdeep Bahga, "Internet of things(A-Hand-on-Approach)", 1st Edition ,Universal Press.

3. Hakima Chaouchi "The Internet of Things: Connecting Objects", Wiley publication.

4. Charless Bell "MySQL for the Internet of things", Apress publications.

5. Francis dacosta "Rethinking the Internet of things A scalable Approach to connecting everything", 1st edition, Apress publications 2013.

6. Donald Norris"The Internet of Things: Do-It-Yourself at Home Projects for Arduino, Raspberry Pi and BeagleBone Black", McGraw Hill publication.

**Course Outcomes:**

CO1: Define fundamentals of IoT, Enabling Technologies, Networking and Communication Protocols.

CO2: Illustrate the functions, applications of various IOT Protocols and architectures.

CO3: Make use of networking knowledge in Domain Specific IOTs for societal benefits

CO4: Discover technologies and theories involved in Sensor Networks, Machine-to-Machine Communications & Arduino Programming

CO5: Evaluate the role of Security and privacy in the internet of things to provide solutions related to reliability and privacy for real world problems

CO6: Develop IoT design methodologies using Python constructs and Raspberry Pi

## Computer Networks
## 680213 (DC-6)

Objectives:

- To introduces students to computer networks and concentrates on building a firm foundation for understanding Data Communicatsons and Computer Networks
- To introduce the student to the major concepts involved in wide-area networks (WANs), local area networks (LANs) and Wireless LANs (WLANs)
- To acquire Familiarity with the basic protocols of computer networks and how they can be used to assist in network design and implementation

UNIT-I

**Introduction:** Layered Networks Architecture, Review of ISO-OSI model, Data Communication techniques pulse code modulation (PCM) Differential Pulse Code Modulation (DPCM), Delta Modulation (DM), transmission media wires cables, radio links, satellite links, fiber-optic links, error detection, parity check codes, cyclic redundancy codes, & Hamming code

UNIT-II

**Multiplexing and DLC Preliminaries:** Multiplexing techniques Frequency division, time division, statistical time division multiplexing, multiplexing hierarchies. **DLC Preliminaries:** Stop and wait protocols Noise free and noisy channels, performance and efficiency, sliding window protocols Go back and selective repeat

UNIT III

**Data Link Protocols:**

HDLC data link protocol, Integrated services digital networks, interfaces, Devices, Channel structure, Asynchronous transfer node (ATM) cells, header and cell formats, Layers in ATM, Class 1,2,3,4 traffic

FDDI, token bus, token ring, Reservation, polling, Multiple access protocols Concept of random access Pure ALOHA, Slotted ALOHA, CSMA, CSMA/CD, FDMA, TDMA, CDMA

UNIT-IV

**Network Layer Protocols:** Design Issues Virtual Circuits and Datagram, Internetworking & devices Repeaters, Hubs, Bridges, Switches, Router, Gateway, Addressing Internet address, classful address, subnetting, Routing techniques, static vs. dynamic routing , routing table for classful address.Routing algorithms Optimality principle, Shortest path routing – Dijkstra, bellman-ford and floyd warshall algorithms, flooding and broadcasting, distance vector routing, link state routing, flow based routing, multicasting, routing

UNIT-V

**Transport Layer Protocols and Congesting Control:** General principles of congestion control, window flow control, packet discarding, Isarithmic control, traffic shaping, choke packets Leaky bucket algorithm, Token bucket algorithm, choke packets; Connection Management, Addressing, Connection Establishment and releases, flow control and buffering, multiplexing, crash recovery in TCP

**Presentation and Application Layer Protocols:** Presentation concepts, Cryptography Substitution and transposition, ciphers, data encryption standard (DES), DES chaining,

breaking DAS, public key cryptography, RSA, authentication protocols

**Books:**

1. A.S. Tanenbaum, "Computer Networks", Second Ed., Prentice Hall India(tan)
2. J.F.Hayes, "Modeling and Analysis of Computer Communication Networks", Plenum press.
3. D.Bertsekas and R. Gallager, "Data Networks", Second Ed. Prentice Hall, India.
4. D.E. Comer, "Internetworking with TCP/IP", vol. 1, prentice Hall India.
5. G.E. Keiser, "Local Area Networks", McGraw Hill, international Ed.
6. W. Stalling, "Data & Computer Communications", Maxwell Macmillan international Ed.

**Course Outcomes:**

Student would be able to

CO1. describe various data communication techniques, OSI reference model, the TCP/IP reference model and other basics in data communication and networking. (Understanding)

CO2. discuss some medium access protocols (like, Pure ALOHA, Slotted ALOHA, CSMA, CSMA/CD etc), some Modern topics (like ISDN services, ATM) (Understanding)

CO3. examine various multiplexing techniques, error detection & correction methods, flow control methods and other concepts of computer networks to achieve required networking results as per standards. (Analyzing)

CO4. illustrate different types of network devices and their functions within a network, Internetworking devices, Routing concepts, techniques and protocols and other concepts of computer networks (Applying)

CO5. evaluate various congestion prevention, avoidance and control mechanisms and other concepts of computer networks (Evaluation)

CO6. justify the use of cryptography, security and networking techniques and other concepts of computer networks for providing better network/applications in society. (Evaluation)

# *Syllabi*
# *of*
# *Departmental Elective (DE-I) Courses*
## *M.C.A. II Semester*

## Computer Architecture and Organization
## 680214 (DE-I)

**Objectives:**

- To introduce basic concepts of computer organization
- To understand the architecture of modern computer
- To understand different instruction types.
- To illustrate the computer organization concepts by Assembly Language programming
- To teach Assembly language programming
- To understand how a computer performs arithmetic operation of positive and negative numbers
- To understand how computer stores floating point numbers in IEEE 754 standard
- To understand how cache mapping occurs in computer

**UNIT-I**

**Representation of Information:** Number, integer and floating-point representation, character codes (ASCII, EBCDIC), Error detection and correction codes. Basic Building Blocks: Boolean Algebra, combinational blocks: gates, multiplexers, decoders etc, Sequential building blocks: flip-flops,, registers, counters, ALU, Random access memory etc.

**UNIT-II**

**Register Transfer Language and Micro-operations**: concept of bus, data movement among registers, language to represent conditional data transfer, data movement from/to memory, arithmetic and logical operations along with register transfer, timing in register transfer.

**UNIT-III**

**Architecture of a simple processor:** A simple computer organization and instruction set, instruction formats, addressing modes, instruction execution in terms of microinstructions, coacepts of interrupt and simple I/O organization, implementation of processor using the building blocks.

**UNIT-IV**

**Assembly Language programming**: detailed study of 8086/8088 assembly language instruction set, loops and comparisons, conditions and procedures, arithmetic operations in assembly language, illustrations using typical programs like: table search, subroutines, symbolic and numerical manipulations and I/O.

**UNIT-V**

**Memory organization**: basic cell of static and dynamic RAM, Building large memories using chips, associative memory, cache memory organization, virtual memory organization.

**Books:**

1. M. Morris Mano, "Computer System Architecture", PHI, 3rd edition, 1993.
2. Liu and Gibson, "8086/8088 Microprocessor Assembly Language".
3. Bartee, "Digital Computer Fundamentals".
4. Malvino, "Digital Computer Electronics".

**Course Outcomes:**

Student would be able to

CO1 Analyze computer hardware at abstract level
CO2 Design the Instruction execution stages
CO3 Differentiate between High level languages and machine language
CO4 Depict storage of positive and negative number at hardware level
CO5 Design Assembly language programs
CO6 Solve various problems related to secondary storage organization and utilization of cache memory

# Computer Graphics and Multimedia
## 680215 (DE-I)

Objectives:

- To identify and explain the core concepts of computer graphics
- To apply graphics programming techniques to design, and create computer graphics scenes.
- To understand the basics of multimedia data, video data and audio data

**UNIT-I**

**Introduction:** Basics of computer graphics. Graphics hardware and software. DDA and Bresenhan's line drawing algorithm, antialiasion, circle generation Midpoint algorithms, ellipse, other curves, character generation, area filling scan line algorithm, boundary fill flood fill algorithm, attributes of output primitives line attributes, area fill attributes, character attributes

**UNIT-II**

**Two-dimensional Transformations:** Translation scaling rotation reflection sheer, matrix representation and homogeneous coordinate's composite transformation commands Viewing coordinates window, view port, clipping, window to view transformation line clipping Cohan Sutherland algorithm polygon clipping Sutherland-hodgeman algorithm.

**Unit-III**

**Three-dimensional concepts:** Three dimensional viewing, three dimensional object presentation polygons, cured line & surfaces quadrate (sphere, ellipsoid), surfaces, design of curves & surfaces, bezier's methods, Bspline methods, three dimensional transformation Translation, scaling composite transformation, rotation, about arbitrary axis, projection parallel, perspective

**UNIT-IV**

**Introduction to multimedia** Introduction to multimedia, multimedia and hypermedia, Multimedia hardware, analog media devices, digital media devices, MIDI, RAID, CD-ROM standards, Multimedia software Multimedia operating systems, multimedia databases, multimedia software tools.

**UNIT-V**

**Video Data:** Video representation and operations on video data type, YUV, YIQ and YCbCr Color models, analog to digital video conversion, Basic video compression schemes, H 261 Video, H 263, MPEG-1 and MPEG-2 Video compression standards

**Sound and Audio** Digitization of sound, Signal-to-Noise Ration(SNR), Linear and non linear quantization, audio filtering MIDI Hardware aspects, structure of MIDI, MIDI to wav conversion, Quantization and transformation of audio Pulse code modulation, differential coding, DPCM, DM and ADPCM, audio formats.

**Books:**

1. D Hearn and M P Baker Computer Graphics (2nd ed), PHI
2. S Harrington-Computer Graphics-a Programming approach (2nd ed) McGrawhill
3. New Mann & Sprout - Principles of interactive computer graphics (2nd ed) McGrawhill
4. Multimedia Computing, communications and applications Ralf Steinmetz and Klara Nahrstedt, Pearson Education
5. Multimedia Systems Design Prabhat K Andleigh and Kiran Thakrar, PHI

6. Multimedia Systems. John F.K. Buford, Pearson Education

**Course Outcomes:**

Student would be able to

- CO1 analyze the structure of an interactive computer graphics system
- CO2 apply geometrical transformations, interaction techniques and 2D viewing
- CO3 demonstrate use of modern 3D computer graphics techniques, models, and algorithms to solve graphics problems
- CO4 incorporate and operate various multimedia object and technology
- CO5 analyze various compression schemes
- CO6 analyze various audio formats

# Web Technology
## 680216 (DE-I)

**Objectives:**

- understand best technologies for solving web client/server problems
- analyze and design real time web applications
- use Java script for dynamic effects and to validate form input entry
- Analyze to Use appropriate client-side or Server-side applications

**UNIT I**

History of the internet, internetworking concepts, architecture, and protocol. Switch router etc., internet address and domains. Introduction World Wide Web (WWW), Hyper Text Transfer Protocol (HttP), feature of HTTP protocol HTTP request-response model, Hyper Text Transfer Protocol Secure (HTTPS) Security on the web, proxy server, Firewall.

**UNIT II**

Introduction to Hyper Text Markup Language (HTML), HTML elements, XHTML syntax and Semantics, extensible Markup Language (XML), element, attributes, entity declarations, DTD files and basics of Cascading Style Sheet (CSS),Document object Model (DOM) history and levels, Document tree

**UNIT III**

Introduction to Java Script, Basic concepts, variables and data types, functions, conditional statements, Loops, Operators, Arrays. Introduction to Web Services UDDI, SOAP, WSDL.

**UNIT IV**

PHP : Introduction and basic syntax of PHP, decision and looping with examples, PHP and HTML, Arrays, Functions, Browser control and detection, string, Form processing, Files, Advance Features: Cookies and Sessions, Object Oriented Programming with PHP

**UNIT V**

PHP and MySQL: Basic commands with PHP examples, Connection to server, creating database, selecting a database, listing database, listing table names, creating a table, inserting data, altering tables, queries, deleting database, deleting data and tables, PHP myadmin and database bugs

**Books :**

1. Web Technologies, Uttam Roy, OXFORD University press
2. Web programming with HTML, XHTML and CSS, 2e, Jon Duckett, Wiley India
3. Web programming Bai, Michael Ekedahl, CENAGE Learning , India edition
4. An Introduction to Web Design + Programming, Paul S Wang, India Edition

**Course Outcomes:**

Student would be able to

- CO1: evaluate web application architecture, technologies and frameworks
- CO2: integrate java and server side scripting languages to develop web applications
- CO3: debug, test and deploy web applications in different web servers
- CO4: apply the knowledge of web technology in developing web applications
- CO5: implement small to large scale project to provide live solution in web application development fields
- CO6: evaluate different solutions in field of web application development

# Machine Learning with Python
## 680217 (DE-I)

Objectives:

- To learn the basic construct of python programming for implementing various Machine Learning algorithms.
- To understand the basic concepts of Machine Learning.
- To use Machine Learning concepts and algorithms for real-world problem solving.

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**Unit – I**

**Introduction to Python Programming:** Setting up Programming Environment, Running Python Programs from a Terminal, Variables and Simple Data Types: Numeric, String, List, Tuple, Dictionary, Set, Boolean, Conditional Statements and Loops, Lambda Functions, Various inbuilt Functions, Read Write Operations in Files, using Python Packages and Modules.

**Unit – II**

**Data Processing and Visualization:** Introduction to Pandas, Installation, Reading CSV Files and Performing Various Operations: Slicing, Merging, Concatenation on Various Datasets. Introduction to Numpy, Vector Representation, Basic Operations on N-Dimensional Matrices using Numpy. Data Visualization using Matplotlib, Plotting Various Types of Graphs: Line, Bar, Scatter, Histogram and Pie-Charts.

**Unit – III**

**Introduction to Machine Learning:** Basic Principles, Applications, Challenges, Supervised, Unsupervised and Reinforcement Learning Approaches, Basic Steps of Machine Learning: Data Collection, Data Preparation, Choosing a Learning Model, Training a Model, Evaluation of Model, Parameter Tuning and Prediction.

**Unit – IV**

**Supervised Learning:** Linear Regression, Gradient Descent, Features, Overfitting, Regularization and Complexity, Training, Validation, Testing Data, Performance Matrices: Mean Squared Error(MSE), Root-Mean-Squared-Error(RMSE), Mean-Absolute-Error(MAE), $R^2$ or Coefficient of Determination, Multivariate Regression, Applications of Regression. **Classification:** Binary, Multi-Class and Multi-Label Classification, Applications, Logistic Regression, K-Nearest Neighbour, **Decision Trees,** Random Forests, **Support Vector Machines and Neural Networks: Comparison Matrix.**

**Unit – V**

**Unsupervised Learning:** Clustering and Association Problems, Applications, **K-Means, DBSCAN,** Principal Component Analysis, Apriori Algorithm for Association Rule Learning Problems, Machine Learning Model Building on Various Datasets.

available on Kaggle and UCI Repositories using Python Machine Learning Library Scikit-Learn.

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**Books:**


- John Hunt, A Beginners Guide to Python 3 Programming, Springer, 1st Edition, 2019.
- Learn Python the Hard Way, 3rd Edition.
- Python Crash Course: A Hands-On, Project-Based Introduction to Programming, By: Eric Matthes.
- Andreas C. Muller, Sarah Guido, Introduction to Machine Learning with Python, O'Reilly Media, Inc, 2016.
- Aurélien Géron, Hands-On Machine Learning with Scikit-Learn and TensorFlow, O'Reilly Media, Inc, 2017.


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**Course Outcomes:**

After completion of this course, the students would be able to

**CO1.** define basic concepts of machine learning.

**CO2.** summarize various concepts of python programming, data processing and visualization.

**CO3.** apply machine learning algorithms to solve real world problems using python programming.

**CO4.** compare machine learning algorithms for applicability and performance analysis.

**CO5.** assess various open source datasets and estimate the most suitable machine learning model for prediction process.

**CO6.** build machine learning models on open source datasets using python machine learning library.

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# *Syllabi*
# *of*
# *Departmental Elective (DE- II) Courses*
## *M.C.A. II Semester*

# Managerial Economics
## 6802018 (DE-II (BM))

**UNIT-I**

Meaning, nature and scope of managerial economics, difference and similarities between micro-economics and macro-economics, objectives of firm, Profit maximization theory alternative theories and behavioral theories of the firm

**UNIT-II**

Economic Principles, concepts of opportunity cost , marginal cost, incremental, time perspective, principles of discounting and equi-margin

**UNIT-III**

Consumer behaviour-demand analysis purpose and concepts of demand, doctrine of diminishing utility, elasticity of demand, price elasticity, income elasticity and cross elasticity, demand forecasting

**UNIT-IV**

Product and cost analysis short run and long run average cost curves Law of supply, economies and diseconomies of scale, law of variable proportions Production functions single output isoquants

**UNIT-V**

Pricing prescriptive approach, price determination under perfect competition, monopoly, oligopoly and monopolistic competition, methods of pricing, pricing strategies Profits nature and measurement policy, break even analysis, case study

**Books**

1. Dean J. Managerial Economics PHI, New Delhi
2. Mote V L. et al Management Economics Concepts and Cases TMH, New Delhi

**Course outcomes:**

**Student would be able to**

CO1 Develop an understanding of management and its uses in day to day life
CO2 The aware students about each and functions of management and to understand the ability to understand how management serves as a guideline to sustain in professional life
CO3 Develop an understanding of professional and ethical responsibilities so as to analyze and solve contemporary issue
CO4 Relate the subjects of arts and management in engineering and allied fields
CO5 Understanding as to how management helps a student to understand, adjust and adapt to the world around us
CO6 Enhance the understanding of economics and its impact on organization

# Corporate Planning
## 680219 (DE-II (BM))

**Unit 1:** Introduction to Strategies Introduction, Fundamentals of Strategy, Conceptual Evolution of Strategy, Scope and Importance of Strategies, Purpose of Business, Difference between Goals and Objectives of Business, Strategic Intent through Vision and Mission Statements, Core Competencies of Business
Strategic Management Introduction, Strategic Management, Need, scope, key features and importance of strategic management, Role of Strategists in Decision Making, strategists at various management levels, Types of Strategies, Limitations of Strategic Management

**Unit 2:** Strategy Analysis Introduction, Strategy Analysis and its Importance, Environmental Appraisal and Scanning Techniques, Organisational Position and Strategic Advantage Profile, Strategic Management Model
Strategy Formulation and Implementation Introduction, Strategy Formulation, Process in Strategy Formulation, Strategy Implementation and its Stages, Reasons for Strategy Failure and Methods to Overcome, Strategy Leadership and Strategy Implementation, Strategic Business Units (SBUs)

**Unit 3:** Strategic Control and Evaluation Introduction, Strategy Evaluation, Strategic Control, Difference Between Strategic Control and Operational Control, Concept of Synergy and its Meaning, Key Stakeholder's Expectations
Business Policies Introduction, Overview of Business Policies, Importance of Business Policies, Definitions of Policy, Procedures, Process and Programmes, Types of Policies, Business Policy Statements, Corporate Culture

**Unit 4:** Strategies for Multinational Corporations Introduction, Multinational Corporations (MNCs), Benefits of MNCs, Limitations of MNCs, Business Strategies of MNCs, Techniques Employed by MNCs to Manage Markets, MNC, TNC and Global Companies
Strategic Alliances Introduction, Strategic Alliances, Types of Strategic Alliances and Business Decisions, Problems Involved in Strategic Alliances

**Unit 5:** Role of Creativity and Innovation in Business Introduction, Creativity, Innovation, Creating and Building Creative and Innovative Business Culture, Business Practices Adopted to Promote Creativity and Innovation, Importance of Creativity and Innovation in Business, Challenges Involved in Creativity and Innovation
Business Ethics and Corporate Social Responsibility Introduction, Ethics and Values, Ethical Conduct and Unethical Conduct, Impact of Ethical Conduct, Corporate Social Responsibilities (CSR), Business obligations, Social Audit and Corporate Governance

Books:

1. Business Policy - Azhar Kazmi- S. Chand & Co. New Delhi
2. Strategic Management: Concepts & Cases - Upendra Kachru, Excel Bppks
3. Strategic Planning: Formulation of Corporate strategy - V.S. Ramaswamy, S. Namakumari - Macmillan Publishing House Ltd.
4. Management Policy & Strategic Management - R. M. Shivastava, Himalaya Publishing House, Mumbai
5. Creating Excellence - Craig R. Hickman & Michael A. Silva - London Univeral Book Stall, New Delhi

Course Outcomes:

CO1 Describe major theories, background work, concepts and research output in the field of strategic management.

CO2 Demonstrate a clear understanding of the concepts, tools & techniques used by executives in developing and executing strategies and will appreciate its integrative and interdisciplinary nature.

CO3 Demonstrate effective application of concepts, tools & techniques to practical situations for diagnosing and solving organisational problems.

CO4 Demonstrate capability of making their own decisions in a dynamic business landscape.

CO5 Develop their capacity to think and execute strategically.

CO6 Select and apply current technologies to support an organization's integrative trade initiatives.

# MIS Framework and Implementation
## 680220 (DE-II (BM))

**Course Objective:**

- Understand the role of the information systems (IS) function in an organization
- Develop an insight as to how information systems influence business strategy
- Develop the ability to contribute meaningfully towards information system selection

**Unit I**

An overview MIS definition of MIS, MIS as an evolving concept, MIS and other academic disciplines subsystems of an MIS, operating elements of an information system MIS support for decision making

**Unit II**

Management information system structure based on management activity, hierarchy of Management activity, information systems for operation control, information system for management operation control, information system for strategic planning

**Unit III**

Based on organizational function sales and marketing subsystem, production subsystem logistics subsystem, personnel subsystem, financial and accounting subsystem, information processing subsystem, top management subsystem, synthesis of MIS structure, some issues in MIS

**Unit IV**

Development of long range plans of the MIS, Ascertaining the class of information, Determining the information requirement, Development and implementation of the MIS, Management of information quality in the MIS, Organization for development of MIS, MIS development process model

**Unit V**

Planning fundamentals (real world cases), Organizational planning, planning for competitive advantage,(SWOTAnalysis), Business models and planning Business/IT planning, identifying business/IT strategies, Implementation Challenges, Change management, Developing business systems, (real world case), SDLC, prototypine, System development process, implementing bussness system

**Books :**

1. Gordan B. Davis and Margrethe H. Olson, Management Information Systems - Conceptual Foundation, Structure and Development, McGraw Hill
2. D. P. Goyal, Management Information Systems, McMillan E. M. Awad, system
3. System Analysis and Design, E. M. Awad

**Course Outcomes:**

CO1 define fundamental concepts of MIS framework, elements, challenges encountered in implementation and role of MIS in decision making

CO2 summarize the organizational functions of various subsystems and issues involved in MIS

CO3 identify the need of MIS structure, hierarchy of Management activity and

information system for strategic planning to provide benefits to business organizations

CO4 analyze various business/IT strategies and Business models to improve business systems using MIS

CO5 evaluate the role of management of information quality in the MIS, implementation Challenges and System development process

CO6 develop business plans, strategies and models using MIS framework to find solutions for real world cases

# Management of Software Projects
## 680221 (DE-II (BM))

**Unit 1 – Overview of Project Management** Project Management – Definitions, Factors Influencing Project Management – Project Manager, Project Management Activities, Stakeholders, Project Communication, Project Development Phases, Project Charter, Statement of Work (SoW), Project Management Associations.

**Unit 2- Planning a Software Project:** Project Plan, guidelines for Software planning, Tasks in Project Planning, Work Breakdown Structures (WBS), Planning Methods, Development Life Cycle Models, Estimation and Budgeting of Projects Software Cost Estimation, COCOMO Model, Budgeting.

**UNIT 3- Project Scheduling: Scheduling Techniques** – Program Evaluation and Review Technique (PERT), Gantt Chart, Critical Path Method (CPM), Automated Tools. **Project Monitoring and Controlling** Project Status Reporting, Project Metrics, Earned Value Analysis (EVA), Project Communication Plan & Techniques, Steps for Process Improvement.

**UNIT 4- Risk Management** Concepts of Risks and Risk Management, Risk Management Activities, Effective Risk Management, Risk Categories, Aids for Risk Identification, Potential Risk Treatments, Risk Components and Drivers, Risk Prioritization.

**UNIT 5-Software Maintenance:** Fundamental of software maintenance, types of software maintenance, strategies, and maintenance of object oriented system design
**CASE tools and Environment:** Concept, scope of CASE, classification of CASE tools, categories of CASE environment.
**Communication & Business technical reports** Role of communication in s/w project management & its type's Various Types of Reports according to different phases of SDLC.

**Books :**

1. Software Engineering: A Practitioner's Approach, Pressman Roger, Tata Megraw hill
2. An Integrated Approach to Software Engineering, Pankaj Jalote, Narosa Pub
3. Bob Hughes and Mike Cotterell "Software Project Management", Third Edition, Tata Megraw- Hill
4. Project Management -"Harold Kerznes"
5. Basics of software Project Management, Nitt, Prentice-Hall India, 2004
6. Jalote Pankaj, Software Project Management In Practice, Pearson Education

**Course Outcome**

CO1 define fundamental concepts of software project management and related factors, activities, maintenance etc.

CO2 demonstrate the role and need of risk management in software project management

CO3 apply the fundamental knowledge of Project Management to improve overall performance of software projects

CO4 analyze techniques of Project Scheduling and Project Monitoring & Controlling

CO5 evaluate the role of Communication & Business technical reports and case tools in project management

CO6 develop project plan for software project by using guidelines of Software planning, structures, Planning Methods and Budgeting principles

# Organizational Behaviour
## 680222 (DE-II (BM))

**COURSE OBJECTIVES**

- To help the students to develop cognizance of the importance of human behaviour
- To enable students to describe how people behave under different conditions and understand why people behave as they do
- To provide the students to analyse specific strategic human resources demands for future action
- To enable students to synthesize related information and evaluate options for the most logical and optimal solution such that they would be able to predict and control human behaviour and improve results

**UNIT – I**

Organizational Behavior Today. What is Organizational Behavior, shifting paradigms of organizational behavior, organizational behavior and diversity. Learning about Organizational Behavior Organizational Behavior and learning imperative scientific Foundations of organizational behavior.

**UNIT – II**

Challenge and Opportunities for organizational behavior. Towards improving quality & productivity, improving people skills from management control to empowerment, from sterility of flexibility, Improving ethical behavior, organizational social responsibility work and quality of life.

**UNIT- III**

A Micro Perspective of Organizational Behavior. The perception process, personality and attitudes, motivation: motivating performance through job design and goal setting, learning processes rewards systems and behavior management.

**UNIT – IV**

Micro and Macro Dynamics of Organizational Behavior. Graph dynamics and teams, interactive conflict and negotiation skills, stress: cause effects and coping strategies, leadership styles, activities and skills. A Macro Perspective of Organizational Behavior Communications, decision-making, Organizational Theory & Design, Organizational Culture.

**UNIT – V**

Horizons for Organizational Behavior. International Organizational Behavior (IOB), the impact of culture on IOB, Communication in IOB, motivation across culture, managerial leadership across cultures Organizational Change & Development. Learning objectives, the changes facing organizations, managing change and organizational development, future of organizational Behavior.

**Books:**

1. Fred Luthans "Organizational Behavior", McGraw Hills international Edition, Management & Organization series.
2. Schermerhorn, Hunt & Osborn "Organizational Behavior" (7th Edition), John Wiley & Sours Inc.
3. Stephen P. Robbins "Organizational Behavior: Concepts controversies applications", PHI publications.
4. A.J.Robertson Lyan T. and Cooper, Cary L. "Work Psychology Understanding Human Behavior in the workplace" Macmillan India Ltd. Delhi 1996.
5. M.N. Mishra "Organizational Behavior", Vikas Pub. Co. Note: Paper is to be set unit

wise with internal choice.

**Course Outcomes:**

CO1 to be familiarized with various aspects of organizational behavior, personality and attitude, perception, motivation etc.

CO2 describe and assess the basic design elements of organizational structure and evaluate their impact on employees.

CO3 demonstrate the applicability of the concept of organizational behavior to understand the behavior of people in the organization.

CO4 demonstrate the applicability of analyzing the complexities associated with management of individual behavior in the organization.

CO5 analyze the complexities associated with management of the group behavior in the organization.

CO6 demonstrate how the organizational behavior can integrate in understanding the motivation (why) behind behavior of people in the organization.

## Java Programming Lab
## 680223 (DLC-3)

Basics: Data types, Operators- precedence and associativity, Type conversion, decision making – if, if else, switch, loops – for, while, do while, special statements-return, break, continue, labeled break, labeled continue, Modular programming methods, arrays, memory allocation and garbage collection in java keywords.

Class, Packages, scope and lifetime, Access specifies, Constructors, Copy constructor, this reference, finalize () method, arrays, Memory allocation and garbage collection in java keywords, variable argument list, command line arguments, super keyword.

Basic idea of multithreaded programming, The lifecycle of a thread, Creating thread with the thread class and runnable interface, Thread synchronization, Thread scheduling, Producer-consumer relationship, Daemon thread, Selfish threads, Basic idea of exception handling, The try, catch and throw, throws Constructor and finalizers in exception handling, Exception Handling.

Applet security restrictions, the class hierarchy for applets, Life cycle of applet, HTML Tags for applet.

Course outcomes:

Student would be able to

CO1 apply the principles and practice of object oriented analysis and design in the construction of robust, maintainable programs which satisfy their requirements.

CO2 implement, compile, test and run Java programs comprising more than one class, to address a particular software problem.

CO3 demonstrate the ability to use simple data structures like arrays in a Java program.

CO4 make use of members of classes found in the Java API (such as the Math class).

CO5 demonstrate the ability to employ various types of selection constructs in a Java program.

CO6 employ a hierarchy of Java classes to provide a solution to a given set of requirements.

## Business Programming Laboratory
## 680224 (DLC-4)

This course is an introduction to basic concepts of business modelling and underlying technologies for implementing the business practices. In this emphasis is on developing business and commercial applications in stand- alone mode or as android based applications. Student may be exposed the process of app development for business applications. Emphases is placed on the implementation of programs with procedural structures, along with graphical user interfaces and event-driven code. Upon completion, students should be able to design, code, test, and debug programs based on business requirements using a selected programming language.

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**ANNEXURE V**

# *Syllabus of Newly Proposed Course in the Existing Scheme of III Semester*

## *(M.C.A. Programme)*

## *[ITEM 11(C)]*

MADHAV INSTITUTE OF TECHNOLOGY AND SCIENCE, GWALIOR – 474005
(A Govt. Aided UGC Autonomous Institute Affiliated to R.G.P.V. Bhopal, M.P.)

# Programming in Python
# (6803011)

- **Unit 1 - Introduction to Python:** Data Types, Variables, Basic Input-Output Operations, Basic Operators Boolean Values, Conditional Execution, Loops, Lists and List Processing, Logical and Bitwise Operations. Python literals, Operators - data manipulation tools, Variables - data-shaped boxes, How to talk to computer?, Making decisions in Python, Python's loops, Logic and bit operations in Python, Lists - collections of data, Sorting simple lists - the bubble sort algorithm, Lists - some more details, Lists in advanced applications.

- **Unit 2 - Functions, Tuples, Dictionaries, and Data Processing Modules, Packages, String and List Methods, and Exceptions:** Writing functions in Python, How functions communicate with their environment?, Returning a result from a function, Scopes in Python, Let's make some fun - sorry, functions, Tuples and dictionaries, Using modules, Some useful modules, What is package?, Errors - the programmer's daily bread, The anatomy of exception, Some of the most useful exceptions, Characters and strings vs. computers, Python's nature of strings, String methods, Strings in action, Four simple programs.

- **Unit 3- The Object-Oriented Approach:** Classes, Methods, Objects, and the Standard Objective Features, Exception Handling, and Working with Files, Basic concepts of object programming, A short journey from procedural to object approach, Properties, Methods, Inheritance - one of object programming foundations, Exceptions once again, Generators and closures, Processing files, Working with real files.

- **Unit 4: Regular expressions, CGI, Multithreading:** Match function, Search function, Matching VS Searching, Modifiers, Patterns, Introduction, Architecture, CGI environment variable, GET and POST methods, Cookies, File upload, Thread Starting a thread, Threading module, Synchronizing threads, Multithreaded Priority Queue.

- **Unit 5: Database connectivity & Network Programming through Python:** Introduction, Connections, Executing queries, Transactions, Handling error, Socket, Socket, Module, Methods, Client and server, Internet modules.

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