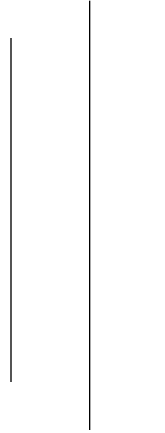


**MIT**  
**Second Semester**



**Micro syllabus**

**&**

**Model Question**

## Distributed and Cloud Computing

**Course Title:** Distributed and Cloud Computing  
**Course No:** MIT551  
**Nature of the Course:** Theory + Lab  
**Semester:** II

**Full Marks:** 45+30  
**Pass Marks:** 22.5+15  
**Credit Hrs:** 3

### Course Description:

The course introduces the concepts of distributed and cloud computing including cloud computing, cloud service models, parallel and distributed computing, cloud networks, cloud resource management and scheduling, concurrency in cloud and emerging concepts in cloud.

### Course Objectives:

The main objective of this course is to make students familiar with the concepts of distributed and cloud computing so that upon completion of the course students will be able to use and develop the distributed and cloud computing models.

### Course Contents:

Unit	Contents	Hour
<b>Unit 1 Introduction (4 Hrs.)</b>	Cloud Computing, Impact of Cloud Computing [Definition, NIST Definition of cloud, Impact of Cloud Computing]	<b>1</b>
	Ethical Issues in Cloud Computing, Factors affecting Cloud Computing Service Availability [Different ethical issues in cloud computing, infrastructure failure, DDOS attack]	<b>0.5</b>
	Network Centric Computing and Network Centric Content [Introduction to Network Centric Computing and Network Centric Content]	<b>0.5</b>
	Virtualization and Cloud Computing [Hypervisor and its types, Virtualization architecture (Bare metal and Hosted)], Types of Virtualization [(Full and Para virtualization), Popular Hypervisors]	<b>2</b>
<b>Unit 2 Cloud Ecosystem (6 Hrs.)</b>	Cloud Computing Delivery Models and Services [Public, private hybrid and community, IAAS, PAAS and SAAS]	<b>2</b>
	AWS, Google Clouds, Azure, IBM Clouds [General Introduction about popular cloud service Providers]	<b>1</b>
	Cloud Storage Diversity [RAID 5 and RACS] and Vendor Lock-In, Cloud Interoperability	<b>1</b>
	Service Level Agreement, Compliance [SLA, Compliance and examples of different compliance standards of data security]	<b>1</b>
	User Challenges and Experience	<b>0.5</b>
	Challenges in Cloud Computing [Different challenges of Cloud Computing]	<b>0.5</b>
<b>Unit 3 Parallel and Distributed Computing (5 Hrs.)</b>	Introduction to Parallel and Distributed Computing	<b>1</b>
	Elements of Parallel Computing [Different Elements of Parallel Computing]	<b>1</b>
	Elements of Distributed Computing [Different Elements of Distributed Computing]	<b>1</b>
	Elements of Distributed Computing [Different Elements of	<b>2</b>

	Distributed Computing]	
<b>Unit 4 Cloud Access and Cloud Interconnection Networks (9 Hrs.)</b>	Packet Switched Network and Internet, TCP Congestion Control [Overview of packet switched network, UDP and TCP, General introduction of congestion control mechanism]	<b>1</b>
	Content Centric Network, Software Defined Networks [Overview of content centric network, Architecture of Software defined network (ONF architecture)]	<b>2</b>
	Interconnection Networks for Computer Clouds [Topologies: Static networks and Switched]	<b>1</b>
	Multistage Interconnection Networks, Storage Area Networks and Fiber Channel [Clos network, Flattened butterfly network]	<b>1</b>
	Scalable Data Center Communication Architectures [Introduction, Fat tree topology]	<b>1</b>
	Network Resource Management Algorithms (Fair Queuing, Class- Based Queuing) [Fair Queuing, Class- Based Queuing]	<b>1</b>
	Content Delivery Networks [CDN organization, design decisions, and performance and case study of Akamai]	<b>1</b>
	Vehicular Ad Hoc Networks [General Introduction]	<b>1</b>
<b>Unit 5 Cloud Resource Management and Scheduling (10 Hrs.)</b>	Policies and Mechanisms for Resource Management [General Introduction, Control theory, machine learning, utility-based, market-oriented]	<b>1</b>
	Scheduling Algorithms for Computer Clouds [General Introduction of Delay Scheduling, Data-aware scheduling, Apache Capacity Scheduler and Start-Time Fair Queuing]	<b>3</b>
	Borrowed Virtual Time [General introduction and concept]	<b>1</b>
	Cloud Scheduling Subject to Deadlines, Resource Bundling and Combinatorial Auctions for Cloud Resources [FIFO, EDF, MWF and introduction of Resource Bundling and Combinatorial Auctions for Cloud Resources]	<b>1.5</b>
	Resource Management and Dynamic Application Scaling [General Concept]	<b>0.5</b>
	Control Theory and Optimal Resource Management [Control theory principle]	<b>0.5</b>
	Two Level Resource Allocation Architecture [General introduction to Architecture of Two-Level Resource Allocation]	<b>1</b>
	Feedback Control on Dynamic Thresholds [Proportional thresholding]	<b>0.5</b>
	Autonomic Performance Managers, Utility Model for Cloud-Based Web Services [Approaches to coordinating power and performance management, General introduction of Utility Model for Cloud-Based Web Services]	<b>1</b>
<b>Unit 6 Concurrency and Cloud Computing</b>	Concurrency, Communication and Concurrency, Computational Models, Communicating Sequential Processes [Definition and challenges, Communicating Sequential Processes (CSP)]	<b>1</b>

<b>(8 Hrs.)</b>	Bulk Synchronous Parallel Model [General introduction and approach]	<b>1</b>
	Model for Multicore Computing [The Multi-BSP model]	<b>1</b>
	Modeling Concurrency with Petri Nets [Petri nets model]	<b>0.5</b>
	Process State , Communication Protocols and Process Coordination [Different process states, Concept of global clock]	<b>1</b>
	Logical Clocks and Message Delivery Rules [Logical clock: Lamport’s clock, FIFO and casual message delivery]	<b>1.5</b>
	Runs and Cuts, Threads and Activity Coordination [Introduction of Run and Cut, thread state and basic thread transition]	<b>1</b>
	Critical Sections, Locks, Deadlocks, Atomic Actions, Consensus Protocol, Load Balancing [Definition, Locks and Deadlocks, Atomicity (all or nothing), Consensus protocol , Balls and bins model]	<b>1</b>
<b>Unit 7 Emerging Clouds (3 Hrs.)</b>	Machine Learning on Clouds [General Introduction]	<b>1</b>
	Quantum Computing on Clouds [Brief discussion about Quantum Computing on Clouds]	<b>1</b>
	Vehicular Clouds [General Introduction]	<b>1</b>

**Laboratory Works:**

The laboratory work should include the implementation and simulation of the concepts in above mentioned units using appropriate platforms and tools.

**References:**

1. Dan C. Marinescu, Cloud Computing Theory and Practice, 3<sup>rd</sup> Edition, Morgan Kaufmann Publishers, 2022
2. Raj Kumar Buyya, Christian Vecchiola, S. ThamaraiSelvi, Mastering Cloud Computing Foundations and Applications Programming, Morgan Kaufmann Publishers

**Tribhuvan University**  
**Institute of Science and Technology**  
**Model Question**

**Master Level/ First Year/ Second Semester**  
**Information Technology (MIT551)**  
**(Distributed and Cloud Computing)**

**Full Marks: 45**  
**Pass Marks: 22.5**  
**Time: 2 hours**

**Section A**

**Attempt any two questions. [2 x 10 =20]**

1. Why there is need of content delivery network in cloud? Explain fair queuing and class-based queuing resource management algorithms in brief. [3+7]
2. What is delay scheduling? Explain apache capacity scheduler in brief. [2+4+4]  
Explain two-level resource allocation architecture in cloud.
3. Explain different Cloud Deployment Models in brief. Discuss load balancing in cloud using balls and bin model. [5+5 ]

**Section B**

**Attempt any five questions. [5 x 5 =25]**

4. What are basic characteristics of cloud computing? Explain in brief? [5]
5. What is service level agreement? Discuss its importance in cloud service delivery. [1+4]
6. What is distributed computing? Explain various technologies for distributed computing in brief. [2+3 ]
7. What is Vehicular Cloud? Explain. [5]
8. How dynamic system behaviour are modelled using Petri nets? [5]
9. “Virtualization in the main enabling technology of the cloud”. Justify this statement. [5]

## Digital Marketing

**Course Title:** Digital Marketing  
**Course No:** MIT552  
**Nature of the Course:** Theory + Lab  
**Semester:** II

**Full Marks:** 45+30  
**Pass Marks:** 22.5 + 15  
**Credit Hrs:** 3

### Course Description:

This course introduces the concepts of digital marketing. The course contains concepts and structures of digital marketing types, tools and analytical aspect digital marketing. This course also highlights various types different digital marketing metrics.

### Course Objectives:

Upon completion of the course, students should be able to:

1. Understand concepts of digital marketing and differentiate it from traditional marketing
2. Plan and execute digital marketing strategies in real world scenarios
3. Use various method of digital marketing effectively for real world scenarios
4. Understand concept of lead generation and lead funnel

### Course Details:

Unit	Contents	Hours
<b>Unit 1</b> <b>Introduction to Digital Marketing</b> (2 Hrs.)	Digital Marketing Definition; Traditional Marketing vs. Digital Marketing; Relevance of Digital Marketing	<b>1</b>
	The 3i Principles <ul style="list-style-type: none"><li>• Initiate</li><li>• Iterate</li><li>• Integrate</li></ul>	<b>1</b>
<b>Unit 2</b> <b>Search Engine Marketing and Optimization</b> (12 Hrs.)	Techniques to Generate Website Traffic <ul style="list-style-type: none"><li>• Building High-Converting Landing Pages</li><li>• Capturing Traffic with Search Marketing</li><li>• Leveraging the Social Web</li><li>• Tapping into Paid Traffic</li><li>• Following Up with Email Traffic</li></ul>	<b>2</b>
	Techniques Used to Increase the Visibility of Webpage on Google Search Result Page (SERP)	<b>1</b>
	Positioning in SERP <ul style="list-style-type: none"><li>• Organic versus Paid Listings</li><li>• Location-Based Search</li><li>• Knowledge Graph Listing</li><li>• Data Highlighter</li></ul>	<b>2</b>
	On-page optimization <ul style="list-style-type: none"><li>• Keyword Research</li><li>• On-Page Optimization Process</li><li>• Optimizing the Technical Mechanics</li><li>• Technical Aspects</li></ul>	<b>2.5</b>

	<ul style="list-style-type: none"> <li>• Site Maps and Google Search Console</li> </ul>	
	Off-page optimization <ul style="list-style-type: none"> <li>• Link Formats</li> <li>• Link Building</li> <li>• Content Marketing</li> <li>• Social Sharing</li> </ul>	<b>2.5</b>
	Pay Per Click <ul style="list-style-type: none"> <li>• Introduction</li> <li>• Process</li> </ul>	<b>1</b>
	Google AdWords	<b>1</b>
<b>Unit 3 Social Media Marketing (10 Hrs.)</b>	Definition of Social Media Marketing; Media Types: Earned, Owned, and Paid	<b>1</b>
	Forms of Social Media; Stakeholders of SMM	<b>1</b>
	Understanding the right fit	<b>1</b>
	Various SMM Strategies	<b>2</b>
	Analysis of social media <ul style="list-style-type: none"> <li>• Different measurement tools available through different social media platforms</li> <li>• Social Media KPIs</li> </ul>	<b>5</b>
<b>Unit 4 Web Analytics (6 Hrs.)</b>	Analyzing the behavior of visitors to a website through reports based on traffic sources, referring sites, page views, and conversion rates of that website	<b>3</b>
	Google Analytics concept, setup, monitoring and analyzing	<b>3</b>
<b>Unit 5 Email Marketing (4 Hrs.)</b>	Definition of Email Marketing Email Marketing Process <ul style="list-style-type: none"> <li>• Data (Spam, Subscriber Management)</li> <li>• Design</li> <li>• Delivery</li> <li>• Discovery</li> </ul>	<b>1</b>
	Design and Contents	<b>1</b>
	Delivery	<b>1</b>
	Discovery	<b>1</b>
<b>Unit 6 Strategy and Planning (4 Hrs.)</b>	Digital marketing plan and structure	<b>1</b>
	Identification of tools and audience	<b>1</b>
	Defining objectives and activities	<b>1</b>
	Analysis and ROI	<b>1</b>
<b>Unit 7 Content Marketing (5 Hrs.)</b>	Definition and History of Content Marketing	<b>1</b>
	Need of Content Marketing	<b>1</b>
	Business Model and Cases of Content Marketing	<b>1.5</b>
	Epic Content Marketing	<b>1.5</b>

	<ul style="list-style-type: none"> <li>• Epic content marketing</li> <li>• Principles of epic content marketing</li> </ul>	
<b>Unit 8 Affiliate Marketing (2 Hrs.)</b>	Concepts and Examples of Affiliate Marketing <ul style="list-style-type: none"> <li>• Definition of Affiliate Marketing</li> <li>• Example of Affiliate Marketing</li> <li>• Types of Affiliate Marketing</li> <li>• Advantages and Disadvantages</li> </ul>	2

**Laboratory Works:**

Lab works includes on page and off page optimization of a particular website using various tools, hands on sessions of social media marketing with lead generation and ppc and google analytics setup, monitoring and analysis.

**Text/ References:**

1. Ian Dodson - The art of digital marketing the definitive guide to creating strategic, targeted and measurable online campaigns (2016), Wiley
2. Russ Henneberry& Ryan Deiss, Digital Marketing for Dummies, 2<sup>nd</sup> Edition, John Wiley & Sons, Inc.
3. Pulizzi, Joe, Epic content marketing how to tell a different story, break through the clutter, and win more customers by marketing less-McGraw-Hill Education (2014)



**Tribhuvan University**  
**Institute of Science and Technology**  
**Model Question**

**Master Level/ First Year/ Second Semester**  
**Information Technology (MIT552)**  
**(Digital Marketing)**

**Full Marks: 45**  
**Pass Marks: 22.5**  
**Time: 2 hours**

**Section A**

**Attempt any two questions.**

**[2 x 10 =20]**

1. What is SEO? Explain different on-page optimization techniques in detail. [2+8]
2. Explain importance of social media marketing. How do you analyze social media marketing? What are social media KPIs? [2+6+2]
3. Define content marketing. What is epic content marketing? Explain different principles of epic content marketing. [2+2+6]

**Section B**

**Attempt any five questions.**

**[5 x 5 =25]**

4. Explain 3i principles of digital marketing. [5]
5. Why is keyword research important? Compare online keyword research with offline keyword research. [2.5+2.5]
6. What do you mean by Web analytics? What are the uses of Google Analytics? [2.5+2.5]
7. Explain e-mail marketing process in brief. [5]
8. What is digital marketing plan? Explain. [5]
9. What are different types of affiliate marketing? Explain. [5]

**Course Title:** IT Project Management  
**Course No:** MIT553  
**Nature of the Course:** Theory + Lab  
**Semester:** II

**Full Marks:** 45 + 30  
**Pass Marks:** 22.5 + 15  
**Credit Hrs:** 3

**Course Description:**

This course familiarizes students with the concepts of managing IT projects in a systemic manner using various project management concepts. This course focuses on evaluation, estimation, planning, risk management, managing people, managing contract and quality.

**Course Objectives:**

By the end of this course, students will be able to use various project management skills while developing IT projects. They will also be able to manage stakeholders and maintain quality of the project.

**Course Contents:**

<b>Unit</b>	<b>Contents</b>	<b>Hour</b>
<b>1 (4 Hrs.) Introduction to Software Project Management</b>	Introduction Why is Software Project Management Important What is a Project? Software Projects versus Other Types of Project Contract Management and Technical Project Management	<b>1</b>
	Activities Covered by Software Project Management Plans, Methods and Methodologies	<b>1</b>
	Some Ways of Categorizing Software Projects Stakeholders Setting Objectives Project Success and Failure	<b>1</b>
	What is Management Management Control Traditional versus Modern Project Management Practices	<b>1</b>
<b>2 (5 Hrs.) Project Evaluation and Program Management</b>	Introduction Project Portfolio Management <ul style="list-style-type: none"> <li>• Project portfolio Definition</li> <li>• Project Portfolio Management</li> <li>• Project Portfolio Optimization</li> <li>• Some Problems with Project Portfolio Management</li> </ul> Evaluation of Individual Projects <ul style="list-style-type: none"> <li>• Technical Assessment</li> <li>• Cost-Benefit Analysis</li> <li>• Cash Flow Forecasting</li> </ul>	<b>1</b>
	Cost-benefit Evaluation Techniques <ul style="list-style-type: none"> <li>• Net Profit</li> <li>• Payback Period</li> <li>• Return on Investment</li> </ul>	<b>2</b>

	<ul style="list-style-type: none"> <li>• Net Present Value</li> <li>• Internal Rate of Return</li> </ul>	
	<p>Risk Evaluation</p> <ul style="list-style-type: none"> <li>• Risk Identification and Ranking</li> <li>• Risk and Net Present Value</li> <li>• Cost-Benefit Analysis</li> <li>• Risk Profile Analysis</li> <li>• Using Decision Trees</li> </ul>	<b>1</b>
	<p>Program Management</p> <ul style="list-style-type: none"> <li>• Business Cycle Programs</li> <li>• Strategic Programs</li> <li>• Infrastructure Programs</li> <li>• Research and Development Programs</li> <li>• Innovative Partnerships</li> </ul> <p>Managing the Allocation of Resources within Program Strategic Program Management</p>	<b>1</b>
<b>3 (3 Hrs.) An Overview of Project Planning and Modern Project Approaches</b>	<p>Introduction; Detail steps of Project Planning</p> <ul style="list-style-type: none"> <li>• Introduction to Step Wise Project Planning (Focus on Case Study Examples)</li> </ul>	<b>2</b>
	<p>Agile Methods</p> <ul style="list-style-type: none"> <li>• Extreme Programming (XP) <ul style="list-style-type: none"> <li>○ Four Core Values</li> <li>○ The Planning Exercise</li> <li>○ Limitations of XP</li> </ul> </li> <li>• Scrum</li> </ul> <p>Managing Iterative Processes</p>	<b>1</b>
<b>4 (5 Hrs.) Software Effort Estimation</b>	<p>Introduction</p> <p>Where are Estimates Done?</p> <p>Problems with Over- and Under-Estimates</p> <p>The Basis for Software Estimating</p>	<b>1.5</b>
	<p>Software Effort Estimation Techniques</p> <ul style="list-style-type: none"> <li>• Bottom-up Estimating</li> <li>• The Top-down Approach and Parametric Models</li> <li>• Expert Judgement</li> <li>• Estimating by Analogy</li> </ul>	<b>1</b>
	<ul style="list-style-type: none"> <li>• Function Points Mark II</li> <li>• COSMIC Full Function Points</li> </ul>	<b>1</b>
	<ul style="list-style-type: none"> <li>• COCOMO II: A Parametric Productivity Model <ul style="list-style-type: none"> <li>○ Cost Estimation</li> </ul> </li> </ul>	<b>1.5</b>
<b>5 (5 Hrs.) Activity Planning</b>	<p>Introduction</p> <p>Planning Objectives and timing</p> <ul style="list-style-type: none"> <li>• The Objectives of Activity Planning</li> <li>• When to Plan</li> </ul> <p>Project Schedules</p>	<b>1</b>

	<p>Projects and Activities</p> <ul style="list-style-type: none"> <li>• Defining Activities</li> <li>• Identifying Activities <ul style="list-style-type: none"> <li>○ The Activity Based Approach</li> <li>○ The Product Based Approach</li> <li>○ The Hybrid Approach</li> </ul> </li> </ul> <p>Sequencing and Scheduling Activities</p>	<b>1</b>
	<p>Network Planning Models</p> <p>Formulating a Network Model</p> <ul style="list-style-type: none"> <li>• Constructing Precedence Networks</li> <li>• Representing Lagged Activities</li> <li>• Hammock Activities</li> <li>• Labelling Conventions</li> </ul>	<b>1</b>
	<p>Adding the Time Dimension</p> <p>The Forward Pass</p> <p>The Backward Pass</p> <p>Identifying the Critical Path</p> <p>Activity Float</p>	<b>1</b>
	<p>Shortening the Project Duration</p> <p>Identifying Critical Activities</p> <p>Activity-on-Arrow Networks</p> <p>Activity-On-Arrow Network Rules and Conventions</p>	<b>1</b>
<b>6 (5 Hrs.) Risk Management</b>	<p>Introduction</p> <p>Categories of Risk</p> <p>A Framework for Dealing with Risk</p> <p>Risk Identification</p> <p>Risk Assessment</p> <ul style="list-style-type: none"> <li>• Risk exposure calculation</li> <li>• Probability Impact Matrix</li> </ul>	<b>1</b>
	<p>Risk Planning</p> <ul style="list-style-type: none"> <li>• Risk Acceptance</li> <li>• Risk Avoidance</li> <li>• Risk Reduction and Mitigation</li> <li>• Risk Transfer</li> </ul> <p>Risk Management</p> <ul style="list-style-type: none"> <li>• Contingency</li> <li>• Deciding on the Risk Actions</li> <li>• Creating and Maintaining the Risk Register</li> </ul> <p>Evaluating Risks to the Schedule</p>	<b>1</b>
	<p>Applying the PERT Technique</p> <ul style="list-style-type: none"> <li>• Using PERT to Evaluate the Effects of Uncertainty</li> <li>• Using Expected Durations</li> <li>• Activity Standard Deviations</li> <li>• The Likelihood of Meeting Targets</li> <li>• Calculating the Standard Deviations of Each Project Event</li> </ul>	<b>2.5</b>

	<ul style="list-style-type: none"> <li>• Calculating the z Values</li> <li>• Converting the z Values to Probabilities</li> <li>• The Advantages of PERT</li> </ul>	
	Monte Carlo Simulation (Basic Concept)	<b>0.25</b>
	Critical Chain Concepts (Basic Concept)	<b>0.25</b>
	Project Execution	
<b>7 (4 Hrs.) Resource Allocation</b>	Introduction	<b>1</b>
	<ul style="list-style-type: none"> <li>• The Nature of Resources</li> </ul>	
	Identifying and Scheduling Resources	<b>2</b>
	Publishing the Resource Schedule	<b>0.5</b>
	The Scheduling Sequence	<b>0.5</b>
<b>8 Monitoring and Control (4 Hrs.)</b>	Introduction	<b>0.5</b>
	Creating the Framework	
	<ul style="list-style-type: none"> <li>• Responsibility</li> <li>• Accessing Progress</li> <li>• Setting checkpoints</li> <li>• Tacking snapshots</li> </ul>	
	Collecting the Data	<b>0.5</b>
	<ul style="list-style-type: none"> <li>• Partial Completion Reporting</li> <li>• Red/amber/green (RAG) Reporting</li> </ul>	
	Visualizing Progress	<b>0.5</b>
<ul style="list-style-type: none"> <li>• The Gantt Chart</li> <li>• The Slip Chart</li> <li>• The timeline</li> </ul>		
	Earned Value Analysis	<b>2</b>
<ul style="list-style-type: none"> <li>• The Baseline Budget</li> <li>• Monitoring Earned Value</li> <li>• Schedule Variance (SV)</li> <li>• Time Variance (TV)</li> <li>• Cost Variance(CV)</li> <li>• Performance Ratios</li> </ul>		
	Software Configuration Management	<b>0.5</b>
<ul style="list-style-type: none"> <li>• Change Control <ul style="list-style-type: none"> <li>○ Change Control Procedures</li> <li>○ Changes in Scope of a System</li> </ul> </li> </ul>		
<b>9 (3 Hrs.) Managing Contracts</b>	Introduction	<b>1</b>
	Types of Contract	
	<ul style="list-style-type: none"> <li>• Fixed Price Contracts</li> <li>• Time and Materials Contracts</li> <li>• Fixed Price per Unit Delivered Contracts</li> </ul>	
	Stages in Contract Placement	<b>1</b>
	<ul style="list-style-type: none"> <li>• Requirements Analysis</li> <li>• Evaluation Plan</li> <li>• Invitation to Tender</li> <li>• Evaluation of Proposals</li> </ul>	

	<p>Typical Terms of a Contract</p> <ul style="list-style-type: none"> <li>• Definition</li> <li>• Form of Agreement</li> <li>• Goods and Services to be Supplied</li> <li>• Ownership of the Software</li> <li>• Environment</li> <li>• Customer Commitments</li> <li>• Acceptance Procedures</li> <li>• Standards</li> <li>• Project and Quality Management</li> <li>• Timetable</li> <li>• Price and Payment Method</li> <li>• Miscellaneous Legal Requirements</li> </ul> <p>Contract Management</p>	<b>1</b>
<b>10 (4 Hrs.) Managing People in Software Environments and working in teams</b>	<p>Introduction</p> <p>The Oldham–Hackman Job Characteristics Model</p> <ul style="list-style-type: none"> <li>• Concepts</li> <li>• Methods of Improving Motivation</li> </ul> <p>Becoming a Team</p>	<b>1</b>
	<p>Decision Making</p> <ul style="list-style-type: none"> <li>• Some Mental Obstacles to Good Decision Making</li> <li>• Group Decision Making</li> <li>• Obstacles to Good Group Decision Making</li> <li>• Measures to Reduce the Disadvantages Of Group Decision Making</li> <li>• Team Heedfulness</li> <li>• Egoless Programming</li> <li>• Chief Programmer Teams</li> </ul>	<b>1</b>
	<p>Organization and Team Structures</p> <ul style="list-style-type: none"> <li>• Organizational Structures and Projects</li> <li>• Formal Versus Informal Structures</li> <li>• Hierarchical Approach</li> <li>• Staff Versus Line</li> <li>• Departmentalization</li> </ul>	<b>0.5</b>
	<p>Coordination Dependencies</p> <p>Dispersed and Virtual Teams</p> <p>Communication Genres</p> <ul style="list-style-type: none"> <li>• Early Stages of a Project</li> <li>• Intermediate Design Stages of the Project</li> <li>• Implementation Stages of the Project</li> </ul>	<b>1</b>
	<p>Communication Plans</p> <p>Leadership</p> <p>Leadership Styles</p>	<b>0.5</b>

<b>11 (3 Hrs.) Software Quality</b>	Introduction The Place and importance of Software Quality	<b>0.5</b>
	Product and Process Metrics with respect to project management <ul style="list-style-type: none"> <li>• ISO 9126</li> </ul>	<b>0.5</b>
	Quality Management Systems <ul style="list-style-type: none"> <li>• BS EN ISO 9001:2000</li> <li>• An Overview of BS EN ISO 9001:2000 OMS Requirements</li> </ul>	<b>1.5</b>
	Process Capability Models	<b>0.5</b>

**Laboratory Works:**

Students should be able to use different CASE tools regarding project management focusing on work breakdown structure, resource break down structure, estimation, software configuration management. The students should prepare a report on a case study focusing on cost benefit analysis, earned value analysis, risk analysis

**References:**

1. Software Project Management 5 edition; Tata McGraw Hill Education Private Limited; Bob Hughes, Mike Cotterell, Rajib Mall
2. Introduction to Software Project Management & Quality Assurance, Darrel Ince, I. Sharp, M. Woodman, Tata McGraw Hill
3. Software Project Management: A Unified Framework, Walker Royce, Addison-Wesley, An Imprint of Pearson Education

**Tribhuvan University  
Institute of Science and Technology  
Model Question**

**Master Level/ First Year/ Second Semester  
Information Technology (MIT553)  
(IT Project Management)**

**Full Marks: 45  
Pass Marks: 22.5  
Time: 2 hours**

**Section A**

**Attempt any two questions.**

**[2 x 10 =20]**

1. Draw activity network diagram based on precedence network for the following scenario. List the critical activities, critical paths. Draw the Gantt chart as well. [6+1+3 ]

Activity Name	Activities	Duration (Week)	Precedence
A	Requirement Collection	4	
B	Analysis	2	A
C	Design	3	A,B
D	Hardware Selection	3	
E	Testing	3	B,C
F	Deployment	2	D,E

2. Carry out Earned value analysis on the given scenario. Calculate Schedule Variance and Cost Variance and state the status of the project. [10]

Activity Name	Duration (days)	Precedence	Cost/day (Rs.)
A	3		100
B	5	B	200
C	10		100
D	6	A,C	200

At the end of 5<sup>th</sup> day, the status of the project is as follows:

Activity Name	% Completion	Precedence
A	100	
B	100	B
C	20	
D	0	A,C

3. Explain risk acceptance, risk avoidance, risk reduction and mitigation and risk transfer with an example. Differentiate between different types of contracts. [5+5]



**Section B**

**Attempt any five questions.**

**[5 x 5 =25]**

- 4. Explain management control process. [5]
- 5. Calculate payback period and ROI for the following project [5]

Year	Project
0	-400000
1	50000
2	100000
3	300000
4	50000
5	100000

- 6. Illustrate on the problems with over and under-estimates. Explain COSMIC full function point estimation technique. [1+4]
- 7. Highlight on the prioritization techniques that can be used while scheduling resources. [5]
- 8. Differentiate between formal and informal organization and team structure. Explain different leadership styles. [5]
- 9. Briefly highlight on the major characteristics of ISO 9126. [5]

**Course Title:** Intelligent Computing  
**Course No:** MIT554  
**Nature of the Course:** Theory + Lab  
**Semester:** II

**Full Marks:** 45 + 30  
**Pass Marks:** 22.5 + 15  
**Credit Hrs:** 3

**Course Description:**

This course covers different concepts related with computational linguistics that can be applied for machine learning. The course will focus on the main computational intelligence approaches and methodologies, namely artificial neural networks, genetic algorithms, swarm optimization, and fuzzy systems.

**Course Objectives:**

The main objective of this course is to provide fundamental knowledge on the concept of computational intelligence.

**Course Contents:**

Unit	Contents	Hour
<b>1</b> (2 Hrs.) <b>Introduction to Computational Intelligence</b>	Intelligent System, Computational Intelligent, Paradigms	<b>0.5</b>
	Natural Immune System, Antibodies, Antigen, Lymphocytes, Lymphoid, Danger theory	<b>1</b>
	Artificial Immune Model, Classical view model	<b>0.5</b>
<b>2</b> (5 Hrs.) <b>Neural Network</b>	<b>Introduction to neural network:</b> Rosenblatt’s neuron, Perceptron training algorithm, Perceptron convergence algorithm, Activation functions (Threshold, Sigmoid, Tanh, ReLU), Adaptive Linear Neural	<b>1</b>
	<b>Multi-Layer Neural Network and Backpropagation:</b> Universal approximation theory, Backpropagation training algorithm, Batch learning and online learning, Cross – validation and generalization	<b>2</b>
	<b>Radial Basis Function Networks:</b> Definition and examples, Radial basis function, The interpolation problem, Training algorithm, Radial basis function network variations ( <i>Normalized Hidden Unit Activations, Soft – Competition</i> ), Kernel regression	<b>2</b>
<b>3</b> (10 Hrs.) <b>Fuzzy Logic</b>	<b>Basic Fuzzy Set Theory:</b> Introduction, Natural language and formal models, Fuzzy sets, Interpretation of Fuzzy sets ( <i>Fuzzy sets for Modeling Similarity, Modeling Preference, Modeling Possibility</i> ), Representation of Fuzzy sets ( <i>Definition based on functions, Level sets</i> ), Fuzzy logic ( <i>Propositions and truth values, t-Norms, t-Conorms, Aggregation functions</i> ), Operations on Fuzzy sets ( <i>Intersection, Union, Complement, Linguistic modifiers</i> ), Alpha cuts, The decomposition theory, The extension principle ( <i>Mapping of Fuzzy sets and Level sets</i> ),	<b>5</b>

	Compensatory operators	
	<b>Fuzzy Relations:</b> Introduction, Fuzzy relation and propositions, Crisp relations, Fuzzy logic inference ( <i>Fuzzification, Inferencing, Defuzzification</i> ), Fuzzy logic for real valued inputs	<b>1</b>
	<b>Fuzzy Data Analysis:</b> Fuzzy methods in data analysis, Fuzzy clustering ( <i>Clustering, Presupposition and notation, Fuzzy c-Means</i> ), Fuzzy classifiers (Fuzzy k-Nearest neighbors)	<b>3</b>
	<b>Fuzzy Measures and Fuzzy Integrals:</b> Fuzzy measures, Fuzzy integrals, Training the fuzzy integrals	<b>1</b>
<b>4 (8 Hrs.) Evolutionary Computation</b>	<b>Introduction to Evolutionary Computation:</b> Generic evolutionary algorithms, Biological evolution, Simulated evolution, Representation – The chromosome, Initial population, Fitness function, Selection (Selective pressure, Random selection, Proportional selection, Tournament selection, Rank based selection, Boltzmann selection, Elitism, Hall of fame), Reproduction operators, Stopping conditions ( <i>Terminate when no improvement is observed over a number of consecutive Generations, Terminate when there is no change in the population, Terminate when an acceptable solution has been found, Terminate when the objective function slope is approximately zero</i> )	<b>4</b>
	<b>Evolutionary Optimization:</b> Global numerical optimization ( <i>A Canonical Example in One and two Dimension</i> ), Combinatorial optimization, Constraint handling approaches, Multi objective optimization, Dynamic and noisy environments, Niching, Strategy parameters and Self-adaptation	<b>2</b>
	<b>Elements of Evolutionary Algorithms:</b> Encoding of solution candidates (Hamming cliffs, Epistasis, Closedness of the search space), Genetic operators	<b>2</b>
<b>5 (9 Hrs.) Computational Swarm Intelligence</b>	<b>Particle Swarm Optimization:</b> Basic principles of computational swarm intelligence ( <i>Swarm in Known and Unknown environments</i> ), Particle swarm optimization (Influence of the parameters, Turbulence factor, Boundary handling, Global best and local best PSO), Social network structures, Basic variations (Velocity clamping, Inertia weight, Construction coefficient, Synchronous vs Asynchronous updates, Velocity models)	<b>4.5</b>
	<b>Single Solution Particle Swarm Optimization:</b> Guaranteed convergence PSO, Social based PSO, Hybrid algorithm, Sub swarm based PSO, Multi start PSO algorithm, Repelling models, Binary PSO, Multi-objective PSO ( <i>Leader selection mechanism</i> )	<b>4.5</b>

<b>6 (11 Hrs.) Deep Learning</b>	<b>Basic Idea:</b> Introduction to Deep Learning, Common architectural principles of Deep Networks (Parameters, Layers, Activation functions, Loss functions, Optimization algorithm, Hyper parameters)	<b>2</b>
	<b>Major Architectures of Deep Networks:</b> Generative Adversarial Networks, Convolutional Neural Network (CNN Architecture, Input layers, Convolution layers, Pooling layers, Fully connected layers), Recurrent Neural Network (RNN architecture, Modeling the time dimension, LSTM networks)	<b>3</b>
	<b>Transformers:</b> Encoder decoder architecture ( <i>Encoder only, Decoder only, Encoder-decoder</i> ), <i>LLM (Large Language Models, Pre-training, fine-tuning)</i> , Issues with RNN encoder decoder, Attention mechanism	<b>6</b>

### Laboratory Works:

#### Illustration of the Laboratory Works

1. Simulating neural network models, fuzzy models, genetic algorithmic models using some programming language
2. Fine – tuning the pre-trained model for your own specific task

### References:

1. Andries P. Engelbrecht, Computational Intelligence, An Introduction, Second Edition, WILEY, 2007
2. James M. Keller, Derong Liu, David B. Fogel, Fundamentals of Computational Intelligence, WILEY, 2016
3. Rudolf Kruse, Christian Borgelt, Christian Braune, Sanaz Mostaghim, Matthias Steinbrecher, Computational Intelligence, A Methodological Introduction, Second Edition, Springer, 2016
4. Deep Learning: A Practitioner’s Approach, O’Reilly, Josh Patterson and Adam Gibson, 2017

**Tribhuvan University**  
**Institute of Science and Technology**  
**Model Question**

**Master Level/ First Year/ Second Semester**  
**Information Technology (MIT554)**  
**(Intelligent Computing)**

**Full Marks: 45**  
**Pass Marks: 22.5**  
**Time: 2 hours**

**Section A**

**Attempt any two questions.**

**[2 x 10 =20]**

1. Distinguish between RNN and Transformer. Describe the architectures of Transformer. [ 2 + 8 ]
2. Explain about any two selection approaches in evolutionary algorithm. Discuss about the significance of PSO in social network structure. [5 + 5 ]
3. State decomposition theory. Illustrate the different operations in Fuzzy sets with examples. Differentiate between batch learning and online learning. [2 + 5 + 3 ]

**Section B**

**Attempt any five questions.**

**[5 x 5 =25]**

4. How Fuzzy c-Means can be applied in clustering? Explain. [5 ]
5. Describe about Hamming cliffs in encoding of solution candidates. [5 ]
6. How PSO can be implemented on multi - start fashion? Explain. [5 ]
7. Discuss about attention mechanism in encoder – decoder. [5 ]
8. Define velocity clamping. Discuss how artificial immune system is inspired with biological immune system. [2 + 3]
9. Describe the back propagation algorithm. [5 ]

## Seminar

**Course Title:** Seminar  
**Course No:** MIT555  
**Nature of the Course:** Seminar

**Full Marks:** 25  
**Pass Marks:** 12.5  
**Credit Hrs:** 1

**Course Description:** The seminar is of full marks 25 offered in the curriculum of the MIT first year second semester. A student pursuing the seminar prepares a seminar report and presents the seminar in the department/campus. Once accepted by the department/campus, the students have to submit the final copy of the report.

### **Introduction:**

Each student is required to write a comprehensive report about the seminar. The report should consist of 5 to 10 pages describing the topic selected. Students can choose the seminar topics of their relevant subject area. The students are suggested to select the research oriented topics rather than just informative ones. The report should be in the format as described below;

### **Arrangement of Contents:**

The sequence in which the seminar report material should be arranged and bound should be as follows:

1. Cover Page & Title Page
2. Abstract
3. Chapters:
  - a. Introduction
  - b. Previous Works, Discussions and Findings
  - c. Conclusion
4. References

### **Detail Contents of the Seminar Report**

1. Cover & Title Page
2. Supervisor Recommendation
3. Head/Coordinator, Supervisor, and Internal Examiners' Approval Letter
4. Acknowledgement
5. Abstract
6. Table of Contents
7. List of Abbreviations
8. List of Figures
9. List of Tables
10. **Chapter 1: Introduction**
  - a. Introduction
  - b. Problem Statement

- c. Objectives
- 11. **Chapter 2: Previous Works, Discussions and Findings**
  - a. Background Study
  - b. Previous Works/ Literature Review
  - c. Methodology (Flowchart, Data description, Algorithm description, etc.)
  - d. Implementation Details
  - e. Result Analysis
- 12. **Chapter 3: Conclusion**
  - a. Conclusion
  - b. Future Recommendation
- 13. References
- 14. Bibliography (if any)
- 15. Appendices (if any)

## **Format of References**

### **1. References**

A list of all publications (articles, texts, monographs, etc.) must be listed at the last section of the report. Each article or paper used must be listed alphabetically by last name of the author and the list must be numbered sequentially. The following are examples of the format for various types of entries in the list.

**Journal:** Stalling, W., RSA and its computational aspects, *Infoworld*, 12, 28 (Jul. 2012), 42-49.

**Book:** Bishop, M. and Boneh, D., *Elements of Computer Security*, Pearson Education., 2009.

**Proceedings:** Shamir, A., Controlling attacks on public key cryptography. *Proceedings of OOPSLA 86* (Sept. 1986., Portland), 405-416.

**Articles Which Have Established Citation Pages at ACM (Electronically published articles):** Smith, J., An algorithm for the traveling salesman problem, *Journal of the ACM* 54 (June 2011), 234-245. (<http://www.acm.org/jacm/2011/SmithspAlgo/>)

### **2. Citations**

Whenever material from a publication is used in the paper it must be followed by a citation which is simply the number of the reference in the list of references enclosed in square brackets (for example, a reference to the third article listed in the list of references would contain the citation [3].) Multiple citation numbers can be incorporated within one citation when required (for example, references to the fourth, eighth, and eleventh entries in the reference list would appear as [4, 8, 11]).

Thus students should follow IEEE referencing and citation standard.

**Formatting the Text of the Seminar:**

1. The report can be prepared using a word processor or LATEX. The students are highly recommended to use LATEX.
2. Margins - All margins must be one inch.
3. The text must be spaced by 1.5.
4. The text must be typed in 12 point font.
5. The text must be typed in Times New Roman font.
6. The tables should be captioned above it. The table number should be labeled as per the chapter number i.e. the first table in chapter 1 should be captioned Table 1.1 and so on.
7. The figures should be captioned below it. The figure number should be labeled as per the chapter number i.e. the first figure in chapter 1 should be captioned Figure 1.1 and so on.

**Provision of Supervision:**

Supervisor should be the regular faculty member of MIT program at the department/campus. The role of supervisor is to supervise the students throughout the seminar period.

**Evaluation Scheme**

Students should submit the seminar report and present the seminar work. The seminar work will be evaluated by an evaluation committee. The seminar evaluation committee comprises of three members, namely, Head of the Department/Program Coordinator, Internal Examiner and Supervisor. The internal examiner should be the regular faculty of MIT program at the department/campus. Each of the members will evaluate the student's seminar individually based on the following scheme and the average of the evaluation will be the final evaluation.

S.N.	Topic	Full Marks
1	Overall Seminar Work	5
2	Overall Presentation	5
3	Overall Report	4
4	List of Tables, Charts, Groups, Figures/ Captions	3
5	Abstract and Conclusion	3
6	References	2
7	Question/Answer	3
	Total	25

**Final Report Submission**

A final approved signed copy of the seminar report should be submitted to the department/campus after successful defense of the work.



Tribhuvan University  
Institute of Science and Technology  
Name of Department/Campus  
Masters in Information Technology

***Seminar (MIT555)***

***Evaluation Sheet***

Name:-

Roll No:-

Seminar Title:-

S.N.	Topic	Full Marks	Marks Obtained
1	Overall Seminar Work	5	
2	Overall Presentation	5	
3	Overall Report	4	
4	List of Tables, Charts, Groups, Figures/ Captions	3	
5	Abstract and Conclusion	3	
6	References	2	
7	Question/Answer	3	
	Total	25	

Marks in Words:

Name of Head/Coordinator

Signature

Tribhuvan University  
Institute of Science and Technology  
Name of Department/Campus  
Masters in Information Technology

***Seminar (MIT555)***

***Evaluation Sheet***

Name:-

Roll No:-

Seminar Title:-

S.N.	Topic	Full Marks	Marks Obtained
1	Overall Seminar Work	5	
2	Overall Presentation	5	
3	Overall Report	4	
4	List of Tables, Charts, Groups, Figures/ Captions	3	
5	Abstract and Conclusion	3	
6	References	2	
7	Question/Answer	3	
	Total	25	

Marks in Words:

Name of Internal Examiner

Signature

Tribhuvan University  
Institute of Science and Technology  
Name of Department/Campus  
Masters in Information Technology

***Seminar (MIT555)***

***Evaluation Sheet***

Name:-

Roll No:-

Seminar Title:-

S.N.	Topic	Full Marks	Marks Obtained
1	Overall Seminar Work	5	
2	Overall Presentation	5	
3	Overall Report	4	
4	List of Tables, Charts, Groups, Figures/ Captions	3	
5	Abstract and Conclusion	3	
6	References	2	
7	Question/Answer	3	
	Total	25	

Marks in Words:

Name Supervisor

Signature

**Course Title: E-commerce and E-Business**  
**Course No: MIT558**  
**Nature of the Course: Theory + Lab**  
**Semester: II**

**Full Marks: 45 + 30**  
**Pass Marks: 22.5 + 15**  
**Credit Hrs: 3**

**Course Description:**

The course introduces the fundamentals and infrastructure of e-Commerce and e-Business to familiarize students with related new technology development. The tentative topics include but are not limited to Internet business models, e-commerce infrastructure, e-Payment system, e-SCM, e-CRM, and e-Procurement

**Course Objectives:**

Students are expected to understand recent developments in e-Business and be able to employ e-Business strategically to enhance business processes. Students will be able apply skills and knowledge in planning, designing and restructuring of business using digital tools

**Course Contents:**

<b>Unit</b>	<b>Contents</b>	<b>Hours</b>
<b>1</b> <b>(6 Hrs.)</b> <b>Introduction to digital business and e-commerce</b>	<b>Introduction</b> [Digital Business Technologies]	<b>0.5</b>
	<b>The impact of electronic communications on traditional businesses</b> [Digital Transformation, Inbound Marketing, Social Media Marketing, Mobile Commerce]	<b>1</b>
	<b>Difference between digital business and e-commerce</b> [E-commerce, Sell-side E-commerce and Buy-side Ecommerce, Digital Business, Types of sell-side e-commerce (transactional, service-oriented relationship-building, Brand-building, Publisher or Media, Social Network Sites), Business or consumer models of e-commerce transactions (B2B, B2C, C2C, C2B)]	<b>1.5</b>
	<b>Digital Business Opportunity</b> [Soft-Lock-in, Drivers of digital technology adoption ( Cost/efficiency drivers, Competitiveness drivers), Tangible and intangible benefits from e-commerce and digital business]	<b>1</b>
	<b>Risks and Barriers to Digital Business Adoption</b> [Evaluating an organization’s digital business capabilities(Stage Models), Drivers of consumer technology adoption (Online Value Proposition, Content, Customization, Community, Convenience, Choice, Cost Reduction)]	<b>1.5</b>
	<b>Barrier to Consumer Internet Adoption</b> [No perceived benefit, Lack of trust, Security problems, Lack of skills, Cost]	<b>0.5</b>
<b>2</b> <b>(5 Hrs.)</b> <b>Marketplace analysis for e-commerce</b>	<b>Introduction</b> [Online marketplace, Path to purchase, Multi-screening, E-retail destination site, Online intermediaries, Destination Sites]	<b>0.5</b>
	<b>Business and revenue models for e-commerce</b>	<b>0.5</b>
	<b>Online marketplace analysis</b> [Situation analysis, Environmental scanning and analysis, Strategic agility, Process for online marketplace analysis( Click ecosystem, Online market	<b>1</b>

	ecosystem, An online marketplace map, Customer segments, Search intermediaries, Intermediaries, influencers, media site, Destination sites)]	
	<b>Location of trading in the marketplace</b> [Electronic marketplace, Review of marketplace channel structures, Location of trading in the marketplace, The importance of multichannel marketplace models, Commercial arrangement for transactions, Different types of online intermediary and influencers, Search engines]	<b>1</b>
	<b>Business models for e-commerce</b> [Online business model (Value proposition, Customer segments, Customer relationships, Channel, Key partners, Activities, Resources, Cost structure, Revenue stream), Revenue models (CPM, CPC, Sponsorship, Affiliate revenue, CPA, Transaction fee, Subscription, Pay-per-view, Subscriber)]	<b>1.5</b>
	<b>Online start-up companies</b> [Assessing online businesses, Valuing Internet start-ups(Concept, Innovation, Execution, Traffic, Financing, Profile), Dot-Com Failure]	<b>0.5</b>
<b>3 (6 Hrs.) Managing digital business infrastructure</b>	<b>Introduction</b> [Digital technology infrastructure, Digital business infrastructure]	<b>0.5</b>
	<b>Digital business infrastructure components</b> [A five-layer model of digital business infrastructure]	<b>0.5</b>
	<b>Introduction to Internet technology</b> [Client Server System, Physical and network infrastructure components of the Internet (Client-server, ISP, Backbones)]	<b>0.5</b>
	<b>Management issues in creating a new customer-facing digital service</b> [Domain name selection, Uniform resource locators, Domain name registration, Managing hardware and systems software infrastructure, Managing digital business applications infrastructure]	<b>1</b>
	<b>Focus on Web services SaaS, cloud computing and service-oriented architecture (SOA)</b> [Web Services, Benefits of web services or SaaS, Application programming interfaces (APIs), Challenges of deploying SaaS, Cloud computing, Virtualization, Service- oriented architecture (SOA)]	<b>1</b>
	<b>Managing internal digital communications through intranets and extranets</b> [Intranet applications, Extranet applications, Encouraging use of intranets and extranets, IPTV (Internet TV), Voice over IP (VoIP), Widgets (Types of Widgets)]	<b>1</b>
	<b>Web presentation and data exchange standards</b> [XML, Semantic web standards, Microformats (hCalendar, hReview, hCard)]	<b>0.5</b>
	<b>Internet governance</b> [Internet Governance, The net neutrality principle, Overview of ICANN, ISOC, IETF, W3, TINA-C]	<b>1</b>
	<b>4</b>	<b>Introduction</b> [Macro and micro-environment, Factors in the

<b>(4 Hrs.) E-environment</b>	macro-and micro-environment of an organization(SLEPT), Environmental scanning, Wave scanning]	
	<b>Social and legal factors</b> [Show rooming, Factors governing e-commerce service adoption (Understanding users' access requirements, Consumers influenced by using the online channel, Motivation for use of online services, Purchased online, Business demand for digital business services, B2B profiles, Adoption of digital business), Privacy and trust in e-commerce (Privacy legislation, Anti-spam legislation, Regulations)]	<b>1.5</b>
	<b>Environmental and green issues related to Internet usage</b> [Reasons for green e-commerce]	<b>0.25</b>
	<b>E government</b> [Policy prioritization, types of actions]	<b>0.25</b>
	<b>Technological innovation and technology assessment</b> [Gartner hype cycle], Approaches to identifying emerging technology (Technology networking, Crowdsourcing, Technology hunting, Technology mining, Technology incubators), Multiscreening(Content grazing, Investigative spider-webbing, Quantum journey, Social spider-webbing)]	<b>1.5</b>
<b>5 (6 Hrs.) Digital business strategy</b>	<b>Introduction</b>	<b>0.25</b>
	<b>Digital business strategy</b> [Strategy, Types of Strategy(Corporate, Business unit, Operational, Functional), The imperative for digital business strategy, Digital channel strategies, Strategy process models for digital business]	<b>1</b>
	<b>Strategic analysis</b> [Elements of strategic situation analysis, Resource and process analysis(Stage models, Application portfolio analysis, Organizational and IS SWOT analysis, Human and financial resources), Competitive environment Analysis(Demand analysis, Assessing competitive threats (Competitive threats, Sell-side threats, Buy-side threats), Co-opetition, Competitor analysis (Resource-advantage mapping)]	<b>1.5</b>
	<b>Strategic objectives</b> [Vision and mission, Scenario-based analysis, Creating business value, Objective setting (SMART, Online revenue contribution, Conversion modelling for sell-side and buy-side e-commerce, Balanced score card approach)]	<b>1</b>
	<b>Strategy definition</b> [Strategy definition, Fit and viability metrics, Digital business channel priorities, Market and product development strategies, Positioning and differentiation strategies, Business, service and revenue models, Marketplace restructuring, Supply chain management capabilities, Internal knowledge management capabilities, Organizational resourcing and capabilities]	<b>1.5</b>
	<b>Strategy implementation</b> [Strategy implementation, Implementation issues, Failed digital business strategies (Reasons to failure), Digital business strategy implementation success factors]	<b>0.25</b>

	<b>Aligning and impacting digital business strategies</b> [In the business-alignment approach, critical success factors (CSF) analysis, business-impacting approach, value chain analysis, Elements of IS strategy, Investment appraisal (Operational value, strategic value, threshold, infrastructure investments, Productivity paradox)]	<b>0.5</b>
<b>6 (6 Hrs.) Supply chain management</b>	<b>Introduction</b> [Problems of Supply Chain Management (SCM)]	<b>0.25</b>
	<b>Supply chain management</b> [SCM (Upstream supply chain, Downstream supply chain, Supply chain network, Efficient Customer Response(ECR)), Using technology to support supply chain, Model of supply chain, Logistic(Inbound, Outbound), Push and pull supply chain models]	<b>1</b>
	<b>Value chain</b> [Traditional and revised value chain models, Restructuring the internal value chain, The value stream, Value chain analysis, Value networks, Members of the value network, Virtual organization]	<b>1</b>
	<b>Options for restructuring the supply chain</b> [Vertical integration, Vertical disintegration, and Virtual integration]	<b>0.5</b>
	<b>Using digital business to restructure the supply chain</b> [Information supply chain, Information asymmetry, Technology options and standards for supply chain management, Adoption rates of digital business applications(Benefits of e-supply chain management, IS-supported upstream supply chain management, RFID and The Internet of Things), IS-supported downstream supply chain management, Outbound logistics management, IS infrastructure for supply chain management]	<b>2.5</b>
	<b>Supply chain management implementation</b> [Data standardization and exchange, The supply chain management strategy process]	<b>0.5</b>
	<b>Goal-setting and performance management for e-SCM</b> [Measurement framework, Managing partnership, Managing global distribution]	<b>0.25</b>
<b>7 (6 Hrs.) E-procurement</b>	<b>Introduction</b> [Key procurement activities]	<b>0.25</b>
	<b>e-procurement</b> [E-procurement, Electric procurement systems, Understanding the procurement process, Types of procurement, Participants in different types of e-procurement, Applications of e-procurement]	<b>1.75</b>
	<b>Drivers of e-procurement</b> [Selection criteria for e-procurement adoption, Digital business e-value grid ]	<b>0.5</b>
	<b>Estimating e-procurement costs</b> [E-procurement cost savings, The impact of cost savings on profitability]	<b>0.5</b>
	<b>Barriers and risks of e-procurement adoption</b>	<b>0.25</b>
	<b>Implementing e-procurement</b> [information system for procurement cycle, Integrating company systems with supplier systems, Integration between e-procurement systems and catalogue data, Punchout catalogue]	<b>1.5</b>
	<b>B2B marketplaces</b> [B2B marketplaces failure, limited adoption of e-marketplaces, neutral to private B2B exchanges, Types of	<b>1</b>

	marketplace, Metamediaries]	
	<b>Future of e-procurement</b> [Software agents]	<b>0.25</b>
<b>8 (6 Hrs.) Customer relationship management</b>	<b>Introduction</b> [Customer Relationship Management(CRM), Customer life cycle, Marketing applications of CRM]	<b>0.25</b>
	<b>e-CRM</b> [Electronic customer relationship management, From e-CRM to social CRM, Benefits of e-CRM, Customer engagement strategy, Permission marketing, Customer profiling]	<b>0.25</b>
	<b>Conversion marketing</b> [Conversion marketing, Reach–Act–Convert–Engage model]	<b>0.25</b>
	<b>Online buying process</b> [Searching behaviors, Differences in buyer behavior in target markets, Differences between B2C and B2B buyer behavior, The net promoter score]	<b>0.25</b>
	<b>Customer acquisition management</b>	<b>0.25</b>
	<b>Marketing communications for customer acquisition including search engine marketing</b> [The characteristics of interactive marketing communications(Push to pull, Monologue to dialogue, One-to-many to one-to-some and one-to-one, One-to-many to many-to-many communications, Lean- back to lean- forward, Nature of standard marketing communication, Increase in communications intermediaries, Integration), Assessing marketing communications effectiveness, Online marketing communications(Search engine marketing, Online PR)]	<b>1.75</b>
	<b>Social media and social CRM strategy</b> [Social media marketing, POST framework, Social CRM, Online partnerships, Interactive advertising, Email marketing, and Social Media Marketing]	<b>0.5</b>
	<b>Customer retention management</b> [Customer satisfaction and loyalty, Loyalty drivers, Personalization and mass customization, Managing customer activity and value, Lifetime-value modeling]	<b>0.5</b>
	<b>Excelling in e-commerce service quality</b> [Improving online service quality (tangibles, reliability, responsiveness, assurance, empathy)]	<b>0.5</b>
	<b>Customer extension</b> [Customer extension, Advanced online segmentation and targeting techniques (Sense, Respond, Adjust - monitoring customer behavior, Recency, Frequency, Monetary value (RFM) analysis, Propensity modelling)]	<b>1</b>
<b>Technology solutions for CRM</b> [Types of CRM applications, Integration with back- office systems, The choice of single-vendor solutions or a more fragmented choice, Data quality]	<b>0.5</b>	

### Laboratory Works:

Student should design and construct e-Commerce and e-Business applications and mobile applications using tools of their interest



**References:**

1. Dave Chaffey, Tanya Hemphill, David Edmundson-Bird, Digital Business and E-Commerce Management, Pearson; 6<sup>th</sup> edition, 2015
2. Dave Chaffey, Tanya Hemphill, David Edmundson-Bird, Digital Business and E-Commerce Management, Pearson; 7<sup>th</sup> edition, 2019
3. Kenneth Laudon and Jane Laudon, E-Commerce 2019: Business, Technology and Society, Pearson Education, 15<sup>th</sup> Edition, 2019
4. Schneider, Gary, Electronic Commerce, 12thEdition, Cengage Learning, 2016
5. Strauss, Judy and Frost, Raymond D., E-Marketing, 8<sup>th</sup> Edition, Routledge, 2018. Turban, E., Outland, J., King, D., Lee, J. K., Liang, T. P., and Turban, D. C., Electronic Commerce 2018: A Managerial and Social Networks Perspective, 9<sup>th</sup> Edition, Springer, 2018

**Tribhuvan University**  
**Institute of Science and Technology**  
**Model Question**

**Master Level/ First Year/ Second Semester**  
**Information Technology (MIT558)**  
**(E-commerce and E-business)**

**Full Marks: 45**  
**Pass Marks: 22.5**  
**Time: 2 hours**

**Section A**

**Attempt any two questions.**

**[2 x 10 =20]**

1. Examine the relationship between customer satisfaction and loyalty. What is the net promoter score? Differentiate between B2C and B2B buyer behaviors. [3+2+5]
2. What is Supply Chain Management (SCM)? What are the problems with SCM? How data standardization and exchange is done during supply chain management implementation? [2+3+5 ]
3. What is digital business strategy? How strategic analysis is done in digital business strategy? [2+8 ]

**Section B**

**Attempt any five questions.**

**[5 x 5 =25]**

4. What are microformats? How data exchanges are done using microformats? [2+3 ]
5. How the revenue models like CPM, CPC, and CPA different from each other? [5 ]
6. Discuss the risks and barriers to digital business adoption. [5 ]
7. How technological innovation and technology assessment is done using Gartner's Hype Cycle? [5 ]
8. How Goal-setting and performance management for e-SCM is done? [5]
9. What are the barriers and risks of e-procurement adoption [5 ]

## Advanced Programming

**Course Title:** Advanced Programming  
**Course No:** MIT559  
**Nature of the Course:** Theory + Lab  
**Semester:** II

**Full Marks:** 45+30  
**Pass Marks:** 22.5+15  
**Credit Hrs:** 3

### Course Description

This course covers data processing, inferential statistics, data visualization, machine learning, text mining, and big data processing using with python.

### Course Objectives

The main objective of this course is to enable student to write python programs related to data science and data visualization.

Unit	Contents	Hour
<b>1</b> (12 Hrs.) <b>Data Processing and Inferential Statistics</b>	<b>Review of NumPy and Pandas:</b> NumPy Arrays, Performing various operations with NumPy arrays, Review of Pandas Data Structures, data analysis with Pandas, Data Cleansing, Various Data Operations, Review of Major String Operations.	<b>3</b>
	<b>Various forms of distribution:</b> Normal Distribution, Poisson Distribution, Bernoulli Distribution, z-score, p-value, One-tailed and Two-tailed tests, Type 1 and Type 2 Errors.	<b>4</b>
	<b>Other Distributions:</b> Confidence Interval, Correlation, Z-test vs T-test, F distribution, chi-square distribution, Chi-square for the goodness of fit, The chi-square test of independence, ANOVA.	<b>5</b>
<b>2</b> (10 Hrs.) <b>Data Mining and Data Visualization</b>	<b>Overview:</b> Data mining, Presenting an analysis, Studying the Titanic: Studying data distribution and other summary statistics.	<b>1.5</b>
	<b>Creating Charts:</b> Controlling the Line Properties of a Chart: Keyword Arguments, Setter Method, Step Command, Creating multiple plots, Playing with text, Styling plots.	<b>3</b>
	<b>Creating More Charts:</b> Box plots, Heatmaps, Scatter plots with histograms, scatter plot matrix (Histograms and Density Maps), Area plots (Stacked and Non-Stacked Charts), Bubble charts, Hexagon bin plots, Trellis plots (Histograms, Density plots, and Polylines).	<b>4</b>
	3D Plot: 3D plot of a surface, Manipulating Elevation, and Angle.	<b>1.5</b>
<b>3</b> (14 Hrs.)	<b>Different Types of Machine Learning:</b> Supervised, Unsupervised, and Reinforcement Learning.	<b>1</b>

<b>Python for Intelligence</b>	<b>Linear Regression:</b> Concept, Implementation, and Evaluation of Linear Regression, Concept and Implementation of Multiple Regression.	<b>2</b>
	<b>Naïve Bayes Classifier:</b> Concept, Implementation, and Evaluation of Bayesian Classifier.	<b>1.5</b>
	<b>Logistic Regression:</b> Concept, Implementation, and Evaluation of Logistic Regression	<b>1.5</b>
	<b>Decision Trees:</b> Concept, Implementation, and Evaluation of Decision Trees	<b>1.5</b>
	<b>Random Forest:</b> Concept, Implementation, and Evaluation of Random Forest.	<b>1.5</b>
	<b>K-Mean Clustering:</b> Concept, Implementation, Evaluation, and Application of K-Means.	<b>1.5</b>
	<b>Hierarchical Clustering:</b> Concept of Agglomerative and Divisive Clustering, Implementation and Evaluation of Agglomerative Clustering.	<b>1.5</b>
	<b>Generating Recommendations:</b> Concept of Collaborative Filtering, User Based vs. Item Based Collaborative Filtering, Using Euclidean Distance and Pearson Correlation Coefficient for Similarity Measures, Recommending Items, Implementation of Collaborative Filtering.	<b>2</b>
<b>4 (9 Hrs.) Python for Text Mining and Big Data</b>	<b>Text Processing:</b> Preprocessing Data using NLTK, Creating a Wordcloud, Word and sentence tokenization using NLTK, Parts of speech tagging using NLTK.	<b>3</b>
	<b>Text Mining:</b> Stemming and lemmatization using NLTK, Implementing Porter Stemmer, Lemmatization using WordNet, Stanford Named Entity Recognizer, Sentiment analysis on world leaders using Twitter.	<b>3</b>
	<b>Big Data:</b> Three Vs of Big Data, Hadoop, Introduction to MapReduce Programming Model, Python MapReduce, Examples of Map Reduce Programs, File handling with Hadoopy, Pig, Python with Apache Spark.	<b>3</b>

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**Model Question**

**Master Level/ First Year/ Second Semester**  
**Information Technology (MIT559)**  
**(Advanced Programming)**

**Full Marks: 45**  
**Pass Marks: 22.5**  
**Time: 2 hours**

**Section A**

**Attempt any two questions.**

**[2 x 10 =20]**

1. What is Z-score? How it can be calculated? How can we retain original value from z-score? A survey of daily travel time had these results (in minutes): 26, 33, 65, 28, 34, 55, 25, 44, 50, 36, 26, 37, 43, 62, 35, 38, 45, 32, 28, and 34. Write a python program to convert given data into z-scores and again convert z-scores to original values. [1+2+7]
2. What are different ways of controlling properties of line charts? Explain each with suitable example. [1+9 ]
3. Why logistic regression is used? Explain its working briefly. Suppose we have the data set (Height, Weight, VoicePitch, HairLength, Gender), where gender is class level. Write a python program to classify dataset into Male/Female and display accuracy of the fitted model. [1+3+6 ]

**Section B**

**Attempt any five questions.**

**[5 x 5 =25]**

4. How PDF differs from CDF? Write a python program to demonstrate their use. [1+4]
5. What is scatter plot matrix? When it is useful to create? Demonstrate creation of scatterplot matrix with suitable example. [1+1+3 ]
6. How agglomerative clustering differs from divisive clustering? Write a python program to divide dataset  $\{(2,5),(3,7),(1,3),(2,3),(4,6),(3,8),(3,1),(3,4),(5,8),(4,1)\}$  into two clusters using agglomerative algorithm. [1+4]
7. Write a python program to read text from file "inp.txt" remove stop words from it and then fir stems of words using porter stemmer [2.5+2.5 ]
8. Discuss the concept of map-reduce programming model. How it can be implemented in python? Explain with example. [2+3]
9. Discuss the concept of multiple regression. How it can be implemented and evaluated in python? Demonstrate with example. [1.5+3.5 ]