AC– 11-03-2025
Item No. –05

Approved by the BoS in Information Technology on 05-03-2025 Item No. 05

# As Per NEP 2020

# Tolani College of Commerce (Autonomous)


**Title of the Course: Software Quality Assurance**

**Programme: B.Sc.(Information Technology)**
**Semester VI**

**Syllabus for 4 credits**
**From the academic year-2025-2026**

| Sr. No. | Heading | Particulars |
|---|---|---|
| 1 | **Description the course :** | Quality Assurance (QA) in software testing is a crucial process that ensures software products meet the highest quality requirements, ensuring flawless performance and customer satisfaction. |
| 2 | **Vertical:** | Major |
| 3 | **Type:** | Theory and Project |
| 4 | **Credit**: | 4 credits |
| 5 | **Hours Allotted:** | 60 Hours |
| 6 | **Marks Allotted**: | Total 100 Marks<br>Practical Evaluation:40 Marks<br>Semester-End: 60 Marks |
| 7 | **Course Objectives**:<br>1. To understand and be able to apply software quality fundamentals to real-world software projects, including an ethical approach to Quality, value and cost considerations, quality models and safety considerations.<br>2. To demonstrate by means of example – software quality management processes such as quality assurance, verification and validation, and reviews/audits.<br>3. To illustrate the essential software practical considerations such as quality requirements, defect characterization, SQM techniques and software quality measurement.<br>4. To Employ the latest software quality tools. | |
| 8 | **Course Outcomes**:<br>1. The learners will be familiar with the process of verification and validation.<br>2. The learners will understand the process of applying tests to software and the fundamental components of a test case.<br>3. The learners will be able to derive test cases from software requirement specifications - including being able to partition input and output domains, form test specifications, and identify valid combinations of input.<br>4. The learners will understand and be able to distinguish between methods of judging test case adequacy and how to design tests that will accomplish the obligations of methods. | |

| | |
|---|---|
| **9** | **Modules**:- |
| | **Module 1: Introduction to Quality, Software Quality (15 Hours)** |
| | • Historical Perspective of Quality, What is Quality? (Is it a fact or perception?), Definitions of Quality, Core Components of Quality, Quality View, Financial Aspect of Quality, Customers, Suppliers and Processes, Total Quality Management (TQM), Quality Principles of Total Quality Management, Quality Management Through Statistical Process Control, Quality Management Through Cultural Changes, Continual (Continuous) Improvement Cycle, Quality in Different Areas, Benchmarking and Metrics, Problem Solving Techniques, Problem Solving Software Tools.<br>• Introduction, Constraints of Software Product Quality Assessment, Customer is a King, Quality and Productivity Relationship, Requirements of a Product, Organization Culture, Characteristics of Software, Software Development Process, Types of Products, Schemes of Criticality Definitions, Problematic Areas of Software Development Life Cycle, Software Quality Management, Why Software Has Defects? Processes Related to Software Quality, Quality Management System Structure, Pillars of Quality Management System, Important Aspects of Quality Management. |
| | **Module 2: Fundamentals of testing (15 Hours)** |
| | • Introduction, Necessity of testing, What is testing? Fundamental test process, The psychology of testing, Historical Perspective of Testing, Definitions of Testing, Approaches to Testing, Testing During Development Life Cycle, Requirement Traceability Matrix, Essentials of Software Testing, Workbench, Important Features of Testing Process, Misconceptions About Testing, Principles of Software Testing, Salient Features of Good Testing, Test Policy, Test Strategy or Test Approach, Test Planning, Testing Process and Number of Defects Found in Testing, Test Team Efficiency, Mutation Testing, Challenges in Testing, Test Team Approach, Process Problems Faced by Testing, Cost Aspect of Testing, Establishing Testing Policy, GUI testing, Compatibility Testing, Security Testing, Performance Testing, Volume Testing, Stress Testing, Recovery Testing, Installation Testing, Requirement Testing, Regression Testing, Error Handling Testing, Manual Support Testing, Intersystem Testing, Control Testing, Smoke Testing, Adhoc Testing, Object Oriented Application Testing, Testing of Internal Controls, COTS Testing, Client Server Testing, Web Application Testing, Mobile Application Testing, e- Business e-Commerce Testing, Agile Development Testing, Data Warehousing Testing<br>• Introduction, Proposal Testing, Requirement Testing, Design Testing, Code Review, Unit Testing, Module Testing, Integration Testing, Big-Bang Testing, Sandwich Testing, Critical Path First, Sub System Testing, System Testing, Testing Stages.<br>• Raising Management Awareness for Testing, Skills Required by Tester, Testing throughout the software life cycle, Software development models, Test levels, Test types, the targets of testing, Maintenance Testing. |

**Module 3**: **Unit Testing** **(15 Hours)**

- **Boundary Value Testing:** Normal Boundary Value Testing, Robust Boundary Value Testing, Worst-Case Boundary Value Testing, Special Value Testing, Examples, Random Testing, Guidelines for Boundary Value Testing,
- **Equivalence Class Testing:** Equivalence Classes, Traditional Equivalence Class Testing, Improved Equivalence Class Testing, Edge Testing, Guidelines and Observations.
- **Decision Table–Based Testing:** Decision Tables, Decision Table Techniques, Cause-and- Effect Graphing, Guidelines and Observations,
- **Path Testing:** Program Graphs, DD-Paths, Test Coverage Metrics, Basis Path Testing, Guidelines and Observations,
- **Data Flow Testing:** Define/Use Testing, Slice-Based Testing, Program Slicing Tools

**Module 4**: **Software Verification and Validation, V-test Model** **(15 Hours)**

- Introduction, Verification, Verification Workbench, Methods of Verification, Types of reviews on the basis od Stage Phase, Entities involved in verification, Reviews in testing lifecycle, Coverage in Verification, Concerns of Verification, Validation, Validation Workbench, Levels of Validation, Coverage in Validation, Acceptance Testing, Management of Verification and Validation, Software development verification and validation activities.
- Introduction, V-model for software, testing during Proposal stage, Testing during requirement stage, Testing during test planning phase, Testing during design phase, Testing during coding, VV Model, Critical Roles and Responsibilities.

| | | | |
|---|---|---|---|
| 10 | **Reference Books:**<br>**Author:** William E. Lewis, **Title:** Software Testing and Continuous Quality Improvement<br>**Publisher:** CRC Press 3rd Edition **year**:2016<br>**Author:** M. G. Limaye, **Title:** Software Testing: Principles, Techniques and Tools<br>**Publisher:** TMH **year**:2017<br>**Author:** Paul C. Jorgenson, **Title:** Software Testing: A Craftsman's Approach,<br>**Publisher:** CRC Press 4th Edition **year**:2017 | | |
| 11 | **Project Assessment:40%** | **Sem ter End Examination:60%** | |
| 12 | **Continuous Evaluation through:** | **Pro ect** | |

**13** **Format of Question Paper:**

**Scheme of Evaluation Pattern**
**Table 1A: Scheme of Continuous Evaluation**
**(CE)Scheme of Evaluation Pattern**

| Sub-components | Maximum Marks | Conditions for passing |
|---|---|---|
| Project Demonstration and Viva Voce | 40 | A learner must be present for each of the sub- components |
| Total | 40 | |

**Table 1B: Scheme of Semester End Examination (SEE) Evaluation Question Paper Pattern for Semester End Examination (SEE)**

**Maximum Marks: 60** **Duration: 2 Hrs.**

Note: All questions are compulsory. Each question has an internal choice.

| | | | |
|---|---|---|---|
| **Q.1.** | | Attempt any three of the following | (15) |
| | **a)** | | |
| | **b)** | | |
| | **c)** | | |
| | **d)** | | |
| | **e)** | | |
| | | Attempt any three of the following | (15) |
| **Q.2.** | **a)** | | |
| | **b)** | | |
| | **c)** | | |
| | **d)** | | |
| | **e)** | | |
| | | Attempt any three of the following | (15) |
| **Q.3.** | **a)** | | |
| | **b)** | | |
| | **c)** | | |
| | **d)** | | |
| | **e)** | | |
| | | Attempt any three of the following | (15) |
| **Q.4.** | **a)** | | |
| | **b)** | | |
| | **c)** | | |
| | **d)** | | |
| | **e)** | | |

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# As Per NEP 2020

# Tolani College of Commerce (Autonomous)


**Title of the Course: Security in Computing**

**Programme: B.Sc.(Information Technology) Semester VI**

**Syllabus for 2 credits**

**From the academic year-2024-2025**

| Sr. No. | Heading | Particulars |
|---|---|---|
| 1 | **Description the course :** | Information security is concerned with protecting information in all its forms, whether written, spoken, electronic, graphical, or using other methods of communication. Network security is concerned with protecting data, hardware, and software on a computer network. |
| 2 | **Vertical:** | Major |
| 3 | **Type:** | Theory and Practical |
| 4 | **Credit**: | 4 credits |
| 5 | **Hours Allotted:** | 60 Hours |
| 6 | **Marks Allotted**: | 100 Marks<br>Continuous Evaluation: 40Marks<br>Semester-End: 60 Marks |
| 7 | **Course Objectives**<br>**1.** Equip students with a foundational knowledge of key security principles, including confidentiality, integrity, availability, and authentication.<br>**2.** Enable students to identify various types of security threats and vulnerabilities in computing environments and to assess risks to develop effective mitigation strategies.<br>**3.** Teach students how to implement and configure security measures, such as encryption, firewalls, and intrusion detection systems, to protect information systems.<br>**4.** Explore the legal and ethical implications of computing security, including data privacy regulations and ethical hacking practices. | |
| 8 | **Course Outcomes**:<br>1. Students are able to explain the core concepts of confidentiality, integrity, availability, and authentication in the context of computing systems.<br>2. Students can successfully identify common security threats and vulnerabilities in various computing environments through practical assessments.<br>3. Students can demonstrate proficiency in configuring and deploying security technologies, such as encryption protocols and firewall settings, in lab environments.<br>4. Students can analyze real-world scenarios involving ethical dilemmas in security practices and propose responsible solutions. | |

| | |
|---|---|
| **9** | **Modules**:- |
| | **Module1:Information Security, Risk Analysis**, **Secure Design Principles (15 Hours)** |
| | • The Importance of Information Protection, The Evolution of Information Security, Justifying Security Investment, Security Methodology, How to Build a Security Program, The Impossible Job, The Weakest Link, Strategy and Tactics, Business Processes vs. Technical Controls.<br>• Threat Definition, Types of Attacks, Risk Analysis.<br>• The CIA Triad and Other Models, Defense Models, Zones of Trust, Best Practices for Network Defense |
| | **Module2:Authentication and Authorization, Encryption**, **Storage Security, Database Security**: **(15 Hours)** |
| | • Authentication, Authorization<br>• A Brief History of Encryption, Symmetric-Key Cryptography, Public Key Cryptography, Public Key Infrastructure.<br>• Storage Security Evolution, Modern Storage Security, Risk Remediation, Best Practices.<br>• General Database Security Concepts, Understanding Database Security Layers, Understanding Database- Level Security, Using Application Security, Database Backup and<br>Recovery, Keeping Your Servers Up to Date, Database Auditing and Monitoring. |
| | **Module3**:**Secure Network Design, Network Device Security**, **Firewalls, Security Models (15 Hours)** |
| | • Introduction to Secure Network Design, Performance, Availability, Security.<br>• Switch and Router Basics, Network Hardening.<br>• Overview, The Evolution of Firewalls, Core Firewall Functions, Additional Firewall Capabilities, Firewall Design.<br>• Classic Security Models, Reference Monitor, Trustworthy Computing, International Standards for Operating System Security |
| | **Module4**:**Intrusion Detection and Prevention Systems , Virtual Machines and Cloud Computing**, **Secure Application Design, Physical Security (15 Hours)** |
| | • IDS Concepts, IDS Types and Detection Models, IDS Features, IDS Deployment Considerations, Security Information and Event Management (SIEM).<br>• Virtual Machines, Cloud Computing.<br>• Secure Development Lifecycle, Application Security Practices, Web Application Security, Client Application Security, Remote Administration Security.<br>• Classification of Assets, Physical Vulnerability Assessment, Choosing Site Location for Security, Securing Assets:<br>• Locks and Entry Controls, Physical Intrusion Detection. |

| | |
|---|---|
| **11** | **Reference Books:**<br>1. **Author:** Mark Rhodes- Ousley, **Title:** The Complete Reference: Information Security, **Publisher:** McGraw- Hill 2nd Edition**year**:2013<br>2. **Author:** Josiah Dykstra **Title:** Essential Cybersecurity Science, **Publisher:** O'Reilly 5th Edition **year**:2017<br>3. **Author:** Wm. Arthur Conklin, GregWhite **Title:** Principles of Computer Security: CompTIA Security+ and Beyond, **Publisher:** McGraw Hill2nd Edition **year**:2010 |

| | | |
|---|---|---|
| **12** | **Internal Continuous Assessment:40%** | **Semester End Examination:60%** |
| **13** | **Continuous Evaluation through:** | **Practical** |

**14** **Format of Question Paper:**

**Scheme of Evaluation Pattern**

**Table 1A: Scheme of Continuous Evaluation (CE)**
**Scheme of Evaluation Pattern**

| Sub-components | Maximum Marks | Conditions for passing |
|---|---|---|
| 1)Practical exam | 30 | A learner must be present for each of the sub components |
| 2)Journal and Viva | 10 | |
| Total | 40 | |

**Table1B:SchemeofSemesterEndExamination(SEE)Evaluation Question Paper Pattern for Semester End Examination (SEE)**

**Maximum Marks: 60** **Duration:2 Hrs.**

Note: All questions are compulsory .Each question has an internal choice.

| | | | |
|---|---|---|---|
| **Q.1.** | | Attempt any two of the following | 15 |
| | **a)** | | |
| | **b)** | | |
| | **c)** | | |
| | **d)** | | |
| | **e)** | | |
| | | Attempt any two of the following | 15 |
| **Q.2.** | **a)** | | |
| | **b)** | | |
| | **c)** | | |
| | **d)** | | |
| | **e)** | | |
| | | Attempt any two of the following | 15 |
| **Q.3.** | **a)** | | |
| | **b)** | | |
| | **c)** | | |
| | **d)** | | |
| | **e)** | | |
| | | Attempt any two of the following | 15 |
| **Q.4.** | **a)** | | |
| | **b)** | | |
| | **c)** | | |
| | **d)** | | |
| | **e)** | | |

| **Course Name: Security in Computing Practical** | | | |
|---|---|---|---|
| **Periods per week (1 Period is 60 minutes)** | | **4** | |
| **Credits** | | **2** | |
| | | **Hours** | **Marks** |
| **Evaluation System** | **Practical Examination** | **2** | **40** |

| Practical No | Details |
|---|---|
| **1** | **Configure Routers** |
| **a** | OSPF MD5 authentication. |
| **b** | NTP. |
| **c** | to log messages to the syslog server. |
| **d** | to support SSH connections. |
| **2** | **Configure AAA Authentication** |
| **a** | Configure a local user account on Router and configure authenticate on the console and vty lines using local AAA |
| **b** | Verify local AAA authentication from the Router console and the PC-A client |
| **3** | **Configuring Extended ACLs** |
| **a** | **Configure, Apply and Verify an Extended Numbered ACL** |
| **4** | **Configure IP ACLs to Mitigate Attacks and IPV6 ACLs** |
| **a** | Verify connectivity among devices before firewall configuration. |
| **b** | Use ACLs to ensure remote access to the routers is available only from management station PC-C. |
| **c** | Configure ACLs on to mitigate attacks. |
| **d** | Configuring IPv6 ACLs |
| **5** | **Configuring a Zone-Based Policy Firewall** |
| **6** | Configure IOS Intrusion Prevention System (IPS) Using the CLI |
| **a** | Enable IOS IPS. |
| **b** | Modify an IPS signature. |
| **7** | **Layer 2 Security** |
| **a** | Assign the Central switch as the root bridge. |
| **b** | Secure spanning-tree parameters to prevent STP manipulation attacks. |
| **c** | Enable port security to prevent CAM table overflow attacks. |
| **8** | **Layer 2 VLAN Security** |
| | |
| **9** | **Configure and Verify a Site-to-Site IPsec VPN Using CLI** |
| | |

| | | |
|---|---|---|
| 1 | Q.1 | 15 |
| 2 | Q.2 | 15 |
| 3 | Viva | 5 |
| 4 | Journal | 5 |
| 5 | **Total** | **40** |

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# As Per NEP 2020

# Tolani College of Commerce (Autonomous)

Knowledge is Supreme

**Title of the Course: Business Intelligence**

**Programme: B.Sc.(Information Technology)**
**Semester VI**

**Syllabus for 4 credits**
**From the academic year-2025-2026**

| Sr. No. | Heading | Particulars |
|---|---|---|
| 1 | **Description the course ::** | Business intelligence may be defined as a set of mathematical models. and analysis methodologies that exploit the available data to generate information and knowledge useful for complex decision-making processes. |
| 2 | **Vertical:** | Major Electives |
| 3 | **Type:** | Theory and Practical |
| 4 | **Credit**: | 4 credits |
| 5 | **Hours Allotted:** | 60 Hours |
| 6 | **Marks Allotted**: | 100 Marks<br>Practical Evaluation: 40Marks<br>Semester-End: 60 Marks |
| 7 | **Course Objectives**<br>1. To support better business decision making.<br>2. This course provides an overview of the technology of BI and the application of BI to an organization's strategies and goals.3.<br>3. To develop the skills for implementing the supervised and unsupervised learning Techniques<br>4. To comprehend the core concepts of logistics planning and optimal decision making | |
| 8 | **Course Outcomes**<br>1. Enable all participants to recognize, understand and apply the language, theory and models of the field of business analytics<br>2. Foster an ability to critically analyse, synthesise and solve complex unstructured business problems<br>3. Encourage an aptitude for business improvement, innovation and entrepreneurial action<br>4. Encourage the sharing of experiences to enhance the benefits of collaborative learning | |

| | |
|---|---|
| **9** | **Modules**:- |
| | **Module1:Business intelligence, Decision support systems (15 Hours)** |
| | • Effective and timely decisions, Data, information and knowledge, The role of mathematical models, Business intelligence architectures, Ethics and business intelligence<br>• Definition of system, Representation of the decision-making process, Evolution of information systems, Definition of decision support system, Development of a decision support system |
| | **Module2:Mathematical models for decision making, Data mining, Data preparation (15 Hours)** |
| | • Structure of mathematical models, Development of a model, Classes of models<br>• Definition of data mining, Representation of input data , Data mining process, Analysis methodologies<br>• Data validation, Data transformation, Data reduction |
| | **Module3**:**Classification, Clustering (15 Hours)** |
| | • Classification problems, Evaluation of classification models, Bayesian methods, Logistic regression, Neural networks, Support vector machines<br>• Clustering methods, Partition methods, Hierarchical methods, Evaluation of clustering models |
| | **Module4**:**Business intelligence applications, Marketing models, Logistic and production models, Data envelopment analysis (15 Hours)** |
| | • Business intelligence applications**:**<br>• Relational marketing, Sales force management,<br>• Supply chain optimization, Optimization models for logistics planning, Revenue management systems.<br>• Efficiency measures, Efficient frontier, The CCR model, Identification of good operating practices |

**11 Reference Books:**

1. **Author:** Carlo Vercellis, **Title:** Business Intelligence: Data Mining and Optimization for Decision Making, **Publisher:** Wiley 1st Edition **year**:2009
2. **Author:** Efraim Turban, Ramesh Sharda, Dursun Delen, **Title:** Decision support and Business Intelligence Systems, **Publisher:** Pearson 9th Edition **year**:2011
3. **Author:** Grossmann W, Rinderle-Ma, **Title:** Fundamental of Business Intelligence, **Publisher:** Springer 1st Edition **year**:2015

| | | |
|---|---|---|
| **12** | **Practical Assessment: 40%** | **Semester End Examination: 60%** |
| **13** | **Continuous Evaluation through:** | **Practical** |
| **14** | **Format o question Paper:** | |

**Scheme of Evaluation Pattern**
**Table 1A: Scheme of Continuous Evaluation (CE/Practical)**
**Scheme of Evaluation Pattern**

| Sub-components | Maximum Marks | Conditions for passing |
|---|---|---|
| 1)Practical exam | 30 | A learner must be present for each of the sub components |
| 2)Journal and Viva | 10 | |
| Total | 40 | |

**Table 1B: Scheme of Semester End Examination (SEE) Evaluation**
**Question Paper Pattern for Semester End Examination (SEE)**
**Maximum Marks: 60** **Duration: 2 Hrs.**
Note: All questions are compulsory. Each question has an internal choice.

**Q.1.** Attempt any three of the following (15)

| | | | |
|---|---|---|---|
| | **a)** | | |
| | **b)** | | |
| | **c)** | | |
| | **d)** | | |
| | **e)** | | |
| | | | |

| | | | |
|---|---|---|---|
| | | Attempt any three of the following | (15) |
| **Q.2.** | **a)** | | |
| | **b)** | | |
| | **c)** | | |
| | **d)** | | |
| | **e)** | | |
| | | Attempt any three of the following | (15) |
| **Q.3.** | **a)** | | |
| | **b)** | | |
| | **c)** | | |
| | **d)** | | |
| | **e)** | | |
| | | Attempt any three of the following | (15) |
| **Q.4.** | **a)** | | |
| | **b)** | | |
| | **c)** | | |
| | **d)** | | |
| | **e)** | | |

| **Course Name: Business Intelligence Practical** | | | |
|---|---|---|---|
| **Periods per week (1 Period is 60 minutes)** | | **4** | |
| **Credits** | | **2** | |
| | | **Hours** | **Marks** |
| **Evaluation System** | **Practical Examination** | **2** | **40** |

| **Practical No** | **Details** |
|---|---|
| **1** | Import the legacy data from different sources such as ( Excel , SqlServer, Oracle etc.) and load in the target system. ( You can download sample database such as Adventureworks, Northwind, foodmart etc.) |
| **2** | Perform the Extraction Transformation and Loading (ETL) process to construct the database in the Sqlserver. |
| **3** | a. Create the Data staging area for the selected database.<br>b. Create the cube with suitable dimension and fact tables based on ROLAP, MOLAP and HOLAP model. |

| | |
|---|---|
| **4** | a. Create the ETL map and setup the schedule for execution.<br>b. Execute the MDX queries to extract the data from the datawarehouse. |
| **5** | a. Import the datawarehouse data in Microsoft Excel and create the Pivot table and Pivot Chart.<br>b. Import the cube in Microsoft Excel and create the Pivot table and Pivot Chart to perform data analysis. |
| **6** | Apply the what – if Analysis for data visualization. Design and generate necessary reports based on the data warehouse data. |
| **7** | Perform the data classification using classification algorithm. |
| **8** | Perform the data clustering using clustering algorithm. |

| | | |
|---|---|---|
| 1 | Q.1 | 15 |
| 2 | Q.2 | 15 |
| 3 | Viva | 5 |
| 4 | Journal | 5 |
| 5 | **Total** | **40** |

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# As Per NEP 2020

# Tolani College of Commerce (Autonomous)


**Title of the Course: Cyber Laws**

**Programme: B.Sc.(Information Technology)**

**Semester VI**

**Syllabus for 4 credits**

**From the academic year-2025-2026**

| Sr. No. | Heading | Particulars |
|---|---|---|
| 1 | **Description the course** | The main subjects of Cyber Law course include Digital Signatures, E-commerce, Copyright Issues, Trademark Issues and Information and Technology Act, 2000 |
| 2 | **Vertical:** | Major Electives |
| 3 | **Type:** | Theory and Practical |
| 4 | **Credit**: | 4 credits |
| 5 | **Hours Allotted:** | 60 Hours |
| 6 | **Marks Allotted**: | 100 Marks<br>Practical Evaluation: 40Marks<br>Semester-End: 60 Marks |
| 7 | **Course Objectives**:<br>1. To achieve a fair and sound understanding of the concepts of the Cyber Crime Law.<br>2. To demonstrate good comprehension of cybercrime in areas of aspirant's interest or professional field.<br>3. To apply basic research methods, data analysis, and interpretation in the field of cybercrime law.<br>4. To reduce or prevent damage from online criminal activities by protecting privacy. | |
| 8 | **Course Outcomes**:<br>1. Make Learner Conversant With The Social And Intellectual Property Issues Emerging From 'Cyberspace.<br>2. Explore The Legal And Policy Developments In Various Countries To Regulate Cyberspace;<br>3. Develop The Understanding Of Relationship Between Commerce And Cyberspace<br>4. Learners may seek remedies like refunds, replacements and damages for grievances. | |

| | |
|---|---|
| **9** | **Modules**:- |
| | **Module1: Power of Arrest Without Warrant Under the IT Act, 2000 and Cyber Crime and Criminal Justice: Penalties, Adjudication and Appeals Under the IT Act, 2000 (15 Hours)** |
| | • **Overview of Cyber Crimes:** Examining the rise of AI-driven fraud, ransomware attacks, cryptocurrency scams, and cyber terrorism.<br>• **AI and Cybercrime**: Legal challenges related to AI-based identity theft, deepfake manipulation, and automated phishing attacks.<br>• **Cyber Terrorism and Nation-State Threats**: Understanding the increasing threat of state-sponsored cyberattacks on national security and infrastructure.<br>• **Arrest Without Warrant**: A critique of Section 80 of the IT Act, 2000, with modern challenges like cross-border jurisdiction and enforcement in digital crimes.<br>• **Emerging Legal Frameworks**: The Artificial Intelligence and Cybercrime Act (Proposed) and its role in combating AI-related cybercrimes.<br>• **Penalties and Adjudication**: Updated procedures for adjudication and penalties under the **Indian IT Act 2000**. Exploring the impact of international cooperation in cybercrime enforcement. |
| | |
| | • **Smart Contracts and Blockchain**: Exploring the legal implications of blockchain-based contracts and their enforceability in the Indian Contract Act, 1872.<br>• **Blockchain and Intellectual Property (IP)**: How blockchain is revolutionizing copyright protection, smart contract enforcement, and digital IP management.<br>• **Jurisdiction in the Digital Age**: The challenges of cross-border jurisdiction in digital contract disputes and intellectual property rights (IPR).<br>• **Click-Wrap and Shrink-Wrap Contracts**: Legal status under the Indian Contract Act and their impact on the e-commerce landscape.<br>• **Global Jurisdiction Issues**: Comparative study of U.S., EU, and Indian laws on cross-border jurisdiction and data privacy.<br>• **Crypto Regulation**: Legal frameworks for cryptocurrency and tokenized assets (e.g., the Crypto Regulation Bill 2025 in India). The role of smart contracts in blockchain-based agreements. |
| | **Module 3**: **Cyber Squatting, Copyright Protection, and AI in the Digital World (15 Hours)** |

| | | |
|---|---|---|
| | • **Cyber Squatting and Domain Name Disputes**: Legal remedies for domain name hijacking, cyber squatting, and the role of the Uniform Domain Name Dispute Resolution Policy (UDRP).<br>• **Meta-Tagging and SEO Manipulation**: Legal implications of meta-tagging, SEO manipulation, and its impact on digital intellectual property rights.<br>• **AI and Copyright**: The legal dilemmas of AI-generated content and its ownership under Indian copyright law. The intersection of AI and intellectual property in digital media.<br>• **Digital Piracy and Copyright Protection**: Addressing issues of online piracy, content theft, and the evolving DMCA (Digital Millennium Copyright Act) and Indian copyright law.<br>• **Blockchain for Copyright Protection**: How blockchain is being used to protect digital content and enforce copyright in the digital ecosystem.<br>• **Content Moderation and Free Speech**: Legal challenges regarding online defamation, hate speech, and censorship on social media platforms. | |
| | **Module 4: Data Privacy, Consumer Protection, and Legal Technology in the Digital Economy (15 Hours)**<br><br>• **Data Privacy and Protection Laws**: An in-depth exploration of India's Personal Data Protection Bill (PDPB 2025), GDPR, and the California Consumer Privacy Act (CCPA). The importance of data portability, data subject rights, and cross-border data flow.<br>• **The Indian Digital Data Protection Act 2025**: Legal frameworks for data protection, consumer consent, and the regulation of AI-powered data processing.<br>• **Legal Technology and AI in Legal Practice**: Overview of AI-driven legal tech such as automated contract review, predictive analytics, and intelligent case management systems.<br>• **Consumer Protection in the E-Commerce Age**: Legal aspects of digital consumer rights, e-commerce regulations, refund policies, and digital product liability.<br>• **Cybersecurity Legal Liability**: Understanding the liability of platforms in the case of cyber-attacks and data breaches. The role of cybersecurity frameworks like the Cybersecurity Act 2025 and India's National Cybersecurity Strategy.<br>**Consumer Protection Act 2025 Amendments**: Focus on the application of consumer rights in the digital economy, including online transactions, privacy breaches, and unfair trade practices. | |
| **11** | **Reference Books:**<br><br>• Cyber Law: A Guide for the Perplexed **by** M.S. Venkatesh<br>• Information Technology Act, 2000: With Amendments and Case Law **by** Sandeep Kumar<br>• Copyright Law and Practice in the Digital Age **by** P. Narayanan<br>• Consumer Protection in E-Commerce **by** Shashank P. Mehta | |
| **12** | **Internal Continuous Assessment:40%** | **Semester-End Examination:60%** |
| **13** | **Continuous Evaluation through:** | **Practical** |

| | |
|---|---|
| **14** | **Format of Question Paper** |

**Scheme of Evaluation Pattern**

**Table 1A: Scheme of Continuous Evaluation (CE)**
**Scheme of Evaluation Pattern**

| Sub-components | Maximum Marks | Conditions for passing |
|---|---|---|
| 1)Practical exam | 30 | A learner must be present for each of the sub-components |
| 2)Journal and Viva | 10 | |
| Total | 40 | |

**Table 1B: Scheme of Semester End Examination (SEE) Evaluation**
**Question Paper Pattern for Semester End Examination (SEE)**
**Maximum Marks: 60** **Duration: 2 Hrs.**

Note: All questions are compulsory. Each question has an internal choice.

| | | | |
|---|---|---|---|
| **Q.1.** | | **Attempt any three** | **(15)** |
| | **a)** | | |
| | **b)** | | |
| | **c)** | | |
| | **d)** | | |
| | **e)** | | |
| | | **Attempt any three** | **(15)** |
| **Q.2.** | **a)** | | |
| | **b)** | | |
| | **c)** | | |
| | **d)** | | |
| | **e)** | | |
| | | **Attempt any three** | **(15)** |
| **Q.3.** | **a)** | | |
| | **b)** | | |
| | **c)** | | |

| | | | |
|---|---|---|---|
| | **d)** | | |
| | **e)** | | |
| | | **Attempt any three** | **(15)** |
| **Q.4.** | **a)** | | |
| | **b)** | | |
| | **c)** | | |
| | **d)** | | |
| | **e)** | | |

**Course Name: Advanced Mobile Programming Practical**

| | | | |
|---|---|---|---|
| **Periods per week (1 Period is 60 minutes)** | | **4** | |
| **Credits** | | **2** | |
| | | **Hours** | **Marks** |
| **Evaluation System** | **Practical Examination** | **2** | **40** |

| **Practical No** | **Details** |
|---|---|
| **1** | **Introduction to Android, Introduction to Android Studio IDE, Application Fundamentals:** Creating a Project, Android Components, Activities, Services, Content Providers, Broadcast Receivers, Interface overview, Creating Android Virtual device, USB debugging mode, Android Application Overview. Simple "Hello World" program. |
| | |
| **2** | **Programming Resources** Android Resources: (Color, Theme, String, Drawable, Dimension, Image), |
| | |
| **3** | **Programming Activities and fragments** Activity Life Cycle, Activity methods, Multiple Activities, Life Cycle of fragments and multiple fragments. |
| | |
| **4** | **Programs related to different Layouts** Coordinate, Linear, Relative, Table, Absolute, Frame, List View, Grid |

| | |
|---|---|
| | View. |
| | |
| **5** | **Programming UI elements**<br>AppBar, Fragments, UI Components |
| | |
| **6** | **Programming menus, dialog, dialog fragments** |
| | |
| **7** | **Programs on Intents, Events, Listeners and Adapters**<br>The Android Intent Class, Using Events and Event Listeners |
| | |
| **8** | **Programs on Services, notification and broadcast receivers** |

| | | |
|---|---|---|
| 1 | Q.1 | 15 |
| 2 | Q.2 | 15 |
| 3 | Viva | 5 |
| 4 | Journal | 5 |
| 5 | **Total** | **40** |

AC–11-03-2025
Item No. –05

Approved by the BoS in Information Technology on 05-03-2025 Item No. 05

# As Per NEP 2020

# Tolani College of Commerce (Autonomous)

Knowledge is Supreme

**Title of the Course: Principles of Geographic Information Systems**

**Programme: B.Sc.(Information Technology)**

**Semester VI**

**Syllabus for 4 credits**

**From the academic year-2025-2026**

| Sr. No. | Heading | Particulars |
|---|---|---|
| 1 | **Description the course:** | A geographic information system (GIS) is a computer system for capturing, storing, checking, and displaying data related to positions on Earth's surface. By relating seemingly unrelated data, GIS can help individuals and organizations had better understand spatial patterns and relationships. |
| 2 | **Vertical:** | Mandatory Electives |
| 3 | **Type:** | Theory and Practical |
| 4 | **Credit**: | 4 credits |
| 5 | **Hours Allotted:** | 60 Hours |
| 6 | **Marks Allotted**: | 100 Marks<br>Practical Evaluation: 40Marks<br>Semester-End: 60 Marks |
| 7 | **Course Objectives:**<br>**1.** For students to become skilled with the acquisition, handling and analysis of geographic data<br>**2.** These skills to problems within their profession or discipline.<br>3. To explain the concepts of spatial referencing and positioning.<br>**4.** To explain data preparation and various analytical functions | |
| 8 | **Course Outcomes:**<br>**1.** Demonstrate organizational skills in file and database management.<br>**2.** Give examples of interdisciplinary applications of Geospatial Information Science and Technology.<br>**3.** Apply GIS analysis to address geospatial problems and/or research questions.<br>**4.** Demonstrate proficiency in the use of GIS tools to create maps that are fit-for-purpose and effectively convey the information they are intended to. | |

| | |
|---|---|
| **9** | **Modules**:- |
| | **Module1:A Gentle Introduction to GIS, Geographic Information and Spatial Database Models and Representations of the real world (15 Hours)** |
| | • **The nature of GIS:** Some fundamental observations, Defining GIS, GISystems, GIScience and GIApplications, Spatial data and Geoinformation.<br>• **The real world and representations of it:** Models and modelling, Maps, Databases, Spatial databases and spatial analysis<br>• **Geographic Phenomena:** Defining geographic phenomena, types of geographic phenomena, Geographic fields, Geographic objects, Boundaries<br>• **Computer Representations of Geographic Information:** Regular tessellations, irregular tessellations, Vector representations, Topology and Spatial relationships, Scale and Resolution, Representation of Geographic fields, Representation of Geographic objects |
| | **Module 2:Data Management and Processing Systems Hardware and Software Trends (15 Hours)** |
| | • **Geographic Information Systems:** GIS Software, GIS Architecture and functionality, Spatial Data Infrastructure (SDI)<br>• **Stages of Spatial Data handling:** Spatial data handling and preparation, Spatial Data Storage and maintenance, Spatial Query and Analysis, Spatial Data Presentation.<br>• **Database management Systems:** Reasons for using a DBMS, Alternatives for data management, the relational data model, Querying the relational database.<br>• **GIS and Spatial Databases:** Linking GIS and DBMS, Spatial database functionality. |
| | **Module 3**:**Spatial Referencing and Positioning, Data Entry and Preparation (15 Hours)** |
| | • **Spatial Referencing:** Reference surfaces for mapping, Coordinate Systems, Map Projections, Coordinate Transformations<br>• **Satellite-based Positioning:** Absolute positioning, Errors in absolute positioning, Relative positioning, Network positioning, code versus phase measurements, Positioning technology<br>• **Spatial Data Input:** Direct spatial data capture, Indirect spatial data capture, Obtaining spatial data elsewhere<br>• **Data Quality:** Accuracy and Positioning, Positional accuracy, Attribute accuracy, temporal accuracy, Lineage, Completeness, Logical consistency<br>• **Data Preparation:** Data checks and repairs, Combining data from multiple sources |
| | **Module 4**:**Spatial Data Analysis, Classification of analytical GIS Capabilities (15 Hours)** |
| | • **Retrieval, classification and measurement:** Measurement, Spatial selection queries, Classification<br>**Overlay functions:** Vector overlay operators,Raster overlay operators **Neighbourhood unctions:** Proximity computations, Computation of diffusion, Flow computation, Raster |

- **Analysis:** Network analysis, interpolation, terrain modeling
- **GIS and Application models:** GPS, Open GIS Standards, GIS Applications and Advances
- **Error Propagation in spatial data processing:** How Errors propagate, Quantifying error propagation

**11** **Reference Books:**


1. **Author:** otto huisman and Rolf A, **Title:** principal of geographic information system, **Publisher:** the international institute of geo information science and Earth observation 4th Edition year 2009
2. **Author:** P A Burrough an R A McDonnel, **Title:** principal of geographic information system, **Publisher:** Oxford university press 3rd Edition year:1999
3. **Author:** Michel N, Demers **Title:** Fundamental of geographic information system, **Publisher:** Wiley 4th Edition year:2009


| **12** | **Practical Assessment: 40%** | **Semester End Examination: 60%** |
|---|---|---|

**14** **Format of Question Paper:**

**Scheme of Evaluation Pattern**

**Table 1A: Scheme of Continuous Evaluation (CE/Practical)**
**Scheme of Evaluation Pattern**

| Sub-components | Maximum Marks | Conditions for passing |
|---|---|---|
| 1)Practical exam | 30 | A learner must be present for each of the sub-components |
| 2)Journal and Viva | 10 | |
| Total | 40 | |

**Table 1B: Scheme of Semester End Examination (SEE) Evaluation**
**Question Paper Pattern for Semester End Examination (SEE)**

**Maximum Marks: 60** **Duration: 2 Hrs.**

Note: All questions are compulsory. Each question has an internal choice.

| **Q.1.** | | Attempt any three of the following | (15) |
|---|---|---|---|
| | **a)** | | |
| | **b)** | | |
| | **c)** | | |
| | **d)** | | |
| | **e)** | | |

| | | | |
|---|---|---|---|
| | | Attempt any three of the following | (15) |
| **Q.2.** | **a)** | | |
| | **b)** | | |
| | **c)** | | |
| | **d)** | | |
| | **e)** | | |
| | | Attempt any three of the following | (15) |
| **Q.3.** | **a)** | | |
| | **b)** | | |
| | **c)** | | |
| | **d)** | | |
| | **e)** | | |
| | | Attempt any three of the following | (15) |
| **Q.4.** | **a)** | | |
| | **b)** | | |
| | **c)** | | |
| | **d)** | | |
| | **e)** | | |

| **Course Name: Geographic Information Systems Practical** | | | |
|---|---|---|---|
| **Periods per week (1 Period is 60 minutes)** | | **4** | |
| **Credits** | | **2** | |
| | | **Hours** | **Marks** |
| **Evaluation System** | **Practical Examination** | **2** | **40** |

| **Practical** | **Details** |
|---|---|
| **0** | Familiarizing Quantum GIS: Installation of QGIS, datasets for both Vector and Raster data, Maps. |
| | |
| **1** | Creating and Managing Vector Data: Adding vector layers, setting properties, formatting, calculating line lengths and statistics |
| | |
| **2** | Exploring and Managing Raster data: Adding raster layers, raster styling and analysis, raster mosaicking and clipping |
| | |
| **3** | Making a Map, Working with Attributes, Importing Spreadsheets or CSV filesUsing Plugins, Searching and Downloading OpenStreetMap Data |
| | |

| | |
|---|---|
| **4** | Working with attributes, terrain Data |
| | |
| **5** | Working with Projections and WMS Data |
| | |
| **6** | Georeferencing Topo Sheets and Scanned<br>Maps Georeferencing Aerial Imagery<br>Digitizing Map Data |
| | |
| **7** | Managing Data Tables and Saptial data Sets: Table joins, spatial joins, points in polygon analysis, performing spatial queries |
| | |
| **8** | Advanced GIS Operations 1: Nearest Neighbor Analysis, Sampling Raster Data using Points or Polygons, Interpolating Point Data |
| | |
| **9** | Advance GIS Operations 2: Batch Processing using Processing Framework<br>Automating Complex Workflows using Processing Modeler<br>Automating Map Creation with Print Composer Atlas |
| | |
| **10** | Validating Map data |

| | | |
|---|---|---|
| 1 | Q.1 | 15 |
| 2 | Q.2 | 15 |
| 3 | Viva | 5 |
| 4 | Journal | 5 |
| 5 | **Total** | **40** |

Approved by the Academic Council on 14-3-26 item no. 04

Approved by the BoS in Maths

# As Per NEP 2020

# Tolani College of Commerce (Autonomous)


**Title of the Course: Linear Algebra**

**Programme:**
**Bachelor of Commerce( Management Studies)**
**Bachelor of Commerce (Accounting & Finance)**
**Bachelor of Commerce (Banking & Insurance)**
**Bachelor of Commerce (Financial Markets)**
**Bachelor of Science (Information Technology)**

**(Semester – VI)**

**Syllabus for 04 Credit Course**
**From the Academic Year 2026 – 2027**

**Name of the Course: Probability and Probability Distributions**

| Sr. No. | Heading | Particulars |
|---|---|---|
| 1 | **Description of the course:** | Linear algebra is a branch of mathematics that focuses on the study of vector spaces and linear transformations. It deals with systems of linear equations, matrices, determinants, eigenvalues, and eigenvectors.<br>Linear algebra is widely applied in various areas, including computer graphics, machine learning, cryptography, signal processing, control theory, and operations research. |
| 2 | **Vertical:** | Minor |
| 3 | **Type:** | Theory/ Practical |
| 4 | **Credit:** | 4 Credits (1 Credit = 15 Hours for Theory in a Semester) |
| 5 | **Hours Allotted:** | 60 Hours |
| 6 | **Marks Allotted:** | 100 Marks<br>Continuous Evaluation 40 Marks<br>Semester End Examination 60 Marks |
| 7 | **Course Objectives: The course aims to:**<br>**1.** To define matrices and understand their properties, including addition, scalar multiplication<br>2. To understand matrix multiplication, and transpose.<br>3. To understand the relationship between the solutions of linear systems<br>4. To learn the geometry of vector spaces. | |
| 8 | **Course Outcomes: After successful completion of the course, learners will be able to:**<br>1. Students will demonstrate a clear understanding of fundamental concepts in linear algebra<br>2. Also they will understand vectors, matrices, vector spaces, and linear transformations.<br>3. Students will be able to perform matrix operations efficiently, including addition, scalar multiplication, matrix multiplication<br>4. Student will be able to find the inverse of matrix | |
| **9** | **Modules** | |
| | **Modules I: Matrices and Linear Equations (15 Hours)** | |
| | • Types of Matrices, Basic Properties of Matrices<br>• Determinants, and their basic properties<br>• Inverse of a matrix by row and column transformation<br>• Solution of the system of linear equations | |
| | **Module II: Linear Mappings (15 Hours)** | |
| | • Rank of a matrix, Gauss Elimination method<br>• Representation of Linear Mappings by matrices<br>• Rank Nullity Theorem and its applications<br>• Eigen values, Properties of Eigenvalues | |
| | **Module 3: Canonical Forms (15 Hours)** | |
| | • Eigen Vectors, Properties of Eigen Vectors<br>• Minimal Polynomial<br>• Jordan Canonical form<br>• Triangulable operators | |

| | **Module 4: Inner Product Spaces (15 Hours)** |
|---|---|
| | • Orthogonality<br>• Adjoint of Linear Transformation<br>• Unitary Operators<br>• Self adjoint and Normal Operators |
| 10 | ***Reference Books:***<br>• *Narayan, Shanti, and P.K. Mittal. A Textbook of Matrices. S. Chand & Co.*<br>• *Lay, David. Linear Algebra and Its Applications. Pearson Publications.*<br>• *Sharma, R.D. Theory and Problems of Linear Algebra. Dreamtech.* |

## Evaluation Pattern

Continuous Evaluation: 40%
Semester End Examination: 60%

The Continuous evaluation will consist of

| | Total Marks |
|---|---|
| Class Test/ Assignment/ Practical/ Project Work/ Presentation/ Case Study/ Book Review | 40 |

### Semester End Examination Question Paper Pattern

Maximum Marks: 60 Duration: 02 Hours
All Questions are Compulsory Carrying 15 Marks each.

| Q. No. | Particular | Marks |
|---|---|---|
| Q-1 | Q. 1 Attempt any Three (15 marks)<br>a.<br>b.<br>c.<br>d. | **15 Marks** |
| Q-2 | Q. 2 Attempt any Three (15 marks)<br>a.<br>b.<br>c.<br>d. | **15 Marks** |
| Q-3 | Q. 3 Attempt any Three (15 marks)<br>a.<br>b.<br>c.<br>d. | **15 Marks** |
| Q-4 | Q. 4 Attempt any Three (15 marks)<br>a.<br>b.<br>c.<br>d. | **15 Marks** |

## Signature of Team Members

| Sr. No. | Name | Signature |
|---|---|---|
| 1 | Ms. Shubha Chaubal | |
| 2 | Ms. Priyanka Malvankar | |

Approved by the Academic Council on 14-3-26 item no. 04

Approved by the BoS in Maths

# As Per NEP 2020

# Tolani College of Commerce (Autonomous)


**Title of the Course: Statistical Quality Control**

**Programme:**
**Bachelor of Commerce( Management Studies)**
**Bachelor of Commerce (Accounting & Finance)**
**Bachelor of Commerce (Banking & Insurance)**
**Bachelor of Commerce (Financial Markets)**
**Bachelor of Science (Information Technology)**

**(Semester – VI)**

**Syllabus for 04 Credit Course**
**From the Academic Year 2026 – 2027**

**Name of the Course: Probability and Probability Distributions**

| Sr. No. | Heading | Particulars |
|---|---|---|
| 1 | **Description of the course:** | Statistical Quality Control (SQC) is a branch of statistics that involves the application of statistical methods to monitor and improve the quality of products and processes.<br>SQC techniques include statistical process control (SPC), design of experiments (DOE), acceptance sampling, reliability analysis, and Six Sigma methodologies<br>Graduates with proficiency in SQC have various career opportunities in quality assurance, quality engineering, process improvement, and operations management. |
| 2 | **Vertical:** | Minor |
| 3 | **Type:** | Theory/ Practical |
| 4 | **Credit:** | 4 Credits (1 Credit = 15 Hours for Theory in a Semester) |
| 5 | **Hours Allotted:** | 60 Hours |
| 6 | **Marks Allotted:** | 100 Marks<br>Continuous Evaluation 40 Marks<br>Semester End Examination 60 Marks |
| 7 | **Course Objectives: The course aims to:**<br>1. Introduce students to the principles and methodologies of Statistical Quality Control (SQC)<br>2. Create interest in the topics statistical process control (SPC), acceptance sampling, design of experiments (DOE), and reliability analysis.<br>**3.** Teach students how to apply statistical tools and techniques to monitor, analyze, and improve the quality of products and process<br>4. Teach students control charts, Pareto analysis, histograms, scatter plots, and cause-and-effect diagrams. | |
| 8 | **Course Outcomes: After successful completion of the course, learners will be able to:**<br>**1.** Students will be familiar with the principles and methodologies of Statistical Quality Control, including statistical process control (SPC),<br>2. Students also will be familiar with the acceptance sampling, design of experiments (DOE), and reliability analysis<br>**3.** Students will be proficient in using statistical tools and techniques to monitor, analyze, and improve the quality of products and processes<br>4.Teaching students control charts, Pareto analysis, histograms, scatter plots, and cause-and-effect diagrams | |
| **9** | **Modules** | |
| | **Modules I: Concept of Quality (15 Hours)** | |
| | ● Meaning and definition of Quality,Quality characteristics (variables and attributes),Quality in manufacturing and services,Dimensions of quality (performance, reliability, durability, etc.)<br>● Quality Control:Meaning and objectives of Quality Control, Role of statistics in Quality Control, Difference between Quality Control, Quality Assurance, and Quality Management<br>● Basic Statistical Concepts:Population and Sample, Descriptive statistics: Mean, Median, Mode, Variance, Standard Deviation, Normal distribution and its properties (conceptual only) | |

| | |
|---|---|
| | **Module II: Control Charts for Variables (15 Hours)** |
| | • Concept of Control Charts, Need and purpose of control charts, Types of control charts<br>Process variability and causes (chance and assignable causes)<br>• $\bar{X}$ (Mean) and R (Range) Charts: Construction of $\bar{X}$ chart, Construction of R chart, Control limits and interpretation, Numerical problems<br>• $\bar{X}$ and S Charts (Conceptual):Standard deviation charts (basic concept), Comparison between R and S charts |
| | **Module 3: Control Charts for Attributes (15 Hours)** |
| | • Attribute Quality Characteristics, Defect and defective, Attribute data vs Variable data<br>• Control Charts for Attributes: p-chart (fraction defective), np-chart (number of defectives), c-chart (number of defects), u-chart (defects per unit), Construction and interpretation with numerical problems |
| | **Module 4: Acceptance Sampling and Quality Improvement (15 Hours)** |
| | • Acceptance Sampling:Concept of acceptance sampling, Sampling inspection vs 100% inspection, Types of sampling plans (single sampling plan), Operating Characteristic (OC) curve (conceptual)<br>• Producer's Risk and Consumer's Risk: Meaning and interpretation, AQL and LTPD (conceptual)<br>• Quality Improvement Tools (Introductory): Pareto chart, Cause-and-effect (Fishbone) diagram, Histogram and Flowchart,Basic concept of Six Sigma and TQM |
| 10 | ***Reference Books:***<br>• *Grant, E.L., and Leavenworth. Statistical Quality Control. McGraw Hill, New Delhi.*<br>• *Duncan, A.J. Quality Control and Industrial Statistics. Taraporewala Sons & Ltd.*<br>• *Kamji, and Asher. 100 Methods of TQM. Sage Publication*<br>• *S. C. Gupta & V. K. Kapoor – Fundamentals of Mathematical Statistics* |

## Evaluation Pattern

Continuous Evaluation: 40%
Semester End Examination: 60%

The Continuous evaluation will consist of

| | Total Marks |
|---|---|
| Class Test/ Assignment/ Practical/ Project Work/ Presentation/ Case Study/ Book Review | 40 |

### Semester End Examination Question Paper Pattern

Maximum Marks: 60 Duration: 02 Hours
All Questions are Compulsory Carrying 15 Marks each.

| Q. No. | Particular | Marks |
|---|---|---|
| Q-1 | Q. 1 Attempt any Three (15 marks)<br>a.<br>b.<br>c.<br>d. | **15 Marks** |
| Q-2 | Q. 2 Attempt any Three (15 marks)<br>a.<br>b.<br>c.<br>d. | **15 Marks** |
| Q-3 | Q. 3 Attempt any Three (15 marks)<br>a.<br>b.<br>c.<br>d. | **15 Marks** |
| Q-4 | Q. 4 Attempt any Three (15 marks)<br>a.<br>b.<br>c.<br>d. | **15 Marks** |

### Signature of Team Members

| Sr. No. | Name | Signature |
|---|---|---|
| 1 | Ms. Shubha Chaubal | |
| 2 | Ms. Priyanka Malvankar | |

AC –
Item No. –

# As Per NEP 2020

## Tolani College of Commerce
## (Autonomous)


**Title of the Course: Internet of Things**

**Programme: Bachelor of Science (Information Technology)**

**Semester VI**

**Syllabus for 4 Credits**

**From the Academic Year 2026-2027**

# Name of the Course: Internet of Things

| Sr. No. | Heading | Particulars |
|---|---|---|
| 1 | **Description of the Course :** | This course introduces the fundamental concepts, architecture, and technologies of the Internet of Things (IoT). It covers Internet communication protocols, connected device design principles, embedded systems, and real-time data exchange. The course emphasizes hands-on prototyping using sensors, actuators, microcontrollers, and single-board computers. It also explores IoT business models, manufacturing processes, security, and ethical considerations. By the end of the course, learners will be able to design, develop, and evaluate IoT-based solutions for real-world applications. |
| 2 | **Vertical :** | Minor |
| 3 | **Type :** | Theory and Practical |
| 4 | **Credit**: | 4 credits |
| 5 | **Hours Allotted :** | 60 Hours |
| 6 | **Marks Allotted**: | 100 Marks<br>Continuous Evaluation =40<br>Semester End =60 |
| 7 | **Course Objectives**: Enable learners to<br><br>1. introduce fundamental concepts and architecture of the Internet of Things.<br>2. understand communication protocols and Internet principles used in IoT.<br>3. develop skills in prototyping IoT systems (hardware and software).<br>4. explore embedded platforms such as Arduino and Raspberry Pi. | |
| 8 | **Course Outcomes**: Learners will be able to :<br><br>1. explain IoT architecture, components, and design principles.<br>2. apply TCP/IP, HTTP, MQTT, and CoAP in IoT applications.<br>3. design and prototype IoT-based physical and online systems.<br>4. develop embedded solutions using microcontrollers and single-board computers. | |

| | |
|---|---|
| **9** | **Modules**:- |
| | **Module 1: Foundations of IoT & Internet Principles (15 Hours)** |
| | • The Internet of Things: An Overview: The Flavour of IoT, The "Internet" of "Things",IoT Technologies, Enchanted Objects, IoT Ecosystem and Stakeholders.<br>• Design Principles for Connected Devices: Calm and Ambient Technology, Magic as Metaphor, Privacy and Data Ownership, Web Thinking for Connected Devices, Small Pieces, Loosely Joined, Graceful Degradation, Affordances.<br>• Internet Principles: Internet Communication Overview,IP, TCP, UDP,TCP/IP Protocol Suite,IP Addressing (Static & Dynamic),IPv6,MAC Addresses,DNS,Ports and HTTP/HTTPS,Application Layer Protocols |
| | **Module 2: Prototyping IoT Systems (15 Hours)** |
| | • Prototyping the Physical Design: Sketching and Iteration, No digital Prototyping Methods, Laser Cutting and Software, Hinges and Mechanical Design,3D Printing (Types & Software),CNC Milling, Recycling and Repurposing<br>• Prototyping Online Components: Introduction to APIs, Mashing Up APIs, Web Scraping and Legalities, Writing and Implementing APIs, Testing APIs using Curl, Security Considerations<br>• Real-Time Communication: Polling, Comet, MQTT, XMPP, CoAP |
| | **Module 3**: **Embedded Systems & Development (15 Hours)** |
| | • Thinking About Prototyping: Sketching and Familiarity, Cost vs Ease of Prototyping, Prototypes vs Production, Open Source vs Closed Source, Community Engagement<br>• Prototyping Embedded Devices: Electronics Basics, Sensors and Actuators, Scaling Electronics, Embedded Computing Basics, Microcontrollers and SoCs, Choosing a Platform<br>• Development Platforms: Arduino (Development & Hardware Notes),Raspberry Pi (Development & Hardware Notes)<br>• Techniques for Writing Embedded Code: Memory Management, Types of Memory, RAM Optimization, Performance and Battery Life, Libraries, Debugging |
| | **Module 4 : Business, Manufacturing & Ethics in IoT (15 Hours)** |
| | • Business Models in IoT: Evolution of Business Models ,Business Model Canvas, Make and Sell Model, Subscription Model, Infrastructure Model, Revenue Sharing, Funding Options (VC, Government, Crowdfunding, Lean Startup).<br>• Moving to Manufacture: Product Planning, PCB Design and Manufacturing, Assembly and Testing, Certification, Cost Analysis, Deployment, Security and Performance, Community Support.<br>• Ethics in IoT: Privacy and Data Control, Crowdsourcing, Environmental Impact, IoT as Part of the Solution, Open IoT Definition, Cautious Optimism |

| | |
|---|---|

| | | |
|---|---|---|
| **10** | **Reference Books:**<br>1 **Author:** QusayF.Hassan,**Title:** Internet of Things A to Z: Technologies and Applications **Publisher:** Wiley-IEEE Press, **Edition:** 2nd Edition,**Year:** 2025<br>2. **Author:** Arshdeep Bahga, Vijay Madisetti,**Title:** Internet of Things – A Hands-On Approach**Publisher:** Universities Press,Edition: Latest Edition,**Year:** 2023<br>3. **https://www.youtube.com/live/e7mPuhSz8o8?utm_source=chatgpt.com**<br>4. **https://www.youtube.com/@iotdunia**<br>5. **https://t.me/appletoniot**<br>6. **https://t.me/iotacademy** | |
| **11** | **Internal Continuous Assessment: 40%** | **Semester End Examination : 60%** |
| **12** | **Continuous Evaluation through:**<br>**Project Work**<br>**40 Marks** | |
| **13** | **Question Paper Pattern for Semester End Examination**<br>**Maximum Marks: 60** **Duration: 2 Hrs.**<br>**Note: All questions are compulsory. Each question has an internal choice.**<br>***[Refer to Next Page]*** | |

| Question Number | | Nature of Questions | Maximum Marks |
|---|---|---|---|
| 1) | | **Attempt any 3** | |
| | a) | | 15 |
| | b) | | |
| | c) | | |
| | d) | | |
| | e) | | |
| 2) | | **Attempt any 3** | |
| | a) | | 15 |
| | b) | | |
| | c) | | |
| | d) | | |
| | e) | | |
| 3) | | **Attempt any 3** | |
| | a) | | 15 |
| | b) | | |
| | c) | | |
| | d) | | |
| | e) | | |
| 4) | | **Attempt any 3** | |
| | a) | | 15 |
| | b) | | |
| | c) | | |
| | d) | | |
| | e) | | |

## Signatures of Team Members

| Sr.No | Name | Signature |
|---|---|---|
| **1.** | Mr. Deepak Sharma | |
| **2.** | Ms. Sabiha Malik | |
| **3.** | Ms. Vibhuti Barad | |

Approved by the Academic Council on 11-3-25 item no.4 for the B.Com Programme.
Approved by the BoS in Business Economics on 04-03-2025 Item No. 06 for the B.Com Programme.
Approved by the Academic Council on 14-3-26 item no.04 for the B.Com in Management Studies, B.Com in Accounting and Finance, B.Com in Banking and Insurance, B.Com in Financial Markets and B.Sc. in Information Technology
Approved by the BoS in Business Economics on 27-02-2026 Item No. 05 for the B.Com in Management Studies, B.Com in Accounting and Finance, B.Com in Banking and Insurance, B.Com in Financial Markets and B.Sc. in Information Technology

# As Per NEP 2020

# Tolani College of Commerce (Autonomous)

Knowledge is Supreme

## Business Economics- (Semester VI): Contemporary Issues of Indian Economy

# Syllabus for 4 credit Course from the academic year 2025-2026 for B.Com. Programme

## Title of the Course: Business Economics- (Semester VI): Contemporary Issues of Indian Economy

## Applicable to B.Com in Management Studies, B.Com in Accounting and Finance, B.Com in Banking and Insurance, B.Com in Financial Markets and B.Sc. in Information Technology

## Wef A.Y. 2026-2027

| Sr. No. | Heading | Particulars |
|---|---|---|
| 1) | Description the course | The course on offers a comprehensive examination of India's economic trajectory over the past decade or so (2010-2023), focusing on key trends, policy frameworks, and strategic insights that have shaped its development. Designed for students interested in understanding the dynamic landscape of one of the world's fastest-growing economies, the course delves into critical aspects of economic growth, sectoral dynamics, international trade, socioeconomic challenges, and policy responses.<br>**Justification for the selection of the period 2010-2023:**<br>1) Analyses India's economic performance post-liberalisation with a focus on growth phases and challenges.<br>2) Evaluates the effects of major reforms such as GST implementation, inflation targeting, digitalisation of the economy and fiscal policy changes.<br>3) Studies the evolution of agriculture, industry, and services sectors, highlighting sector-specific policies and advancements.<br>4) Explores India's integration into global markets through trade agreements, FDI trends, and economic diplomacy.<br>5) Provides insights into contemporary economic issues like inequality, employment dynamics, and environmental sustainability, crucial for policy analysis. |
| 2) | Programme | B.Com.; B.Com in Management Studies, B.Com in Accounting and Finance, B.Com in Banking and Insurance, B.Com in Financial Markets and B.Sc. in Information Technology |
| 3) | Semester | VI |
| 4) | Course/ Subject | Business Economics: Contemporary Issues of Indian Economy. |
| 5) | A.Y. | 2025-2026 |
| 6) | Vertical: | Minor |
| 7) | Type: | Theory |
| 8) | Credits: | 04 |

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| 9) | Hours Allotted: | 60 |
| 10) | Marks Allotted: | Total Marks: 100<br>Continuous Evaluation Marks: 40<br>Semester End Examination Marks: 60 |

Course Objectives: By end of this course student should be able to-

1) understand the key phases of India's economic growth post-liberalisation, focusing on the factors influencing high growth periods and slowdowns, alongside the evolution of monetary and fiscal policies.
2) explore the dynamics of key sectors in the Indian economy, including agriculture, industry, infrastructure, and services, and assess the impact of technological advancements and government initiatives.
3) examine India's trade policies, foreign direct investment trends, and the impact of globalisation on economic integration and competitiveness in global markets.
4) understand the socioeconomic challenges in India, including inequality, poverty, employment, and environmental sustainability, and examine the effectiveness of government policies in addressing these issues.

Course Outcomes: Upon completion of this course students will be able to:

1) critically analyse India's economic growth trajectory in comparison with other emerging economies and evaluate the impact of monetary and fiscal policies on the nation's economic stability.
2) assess sector-specific challenges and opportunities, and propose strategies for enhancing sectoral growth and development in the context of technological innovation and policy interventions.
3) evaluate the effectiveness of India's trade and FDI policies, and analyse the country's role in global supply chains and its response to geopolitical challenges.
4) critically assess the impact of socioeconomic policies on inequality, poverty, and environmental sustainability, and propose policy recommendations for promoting inclusive and sustainable development in India.

| **Module 1: Macroeconomic Framework of India (15 hours)** | |
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| 1) Economic Growth and Development | a) Growth of the economy during the post-liberalisation phase (2010-2023): High Growth Phase (2012-2013 to 2016-2017), Slow Growth Phase (2017-2018 to 2020-2021) and Recovery of Growth Phase (2021-2022 to 2023-2024).<br>b) Role of government policies in shaping economic growth: Key government initiatives and reforms post-liberalisation, such as Make in India, Digital India, and infrastructure development, and their impact on economic growth during various phases.<br>c) Comparative analysis: India's growth trajectory compared to major emerging economies like China, Brazil, and South Africa.<br>d) Middle Income Trap: Understanding the trap and assessing India's challenges, Structural issues like low productivity, limited |

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| | innovation, and labour market constraints and Government efforts in human capital, technology, and infrastructure to boost growth. |
| 2) Monetary Policy and Inflation | a) Evolution of RBI's monetary policy framework since 2010: Shift towards inflation targeting, policy rate changes, and their impacts<br>b) Effectiveness of inflation targeting regime: Analysis of inflation rates, core inflation, and policy responses.<br>c) Inflation trends from 2010 onwards: Analysis of factors influencing inflation, such as food prices, oil prices, and global economic conditions.<br>d) Role monetary inflation management: Evaluation of the RBI's strategies and measures for controlling inflation during periods of economic shocks, such as global financial crises or sudden price spikes in essential commodities, and their effectiveness in maintaining price stability. |
| 3) Fiscal Policy and Public Finance | a) Analysis of Union and State budgets (2010-2023): Key expenditure patterns, revenue sources, and fiscal deficits.<br>b) Fiscal reforms: Impact of GST implementation, Direct Tax Code reforms, and FRBM Act amendments.<br>c) Public debt management strategies and sustainability: Trends in public debt levels, debt-to-GDP ratio, and fiscal consolidation efforts.<br>d) Assessment of fiscal policy effectiveness in achieving economic stability: Evaluation of how fiscal policies and budgetary measures have influenced economic stability, including their impact on economic growth, inflation control, and public sector efficiency. |
| **Module II: Sectoral Dynamics (15 hours)** | |
| 1) Agriculture and Rural Development | a) Agrarian distress: Causes such as land fragmentation, water scarcity, and price volatility; policy interventions and outcomes.<br>b) Technological advancements in agriculture: Adoption of precision farming, biotechnology, and climate-resilient crop varieties.<br>c) Climate change resilience in agriculture: Government policies for sustainable agriculture, irrigation schemes, and crop insurance reforms.<br>d) Impact of rural infrastructure development on agricultural productivity: Analysis of how investments in rural infrastructure, such as roads, storage facilities, and market access, influence agricultural productivity and rural development outcomes. |
| 2) Industry and Infrastructure | a) Make in India initiative: Assessment of sector-specific policies, impact on manufacturing growth, and challenges faced by small and medium enterprises (SMEs).<br>b) Role of infrastructure development: Investment in roads, railways, ports, and smart cities; impact on logistics and industrial growth.<br>c) Assessment of the impact of regulatory reforms on industrial growth: Examination of how changes in regulations, such as ease of doing business reforms and industrial policy updates, have influenced the growth and competitiveness of the industrial sector. |

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| | d) Industry 4.0 and its implications: Adoption of automation, artificial intelligence, and robotics in manufacturing; skill development initiatives. |
| 3) Services Sector and Digital Economy | a) Growth of IT, finance, and healthcare services since 2010: Role in GDP growth, employment generation, and global competitiveness.<br>b) Financial inclusion initiatives: Jan Dhan Yojana, PMJDY, and their impact on banking penetration and rural development.<br>c) Digital economy: Opportunities in e-commerce, digital payments, and cybersecurity challenges; regulatory frameworks and policy initiatives.<br>d) India's Tryst with Tech Independence: The role of Digital Public Infrastructure Framework, the National Quantum Computing Mission, Artificial Intelligence and fabrication of semi-conductors. |
| **Module III: International Trade and Policies (15 hours)** | |
| 1) Trade Policy and Agreements | a) Evolution of India's trade policy: Liberalisation measures, FTAs, and changes in tariff structures; impact on import-export trends.<br>b) Bilateral and regional trade agreements: Case studies of agreements with ASEAN, EU, and US; analysis of benefits and challenges.<br>c) WTO negotiations and India's stance: Dispute resolutions, negotiations on services and agriculture, and their implications for Indian trade.<br>d) Impact of trade policy changes on domestic industries: Analysis of how shifts in trade policies, such as tariff adjustments and trade liberalisation measures, have affected various domestic industries, including their competitiveness and growth prospects. |
| 2) Foreign Direct Investment (FDI) | a) Trends in FDI inflows and their sectoral distribution: Analysis of major sectors attracting FDI such as manufacturing, services, and infrastructure.<br>b) Role of FDI in India's Growth Process: Contribution to Economic Growth and Development, Impact on Employment and Skill Development, Technology Transfer and Innovation, Enhancement of Export Competitiveness and Regional Development and Investment Distribution.<br>c) FDI policy reforms: Ease of Doing Business reforms, FDI limits and regulations, and impact on economic growth and employment.<br>d) Strategies to attract and manage FDI inflows: Investor-friendly policies, incentives, and case studies of successful FDI projects. |
| 3) Globalisation and Economics of Integration | a) India in global supply chains: Participation in manufacturing, services, and technology sectors; challenges and opportunities.<br>b) Geopolitical factors influencing India's trade and investment policies: Impact of global events, trade wars, and geopolitical alignments.<br>c) Enhancing competitiveness in global markets: Policy initiatives for skill development, export promotion, and market access in developed and emerging economies. |

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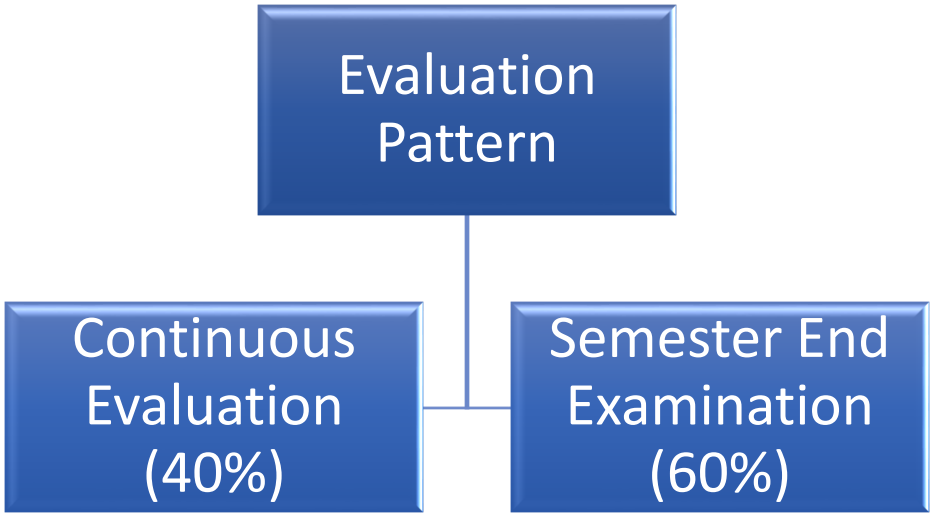
| | d) Globalisation and Its Future for India: Opportunities and Challenges in the Post-Pandemic Global Economy, Impact of Geopolitical Shifts on India's Global Integration and Sustainable Globalisation and India's Role in Climate Policy. |
| **Module IV: Socioeconomic Issues and Policies (15 hours)** | |
| 1) Inequality, Poverty, and Social Justice | a) Intersection of economic growth and social equity: Examination of how economic growth affects social equity, including the balancing act between promoting economic development and addressing income inequality and social disparities.<br>b) Trends in income and wealth inequality: Impact of economic policies on income distribution, Gini coefficient analysis.<br>c) Poverty alleviation programmes: Assessment of schemes like MGNREGA, PMAY, and their effectiveness in reducing poverty.<br>d) Social justice initiatives: Legal reforms, affirmative action policies, and challenges in achieving social inclusivity. |
| 2) Employment and Labour Market | a) Employment trends and challenges in India since 2010: Analysis of formal and informal sector employment, youth unemployment rates.<br>b) Informal sector dynamics: Size, composition, and policy interventions for informal sector workers.<br>c) Skill development initiatives: Pradhan Mantri Kaushal Vikas Yojana (PMKVY), Skill India Mission, and their role in bridging skill gaps and enhancing employability.<br>d) Future of work and emerging job trends: Analysis of how technological advancements, automation, and digitalisation are shaping the future of work in India, including the creation of new job opportunities and the transformation of existing ones. |
| 3) Environmental Sustainability and Policies | a) Impact of climate change on India's economy: Vulnerability assessment, sectors affected, and adaptation strategies.<br>b) Sustainable development goals: Progress in achieving SDGs related to clean energy, sustainable cities, and climate action.<br>c) Role of green finance in promoting sustainability: Examination of how green finance, including investment in sustainable projects and green bonds, supports environmental sustainability and the transition to a low-carbon economy in India.<br>d) Policies for balancing economic growth with environmental conservation: Environmental regulations, pollution control measures, and renewable energy initiatives. |

References:


1. Balakrishnan, P. (2010). *Economic growth in India: History and prospect*. Oxford University Press.
2. Bardhan, P. (1998). *The political economy of development in India* (2nd ed.). Oxford University Press.

3. Basu, K., & Maertens, A. (Eds.). (2011). The new Oxford companion to economics in India (Vol. 1 & 2). Oxford University Press.
4. Datt, R., & Sundharam, K. P. M. (2021). Indian economy (75th ed.). S. Chand & Company.
5. Kapila, U. (2020). Indian economy: Performance and policies (20th ed.). Academic Foundation.
6. Kapila, U. (2024). Indian economy since independence: A comprehensive and critical analysis of India's economy, 1947-2024 (35th ed.). Academic Foundation.
7. Misra, S. K., & Puri, V. K. (2021). *Indian economy* (40th ed.). Himalaya Publishing House.
8. Mohan, R. (Ed.). (2017). India transformed: 25 years of economic reforms. Penguin India.
9. Panagariya, A. (2008). India: The emerging giant. Oxford University Press.
10. Rangarajan, C. (Ed.). (2014). Selected essays on Indian economy. Academic Foundation.
11. **World Bank.** (2024). *World development report 2024: The Middle-Income trap*. World Bank. https://openknowledge.worldbank.org/bitstreams/8dca4aff-e0f5-4865-b245-ec9c4583aa60/download




**Continuous Evaluation**

| (A) | |
|---|---|
| Book Review | Any one |
| Article Review | |
| Research Project | |
| (B) | |
| Class Test | Compulsory |

# Continues Evaluation Research Project Component

## Research Project Rules and Guidelines

### 1. Topic Selection

- Choose **one topic only** from the provided list given against your **ROLL NUMBER ONLY.**
- Change in topic will **NOT BE ALLOWED.**

### 2. Project Format

Each project must include the following sections:

| Section | Description |
|---|---|
| **Cover Page** | Title, Student Name, Roll Number, Class, College, and Date |
| **Index** | List of sections with page numbers |
| **Introduction** | Brief background and significance of the topic |
| **Objectives** | Clearly state 2–3 aims of your research |
| **Methodology** | Mention how you collected data (primary/secondary), sample size, tools used |
| **Data Analysis** | Use tables, graphs, or charts to explain findings |
| **Interpretation** | Explain your results in simple terms |
| **Conclusion** | Summarise key insights; suggest improvements or actions |
| **References** | Books, articles, websites (follow proper citation style) |
| **Appendix (if any)** | Include survey questionnaires, raw data, etc. |

**THE PROJECT REPORT MUST BE HAND WRITTEN IN THE BOOK LET AUTHORISED BY THE COLLEGE. USE BLUE INK.**

### 3. Data Collection

- Projects must be based on **real-world examples, data, or observations**.
- Data may be collected through:
    - Online research (reliable websites, economic reports, articles)
    - Small surveys (questionnaire/interview)
    - Case studies (small businesses, startups, etc.)
- Cite all sources properly.

## 4. Page Limit & Presentation

- **Page Count**: 15 pages (including appendices).
- Ensure **neatness, clarity, and logical flow** of ideas.
- You are free to **affix** relevant pics or draw diagrams.

**Question Paper Pattern of Semester End Examination (SEE)**

**Max. Marks: 60** **Max.Duration: 2 hours**

All questions are compulsory

| | | | | MAX.MARKS |
|---|---|---|---|---|
| Q.1 | a) | | MODULE I | (5) |
| | b) | | | (5) |
| | c) | | | (5) |
| Q.2 | a) | | MODULE II | (5) |
| | b) | | | (5) |
| | c) | | | (5) |
| Q.3 | a) | | MODULE III | (5) |
| | b) | | | (5) |
| | c) | | | (5) |
| Q.4 | a) | | MODULE IV | (5) |
| | b) | | | (5) |
| | c) | | | (5) |

Notes sub-question a, b and c can be on the following:

i) Definitions
ii) Short-answers
iii) Explanatory notes
iv) Caselets and/or numerical problems requiring use of quantitative and/or qualitative methodology to find solutions.