

# **Nagindas Khandwala College (Autonomous)**

**Affiliated to University of Mumbai**



**MKES's Nagindas Khandwala College (Autonomous),  
Gate No 5, Bhavishya Bharat Campus, S. V. Road, Malad (West)  
Mumbai-400 064**

**Programme Code: PMSCIT**

**Post Graduate Programme: Master of Science Information  
Technology (MSc IT) Programme**

**Two Year Integrated Programme -**

**Four Semesters**

***Course Structure***

**Under Choice Based Credit, Grading and Semester System**

***Implemented during Academic Year- 2020-21***

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## **1. Preamble**

Masters of Science (MSc.) in Information Technology is a Post-graduation programme of 104 credits offered by the Department of Information technology and Computer Science, Nagindas Khandwala College [Autonomous], under the Choice Based Credit and Grading System. The programme is designed to fulfil the demand for trained professionals in Information Technology. The curriculum is designed to develop strong theoretical foundation while ensuring the applications of acquired knowledge in various fields.

In the first year, students have to complete four courses with theory and practical in each semester. In the second year, the Department offers specializations.

Master of Arts Programme in Psychology will aim to develop, train and produce graduates who are industry ready. The Master's Degree Program will provide students the right blend of knowledge and skills.

## **2. Objectives of the programme**

The curriculum is framed to accomplish the following program objectives by the end of study.

1. To provide maximum practical experience to enrolled students in order to help them choose their path and pace according to their aptitude and ability.
2. To prepare the students with the capabilities of independently designing and executing research projects and apply their knowledge to come up with technical solutions to problems.
3. To facilitate inclusive development of the student technically, managerially and individually through various support courses along with the core subjects

## **3. Program Outcome:**

- To inculcate scientific and research aptitude.
- To inculcate inquisitiveness, scientific and logical thinking and problem solving skills.

#### 4. Program Specific Outcome:

- To develop logic and problem solving skills towards the requirements of the society and develop software tools in the field.
- To create an exposure to the emerging areas in the field of technology.

#### 5. Scheme of Examination:

The scheme of Examination shall be divided into parts i.e. Continuous Internal Evaluation including Assignment, Projects, Seminars, Case Studies and Class Tests which will be of 40 marks, Semester End Examinations which will be of 60 marks and Practical Examination which will be of 50 Marks. The semester wise Credit Points may vary from course to course but the value of Credits for the Post-Graduate Programme shall be of 96 Credits. Students will have to earn 8 extra credits under autonomy. This will be achieved by doing different courses listed below summing up to 8 credits.

##### Scheme of Total Credits

Sr. No.	Year	Credits
1	Year 1	48
2	Year 2	48
	Total Credits from Academics	96
	<b>Additional Credits</b>	8
	Total Credits for Award of Degree	104

### List of Certifications for Additional Credits

Sr. No.	Certification	Credits
1.	Online Courses (IIT Spoken Tutorials/ Coursera/ Swayam and similar) / certificate courses / short term courses	Each Course will be for 2 credits
2.	Mentoring for UG students (60 hours)	2
3.	Paper Presentation/publications (in conferences/journals in the core or allied areas)	2
4.	Participation in Conferences	1

## 6. Credit Based Evaluation System Scheme of Examination

For all 4 semesters, the performance of the learners shall be evaluated into two components. The first component shall carry 40% marks which will be a Continuous Internal Evaluation while the second component shall carry 60% marks at semester end examination.

The concerned faculty will decide on the exact nature of Continuous Internal Evaluation (CIE) and Semester End Examinations (SEE). However, the faculty must inform and give details of the evaluation methods to the Department of MSc IT as well as to the participants in the program at the beginning of the Semester.

Apart from these, the students will have to appear for Practical Exam which will be of 50 marks.

#### Structure of Continuous Internal Evaluation – 40% = 40 marks

Sr. No.	Particulars	Marks
1	Class test or using any open source learning management system such as Moodle or a test based on an equivalent online course on the contents of the concerned course offered by or build using MOOC platform.	30 marks
2	Active participation in routine class instructional deliveries	10 marks

**Semester End Examination** will be organized after all modules of the course are discussed in the class. It will be a written examination / or as per the needs of the course a practical examination or a combination of both. This examination will be for 60 marks.

The assessment of Continuous Internal Evaluation and Semester End Examination as mentioned above for the Semesters I to IV shall be processed by the College – ‘Institutions of their Learners’ and issue the grade cards to them after the conversion of marks into grade as the procedure mentioned below.

The learners to pass a course shall have to obtain a minimum of 40% marks in aggregate for each course where the course consists of Continuous Internal Evaluation & Semester End Examination. The learner shall obtain minimum of 40% marks (i.e. 16 out of 40) in the Continuous Internal Evaluation and 40% marks in Semester End Examination (i.e. 24 Out of 60) separately, and 40% marks in Practical Examination (i.e. 20 out of 50) to pass the course and minimum of Grade D in each project, wherever applicable, to pass a particular semester. A learner will be said to have passed the course if the learner passes the Continuous Internal Evaluation & Semester End Examination together.

#### **Passing Standards**

<b>Grade</b>	<b>Marks (CIE + SEE)</b>	<b>Practical Marks</b>	<b>Grade Points</b>
O	80 & Above	40 & Above	10
A+	70 to 79.99	35 to 39	9
A	60 to 69.99	30 to 34	8
B+	55 to 59.99	28 to 29	7
B	50 to 54.99	25 to 27	6
C	45 to 49.99	23 to 24	5
D	40 to 44.99	20 to 22	4
F	Less than 40	Less than 20	0

***Master of Science (MSc) Programme in Information Technology***  
**Two Year Integrated Programme - Four Semesters**

**Basic Structure: Distribution of Courses**

**About the Credit Scheme:**

- 104 Credits for the entire MSc course:
  - 24 Credits for each semester ( $24 \times 4 = 96$ ), + 8 Extra credits
  
- For Semester I, II, III and IV each:
  - Four Credits per Theory Course ( $4 \times 16$  Courses = 64 Credits)
  - Two credits per Practical ( $2 \times 14 = 28$  credits)
  - 1 Industry / Research Project = 4 credits
  
- 60 teaching hours per course (core/elective/IC/Ability Enhancement) during the Semester.

***Masters in Science (MSc) Programme in Information Technology***  
**Two Year Integrated Programme -**  
**Four Semesters**

**Basic Structure: Distribution of Courses**

1	<b>Ability Enhancement Compulsory Course (AECC)</b>		
2	<b>Skill Enhancement Compulsory Course (SEC)</b>	Industry / Research Project (1*4=4)	04
3	<b>Core Course (CC)</b>	12 Paper of 4 Credits Hrs. each (Total Credits Hrs. 12*4)=48 10 Paper of 2 Credits Hrs. each (Total Credits Hrs. 10*2)=20	68
4	<b>Discipline Specific Elective (DSE)</b>	04 Paper of 4 Credits Hrs. each (Total Credits Hrs. 04*4)=16 04 Paper of 2 Credits Hrs. each (Total Credits Hrs. 04*2)=08	24
		<b>Total Credits Hrs</b>	<b>96</b>

**Choice Based Credit, Grading and Semester System with effect from the Academic Year 2020-2021**



**Post Graduate Programme: Master of Science Information  
Technology (MSc IT)**

**CONCEPTUAL FRAMEWORK**

**Part - I, Semester I & II**

Sr. No.	Semester I	Subject code	Credits	Sr. No.	Semester II	Subject code	Credits
1	<b>Core 1:</b> Research in Computing	2011PITRC	<b>04</b>	1	<b>Core 3:</b> Internship/ Research paper/ mini-project	2021PITRP	<b>04</b>
2	<b>Core 2:</b> Machine Learning	2012PITML	<b>04</b>	2	<b>Core 4:</b> Soft Computing	2022PITSC	<b>04</b>
3	<b>Elective-I (Any One):</b> Foundations of Data Science; Distributed Systems	2013PITFD 2013PITDS	<b>04</b>	3	<b>Elective-III (Any One):</b> Foundations of Big Data; Cloud Computing	2023PITBD 2023PITCC	<b>04</b>
4	<b>Elective-II (Any One):</b> Cyber and Information Security; Analysis of Algorithms	2014PITCS 2014PITAA	<b>04</b>	4	<b>Elective-IV (Any One):</b> Computer Forensic; Optimization Techniques	2024PITCF 2024PITOT	<b>04</b>
5	Research in Computing Practical	2015PITRC	<b>02</b>	5	Paper Presentation/ Paper Publication	2025PITRP	<b>02</b>
6	Machine Learning Practical	2016PITML	<b>02</b>	6	Soft Computing Practical	2026PITSC	<b>02</b>
7	<b>(Any 1 of 2, corresponding to theory opted)</b> Foundations of Data Science Practical;	2017PITFD 2017PITDS	<b>02</b>	7	<b>(Any 1 of 2, corresponding to theory opted)</b> Foundations of Big Data Practical	2027PITBD 2027PITCC	<b>02</b>

	Distributed Systems Practical				Cloud Computing Practical		
8	<b>(Any 1 of 2, corresponding to theory opted)</b>  Cyber and Information Security Practical  Analysis of Algorithms Practical	2018PITCS  2018PITAA	<b>02</b>	8	<b>(Any 1 of 2, corresponding to theory opted)</b>  Computer Forensic Practical  Optimization Techniques Practical	2028PITCF  2028PITOT	<b>02</b>
	<b>TOTAL</b>		<b>24</b>		<b>TOTAL</b>		<b>24</b>

**Part II, Semester III & IV**

Sr. No.	Semester III	Subject code	Credits	Sr. No.	Semester IV	Subject code	Credits
1	<b>Core -9 :</b> Embedded Systems	1731PITES	4	1	<b>Core -11 :</b> Artificial Intelligence	1741PITAI	4
2	<b>Core -10:</b> Information Security Management	1732PITIS	4	2	<b>Core -12:</b> IT Infrastructure Management	1742PITIM	4
3	<b>DSE 1:</b> <b>(Any 1 of 2)</b> Artificial Neural Networks; Virtualization	1733PITNN  1733PITVR	4	3	<b>DSE 3:</b> <b>(Any 1 of 3)</b> Intelligent Systems; Real Time Embedded Systems; Computer Forensics	1743PITIS  1743PITES  1743PITCF	4
4	<b>DSE 2:</b> <b>(Any 1 of 2)</b> Digital Image Processing; Ethical Hacking	1734PITIP  1734PITEH	4	4	<b>DSE 4:</b> <b>(Any 1 of 3)</b> Advanced Image Processing; Design of Embedded Control Systems; Cloud Management	1744PITIP  1744PITES  1744PITCM	4

5	Embedded Systems Practical	1735PITES	2	5	(Any 1 of 3, corresponding to theory opted) Intelligent Systems Practical; Real Time Embedded Systems Practical; Computer Forensics Practical	1745PITIS 1745PITES 1745PITCF	2
6	Information Security Management Practical	1736PITIS	2	6	(Any 1 of 2, corresponding to theory opted) Advanced Image Processing Practical; Design of Embedded Control Systems Practical; Cloud Management Practical	1746PITIP 1746PITES 1746PITCM	2
7	(Any 1 of 2, corresponding to theory opted) Artificial Neural Networks Practical; Virtualization Practical	1737PITNN 1737PITVR	2	7	Project	1747PITPR	4
8	(Any 1 of 2, corresponding to theory opted) Digital Image Processing Practical; Ethical Hacking Practical	1738PITIP 1738PITEH	2				
	<b>TOTAL</b>		<b>24</b>		<b>TOTAL</b>		<b>24</b>



**Nagindas Khandwala College (Autonomous)**

**Syllabus and Question Paper Pattern  
of Courses of**

**Master of Science Information Technology (MSc IT)  
Programme**

**Part – I, First Year**

***Semester I and II***

**Under Choice Based Credit, Grading and Semester System**

***(Implemented during Academic Year 2020-2021)***

**Post Graduate Programme: Master of Science Information  
Technology (MSc IT)**

**CONCEPTUAL FRAMEWORK**

**Part - I, Semester I & II**

Sr. No.	Semester I	Subject code	Credits	Sr. No.	Semester II	Subject code	Credits
1	<b>Core 1:</b> Research in Computing	2011PITRC	<b>04</b>	1	<b>Core 3:</b> Internship/ Research paper/ mini-project	2021PITRP	<b>04</b>
2	<b>Core 2:</b> Machine Learning	2012PITML	<b>04</b>	2	<b>Core 4:</b> Soft Computing	2022PITSC	<b>04</b>
3	<b>Elective-I (Any One):</b> Foundations of Data Science; Distributed Systems	2013PITFD 2013PITDS	<b>04</b>	3	<b>Elective-III (Any One):</b> Foundations of Big Data; Cloud Computing	2023PITBD 2023PITCC	<b>04</b>
4	<b>Elective-II (Any One):</b> Cyber and Information Security; Analysis of Algorithms	2014PITCS 2014PITAA	<b>04</b>	4	<b>Elective-IV (Any One):</b> Computer Forensic; Optimization Techniques	2024PITCF 2024PITOT	<b>04</b>
5	Research in Computing Practical	2015PITRC	<b>02</b>	5	Paper Presentation/ Paper Publication	2025PITRP	<b>02</b>
6	Machine Learning Practical	2016PITML	<b>02</b>	6	Soft Computing Practical	2026PITSC	<b>02</b>
7	<b>(Any 1 of 2, corresponding to theory opted)</b>	2017PITFD 2017PITDS	<b>02</b>	7	<b>(Any 1 of 2, corresponding to theory opted)</b>	2027PITBD 2027PITCC	<b>02</b>

	Foundations of Data Science Practical; Distributed Systems Practical				Foundations of Big Data Practical Cloud Computing Practical		
8	<b>(Any 1 of 2, corresponding to theory opted)</b>  Cyber and Information Security Practical  Analysis of Algorithms Practical	2018PITCS  2018PITAA	<b>02</b>	8	<b>(Any 1 of 2, corresponding to theory opted)</b>  Computer Forensic Practical  Optimization Techniques Practical	2028PITCF 2028PITOT	<b>02</b>
	<b>TOTAL</b>		<b>24</b>		<b>TOTAL</b>		<b>24</b>

## ***Evaluation Scheme***

### **I. Internal Exam-40 Marks**

#### **(i) Test– 30 Marks - Duration 60 mins**

It will be conducted either as a written test or using any open source learning management system such as Moodle (Modular object-oriented dynamic learning environment) Or a test based on an equivalent online course on the contents of the concerned course(subject) offered by or build using MOOC (Massive Open Online Course) platform.

#### **(ii) 10 Marks – Presentation and active participation in routine class instructional deliveries**

Overall conduct as a responsible student, manners, skill in articulation, leadership qualities demonstrated through organizing co-curricular activities, etc.

### **II. External Examination- 60 Marks**

#### **(i) Duration - 2.5 Hours.**

#### **(ii) Theory question paper pattern:-**

All questions are compulsory.

Question	Based on	Marks
Q.1	Unit I	12
Q.2	Unit II	12
Q.3	Unit III	12
Q.4	Unit IV	12
Q 5	Unit V	12

All questions shall be compulsory with internal choice within the questions.

Each Question may be sub-divided into sub questions as a, b, c, d & e, etc & the allocation of Marks depends on the weightage of the topic.

### **Practical Examination – 50 marks (Duration: 2 Hours)**

- Each practical course carries 50 Marks : 40 marks + 05 marks (journal)+ 05 marks(viva)
- Minimum 75% practical from each core/allied course are required to be completed and written in the journal.

**(Certified Journal is compulsory for appearing at the time of Practical Exam)**



# Syllabus for Programme of Master of Science Information Technology (M.Sc.IT)

## SEMESTER -II

*(Implemented during Academic Year 2020-2021)*

### **Core 3: Internship/ Research paper/ mini-project (2021PITRP)**

#### **Course Objectives:**

1. The course is designed so as to expose the students to industry environment and to take up on-site assignment as trainees or interns.
2. To evaluate complex arguments and to articulate their own positions on a range of technical and general topics.

#### **Learning Outcome:**

Upon completion of this course, learner should be able to:

CO1: Have an exposure to industrial practices and to work in teams (Level: Apply)

CO2. Communicate effectively (Level: Apply)

CO3. Explain the impact of engineering solutions in a global, economic, environmental and societal context (Level: Understand)

CO4. Develop the ability to engage in research and to involve in life-long learning (Level: Apply and Analyse)

CO5. Formulate solution to contemporary issues (Level: Create)

CO6. Engage in establishing his/her digital footprint (Level: Apply)

#### **Paper Presentation/ Paper Publication (2025PITRP)**

1. Students are required to present a paper in any national/international conference
2. Publish a paper in any national or international peer reviewed journal

**Nagindas Khandwala College (Autonomous)**

**Syllabus and Question Paper Pattern  
of Courses of**

**Master of Science Information Technology (MSc IT)  
Programme**

**Part – II, Second Year**

***Semester III and IV***

**Under Choice Based Credit, Grading and Semester System**

***(Implemented during Academic Year 2020-2021)***

**Post Graduate Programme: Master of Science Information  
Technology (MSc IT)**

**CONCEPTUAL FRAMEWORK**

**Part – II, Semester III & IV**

Sr. No.	Semester III	Subject code	Credits	Sr. No.	Semester IV	Subject code	Credits
1	<b>Core -9 :</b> Embedded Systems	1731PITES	4	1	<b>Core -11 :</b> Artificial Intelligence	1741PITAI	4
2	<b>Core -10:</b> Information Security Management	1732PITIS	4	2	<b>Core -12:</b> IT Infrastructure Management	1742PITIM	4
3	<b>DSE 1:</b> <b>(Any 1 of 2)</b> Artificial Neural Networks; Virtualization	1733PITNN 1733PITVR	4	3	<b>DSE 3:</b> <b>(Any 1 of 3)</b> Intelligent Systems; Real Time Embedded Systems; Computer Forensics	1743PITIS 1743PITES 1743PITCF	4
4	<b>DSE 2:</b> <b>(Any 1 of 2)</b> Digital Image Processing; Ethical Hacking	1734PITIP 1734PITEH	4	4	<b>DSE 4:</b> <b>(Any 1 of 3)</b> Advanced Image Processing; Design of Embedded Control Systems; Cloud Management	1744PITIP 1744PITES 1744PITCM	4
5	Embedded Systems Practical	1735PITES	2	5	<b>(Any 1 of 3, corresponding to theory opted)</b> Intelligent Systems Practical; Real Time Embedded Systems Practical; Computer Forensics Practical	1745PITIS 1745PITES 1745PITCF	2

6	Information Security Management Practical	1736PITIS	2	6	(Any 1 of 2, corresponding to theory opted) Advanced Image Processing Practical; Design of Embedded Control Systems Practical; Cloud Management Practical	1746PITIP 1746PITES 1746PITCM	2
7	(Any 1 of 2, corresponding to theory opted) Artificial Neural Networks Practical; Virtualization Practical	1737PITNN 1737PITVR	2	7	Project	1747PITPR	4
8	(Any 1 of 2, corresponding to theory opted) Digital Image Processing Practical; Ethical Hacking Practical	1738PITIP 1738PITEH	2				
	<b>TOTAL</b>		<b>24</b>		<b>TOTAL</b>		<b>24</b>

**Syllabus for Programme of  
Master of Science Information Technology (M.Sc.IT)**

**SEMESTER –III**

### Internal Exam-40 Marks

**Test– 30 Marks - Duration 60 mins**

It will be conducted either as a written test or using any open source learning management system such as Moodle (Modular object-oriented dynamic learning environment)Or a test based on an equivalent online course on the contents of the concerned course(subject)offered by or build using MOOC (Massive Open Online Course)platform.

**10 Marks** – Presentation and active participation in routine class instructional deliveries

Overall conduct as a responsible student, manners, skill in articulation, leadership qualities demonstrated through organizing co-curricular activities, etc.

### External Examination- 60 Marks

Duration - 2.5 Hours.

Theory question paper pattern:-

All questions are compulsory.

Question	Based on	Marks
Q.1	Unit I	12
Q.2	Unit II	12
Q.3	Unit III	12
Q.4	Unit IV	12
Q 5	Unit V	12

All questions shall be compulsory with internal choice within the questions.

Each Question may be sub-divided into sub questions as a, b, c, d & e, etc & the allocation of Marks depends on the weightage of the topic.

### Practical Examination – 50 marks (Duration: 2 Hours)

- Each practical course carries 50 Marks : 40 marks + 05 marks (journal)+ 05 marks(viva)
- Minimum 75% practical from each course are required to be completed and written in the journal.

**(Certified Journal is compulsory for appearing at the time of Practical Exam)**

## **Guidelines for Project:**

- The project topic may be undertaken in any area of Core Courses.
- Each of the students has to undertake a Project individually under the supervision of a teacher-guide.
- The student shall decide the topic in consultation with the teacher-guide concerned.
- College will allot P G Teacher for guidance to the students based on her / his specialization.
- There shall be double valuation of project by the teacher- guide concerned and an external examiner appointed by the College with equal weightage.
- The teacher-guide along with the external examiner appointed by the College for the valuation of project shall conduct viva voce examination with equal weightage.
- The project report shall be prepared as per the broad guidelines given below:
  - Project Report shall be typed in Times New Roman with one and half line spacing in 12 Font Size and 1.5 spacing.
  - The size of the Project Report shall be with a minimum of 50 pages.
  - Project Report shall be printed on both sides of the paper.
  - The Project Report shall be bounded.
- Minimum of Grade E in the project component is needed for passing
- In case of failing in the project work, the same project can be revised for ATKT examination
- Absence of student for viva voce: If any student fails to appear for the viva voce on the date and time fixed by the department, such student shall appear for the viva voce only along with students of the next batch.

## Evaluation Scheme

### Internal Exam-40 Marks

**Test– 30 Marks** - Duration 60 mins

It will be conducted either as a written test or using any open source learning management system such as Moodle (Modular object-oriented dynamic learning environment)Or a test based on an equivalent online course on the contents of the concerned course(subject)offered by or build using MOOC (Massive Open Online Course)platform.

**10 Marks** – Presentation and active participation in routine class instructional deliveries

Overall conduct as a responsible student, manners, skill in articulation, leadership qualities demonstrated through organizing co-curricular activities, etc.

### External Examination- 60 Marks

Duration - 2.5 Hours.

Theory question paper pattern:-

All questions are compulsory.

Question	Based on	Marks
Q.1	Unit I	12
Q.2	Unit II	12
Q.3	Unit III	12
Q.4	Unit IV	12
Q 5	Unit V	12

All questions shall be compulsory with internal choice within the questions.

Each Question may be sub-divided into sub questions as a, b, c, d & e, etc & the allocation of Marks depends on the weightage of the topic.

### Practical Examination – 50 marks (Duration: 2 Hours)

- Each practical course carries 50 Marks : 40 marks + 05 marks (journal)+ 05 marks(viva)
- Minimum 75% practical from each course are required to be completed and written in the journal.

**(Certified Journal is compulsory for appearing at the time of Practical Exam)**