Estd.:1962
NAAC 'A' Grade,
MHRD-NIRF-28th Rank

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दुरध्वनी (ईपीएबीएक्स) २६०९००० (अभ्यास मंडळे विभाग– २६०९०९४)
फॅक्स : ००९१-०२३१-२६९१५३३ व २६९२३३३.e-mail:bos@unishivaji.ac.in

जा.क्र. / एसयु / बीओएस / 3619 दिनांकः–21 / 07 / 2016

प्रति,

1. प्राचार्य / संचालक, सर्व संलग्नित एम.सी.ए. महाविद्यालये, शिवाजी विद्यापीठ, कोल्हापूर.	2. विभागप्रमुख, वाणिज्य अधिविभाग, शिवाजी विद्यापीठ, कोल्हापूर.	3. समन्वयक, यशवंतराव चव्हाण स्कूल ऑफ रूरल डेव्हलपमेंट, शिवाजी विद्यापीठ, कोल्हापूर.	4. विभागप्रमुख, संगणकशास्त्र अधिविभाग, शिवाजी विद्यापीठ, कोल्हापूर.

विषयः– शैक्षणिक वर्ष 2016–17 मधील एम.सी.ए. भाग–1 चा अभ्यासक्रम, स्ट्रक्चर, प्रवेश पात्रता व अन्य तरतुदीबाबत.

महोदय,

उपरोक्त विषयांस अनुसरून आपणांस आदेशान्वये कळविण्यात येते की, विद्याशाखेअंतर्गत AICTE ने निर्धारित केलेल्या मार्गदर्शक तत्वाप्रमाणे एम.सी.ए. पदवीचा भाग 1 चा अभ्यासक्रम, कोर्स स्ट्रक्चर, प्रवेश पात्रता व अन्य तरतुदींना विद्यापीठ अधिकार मंडळाने मान्यता दिली असून सोबत त्याची प्रत सॉफ्ट कॉपीमधून जोडली आहे. तसेच ती विद्यापीठ संकेतस्थळ www.unishivaji.ac.in वर उपलब्ध करण्यात आली आहे.

सदर कोर्स स्ट्रक्चर, प्रवेश पात्रता व अन्य तरतुदी शैक्षणिक वर्ष 2016–17 पासून लागू करण्यात आल्या आहेत. तसेच जुन्या व अनुतीर्ण विद्यार्थ्यांसाठी ऑक्टोबर / नोव्हेंबर 2016 व मार्च / एप्रिल 2017 अशा दोन संधी परीक्षेसाठी उपलब्ध करून देण्यात आल्या आहेत.

सबब, उपरोक्त बाब सर्व विद्यार्थी व शिक्षकांच्या निर्दशनास आणावी.

कळावे,

आपला विश्वासू,

सही / –

उपकुलसचिव

प्रतः–

1. समन्वयक, विज्ञान विद्याशाखा
2. समन्वयक, वाणिज्य विद्याशाखा
3. समन्वयक, अभियांत्रिकी व तंत्रज्ञान विद्याशाखा
4. अध्यक्ष, संगणकशास्त्र समन्वय समिती

} यांना माहितीसाठी

1. पात्रता विभाग
2. परीक्षक नियुक्ती विभाग
3. पदव्युत्तर प्रवेश विभाग
4. संलग्नता विभाग
5. बी.एस्सी. विभाग
6. इतर परीक्षा विभाग – 3
7. अभियांत्रिकी विभाग

} यांना माहितीसाठी व पुढील योग्य त्या कार्यवाहीसाठी

Master of Computer Applications (M.C.A.)
(Under faculty of Science)
(Choice Based Credit System)

MCA (Part I) From Academic Year 2016-2017
MCA (Part II) From Academic Year 2017-2018
MCA (Part III) From Academic Year 2018-2019

1. Introduction

1. The name of the programme shall be **Master of Computer Applications** (MCA).

2. The knowledge and skills required planning; designing and to build Complex Application Software Systems which are highly valued in all industry sectors including business, health, education and the arts. The basic objective of the education in Masters Programme as Computer Applications (MCA) is to provide to the country a steady stream of the necessary knowledge, skills and foundation for acquiring a wide range of rewarding careers into the rapidly expanding world of the Information Technology.

3. Job Opportunities: Many graduates begin their career as a junior programmer and, after some experience, are promoted as system analysts. Other seek entrepreneurial role in the Information Technology world as independent business owners, software authors, consultants, or suppliers of systems and equipments. Career opportunities exist in such areas as management software and hardware sales, technical writing, training others on computer, consulting, software development and technical support. Application areas include transaction processing, accounting functions, sales analysis, games, forecasting and simulation, database management, decision support and data communications.

4. Specific elective courses to be offered in functional areas have to depend on student preferences and needs of the user systems in the region in which the educational institution is located.

5. The MCA programme is a mixture of computer-related and general business courses. The computer related courses includes standard techniques of programming, the use of software packages, databases and system analysis and design tools. The general business courses include the functional areas of management like accounting, sales, purchase, inventory, and production. The course would emphasis the study and creation of business applications. Inclusion of projects in each semester (Except Sem-I,III,V) improves student's technical orientation, understanding of IT environment and domain knowledge. It will build right platform for students to become a successful Software professional. This would emphasize on domain knowledge of various areas, which would help the students to build software applications on it. The students are exposed to system development in the information-processing environment with special emphasis on Management Information Systems and Software Engineering for small and medium computer systems. Inclusion of Business Management Labs will help students to acquire thorough knowledge of management practices in organization. Subjects such as ERP, Information Security and Business Intelligence will work as new application domains. Major focus is also given on Mobile technologies so that student can choose Mobile Technologies as their career options. Also, exposure to microcomputer technology, micro-based systems design and micro applications software, including network and graphical user interface systems is also provided. Advanced Internet and Web technology includes variety of new technologies. Soft skills techniques are covered in first four semesters, which will lead to overall personality development of the student and that will help them in their placement activities and to sustain in the organization successfully.

6. The new curricula would focus on learning aspect from three dimensions viz. Conceptual Learning, Skills Learning and Practical / Hands on.
7. The inclusion of projects at each semester (except Sem-I,III,V) ensures the focus on applying the skill learnt at respective levels. It will enhance student's capability to work on various technologies. It will make appropriate platform for students to work in IT Industry. It will also improve documentation, Coding and Design standards in students. Inclusion of project for subject such as Mobile Computing will definitely improve student's innovativeness and creativity. Student's technical orientation, eagerness will be enhanced.
8. The Institutes should organize placement programme for the MCA students, by interacting with the industries and software consultancy houses in and around the region in which the educational Institution is located.
9. At the end of the syllabus various certifications possible for each Semester is given in the list. Students should try to do maximum certifications in their learning phase only to make their resume rich.
10. Ordinarily, in each class, not more than 60 students will be admitted.

2. Duration of the Course

The MCA programme will be a **full-time three years** i.e. 6 semesters. Pattern of examination will be Semester System.

3. Medium of Instruction

The medium of Instruction will be English only.

4. Admission Procedure

(A) Eligibility

The eligibility criteria for appearing to MAH-MCA-CET conducted by DTE and admission for the MCA course will be as decided by the Competent Authority (Directorate of Technical Education Maharashtra State, Mumbai &/or AICTE, New Delhi) every year.

(B) Reservation of Seats

As per rules of by the Competent Authority

(C) Selection Basis

The selection would be done as per the guidelines given by the Directorate of Technical Education Maharashtra State time to time.

5. Course Structure

Lectures and Practical should be conducted as per the scheme of lectures and practical indicated in the course structure.

MCA (Choice Based Credit System)
(Under Faculty of Science)
(Introduced from June 2016 and Onwards)
To be implemented from the academic year 2016-2017

Semester – I							
Sr. No.	**Subject Code**	**Subject Title**	**Internal Marks**	**External Marks**	**CP**	**Workload per Week**	
						T	**P**
1	IT11	Computer Architecture	20	80	4	4	-
2	IT12	Programming with C	20	80	4	4	-
3	IT13	Database Management System	20	80	4	4	-
4	BM11	Principles & Practices of Management	20	80	4	4	-
5	MT11	Fundamental of Mathematics	20	80	4	4	
6	CS11	Communication Skill –I	50		2	2	-
7	IT12L	LAB I (Programming in C)		100	4	-	4
8	IT13L	LAB II (Database Management System)		100	4	-	4
		Total	**150**	**600**	**30**	**22**	**8**

Semester – II							
Sr. No.	**Subject Code**	**Subject Title**	**Internal Marks**	**External Marks**	**CP**	**Workload per Week**	
						T	**P**
1	IT21	Operating System	20	80	4	4	-
2	IT22	Data Structure	20	80	4	4	-
3	IT23	Object oriented Programming using C++	20	80	4	4	-
4	BM21	Accounting for Managers	20	80	4	4	-
5	MT21	Statistical Computing	20	80	4	4	
6	MP21	Mini Project	50		2	2	-
7	IT22L	LAB III (Data Structure)		100	4	-	4
8	IT23L	LAB IV (Object oriented Programming using C++)		100	4	-	4
		Total	**150**	**600**	**30**	**22**	**8**

	Semester – III						
Sr. No.	**Subject Code**	**Subject Title**	**Internal Marks**	**External Marks**	**CP**	**Workload per Week**	
						T	**P**
1	IT31	Software Engineering	20	80	4	4	-
2	IT32	Java Programming	20	80	4	4	-
3	IT33	Computer Networks	20	80	4	4	-
4	BM31	Management Support System	20	80	4	4	-
5	MT31	Probability and Combinatorics	20	80	4	4	
6	CS31	Communication Skill –II	50		2	2	-
7	IT32L	LAB V (Java Programming)		100	4	-	4
8	IT33L	LAB VI (Open Source Languages)		100	4	-	4
		Total	**150**	**600**	**30**	**22**	**8**

	Semester – IV						
Sr. No.	**Subject Code**	**Subject Title**	**Internal Marks**	**External Marks**	**CP**	**Workload per Week**	
						T	**P**
1	IT41	Advance Java	20	80	4	4	-
2	IT42	Data Mining	20	80	4	4	-
3	IT4E	Elective I IT4E.1 Computer Graphics IT4E.2 Cloud Computing IT4E.3 Python Programming IT4E.4 Theory of Computation	20	80	4	4	-
4	BM41	Organizational Behavior	20	80	4	4	
5	BM4E	Elective I BM4E.1 Entrepreneurship Development BM4E.2 Human Resource Management BM4E.3 Supply Chain Management BM4E.4 Performance Evaluation & Computer Centre Management	20	80	4	4	-
6	MP41	Mini Project	50		2	2	
7	IT41L	LAB VII (Advance Java)		100	4	-	4
8	IT42L	LAB VIII (Data Mining)		100	4	-	4
		Total	**150**	**600**	**30**	**22**	**8**

	Semester – V						
Sr. No.	**Subject Code**	**Subject Title**	**Internal Marks**	**External Marks**	**CP**	**Workload per Week**	
						T	**P**
1	IT51	Artificial Intelligence and Applications	20	80	4	4	-
2	IT52	Advance Web Technology	20	80	4	4	-
3	IT5E	Elective II IT5E.1 Cryptography & Network security IT5E.2 Distribute Computing IT5E.3 Mobile Computing IT5E.4 Big Data Management	20	80	4	4	-
4	BM5E	Elective II BM5E.1 Management Information System BM5E.2 Knowledge Management BM5E.3 Software Project Management& Quality Assurance BM5E.4 Enterprise Resource Planning	20	80	4	4	
5	MT51	Optimization Techniques	20	80	4	4	
6	CS51	Industrial Seminar	50		2	2	-
7	IT51L	LAB IX (Artificial Intelligence and Applications)		100	4	-	4
8	IT52L	LAB X (Advance Web Technology)		100	4	-	4
		Total	**150**	**600**	**30**	**22**	**8**

Semester – VI					
Sr. No.	**Subject Code**	**Subject Title**	**Internal**	**External**	**CP**
1	IT61	Project Work	200	300	20

6. Teaching and Practical Scheme

1. Period for teaching or practical should be of 60 minutes each.
2. Minimum 45 periods should be conducted for each subject of 80 Marks.
3. One Practical Batch should be of 30 students.
4. Practical evaluation should be conducted before the commencement of University examination.

7. Project Work

At the end of the sixth semester of study, a student will be examined in the course" Project Work".

1. Project work may be done individually or in groups in case of bigger projects. However if project is done in groups, each student must be given a responsibility for a distinct module and care should be taken to see the progress of individual modules is independent of others.
2. Students should take guidance from an internal guide and prepare a Project Report on "Project Work" in **2 copies** to be submitted to the Director of the Institute.

3. The Project Report should contain an Introduction to Project, which should clearly explain the project scope in detail. Also, Data Dictionary, DFDs, ERDs, File designs and a list of output reports should be included.(Refer annexure 1)

4. The project Work should be of such a nature that it could prove useful or should be relevant from the commercial/management angle.

5. The project report will be duly accessed by the internal guide of the subject and internal marks will be communicated by the Director of the Institute to the University.

6. The project report should be prepared in a format prescribed by the University, which also specifies the contents and methods of presentation.

7. The major project work carry 200 marks for internal assessment and 300 marks for external viva. The external viva shall be conducted by a panel of minimum of three external examiners out of which one will be the Chairman of the panel.

8. Project work can be carried out in the Institute or outside with prior permission of the Institute.

9. Project viva-voce by the University panel will be conducted in the month of June after completion of 5 months training.

8. Assessment

The final total assessment of the candidate is made in terms of an internal assessment and an external assessment for each course.

1. For each theory paper, 20% marks will be based on internal assessment and 80% marks for semester examination (external assessment), unless otherwise stated.

2. The division of the 20 marks allotted to internal assessment of theory papers is as follows –

1 Attendance	5 Marks
2Mid Test	5 Marks
3Preliminary Examination	5 Marks
4 Assessment by the subject faculty (Presentation/Group Activity/ Assignments)	5 Marks
	Total20 Marks

3. The mini project will be evaluated by the university appointed panel.

4. The final practical examination will be conducted by the university appointed panel at the end of semester for each lab course and marks will be submitted to the university by the panel.

The pattern of final **Practical Examination** will be as follows-

1 Coding and Execution of Program	60 Marks
2 Viva-voce	20 Marks
3 Journal	20 Marks
	Total100 Marks

5. The internal marks will be communicated to the University at the end of each semester, but before the semester end examinations. These marks will be considered for the declaration of the results.

6. Examination

The final Examinations shall be conducted at the end of the semester i.e. during November and in May.

7.Nature of question paper:

Nature of question paper is as follows for University end semester examination

a. Theory Examination:

There will be seven (7) questions of 16 Marks and out of which four (4) to be attempted from question no 1 to 6. Question NO.7 is compulsory and is of short answers type. It must consist four (4) sub-question of Eight(8) marks each out of which two (2) to be attempted.

b. Practical Examination:

i. Duration of Practical Examination : 3 Hrs

ii. Nature of Question paper

There will be three questions out of which any two questions to be attempted and each question carries 30 Marks.

11. Standard of Passing

1. Internal as well as external examination will be held at the end of semester. The candidate must score 40% marks in each head of internal as well as external Examination and Aggregate 50% marks are required for passing in each head (Internal+External).

12. Backlog

1. No candidate will be admitted to Second Year MCA (Sem-III) of the course unless he/she

i) passes MCA sem-I and Sem- II examination. Or

ii) fails in not more than three heads of passing at the first year MCA Sem-I and Sem-II examination.

2. No candidate will be admitted to Third Year MCA (Sem-V) of the course unless he/she –

i) passes MCA sem-I, Sem-II, Sem-III and Sem- IV examination. Or

ii) passes his MCA Sem-I and MCA Sem-II examination and fails in not more than three heads of passing at the Second year MCA Sem-III and Sem-IV examination.

13. Board of Paper Setters /Examiners

For each Semester and examination there will be one board of Paper setters and examiners for every course. While appointing paper setter /examiners, care should be taken to see that there is at least one person specialized in each unit course.

14. Award of Class

There will be numerical marking on each question. At the time of declaration of the result the marks obtained by the candidate is converted into classes as shown below.

15. Credit system implementation

As per the University norms

16. Clarification of Syllabus

The syllabus Committee should meet at least once in a year to study and clarify any difficulties from the Institutes. The Workshop on syllabi should be organised at the beginning of every semester.

17.Certification

The students are expected to complete two certifications on latest technology and softskills.

18. Eligibility of Faculty :

MCA(from any faculty) with first class or equivalent with two years relevant experience.

19. Revision of Syllabus

As the computer technology is changing very fast, revision of the syllabus should be considered every 3 years.

MCA (Choice Based Credit System)
(Under Faculty of Science)
(Introduced from June 2016 and Onwards)
To be implemented from the academic year 2016-2017
Semester-I

IT11-Computer Architecture

Internal Marks -20 **External Marks**-80 **Theory**-04 h/week

UNIT-I

Data Representation Systems and Logic Gates

Data Representation: Introduction to Digital Computer, Number Systems- Binary, Octal and Hexadecimal, Inter-conversion between number systems, Coding Schemes

Boolean Algebra: Binary Logic, Logic Gates, Boolean Algebra, Postulates of Boolean Algebra, Boolean Function, Algebraic Simplification, Karnaugh Maps, Boolean Circuits

UNIT-II

Combinational and Sequential Circuits

Combinational Circuits: Introduction, Design Procedure, Half Adder, Full Adder, Decoder, Encoder, Multiplexer

Sequential Circuits: Flip Flops - SR, D and JK, Registers, Register with parallel load, Shift Registers, Counters, Ripple Counters, Synchronous Counter.

UNIT-III

Memory and CPU Organization

Memory Organization: Memory Hierarchy, Main Memory, Auxiliary memory, Associative Memory, Cache memory, Virtual Memory

CPU Organization: CPU Building Blocks, Instruction codes, Registers, Addressing Modes, Instruction sets, RISC, CISC and its characteristics, Instruction execution and Interrupts.

UNIT-IV

Control Organization and Input Output Processing

Control Organization: Introduction, Hardwired Control, Micro Programmed Control, Micro Instructions, Micro Operation Address Sequencing

Input-Output Processing: Input/ Output Devices, Input-Output Interface, Modes of Transfer, Direct Memory Access, I/O Processor

Reference Books -

1. Computer System Architecture Morris Mano Pearson 3rd Edition
2. Digital Logic and Computer Design Morris Mano Prentice Hall
3. Computer Architecture & Organization J. P. Hayes MGH 3rd Edition
4. Computer Organization & Design Pal Chaudhary PHI 3dr Edition
5. Digital Computer Electronics Malvino TMH 3rd Edition
6. Computer Architecture & Organization Murdocca Wiley India
7. Computer Organization Carl Hamacher, Zvonko and Zaky MGH 5th Edition

MCA (Choice Based Credit System)
(Under Faculty of Science)
(Introduced from June 2016 and Onwards)
To be implemented from the academic year 2016-2017
Semester-I
IT12-Programming with C

Internal Marks-20 **External Marks**-80 **Theory**-04 h/week

UNIT-I **20**

Introduction-History and Importance of C, Procedural Programming, Algorithm, flowchart, Basic structure of C Program, Preprocessor, Preparing ,compiling and running first C program, Constants, Keywords, Variables and Data Types

Operators-Arithmetic, Relational, Logical, Assignment operator, Increment and Decrement operator, Conditional, Bitwise operator, Comma operator, sizeof operator, Precedence of Operator, Type Conversion, Input output operations

Branching and Looping-Introduction, if statement, if…else statement, Nested if…else, Else if Ladder, Switch statement, Goto statement, while statement, do...while statement, for statement, Jumps in Loop, break, continue and exit statement

UNIT-II **15**

Arrays-Introduction, Types of Array (One dimensional, Two Dimensional, Multidimensional and Dynamic Array), Character and String Array

User defined Functions-Introduction, Need, Definition, Returning types and values, Function calls, Recursion, Passing arrays and strings to functions, Scope and Visibility of variable

Structure and Unions-Introduction, Definition, Declaring structure variables, Accessing structure members, Arrays of structure, Unions

UNIT-III **15**

Pointers-Introduction, Declaration, Initialization of pointers, Pointers and Array, Array of Pointers, Pointers as arguments, Pointers to function

UNIT-IV **10**

File Management with C-Introduction, Defining, Opening and closing file, Input Output operations, Error handling During I/O operations

Reference Books -

1. The C Programming Language, Brian W. Kernighan and Dennis M. Ritchie
2. Programming in ANSI C, E Balagurusamy, Tata McGraw-Hill Publishing
3. Programming in ANSI C, Stephen G. Kochan
4. Let Us C ,Yashvant P. Kanetkar
5. "C Programming in an Open Source Paradigm: A Hands on approach", K.S.Oza, S.R.Patil, R.K.Kamat River Publisher Series in Information Science and Technology, Netherland 978-87-93237-67-4 , 2015

MCA (Choice Based Credit System)
(Under Faculty of Science)
(Introduced from June 2016 and Onwards)
To be implemented from the academic year 2016-2017
Semester-I
IT13-Database Management System

Internal Marks-20 **External Marks**-80 **Theory**-04 h/week

UNIT-I

Introduction to DBMS: Database Concept, Characteristics and architecture of DBMS, Database users, 3-tier architecture of DBMS-its advantages over 2-tier, Viewsof data – Schemas and instances, Data independence.

Data models: Conventional data models, NDM & HDM, Physical Data Organization-
Hashed files, Indexed files, B-trees

UNIT-II

Database Design and E-R Model: Entities, Attributes, Relationships, Representation of entities, relationship set, Generalization, aggregation Structure of relationalDatabase and different types of keys, E-R diagrams, E-R design Issues in Relationaldatabase design, Functional dependencies.

Normalization and Database Recovery systems: Codd's rules, Normalization,Database Recovery System- Failure classification, storage structure, recovery andatomicity, log-based recovery. Role of DBA.

UNIT-III

Introduction to RDBMS: History, Generations and characteristics, difference between DBMS & RDBMS. Data constraint- primary key, foreign key, unique key, null, not null,default key etc.SQL: Introduction to SQL, Features of SQL, Basic data types, SQLstatements/commands, Set operations in SQL,order by and group by clause ,likebetween, in, like, create index , view and join command Nested queries, GRANTand REVOKE, Commit, Rollback, Savepoint.

Join concept: Simple, Equi, non-equi, Self, Outer join.View- Introduction, Create, Update, Drop, Index.

SQL functions: MAX, MIN SORT, COUNT, AVERAGE, Numeric, String, Date Functions,Type conversion functions.

UNIT-IV

Introduction to PL /SQL: Introduction, Difference between SQL AND PL/SQL, Blockdefinition structure and Data types, Block Functions - %Type, %RowType, Controlstatements, Looping statements and sequential statement, Exceptionhandling.Simple PL/SQL blocks.

Cursor management: meaning, types and importance, implicit and explicit cursormanagement using simple example.

Trigger: meaning importance and types of trigger, examples using triggerProcedures-Definition, creating procedures, passing parameters.

Function-Definition, syntax and calling methods, passing parameters.

Reference Books -

1. Introduction to database systems C. J. Date PearsonsEducation8th
2. Database system concept Korth, SilberschatzandSudarshanMGH 5th
3. Fundamentals of DatabaseSystemsElmasriNavathe PearsonEducation5th

4. SQL /PL SQL For Oracle 11G BlackBookDr.Deshpande WileyDreamtech2012
5. ORACLE PL/SQL Programming Scott Urman TMH 9th
6. SQL, PL/SQL the programminglanguage of OracleIvanBayross BPB 4th
7. Advance Database ManagementSystemChakrabharati/DasguptaWileyDreamtech2011
8. Understanding SQL Martin Gruber BPB 2nd
9. SQL Scott Urman TMH 4th

MCA (Choice Based Credit System)
(Under Faculty of Science)
(Introduced from June 2016 and Onwards)
To be implemented from the academic year 2016-2017
Semester-I
BM11-Principles & Practices of Management

Internal Marks -20 **External Marks**-80 **Theory**-04 h/week

UNIT-I **15**

Management- Concept , nature ,Scope , importance; Management Vs. Administration, Levels of Management, functions of Management Contribution of f.w. Taylor, Henry Fayol, Peter Drucker in the development of Management thought.

UNIT-II **15**

Planning – Concept, steps in Planning Process, types of plan, importance and limitations of planning. Forecasting- Meaning techniques of forecasting Decision making –types of decisioins, decision making process, Organsing – meaning, Organisation structure, Departmentation – Bases of departmentation, Concept of Authority, Responsibility and Accountability, Delegation.

UNIT-III **15**

Staffing- Meaning need, Human Resource Planning, Recruitment sources and selection procedure. Directing-concept, need Elements of directing- supervion, communication, Leadership and motivation Leadership styles, types of motivation.

UNIT-IV **15**

Controlling: Concept, Types of control, steps in control process, Importance of controlling, Techniques of controlling- Break Even Analysis, Budgetory Control, Zerobased budgetting PERT, CPM. Benchmarking –importance and limitations of benchmarking, Six Sigma-importance, limitations and process of sixsigma. Total Quality Management – Importance of TQM.

Reference Books -

1. Koontz and Weirich : Essentials of Management
2. L.M. Prasad : Principles of Management
3. R.M. Srivastara : Principles of Management
4. Peter Drucker : Essentials of management
5. Stephen P. Robbins Management
6. Sherlekar S.A.- Modern Business Administration and Management

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Semester-I
MT11-Fundamentals of Mathematics

Internal Marks -20 **External Marks**-80 **Theory**-04 h/week

UNIT-I **15**

Logic & Proofs

a)Introduction, statements and Notation, Connectives - negation, conjunction, disjunction, Conditional, biconditional, statement formulas and truth tables, well-formed formulas, Tautologies, Equivalence of formulas, Duality law, Tautological implications, functionally complete sets of connectives, other connectives, Normal & Principle normal forms.

b) Theory of inference for Statement calculus, Predicate calculus, Inference theory of the predicate calculus.

UNIT-II **15**

Sets, Relations and Diagraphs

Review of set concepts,Relations and digraphs,Properties of relations , Equivalence relations, Computer representation of relations and digraphs , Manipulation of relations , Partially Ordered Sets (Posets).

UNIT-III **15**

Algebraic Systems & Lattices

a)Algebraic Systems: Semigroups and Monoids, properties and examples. Subgroups and homomorphism

b)Lattices and their properties, Finite Boolean algebras, Function on Boolean algebras. Definition and examples

UNIT-IV **15**

Graph Theory

Basic concepts of graph theory, Storage representation and manipulation of graphs, Fault detection in combinational switching circuits – Faults in combinational circuits, Notions of Fault detection, Algorithm for fault matrix, PERT and related techniques

Reference Books -

1. Discrete mathematics - SemyourLipschutz, Marc Lipson (MGH), Schaum's outlines.
2. Discrete mathematics and its applications - Kenneth H. Rosen (AT&T Bell Labs)
3. Schaums solved problem series - Lipschutz
4. Discrete Mathematical Structures – Bernard Kolman, Robert Busby, S.C. Ross and Nadeemur-Rehman (Pearson Education

Text Book-Tremblay J.P. and Manohar, R:Discrete Mathematical Structures with applications to Computer Science.(McGraw-Hill book company)

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Semester-I
CS11-Communication Skill-I

Internal Marks-50 **External Marks**-00 **Theory**-02h/week

Objectives:

The objectives of this paper are to introduce communication techniques, professional correspondence techniques and enhance writing skills of the students.

Unit-I

Communication: Nature and Importance of Communication, Objectives of Communication, Importance of Communication, Process and barriers to Communication, Elements of Communication, Forms of Communication **(7)**

Unit-II

Verbal Communication Techniques: Art of Speaking, Speech Styles. Oral Presentation- Preparation of Formal Speech, Meetings, Interviews, Group Discussion, Debate, Elocution, Extempore. **(8)**

Unit-III

Non-verbal Communication- Meaning, Characteristics & classification of Non-verbal Communication, Body Language, Gestures, Postures. Listening & observation skills. **(7)**

Unit-IV

Rapid review of Grammar:- Corrections of common errors, Verb and its subject, forms of verb, Use of phrases and idioms, Use of infinitive Gerund and Participle, Errors & Use of Adjective and adverb , Punctuation and capitalisation **(8)**

Reference books-

1. R.K. Chaddha Communication Techniques and skills – DhanpalRai Publication, NewDelhi.
2. Pravil S. R. Bhatia, Professional Communication Skills- S. Chand and Co.,NewDelhi.
3. J.D.O'Connor, Better English pronounciation.
4. Wren and Martin, Highschool English Grammer and Composition – Chand and Co.,New Delhi.
5. Sunita Mishra, C.Muralikrishna, Communication Skills for Engineers – Pearson Education.
6. Aspi Doctor, Principles and Practice of Business Communication Rhoda Doctor, Sheth Publication, Mumbai.
7. John Collin, "Perfect Presentation", Video Arts MARSHAL
8. Jenny Rogers " Effective Interviews", Video Arts MARSHAL
9. Raman Sharma, " Technical Communications", OXFORD

10. Sharon Gerson, Steven Gerson "Technical writing process and product", Pearson Education Asia, LPE third edition.
11. P .D .Chatuirvedi&MukeshChaturvedi "Business Communication:Concepts, casae, & Application" Dorling Kindersley(India)Pvt .Ltd.
12. James A. F. Stoner, P.D.Chaturvedi ,Michael A Hitt,Stephen Robbins ,Mary Coulter &V.S.Manjunath"Principle& Practices of Business Management and Communication" Dorling Kindersley(India)Pvt .Ltd.
13. Mary Munter "Guide to Managerial communication: Effective Business writing and speaking" Dorling Kindersley(India)Pvt .Ltd.

Guidelines for Internal Marks 50- Nature of Question Paper and List Of Possible Assignments:

Theory Paper 25 Marks

Q1 A) Long Answer Question	10 Marks
or	
B) Long Answer Question	10 Marks
Q2 Short notes on Any Three out of Five	15 Marks

Assignment any three of the following

Assignment One – 10 Marks

Assignment Two – 10 Marks

Assignment Three – 05 Marks

1. Student could give a presentation to a group the on the following ideas – Event of National Importance- Book review- Success story of Eminent Personalities
2. Student have to give a presentation using Multimedia on any topic assigned (Business/Technical)
3. Elocution / Extempore
4. Participating in role-playing like exercises to highlight nonverbal skills.
5. Student will undergo two activities related to verbal/non-verbal skills from Following- Conducting meetings-Appearing for mock personal interview - Participating in group discussion on current affairs/Social Issue/ethics and etiquette
6. Reading comprehension skills & notes taking skills

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Semester-I
IT12L-LAB I (Programming in C)

Internal Marks -00	**External Marks**-100	**Practical** -04 h/week

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Semester-I
IT13L-LAB II (Database Management System)

Internal Marks -00	**External Marks**-100	**Practical** -04 h/week

Programs based on the syllabus IT13- Database Management System

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Semester-II

IT21-Operating System

Internal Marks -20 **External Marks**-80 **Theory** -04 h/week

UNIT-I (15)

Definition of Operating System, Operating system structures, Process Management: Process Concept, Process scheduling, operations on processes, cooperating processes, inter-process communication, and threads overview. CPU Scheduling: Basic Concepts, Scheduling Criteria, Scheduling Algorithms, Algorithm evaluation.

UNIT-II (15)

Process Synchronization: The critical–Section problem, synchronization hardware, and semaphore, classic problems of synchronization, critical regions. Deadlock: System Model, Deadlock Characterization, Resource-Allocation Graph, Methods for Handling Deadlock, Deadlock Prevention, Deadlock Avoidance, Deadlock Detection.

UNIT-III (15)

Memory Management: Concept, Memory Management Techniques, Swapping, Contiguous Memory Allocation, Memory Protection, Memory Allocation, Fragmentation, Paging, Basic Method, Segmentation with Paging, Virtual Memory Concept, Demand Paging, Page Replacement.

UNIT-IV (15)

File System: File System Implementation, Allocation Methods, Free Space Management, Efficiency and Performance. I/O Systems and Mass Storage: I/O Hardware, Polling, Interrupts, DMA, Disk Structure, Disk scheduling, FCFS Scheduling, SSTF Scheduling, Selection of Disk Scheduling Algorithm, Disk Management

Reference Books-

1. Operating Systems: Concepts: By Abraham Siberschatz, Peter Galvin- Willey- Sixth edition.
2. Operating Systems: Andrew S. Tanenbaum-Pearson Education- Second Edition.
3. System Programming and Operating Systems by D.M. Dhamdhere-TMH –Second Edition.
4. Operating Systems: Internals and Design Principles, Seventh Edition by William Stallings, Pearson Publications

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Semester-II

IT22-Data Structure

Internal Marks -20 **External Marks**-80 **Theory** -04 h/week

UNIT-I **(15)**

Fundamental notions: Primitives and composite data types, complexity of an algorithm, various
sort, search algorithms and their complexities. Arrays : Representation, Multidimensional Arrays, sparse matrices, sparse matrix representation. Linked List: Processing linked list, Circularly linked, list, Doubly linked list, Multilinked lists.

UNIT-II **(15)**

Queues : Processing the queues, Linked list implementation, Deques, Priority queues and their applications. Stacks : Processing the stacks, Linked list implementation, Application of Stacks for expression solving, non recursive implementation of recursive algorithm. Hashing: Functions, collision resolution techniques.

UNIT-III **(15)**

Trees : Representation of hierarchical relationships, General Trees, Binary trees, Binary search
trees, linked list implementation, traversal algorithms, threaded binary trees, height balanced trees, Heap tree, Huffman tree, B-tree indexing, Red black trees.

UNIT-IV **(15)**

Graph: Graph representations, Breadth first and Depth first search, Topological sort, Single source Shortest path, Minimum Spanning tree, All pairs shortest path: Floyd-Warshall algorithm.

Reference Books-

1. Aho, Hop craft and Ulman, Data structures and algorithms (Addision - Wesley)
2. Data Structures using Cand C++ - Tanenbaum
3. Classic data structures- D. Samantha- PHI
4. Karnighan B. and Ritchi D., The C Programming Language (PHI-88)
5. R.L.Kruse, Data Structures and Program design (PHI-96)

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Semester-II

IT23-Object Oriented Programming using C++

Internal Marks -20 **External Marks**-80 **Theory** -04 h/week

UNIT-I **15**

Introduction-Difference between Procedure oriented and Object Oriented Programming (OOP), Basic concepts and Benefits of OOP, What is C++, Structure of C++ Program, creating compiling of program

Tokens, keywords, Constants, Data types, Operators in C++,Scope resolution operator, Member dereferencing ,Memory management operator,Functions in C++

UNIT-II **15**

Classes and Objects-Introduction, Specifying a class, Defining member functions, C++ program using class, Private member function, Static data members and functions, Arrays and objects, objects as Function argument, Friend Function, Returning object

UNIT-III **15**

Constructor and Destructor- Introduction, Types of constructor (Default, Parameterized, Copy), Multiple constructors in a class, Destructors

Overloading-Function Overloading, Operator Overloading-Unary and Binary operator overloading

Inheritance- Introduction, Definition, Types of inheritance, making private member inheritable, Virtual Base classes, nesting of classes

UNIT-IV **15**

Pointers- Pointer to object, this pointer, pointer to derived classes

Virtual Functions and Polymorphism-Virtual functions, pure virtual functions

Exception Handling-Introduction & basics, mechanism throwing, catching &rethrowing, specifying exceptions

Templates- Introduction, Class Templates, Function Templates

Overview of Standard Template Library

Reference Books –

1. Object Oriented Programming C++ by E Balagurusamy, Tata McGraw Hill Publication
2. Programming in C++ by YashwantKanetkar (PBP Publications)
3. Programming in C++ by Robert Lafore.
4. The C++ Programming Language by Bjarne Stroustrup, Addison-Wesley

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Semester-II
BM21-Accounting for Managers

Internal Marks-20 **External Marks**-80 **Theory**-04 h/week

UNIT-I

Financial Accounting- Need for Accounting, Internal and external users of accounting information, Accounting concepts and conventions, Accounting process and System: Nature of accounting transactions- journal entries and posting into ledger, subsidiary books. (15 Hours)

UNIT-II

Trial Balance and Final Accounts - Preparation of trial balance, Preparation of final accounts- Trading and Profit and Loss Account, Balance Sheet. Computerised Accounting - Tally package - features and application. (15 Hours)

UNIT-III

Cost Accounting - Meaning, objectives, scope, importance and advantages of cost accounting. Cost unit and cost centre; Elements of cost:- Material, Labour and overheads; Preparation of cost sheet. (15 Hours)

UNIT-IV

Management Accounting - Concept, meaning, Definition, Features, Functions., CVP Analysis - Contribution, PV Ratio, BEP, Margin of Safety, Angle of incidence. Decision making based on CVP Analysis (15 Hours)

Reference Books-

1. Advanced Accountancy : Gupta R.L. and Radhaswamy
2. Advanced Accountancy : Shukla M.C. and Grewal T.S.
3. Cost Accounting : Jawahar Lal
4. Advanced Cost Accounting : Jain S.C. and Narang K.L.
5. Principles and Practice of Management Accounting : Manmohan Goel
6. Management Accounting : Sharma and Gupta
7. Cost Accounting : Arora M.N.

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Semester-II
MT21-Statistical Computing

Internal Marks-20 **External Marks**-80 **Theory**-04 h/week

OBJECTIVES:

The main objective of this course is to acquaint students with some basic concepts in statistics. They will be introduced to some elementary statistical methods of analysis of data and at the end of this course students are expected to be able to compute various measures of central tendencies, dispersion, Correlation and Regression analysis.

Unit-I

Introduction to Statistics and Nature of Data: (15)

1.1: Meaning of the word Statistics.
1.2: Scope of Statistics: In industry, Management, Biological and Medical Sciences, Economics, Social and Sciences.
1.3: Classification of data: Discrete and continuous frequency distribution, inclusive and exclusive methods of classification, Tabulation of statistical data.
1.4: Graphical presentation of data: Histogram, ogive curves. Illustrative Examples.
1.5: Concept of statistical population and sample. Advantages of sampling method over census method Simple random sampling, Stratified random sampling.

Unit-II:

Measures of Central Tendency: (15)

2.1: Concept of measures of central tendency, Statistical average, Requirements of good statistical average.
2.2: Arithmetic Mean (A.M): Definition, Effect of change of origin and scale, Mean of pooled data, Weighted A.M.
2.3: Median: Definition, Derivation of formula for grouped frequency distribution.
2.4: Mode: Definition, Derivation of formula for grouped frequency distribution.
2.5: Empirical relation between Mean, Median and Mode. Comparison between averages in accordance with requirements of good Average. Illustrative examples.

Unit-III

Measures of Dispersion: (15)

3.1: Concept of dispersion, Absolute and Relative measures of dispersion, Requirements of a good measure of dispersion.
3.2: Range: Definition, Coefficient of range.
3.3: Quartile Deviation (Semi-interquartile range): Definition, Coefficient of Q.D.
3.4: Mean Deviation: Definition, Coefficient of M.D., Minimal property of M.D.
3.5: Standard Deviation: Definition, Effect of change of origin and scale, S.D. of pooled data (with out proof), Variance, Coefficient of Variation: Definition and use.Illustrative examples.

Unit-IV

Correlation and Regression: (15)

4.1: Concept of correlation between two variables, Types of correlation, Scatter diagram, its utility.

4.2: Karl Pearson's coefficient of correlation (r): Definition, Computation for Ungrouped , Interpretation when r = -1, 0, 1, Properties (with proof):
i) $-1 \leq r \leq 1$, ii) Effect of change of origin and scale.

4.3: Spearman's rank correlation coefficient: Definition, Computation (for with and without ties). Illustrative examples.

4.4: Concept of regression, Equations of lines of regression, Regression coefficients (bxy, byx), Properties: i) $bxy \times byx = r^2$, ii) $bxy \times byx \leq 1$, iii) $(bxy + byx) / 2 \geq r$

4.5: The point of intersection of two regression lines. Derivation of acute angle between the two lines of regression. Illustrative examples.

Reference Books –

1. Bhat B. R., Srivenkatramana T. and Madhava Rao K. S. (1996): Statistics: A Beginner's Text, Vol. 1, New Age International (P) Ltd.
2. Croxton F. E., Cowden D.J. and Kelin S. (1973): Applied General Statistics, Prentice Hall of India.
3. Goon A.M., Gupta M.K., and Dasgupta B.: Fundamentals of Statistics Vol. I and II, World Press, Calcutta.
4. Gupta C. B.: Introduction to Statistics
5. Gupta S. P. (2002): Statistical Methods, Sultan Chand and Sons, New Delhi.
6. Gupta S. C. and Kapoor V. K.: Fundamentals of mathematical Statistics.
7. Saxena H. C.andKapur J. N.: Mathematical Statistics
8. Snedecor G.W. and Cochran W. G. (1967): Statistical Methods, Lowa State University Press.
9. Thigale T. K and Dixit P. G. (2007): A Book of Paper-I for B. Sc.-I, Nirali Publication, Pune.
10. Waiker and Lev.: Elementary Statistical Methods.

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Semester-II
MP21-Mini Project

Internal Marks -50	**External Marks**-00	**Theory**-02 h/week

Mini Project

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Semester-II
IT22L-LAB III (Data Structure)

Internal Marks -00	**External Marks**-100	**Practical** -04 h/week

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Semester-II
IT23L-LABIV (Object Oriented Programming using C++)

Internal Marks -00	**External Marks**-100	**Practical** -04 h/week

Practical should consists of min. 10 to 12 practical assignments based on the syllabus, Emphasis should be given on solving programming problems relating to the concerned topics .