In pursuance of the decision taken by the University authorities, it is hereby notified for the information of all concerned that the revised syllabus for F.Y.B.A. and F.Y.B.Sc in Mathematics is as given in appendix 'A'.

This revised syllabus will be implemented from the Academic year 1996-97.

The Principals of all affiliated Colleges . where Mathematics is taught, are requested to bring the the contents of this circular to the notice of all concerned teachers and students.

Ganeshkhind,
Pune-411 007.
Ref.No. CB/S/Maths/ 576
Date :12.6.1996

for Registrar

To,

The Principals of all affiliated Science Colleges.

Copy f.w.cs.to :-

1). The Dean, faculty of Science.

2). The members of the Boards of Studies in Mathematics
3) The Dy.Registrar (Examination 1,2,3,4)
4) The Asstt. Registrar (Exam.Co-ordination Unit)
5) The Asstt.Registrar (Exam. S & T Unit)
6) The Asstt. Registrar(Eligibility)
7) The Asstt. Registrar(Records & Meeting)
8) The Public Relation Officer
9) The Law Officer,Pune-7
10) The P.A. to Registrar
11) The University Sub-Centres at Ahmednagar,Dhule & Nasik
12) The Data Processing Unit,Pune-7.
13) The Dy.Registrar (Admission)
14) The Asstt.Registrar(Admission)
15) The Section Officer(External)
16) The Section Officer, (Affiliation)
17) The Section Officer, (Recognition)
18) The Asstt.Registrar(Strong Room)

Authority : $\frac{B33PA\ 33/96}{B\ 33/96}$ dated 19.2.96 & 7,8/3/96

SYLLABUS FOR F.Y.B.A. /B.SC. FOR MATHEMATICS

PAPER I : ALGEBRA

FIRST TERM

1.   Sets, Relations : Equivalence relations, Equivalence classes, partition of a set. $ (5 Lectures)

2.   Integers : Well ordering principle, Divisibility of integers, Division algorithm, Greatest common, divisor, Euclidean Algorithm, prime numbers and composite numbers, Unique factorizatic theorem. There are infinitely many primes, Residue classes of integers modulo, properties of addition and multiplication in Zn, Fermat's theorem, Definition of Euler function.   (20 Lectures)

3.   Complex Numbers : Definition, Algebraic properties, Geometric interpretation, properties of Moduli, polar form Exponential form, powers and Roots, De Moivre's Theorem, Fundamental Theorem of Algebra (without proof)

                    (10 Lectures)

SECOND TERM

4)   Matrices : Transpose of aMatrix, Symmetric and Skew Symmetric Matrices, Adjoint of a matrix, Inverse of a matrix by adjoint method, Necessary and suffucient condition for the existence of the inverse, Solution of the linear system $AX = B$ when $/A = 0$.

5..   Sub matrices of a matrix, Minors of a matrix, Rank Elementary matrices, Invariance of rank under elementary transforkations (without proof) Reduction to the normal form.
                    · (12 Lectures)

6.   System of linear equations : Dependence and independence of vectors in n dimensional vector spaces, systems of Equations, (A X = O, AX = B)
                    (12 Lectures)
                                ..2..

List of Books :

1) Set theory and Related Topics : Seymour Linschutz schaum series.

2) Number Theory : David Burtion, Wm C Brown (1990) Indian Reprint.

3) Complex Variable and Applications : R.V. Churchill, McGraw Hill (1984) 4th Edition.

4. Higher Algebra : Barnard and Child, Macmillan Co.Ltd.

5. A Text Book of Matrices : Shanti Narayan

6. Linear Algebra : A.G.Hamilton (Cambridge University Press)

7. A Survey of Modern Algebra (4th Edition)
   G. Birkhoff and S.MacLane Macwillan Co.Ltd.

PAPER II : CALCULUS

FIRST TERM

1) Real Numbers : Properties of absolute value function g.l.b.,
l.u.b. completeness axiom.   (6 Lectures)

2. Limit and Continuity : Real valued Function of a Real
variable, Limit of a Function, Continuous Functions, Algebra of
Continuous properties of Continuous Functions on closed and
bounded interval; (i) Boundeness ii) Attains sup and Inf,
iii) Intermediate Value Theorem.

(15 Lectures)

3. Differentiability, The Derivative of a Function,
Mean value Theorems : i) Rolle's Theorem, ii) L.M.V.T.
iii) Cauchy's M.V.T. Indeterminates forms, L, Hospital
Rule (Problems only) Successive Differentation. Leibnitz
Theorem (with proof)   (15 Lectures)

SECOND TERM

4. Sequences : Real Sequences, Convergent sequences, Monotonic
sequences, Convergence of $(1+1/b)$ (7 Lectures)

5. Series : Convergence of Series, Series of Positive Terms,
Comparison Test, Ratio Test, Root Test.
(7 Lectures)

6. Power Series : Taylor's Series, Maclaurin Series
(without proof) some basic functions : Exponential, Logarithmic,
Trigonometric and hyperbolic.

(6 Lectures)

7. Integration : Revision, Integration by partial fractions
i) Linear repeated factors ii) Quadratic non repeated factors
iii) One linear and one quadratic factor.
(8 Lectures)

3. Applications of Integration : Area of Plance regions, Rectification, length of plance curves, Volume and Surfaces Revolution.

List of books :

1) Calculus Vol. I and II (Wiley International Edition) T.M. Apstol.

2) Differential Calculus : Shanti Narayan.

3) Integral Calculus : Shanti Narayan.

4) Introduction to Real Analysis (John Wiley & Sons) : R.G.Bartle and D.R. Sherbert.

5) Introduction to Calculus and Analysis Vol. I.R. Courant and Fiilz John (Springer Verlag Pub.)

PAPER III : ANALYTICAL GEOMETRY, DIFFERENTIAL EQUATIONS AND
DISCRETE MATHEMATICS

FIRST TERM

1) Analytical Geometry of three dimensions, co-ordinates in
space, Direction cosines, The plane, Equation of a plane, System
of planes, Lines, Equations of a line, Angle between a line and a
plane.

2) Sphere, Equation of a sphere in different forms, plane
sections of a sphere, Tangent plance, condition of Tangency,
the point of contact.

3) Differential equation of the first order and first degree,
Homogeneous, Non-homogeneous, Exact differential equations,
condition for exactness, Integrating factors, Integrating
factors by inspection and rules for finding integrating factors,
Linear equations, Equations reducible to the linear form.

(14 Lectures)

SECOND TERM

4) Graph Theory : Graph, Application of graphs, finite and
Infinite graphs, incidence and degree, Isolated Vertex, pendant
Vertex, and null graph.

Paths and Circuits : Isomorphism Subgraphs, Walks, Paths and
circuits, connected graphs, Disconnected graphs and components,
Euler graphs, Operations on graphs, More on Euler graphs
Hamiltonian paths and circuits.   (20 Lectures)

5. Bookean Algebra : Axions for Boolean Algebra, Partial
orders, Disjunctive and Conjunctive normal forms, Switching
Circuits, Simplifications of circuits.   (16 Lectures)

List of Books :

1) Elements of Co-ordinate Geometry (Macmillan, 1985)
   S.L. Loney.

2)   Co-ordinate Geometry of Three Dimensions (Longman)
R.J.T. Bell.

3)   Analytical Solid Geometry, Shanti Narayan.

4)   Introductory Course in Differential Equations.(Orient
Longman) D.A.Murray.

5)   Graph Theory (Third Indian Reprint)-Narsingh Deo.

6)   Theory and problems of Boolean Algebra and Switching
Circuits (Schaum Series) Elliot Mendalson.

7)   Boolean Algebra and its applications. J.Eldon and White
Sitt (Addison Wesley.)

8)   Co-ordinate Geometry of Two and Three dimensions.
A. Balasubrahmanayem, K.G. Subramanian, G.R. Venkataraman, Tata
McGraw Hill Pub.

Note : Three will be no change in the syllabus of Industrial
Mathematics at F.Y.B.A.

SYLLABUS FOR F.Y.B.SC. FOR MATHEMATICS

PAPER I : DISCRETE MATHEMATICS

FIRST TERM

1. Introduction to sets, Finite and infinite sets, Mathematical induction, principle of inclusion and exclusion.

2. Logic and Boolean algebra :

   Revision of logic, Test of arguments Quantifiers Lattices and algebric systems, Principle of duality Distributive and Complemented alttices. Boolean algebra, Uniqueness of finite boolean algebras. Boolean functions and Boolan expressions. Minterm normal form, Digital network and swiching circuits.

3. Generating Functions :–

   Recurreance relations. Linear recurrenced relation with constant coefficients, Homogeneous solutions, particular solutions. Total Solutions, Solutions by the method of generating functions.

SECOND TERM

4. Graphs : Simple and multiple and digraphs. Null, Complete Regular, Bipartite and Complete bipartite graphs. Subgraphs, Vertex and edge induced subgraph, Complement, Sum, Ringsum, Union Interestion of graphs.

5. Isomorphism : Necessary conditions, Isomorphism problem Adjacency and Incidence matrices, their use in isomorphism.

6. Connectedness : Walk, Path, Cycle. Connected and disconnected graph, Edge and Vertex connetivity. Connectedness for digraphs (Definitions and examples only) Menger's theorem Halls theorem (Statement only).

7. Eulerian and Hamiltonian graphs : Eluerian graphs,. characteristic of eulerian graphs, Chinese postman problem.

Fleury's algorithm Applications to computer drums. Hamiltonian graphs (examples only.) Tournaments, Tournaments, Travel salesman problem (algorithm).

8.   Trees : Equivalent characterisation of trees, centre of tree, spanning tree, fundamental cycles and cutsets, binary trees, directed trees, application to polish notation, Kruskall's algorithm for weighed spanning trees.

List of Books :

1)   C.L. Liu : Elements of Discrete Mathematics (Mcgraw Hill and Co.)

2)   Olympin Nicodemi : Discrete Mathmatics (CBS Publ. and Distributors)

3)   Trembley and Manohar : Discrete Mathematical structures with applications to Computer Science.

4)   G.Birkhoff and T.C.Bartee : Modern Applied Algebra (C.S Publ. and Distributors, Delhi)

5)   Narsingh Deo : Graph Theory with applications to Computer Science.

6)   Alan Doerr : Applied discrete structures for computer Science (Galgotia Publ.New Delhi)

7)   Harary : Graph Theory (Narosa Publishing House.)

PAPER II : ALGEBRA

FIRST TERM

1. Relations and Functions : Cartesian product of sets, Types of relations, equivalence relations, partitions, Functions, bijective composite inverse function.

2. Divisibility in the set of integers, G.C.D. relatively prime integers, Euclidean algorithm, congruence classes addition and multiplication modulo n.properties of prime residue classes.

3. Algbraic structures : Binary operations, Groups, elementary properties of groups, subgroups cyclic, permution groups(no treatment of direct product of groups).

SECOND TERM

4. Cosets and factor groups, Lagranges theorem, Group homomorphism and isomorphism (definition and simple problems only).

5. Rings, Integral domain, Fields, Finite fields, polynomial rings (definition and examples only).

6. Coding theory : Fundamental ideas of coding theory, Hamming distance, minimum distance, codeword, parity check matrix,design of code. Error recovery in group codes, decoding table.

7. Languages and automata : Introduction to languages, strings concatenation, length of string, Types of grammer, Automata, types of automata.

List of Books :

1. CiL.Liu : Elements of Discrete Mathematics (McGraw Hill and Co.)

2. Olympia Nicodemi : Discrete Mathematics (CBS Publ.and Distributors).

3. J.B. Fraleigh : A course in Abstract Algebra

4. B. Kolman and R.S. Bushy : Discrete Mathematical structures for Computer Science (Prentice Hall of India.)

5. Discrete Mathematics by Nirmal Biggs (Oxford University Press).

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3. J.B. Fraleigh : A course in Abstract Algebra

4. B. Kolman and R.S. Bushy : Discrete Mathematical structures for Computer Science (Prentice Hall of India.)

5. Discrete Mathematics by Nirmal Biggs (Oxford University Press).

PAPER III : CALCULUS AND GEOMETRY

FIRST TERM

1. Revision : Limit, continuity derivative of a function.

2. Mean value theorems (statement only) : Rolle's theorem, Lagrange's Cauchy mean value Theorem, Geometrical Interpretation of Roll's and Lagrange's Mean value Theorem, Indeterminate forms, L'Hospital's Rule.

3. Successive Differentation : nth ' Derivatives of standard functions, Leibnitz's Theorem for the nth Derivative of product of two functions.

4. Taylor's Theorem : and Maclaurin's theorem with Lagranges and Cauchy's form of reminders (statement only) Power series expansions for e^X, Sin x, Cos x, log x, $(1+x)^m$.

5. Functions of R^2 and R^3 : Functions of two and three variables. Partial Derivatives, Chain Rule. Euler's Theorem (Statement only).

SECOND TERM

6. Analytical Geometry of three dimensions, Co-ordinates in space, Direction cosines and Direction ratios, The plane, Equation of a plane, System of planes, Lines, Equations of a line, Angle between a line and a plane, coplanar lines.

7. Line and plane : Vector Algebra (revision). Vector equation of a line (i) passing through given point and parallel to a given vector. (ii) passing through two given points. iii) passing through a given point and perpendicular to given two vectors, shortest distance between two skew lines (vector method) magnitude and equation.

Parametric equation of line. Intersection of lines and line segments (vector method) Distance of point from a line.

8. Plane : Vector equation of the plane i) passing through a given point and parallel to two given vectors.

ii) passing through three given points.iii) in terms of the perpendicular distance from the origin to the plane and unit vector along the normal to the plance. iv) passing through a given point and perpendicular to given vector. v) through the line of intersection of two given planes. Angle between two planes (vector method), Angle between given line and a plane (vector method). Vector equation of the planes bisecting the angles between given two planes. Vector equation of a line of intersection of two given planes,Coplanarity of straight lines, vector equation of a plane passing through two coplanar lines. Distance of a point from a plance (vector method.)

List of Books :

1. Shanti Narayan : Differential Calculus.

2. Shanti Narayan : Integral Calculus

3. R.G.Bartle and D.R.Sherbert Introduction to Real Analysis (John Wiley and Sons).

4. Introduction to Calculus and Analysis Vol.I.F. Courant and Fritz John (Springer Verlag Pub.)

5. Co-ordinate Geometry of two and Three dimensions
   K. Balasubrahmanayam, K.G. Subramanian, G.R. Venkataraman, Tata McGraw Hill Pub.

5. Vector and Geometry : G.S. Pandey K.L.Sharma, Vishwa Prakashan.

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