DR. BABASAHEB AMBEDKAR MARATHWADA UNIVERSITY

CIRCULAR NO.ACAD/NP/B.Sc.-Ist Yr./SEM.-I & II/157/2013

It is hereby notified for information of all concerned that, on the recommendations of the Boards of Studies, Ad-hoc Boards, and Faculty of Science, the **Academic Council at its meeting held on 25-03-2013** has accepted the **following revised syllabi for B.Sc. First Year progressively under the Faculty of Science** :-

Sr. No.	*Revised Syllabus*	
[1]	*B.Sc. [Physics]*	*Semester- I & II,*
[2]	*B.Sc. [Dairy Science & Technology]*	*Semester- I & II,*
[3]	*B.Sc. [Industrial Chemistry]*	*Semester- I & II,*
[4]	*B.Sc. [Geology]*	*Semester- I & II,*
[5]	*B.Sc. [Chemistry]*	*Semester- I & II,*
[6]	*B.Sc. [Botany]*	*Semester- I & II,*
[7]	*B.Sc. [Electronics] Science*	*Semester- I & II,*
[8]	*B.Sc. [Fisheries]*	*Semester- I & II,*
[9]	*B.Sc. [Microbiology]*	*Semester- I & II,*
[10]	*B.A. [Statistics]*	*Semester- I & II,*
[11]	*B.Sc. [Statistics]*	*Semester- I & II,*
[12]	*B.Sc. [Zoology]*	*Semester- I & II,*
[13]	*B.Sc. [Textile and Interior Decoration]*	*Semester- I & II,*
[14]	*B.Sc. [Home Science]*	*Semester- I & II,*
[15]	*B.A. / B.Sc. [Mathematics]*	*Semester- I & II.*

This is effective from the **Academic Year 2013-2014** and onwards.

These **syllabi are available on the University Website www.bamu.net**

All concerned are requested to note the contents of this circular and bring the notice to the students, teachers and staff for their information and necessary action.

University Campus,
Aurangabad-431 004.
REF.NO.ACAD/NP/B.Sc.-IST YEAR/
Sem-I & II/2013/5132-541
A.C.S.A.I.No.327[9].

Date:- 08-05-2013.

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Director,
Board of College and University Development.

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Copy forwarded with compliments to :-

1] **The Principals, affiliated concerned Colleges,**
Dr. Babasaheb Ambedkar Marathwada University.

2] The Director, University Network & Information Centre, UNIC, with **a request to upload the above all syllabi on University Website [www.bamu.net].**

Copy to :-

1] The Controller of Examinations,

2] The Superintendent, [B.Sc. Unit],

3] The Superintendent, [B.A. Unit],

4] The Superintendent, [Eligibility Unit],

5] The Programmer [Computer Unit-1] Examinations,

6] The Programmer [Computer Unit-2] Examinations,

7] The Director, [E-Suvidha Kendra], in-front of Registrar's Quarter,
Dr. Babasaheb Ambedkar Marathwada University,

8] The Public Relation Officer,

9] The Record Keeper,
Dr. Babasaheb Ambedkar Marathwada University.

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S*/-080513/-

Dr. Babasaheb Ambedkar Marathwada University, Aurangabad

Syllabus

B.A./B.Sc. Mathematics
Semester – I & II
(With Effect from June 2013)

Syllabus

B.A. / B.Sc. (Mathematics) Semester- I (With effect from June 2013)

MAT 101: Differential Calculus **Marks : 50.**

1. Prerequisite:

Functions: Domain and range of a function, independent and dependent variables, polynomial functions and rational functions, constant functions and identity functions, one-one functions, onto function, invertible functions, composite function. [1]
Limit and Continuity: Limit of a function, left handed and right handed limits, non existence of limit, theorems on limits (statements only), theorems on continuity (statements only), discontinuity, types of discontinuity. [1]

2. Differentiations:

Derivative of a function, derived function, derivability implying continuity, geometrical interpretation of a derivative, hyperbolic functions, derivatives of hyperbolic and inverse hyperbolic functions, logarithmic differentiation, derivative of implicit functions. [1]

3. Successive Differentiation:

Higher order derivatives, calculation of n th derivatives, some standard results, determination of n th derivative of rational functions, the n th derivatives of the products of the powers of sines and cosines, Leibnitz's theorem: n th derivative of the product of two functions.[1]

4. Mean Value Theorems:

Rolle's Theorem, Lagrange's mean value theorem, meaning of the sign of the derivative, Cauchy's mean value theorem, higher derivatives, Taylor's theorem, Maclaurin's theorem, Maclaurin's power series for a given function. [1]

5. Partial Differentiation:

Function of two variables, limit of a function of two variables, continuity of a function of two variables at a point, limit of a continuous function, partial derivatives, partial derivatives of higher order, homogeneous function, Euler's theorem on homogeneous function, total differentials, differentiation of composite function and implicit function.[1].

6. Prerequisite:

Scalar product of two vectors, sign of the scalar product, length of a vector as a scalar product, angle between two vectors, commutativity, distributivity, right handed and left handed vector triads, vector product, some properties of vector product, scalar triple product, distributive law, some properties of scalar triple product, vector triple product.[2]

7. Differential Operators:

Point Functions: scalar valued point functions, vector valued point functions, limits and continuity, directional derivatives, Cartesian representation of point functions and their directional derivatives, directional derivatives of point functions along co-ordinate axes and along any line, gradient of a scalar point function, character of gradient as a point function, the operator ∇, operator $a.\nabla$, divergence and curl, gradient, divergence and curl of sums and product. [2]

Text Book:

[1]. Shanti Narayan: Differential Calculus, Shyamlal Charitable Trust, 2004

Scope:
Chapter 2: Articles 2.1, 2.11, 2.12, 2.31, 2.32, 2.4 2.42, 2.5
Chapter 3: Articles 3.2, 3.21, 3.22, 3.3, 3.6, 3.61, 3.62, 3.8, 3.81
Chapter 4: Articles 4.1, 4.11, 4.12, 4.14, 4.15, 4.7, 4.71, 4.72, 4.9, 4.10
Chapter 5: Complete
Chapter 7: Articles 7.1, 7.2, 7.3, 7.5, 7.6, 7.61
Chapter 10: Articles 10.1, 10.2, 10.3, 10.4, 10.41, 10.5, 10.51, 10.6, 10.61, 10.8, 10.81, 10.9, 10.91, 10.93, 10.94

[2]. Shanti Narayan and P. K. Mittal : Vector Analysis, S. Chand and Company Ltd, 2007.

Scope:
Chapter 3: Articles 3.1, 3.1.1 to3.1.9, 3.1.10 (statements only)
Chapter 5: Articles 5.2, 5.2.1, 5.3, 5.3.1 to 5.3.3, 5.3.4, 5.3.5, 5.3.6, 5.3.7, 5.5, 5.5.1, 5.6, 5.7, 5.7.1 to 5.7.3, 5.8
Chapter 10: Articles 10.1, 10.1.1 to 10.1.2, 10.2, 10.2.1 to10.2.3, 10.3, 10.3.1 to 10.3.2, 10.4, 10.4.1 to 10.4.2, 10.5, 10.6, 10.7, 10.7.1 to 10.7.2, 10.9, 10.10, 10.11, 10.12, 10.12.1 to10.12.2, 10.14, 10.15 (results 1 to 6).

Note: Questions on prerequisite may not be asked.

MAT 102: Differential Equations **Marks: 50**

1. Prerequisite:

Ordinary and partial differential equations, order and degree of Differential equations, Solutions: general, particular, singular.

2. Equations of The First Order and of The First Degree:

Exact differential equations, Linear equations, Equations reducible to the linear form.

3. Linear Equations with Constant Coefficients:

Linear equations, complementary functions, particular integral, complete integral, The linear equations with constant coefficients and second member zero, case of auxiliary equation having equal roots, case of auxiliary equation having imaginary roots, the symbol D, the linear equation with constant coefficients and second member a function of x, the symbolic function $1/f(D)$, methods of finding the particular integral, short methods of finding particular integrals corresponding to the terms e^{ax}, x^m, $\sin ax$, $\cos ax$, $e^{ax}V$ and xV in the second member.

4. Linear Equations with Variable Coefficients:

The homogeneous linear equation, methods of finding solution, the symbolic functions $f(\theta)$ and $1/f(\theta)$, methods of finding the particular integral, integral corresponding to a term of form x^m in the second member, equations reducible to homogeneous linear form.

5. Exact Differential Equations and Equations of Particular Forms:

Exact differential equations, criterion of an exact differential equation, the integration of an exact equation: first integral, equations of the form $\frac{d^n y}{dx^n} = f(x)$, equation of the form $\frac{d^2 y}{dx^2} = f(y)$.

6. Ordinary Differential Equations with More Than Two Variables:

Simultaneous differential equations which are linear, simultaneous equations of the First order.

7. Partial Differential Equations:

Definitions, derivation of a partial differential equation by the elimination of constants,, Derivation of a partial differential equation by the elimination of arbitrary functions.

Text Book:

D. A. Murray : Introductory Course in Differential Equations, Khosla Publishing House, New Delhi, 2003.

Scope:
Chapter 1: Articles 1, 2, 4
Chapter 2: Articles 11, 12,13,20,21
Chapter 6: Articles 49 to 53, 56 to 64
Chapter 7: Articles 65 to 71
Chapter 8: Articles 73 to 77
Chapter 11: Articles 98, 99
Chapter 12: Articles 107, 108, 109

Note:Questions on prerequisite may not be asked.

Syllabus

B.A / B.Sc. (Mathematics) Semester- II

MAT 201: Integral Calculus : **Marks: 50.**

1. Methods of Integration:

Reduction formulae. [1]

2. Integration of Algebraic Rational Functions:

Case of non-repeated linear factors, case of non-repeated linear or repeated linear factors, case of linear or quadratic non repeated factors [1]

3. Integration of Trigonometric Functions:

Integration of $\sin^n x$, $\cos^n x$ and reduction formulae for integration of $\sin^n x$, $\cos^n x$ [1]

4. Definite Integral as The Limit of a Sum:

Introduction, fundamental theorem.[1]

5. Areas of Plane Regions:

Areas of a region bounded by a curve, x-axis and two ordinates.[1]

6. Rectification, Length of Plane Curves:

Introduction, expression for lengths of curves $y = f(x)$, expressions for lengths of arc $x = f(y)$; $x = f(t)$, $y = \phi(t)$; $r = f(\theta)$. [1]

7. Volumes and Surfaces of Revolution:

Introduction, expressions for the volume obtained by revolving about either the axis [1]

8. Integral Transformation:

Introduction, line integrals, circulation, irrotational vector point functions, surface integrals, volume integrals, reduction of volume to surface integral, physical interpretation of Gauss theorem, reduction of surface to line integrals, condition for irrotational vector functional, Green's theorem.[2]

Text Books:

[1]. Shanti Narayan : Integral Calculus, S. Chand and Company Limited 1999.

Scope:
Chapter 2: Articles 2.8
Chapter 3: Articles 3.1 to 3.4
Chapter 4: Articles 4.1, 4.2
Chapter 6: Articles 6.1, 6.2
Chapter 7: Articles 7.1
Chapter 8: Articles 8.1, 8.2, 8.3, 8.31
Chapter 9: Articles 9.1, 9.2

[2]. Shanti Narayan and P. K. Mittal : Vector Analysis, S. Chand and Company Ltd, 2007.

Scope:
Chapter 11: Articles 11, 11.1, 11.1.1 to 11.1.2, 11.2, 11.2.1, 11.3, 11.3.1, 11.5, 11.6, 11.7, 11.8, 11.9, 11.11.

Note: Questions on prerequisite may not be asked.

MAT 202: Geometry **Marks:50.**

1. The Plane:

Equations of the first degree in x, y, z, transformation to the normal form, determination of plane under given conditions, equations of the plane through three given points, systems of planes, two sides of a plane, length of the perpendicular from a point to a plane, bisectors of angles between two planes, joint equation of two planes.

2. Right Line:

Equations of a line, equations of a straight line in terms of its direction cosines and the co-ordinates of a point on it, equations of a line through two points, symmetrical and unsymmetrical forms of the equations of a line, transformation of the equations of a line to the symmetrical form, angle between a line and a plane, the condition that a given line may lie in a given plane, the condition that two given lines are coplanar, number of arbitrary constants in the equations of a straight line, sets of conditions which determine a line, the shortest distance between two lines, the length and equations of the line of shortest distance between two straight lines, length of perpendicular from a given point to a given line.

3. Sphere:

Definition and equation of the sphere, equation of the sphere through four given points, plane section of a sphere, intersection of two spheres, equation of a circle, sphere through a given circle, intersection of a sphere and a line, equation of a tangent plane.

4. Cones, Cylinders:

The right circular cone, equation of a right circular cone, the right circular cylinder, equation of a right circular cylinder.

5. The Conicoid:

Central conicoids, intersection of a line and a central conicoid, tangent lines and tangent plane at a point, condition that a plane may touch a central conicoid.

Text Book:

[1] Shanti Narayan: ***Analytical Solid Geometry*****, S. Chand and Company Ltd, New Delhi, 1998**

Scope:
Chapter 2: Articles 2.1, 2.3, 2.31, 2.32, 2.4, 2.41, 2.42, 2.5, 2.6, 2.7, 2.71, 2.8
Chapter 3: Articles 3.1, 3.11, 3.12, 3.13, 3.14, 3.2 to3.5, 3.51, 3.6, 3.61, 3.7
Chapter 6: Articles 6.11, 6.12, 6.13, 6.2, 6.31, 6.32, 6.4, 6.41, 6.5, 6.6
Chapter 7: Articles 7.61, 7.62, 7.81, 7.82
Chapter 8: Articles 8.24, 8.3, 8.31, 8.32

(Dr. B. R. SONTAKKE)
Chairman, Board of Studies in Mathematics
Dr. Babasaheb Ambedkar Marathwada University,
Aurangabad

DR. BABASAHEB AMBEDKAR MARATHWADA UNIVERSITY

CIRCULAR NO.ACAD/SU/Sci./B.Sc. & M.Sc. Syll./5/2015

It is hereby notified for information to all the concerned that, on the recommendation of the Faculty of Science the Academic Council at its meeting held on 30-05-2015 has accepted the **revised semester-wise syllabi as mentioned against their names in the Faculty of Science as under** :-

Sr. No.	Name of the Subject	Semester
[1]	B.Sc. Computer Science Degree Course	III & IV
[2]	B.Sc. Information Technology Degree Course	III & IV
[3]	B.C.A. Science Degree Course	III & IV
[4]	B.Sc. Animation Degree Course	III & IV
[5]	B.Sc. Bioinformatics Degree Course	III & IV
[6]	B.Sc. Computer Science [Optional]	III & IV
[7]	B.Sc. Information Technology [Optional]	III & IV
[8]	B.Sc. Computer Applications [Optional]	III & IV
[9]	B.Sc. Computer Maintenance [Optional]	III & IV
[10]	B.Sc. Environmental Science [Optional]	V & VI
[11]	B.Sc. Bio-Chemistry [Optional]	V & VI
[12]	B.Sc. Forensic Science Degree Course	V & VI
[13]	B.Sc. Industrial Chemistry [Optional]	V & VI
[14]	B.Sc. Electronics [Optional]	V & VI
[15]	B.Sc. Zoology [Optional]	V & VI
[16]	B.Sc. Microbiology [Optional]	V & VI
[17]	B.Sc. Instrumentation Practice [Optional]	V & VI
[18]	B.Sc. Statistics [Optional]	V & VI
[19]	B.A. Statistics [Optional]	V & VI
[20]	B.A. / B.Sc. Mathematics [Optional]	V & VI
[21]	B.Sc. Home Science Degree Course	V & VI
[22]	B.Sc. Textile Interior Decoration Degree Course	V & VI
[23]	B.Sc. Fishery Science [Optional]	V & VI
[24]	B.Sc. Dairy Science & Technology [Optional]	V & VI
[25]	B.Sc. Botany [Optional]	V & VI
[26]	B.Sc. Physics [Optional]	V & VI
[27]	M.Sc. Computer Science	III & IV
[28]	M.Sc. I.T.	III & IV

This is effective from the Academic Year 2015-16 & onwards as appended herewith.

All concerned are requested to note the contents of the circular and bring the notice to the students, teachers and staff for their information and necessary action.

University Campus,
Aurangabad-431 004.
REF.NO.ACAD/SU/SCI./
2015/3761-4160
Date:- 16-06-2015.

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Director,
Board of College and University Development.

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Copy forwarded with compliments to:-

1] The Principals, affiliated concerned colleges,
Dr. Babasaheb Ambedkar Marathwada University

Copy to :-

1] The Controller of Examinations,
2] The Director, [E-Suvidha Kendra], in-front of Registrar's Quarter,
Dr. Babasaheb Ambedkar Marathwada University,
3] The Superintendent, [B.Sc. Unit],
4] The Superintendent, [M.Sc. Unit],
5] The Programmer [Computer Unit-1] Examinations,
6] The Programmer [Computer Unit-2] Examinations,
7] The Record Keeper.

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Dr. Babasaheb Ambedkar Marathwada University, Aurangabad

Syllabus of B. A. /B. Sc. Third year (Mathematics) (optional) With Effect from June – 2015

DR . BABASAHEB AMBEDKAR MARATHWADA UNIVERSITY,
AURANGABAD
BOARD OF STUDIES IN MATHEMATICS
REVISED SYLLABUS FOR THIRD YEAR B.Sc. (MATHEMATICS)
(With Effect From June -2015)

Semester V

Compulsory Papers:

Paper – MAT 501: Real Analysis – I
Paper – MAT 502: Abstract Algebra – I

Optional Papers (Any One):

Paper – MAT 503: Mathematical Statistics – I
Paper – MAT 504: Ordinary Differential Equations – I
Paper – MAT 505: Programming in C – I

Semester VI

Compulsory Papers:

Paper – MAT 601: Real Analysis – II
Paper – MAT 602: Abstract Algebra – II

Optional Papers (Any One):

Paper – MAT 603: Mathematical Statistics – II
Paper – MAT 604: Ordinary Differential Equations – II
Paper – MAT 605: Programming in C – II

REVISED SYLLABUS FOR THIRD YEAR B.A. (MATHEMATICS)

(With Effect From June -2015)

Semester V

Main Papers:

Paper – MAT 501: Real Analysis – I
Paper – MAT 502: Abstract Algebra – I

Subsidiary Papers:

Paper – MAT 503: Mathematical Statistics – I
Paper – MAT 504: Ordinary Differential Equations – I

Semester VI

Main Papers:

Paper – MAT 601: Real Analysis – II
Paper – MAT 602: Abstract Algebra – II

Subsidiary Papers:

Paper – MAT 603: Mathematical Statistics – II
Paper – MAT 604: Ordinary Differential Equations – II

B.Sc. (Third Year)(Mathematics)(Fifth Semester)

Paper – MAT 501: Real Analysis – I

Periods : 60
Marks : 50

1) Prerequisite:
Sets and elements, Operations on sets.

2) Functions:
Functions, Real-valued functions, Equivalence, Countability, Real numbers, Least upper bounds. [1]

3) Sequences of Real Numbers:
Definition of sequence and subsequence, Limit of a sequence, Convergent sequences, Divergent sequences, Bounded sequences, Monotone sequences, Operations on convergent sequences, Operations on divergent sequences, Limit superior and limit inferior, Cauchy sequences. [1]

4) Series of Real Numbers:
Convergence and divergence, Series with non-negative terms, Alternating series, Conditional convergence and convergence, Test for absolute convergence. [1]

5) Jacobians:
Definitions, Case of function of functions, Jacobian of implicit functions, Necessary and sufficient condition for a Jacobian to vanish. [2]

Recommended books:

1] R. R. Goldberg : ***Methods of Real Analysis*** : Oxford and IBH Publishing Co. Pvt. Ltd. NewDelhi.

Scope:

Chapter 1 : 1.3(A, B, C, D, E, F, G, H, I), 1.4(A, B, C, D, E), 1.5(A, B, C, D, E, F, G, H, I), 1.6(A, B, C, D, E), 1.7(A, B, C, D, E).

Chapter 2 : 2.1(A, B, C, D), 2.2(A, B), 2.3(A, B, C, D), 2.4(A, B, C), 2.5(A, B), 2.6(A, B, C, D, E), 2.7(A, B, C, D, E, F, G, H, I, J), 2.8(A, B, C, D), 2.9(A, B, C, D, E, F, G, I, J, K, L, M), 2.10(A, B, C, D, E), 2.12(A, B).

Chapter 3 : 3.1(A, B, C, D), 3.2(A, B, C, D, E), 3.3(A, B), 2.4(A, B, C), 3.6 (A, B, C, D, E, F, G, H, I,)

2] J. N. Sharma and A. R. Vashistha : ***Real Analysis*** : Krishna Prakashan Media (P), Ltd. Meerut.

Scope:

Chapter 13 : Articles 1, 2, 3, 4, 5, 6, 7

References:

1) D. Somasundaram and B. Choudhary : ***A first Course in Mathematical Analysis*** : Narosa Publishing House, New Delhi.
2) Hari Kishan ***: Real Analysis*** : Pragati Prakashan, Meerut.
3) S. K. Mittal and S. K. Pundir : ***Real Analysis*** : Pragati Prakashan, Meerut.

Note : Questions on prerequisite should not be asked.

B.Sc. (Third Year)(Mathematics)(Fifth Semester)

Paper – MAT 502: Abstract Algebra – I

Periods : 60
Marks : 50

1) Prerequisite:
Sets, Functions, Integers.

2) Group Theory:
Definition of a group, Some examples of groups, Some preliminary lemmas Subgroups, A counting Principle, Normal subgroups and quotient groups Homomrphism, Automorphism. [1]

3) Ring Theory:
Definition and examples of rings Some special classes of ring, Ideals and quotient rings More ideals and quotient rings, Polynomial ring. [1]

Recommended books:
1] I. N. Herstein : ***Topics in Algebra*** : Willey Eastern Pvt. Ltd., NewDelhi.

Scope:
Chapter 2 : 2.1, 2.2, 2.3, 2.4, 2.5, 2.6, 2.7(Cauchy's Theorem for Abelian Groups and Cauchy's Theorem for Abelian Groups are without proof), 2.8.
Chapter 3 : 3.1, 3.2, 3.3, 3.5, 3.9(Omit Theorem 3.9.1)

References:
1) A. R. Vasishtha : ***Modern Algebra*** : Krishna Prakashan Media Pvt. Ltd. Meerut.
2) M. L. Khanna : ***Modern Algebra*** : Jai Prakash Nath and Co. Meerut.
3) Vijay K. Khanna and S. K. Bhambri : ***A course in Abstract Algebra*** : Vikas Publishing House Pvt.Ltd. New Delhi.
4) Surjeet Singh and Qazi Zameeruddin : ***Modern Algebra*** : Vikas Publishing House Pvt. Ltd. New Delhi.
5) Bhupendra Singh : ***Advanced Abstract Algebra*** : Pragati Prakashan Meerut.
6) Shanti Narayan and Sat Pal : ***A Text book of Modern Abstract Algebra*** : S. Chand and Co. Ltd. New Delhi.
7) I. N. Herstein : Abstract Algebra (Third Edition): Prentice-Hall, Upper Saddle River, New Jersey 07458.
8) Joseph A. Gallian : Contemporary Abstract Algebra (Seventh Edition) : Brooks/Cole 10 Davis Drive Belmont, CA 94002 – 3098 USA.
9) Goyal J. K. and K. P. Gupta : ***Advanced course in Abstract Algebra*** : Pragati Prakashan, Meerut.
10) J. N. Kapoor and K. R. Kalra : ***Modern Algebra*** **(Volume I and II)**: R. Chand and Co. New Delhi.
11) S. Nanda : ***Topics in Algebra***: Allied publishers Pvt. Ltd., New Delhi.

Note : Questions on prerequisite should not be asked.

Optional Papers (any ONE)

B.Sc. (Third Year)(Mathematics)(Fifth Semester)

Paper – MAT 503: Mathematical Statistics – I

Periods : 60
Marks : 50

1) Frequency Distribution and Measures of Central Tendency:
Frequency distribution, Continuous frequency distribution, Graphical representation of a frequency distribution, Histograms, Frequency Polygon, Measures of Central Tendency, Arithmetic mean, Properties of arithmetic mean, merits and demerits of Arithmetic mean, Weighted mean, Median, Merits and demerits of Median, Mode Merits and demerits of mode, Geometric mean, Merits and demerits of Geometric mean, Harmonic mean, partitions [1]

2) Measures of Dispersion Skewness and Kurtosis:
Dispersion, Characteristic for an ideal measure of dispersion, Measures of dispersion, Range, Quartile deviation, Mean deviation, Standard deviation and root mean square deviation, Relation between and s, Different formulae for calculating variance, Variance of the combined series, Coefficient of dispersion, Coefficient of variations, Moments, Relation between moments about mean in terms of moments about any point and vice versa, Effect of change of Origin and scale on moments, Pearson's and coefficients, Skewness and kurtosis. [1]

3) Theory of Probability:
Introduction, Definition of various terms, Mathematical or Classical Probability, Statistical Probability, Axiomatic approach to probability, Random experiments, Sample space, Events, Some illustrations, Algebra of events, Probability – Mathematical Notion, Probability function, Theorems on Probability of events, Law of addition of Probability, Multiplication law of probability and conditional probability, Independent events, Pairwise independent events, Conditions for mutual independence of n events. [1]

4) Random Variables and Distribution Functions:
Random Variable, Distribution function, Properties of distribution function, Discrete random variables, Probability mass function, Discrete distribution function, Continuous random variable, Probability density function, Various measures of Central tendency, Continuous distribution function. [1]

Recommended Book:
1] S. C. Gupta and V. K. Kapoor : ***Fundamentals of Mathematical Statistics*** (Nineth Edition) : Sultan Chand and Sons, New Delhi.

Scope:
Ch – 2: 2.1, 2.1.1, 2.2, 2.2.1, 2.2.2, 2.3, 2.4, 2.5, 2.5.1, 2.5.1, 2.5.2, 2.5.3, 2.6, 2.6.1, 2.7, 2.7.1, 2.8, 2.8.1, 2.9, 2.9.1, 2.11.
Ch – 3: 3.1, 3.2, 3.3, 3.4, 3.5, 3.6, 3.7, 3.7.1, 3.7.2, 3.7.3, 2.8, 2.8.1, 3.9, 3.9.1, 3.9.2, 3.10, 3.13, 3,14.
Ch – 4: 4.1, 4.3, 4.3.1, 4.3.2, 4.5, 4.5.1, 4.5.1, 4.5.2, 4.5.3, 4.5.4, 4.6, 4.6.1(omit Thm 4.1), 4.6.2, 4.7, 4.7.2, 4.7.3, 4.7.4, 4.7.5
Ch – 5: 5.1, 5.2, 5.2.1, 5.3, 5.3.1, 5.3.2, 5.4, 5.4.1, 5.4.2, 5.4.3

B.Sc. (Third Year)(Mathematics)(Fifth Semester)

Paper – MAT 504: Ordinary Differential Equations – I

Periods : 60
Marks : 50

Prerequisite: Complex numbers

1) Preliminaries:
Introduction, Functions, Polynomials, Complex series and the exponential function, Determinants. [1]

2) Linear Equations of First Order:
Introduction, Differential Equations, Problems associated with differential equations, Linear equations of the first order, The equation $y' + ay = 0$, The equation $y' + ay = b(x)$, The general linear equation of the first order. [1]

3) Linear Equations with Constant Coefficients:
Introduction, The second order homogeneous equation, Initial value problems for second order equations, Linear dependence and independence, A formula for Wronskian, The non-homogeneous equation of order two. [1]

Recommended Book:

1] Earl A. Coddington : ***An Introduction to Ordinary Differential Equations*** : Prentice Hall of India Learning Private Limited, New Delhi-110001, (2009)

Scope:
Chapter 0. - Article 1, 3, 4, 5, 6
Chapter 1. - Article 1, 2, 3, 4, 5, 6, 7
Chapter 2. - Article 1, 2, 3, 4, 5, 6

Reference Books:

1) E.A.Coddington and Levinson Norman : ***Theory of Ordinary Differential Equations*** : McGraw Hill New York, (1955)
2) A.H.Siddiqi and P. Manchanda : ***A First Course in Differential Equations with Applications*** : Macmillan India Ltd., (2006)
3) D.G.Zill and M.R.Cullen : ***Advanced Engineering Mathematics*** (Second Edition) : Jones and Bartlett Publishers, (2000)

B.Sc. (Third Year)(Mathematics)(Fifth Semester)

Paper – MAT 505: Programming in C – I

Periods : 45
Marks : 40

1) Overview of C :
Introduction, Importance of c, Sample C Programs, Basic structure of C programs, programming style, Executing a C program. [1]

2) Constants, Variables and Data Types :
Introduction, Character set, C tokens, Keywords and identifies, Constants, variables, Data types, Declaration of Variables, Storage class Assigning values to variables, Defining symbolic constants, case studies. [1]

3) Operators and Expressions:
Introduction, Arithmetic of operators , Relational operators, Logical operators, Assignment operators, Increment and decrement operators, Conditional operators, Bitwise operators, Special operators, Arithmetic expression, Evaluation of expressions, Precedence of arithmetic operators, Some computational problems, Type conversions in expression, Operators precedence and Associativity, mathematical functions. [1]

4) Managing Input and Output Operators:
Introduction, Reading a character, Writing a character, Formatted input, Formatted output. [1]

Recommended Book :

1] E. Balagurusamy : ***Programming in ANSI C*** (Fourth Edition) :Tata McGraw Hill

Scope:
Ch.1 :1.1,1.2, 1.3,1.4,1.5,1.6, 1.8 to 1.10
Ch.2 : 2.1,2.2,2.3,2.4,2.5,2.6,2.7,2.8,2.9,2.10, 2.11
Ch.3 : 3.1 to 3.16
Ch.4 : 4.1 to 4.5

References:
1) Y.P. Kanetkar : ***Let us C*** : BPB Publication
2) Gottfried : ***Programming in C*** : Schaum's Series
3) Moolish Kooper : *Spirit of "C"*
4) D. Ravichandran : ***Programming in C*** : New-Age International Publisher
5) J.B.Dixit :***Mastering C Programs***
6) Pradip D Y and Manas Ghosh : ***Fundamentals of Computing and Programming in C***
7) V.Rajaraman : ***Computer Programming in C*** : PHI Pvt Ltd, New Delhi(2005)

B.Sc. (Third Year)(Mathematics)(Fifth Semester)

Practical Paper – MAT-PR- 505(Based on MAT 505)

Periods : 15
Marks : 10

List of Experiments/Programs:

1. Program to find Maximum between two numbers using conditional operator.
2. Program to convert Temperature in Farad into Celsius. (C=0.5(F-32))
3. Program to find addition of two numbers.
4. Program to find square root of a number using *sqrt()* function.
5. Program to find m^n using *pow()* function.
6. Program to find simple interest (Si=(p+n+r)/100).
7. Program to find Area of Circle ($A=\pi r^2$)
8. Program to find Circumference of Rectangle (C= 2(length+breadth))
9. Program to find root of Quadratic Equation $\frac{-b\pm\sqrt{b^2-4ac}}{2a}$
10. Program to find Area of Rectangle (A = w x h)
11. Program to find circumference of circle
12. Program to find Area of Triangle. (A= ½ x b x h)
13. Program to find Area of Square (A = a2)
14. Program to find Area of Sphere (A = 4 π r2√)□
15. Program to Find Area of Cone (A= π r (r + 2+r2)

Note: University Practical Examination will be conducted annually.

B.Sc. (Third Year)(Mathematics)(Sixth Semester)
Paper – MAT 601: Real Analysis – II

Periods : 60
Marks : 50

1) Limits in Metric Spaces:
Metric spaces, Limits in metric spaces. [1]

2) Continuous Functions on Metric Spaces:
Functions continuous on metric spaces, open sets, Closed sets. [1]

3) Connectedness, Completeness and Compactness:
More about open sets, connected sets, bounded sets and totally bounded sets, Complete metric spaces, Compact metric spaces, Continuous functions on compact metric spaces, Uniform continuity. [1]

4) Calculus:
Sets of measure zero, Definition of Riemann Integral, Existence of Riemann Integral, Fundamental Theorem of Calculus. [1]

5) Fourier Series:
Introduction. [2]

Recommended books:

1] R. R. Goldberg : ***Methods of Real Analysis*** : Oxford and IBH Publishing Co. Pvt. Ltd. NewDelhi.

Scope:

Chapter 4 : 4.2(A, B, C), 4.3(A, C, D).

Chapter 5 : 5.3(A, B, C, D, E, F, G, H), 5.4(A, B, C, D, E, F, G), 5.5(A, B, C, D, E, F, G, H, I, J, L, M).

Chapter 6 : 6.1(A, B), 6.2(A, B), 6.3(A, B, C, D, E), 6.4(A, B, C, D, E, F), 6.5 (A, B, C, D, E), 6.6(A, B, C, D), 6.8(A, B, C, D, E)

Chapter 7 : 7.1(A, B, C, D), 7.2(A, B, C, D, E, F, G), 7.3(Theorem and Lemma are without Proof), 7.4(A, B, C, D, E, F), 7.8(A, B, C, D, E, F, G)

2] D. Somasundaram and B. Choudhary : ***A first Course in Mathematical Analysis*** : Narosa Publishing House, New Delhi.

Scope:

Chapter 10 : Articles 10.1

References:

1) J. N. Sharma and A. R. Vashistha : ***Real Analysis*** : Krishna Prakashan Media (P), Ltd. Meerut.
2) Hari Kishan ***: Real Analysis*** : Pragati Prakashan, Meerut.
3) S. K. Mittal and S. K. Pundir : ***Real Analysis*** : Pragati Prakashan, Meerut.

B.Sc. (Third Year)(Mathematics)(Sixth Semester)

Paper – MAT 602: Abstract Algebra – II

Periods : 60
Marks : 50

1) Vector Spaces and Modules:

Elementary basic concepts, Linear independence and bases, Dual Spaces, Inner product spaces, Modules. [1]

Recommended books:

1] I. N. Herstein : ***Topics in Algebra*** : Willey Eastern Pvt. Ltd., NewDelhi.

Scope:

Chapter 4 : 4.1, 4.2, 4.3, 4.4, 4.5

References:

1) A. R. Vasishtha : ***Modern Algebra*** : Krishna Prakashan Media Pvt. Ltd. Meerut.
2) M. L. Khanna : ***Modern Algebra*** : Jai Prakash Nath and Co. Meerut.
3) Vijay K. Khanna and S. K. Bhambri : ***A course in Abstract Algebra*** : Vikas Publishing House Pvt.Ltd. New Delhi.
4) Surjeet Singh and Qazi Zameeruddin : ***Modern Algebra*** : Vikas Publishing House Pvt. Ltd. New Delhi.
5) Bhupendra Singh : ***Advanced Abstract Algebra*** : Pragati Prakashan Meerut.
6) Shanti Narayan and Sat Pal : ***A Text book of Modern Abstract Algebra*** : S. Chand and Co. Ltd. New Delhi.
7) P. N. Chatterjjee : ***Linear Algebra*** : Prentice-Hall, Upper Saddle River, New Jersey 07458.
8) Joseph A. Gallian : ***Contemporary Abstract Algebra*** (Seventh Edition) : Brooks/Cole 10 Davis Drive Belmont, CA 94002 – 3098 USA.
9) Goyal J. K. and K. P. Gupta : ***Advanced course in Abstract Algebra*** : Pragati Prakashan, Meerut.
10) J. N. Kapoor and K. R. Kalra : ***Modern Algebra*** **(Volume I and II)**: R. Chand and Co. New Delhi.
11) S. Nanda : ***Topics in Algebra***: Allied publishers Pvt. Ltd., New Delhi.

Optional Papers (any ONE)

B.Sc. (Third Year)(Mathematics)(Sixth Semester)

Paper – MAT 603: Mathematical Statistics – II

Periods : 60
Marks : 50

1) Mathematical Expectation, Generating Functions:
Mathematical expectation, Expectation of a function of a random variable, Addition theorem of expectation, Multiplication theorem of expectation, Expectation of linear combination of random variables, Covariance, Correlation coefficient, Variance of a linear combination of random variables. [1]

2) Theoretical Discrete Probability Distributions:
Binomial distribution, moments, Recurrence relation for the moments of Binomial distribution, Moment generating function of Binomial distribution, Additive property of Binomial distribution, Cumulants of Binomial distribution, Recurrence relation for cumulants of Binomial distribution, Poission distribution, Moments of Poission distribution, Recurrence relation for moments of Poission distribution, Moment generating function of Poission distribution, cumulants of Poission distribution, Additive property of independent Poission variates, Geometric didtribution, Lack of memory, Moment of geometric distribution, Moment generating function of Geometric distribution. [1]

3) Theoretical Continuous Distributions:
Rectangular or Uniform distribution, Moments of rectangular distribution, Moment generating distribution of rectangular distribution, Normal distribution, Normal distribution as a limiting case of a binomial distribution, Mode of Normal distribution, Median of Normal distribution, moment generating function of Normal distribution, Cumulant generating function of Normal distribution, moments of Normal distribution, Gamma distribution, Moment generating function of Gamma distribution, Cumulant generating function of Gamma distribution, additive property of Gamma distribution, Exponential distribution, Moment generating function of exponential distribution. [1]

4) Correlation and Regression:
Bivariate distribution, Correlation, Scatter diagram, Karl Pearson's coefficient of correlation, limits for correlation coefficient, Assumptions underlying Karl Pearson's correlation, Regression, Lines of regression, regression curves, Properties of regression coefficients, Angle between two lines of regression. [1]

Recommended Book:
1] S. C. Gupta and V. K. Kapoor : ***Fundamentals of Mathematical Statistics*** (Ninth Edition) : Sultan Chand and Sons, New Delhi.

Scope:
Ch – 6: 6.1, 6.2, 6.3, 6.4, 6.5, 6.6, 6.6.1, 6.7
Ch – 7: 7.2, 7.2.1, 7.2.2, 7.2.6, 7.2.7, 7.2.9, 7.2.10, 7.3, 7.3.2, 7.3.4, 7.3.5, 7.3.7, 7.3.8, 7.5, 7.5.1, 7.5.2, 7.5.2
Ch – 8: 8.1, 8.1.1, 8.1.2, 8.2, 8.2.1, 8.2.3, 8.2.4, 8.2.5, 8.2.6, 8.2.7, 8.3, 8.3.1, 8.3.2, 8.3.3, 8.6, 8.6.1
Ch – 10: 10.1, 10.2, 10.3, 10.3.1, 10.3.2, 10.7, 10.7.1, 10.7.2, 10.7.3, 10.7.4, 10.7.5

B.Sc. (Third Year)(Mathematics)(Sixth Semester)

Paper – MAT 604: Ordinary Differential Equations – II

Periods : 60
Marks : 50

1) Linear Equations with Variable Coefficients:
Introduction, Initial value problems for the homogeneous equation, Solution of homogeneous equation, The Wronskian and linear independence, Reduction of the order of a homogeneous equation, The nonhomogeneous equation, Homogeneous equation with analytic coefficients, The Legendre equation. [1]

2) Linear Equations with Regular Singular Points:
Introduction, The Euler equation, Second order equations with regular singular points- an example, Second order equations with regular singular points- the general case, The Bessel equation. [1]

Recommended Book:
1] Earl A. Coddington : ***An Introduction to Ordinary Differential Equations*** : Prentice India Learning Private Limited, New Delhi-110001, (2009)

Scope:

Chapter 3.- Article 1,2,3,4,5,6,7,8
Chapter 4.- Article 1,2, 3, 4, 7

Reference Books:

1) E. A. Coddington and Levinson Norman : ***Theory of Ordinary Differential Equations*** : McGraw Hill New York, (1955)
2) A.H.Siddiqi and P. Manchanda : ***A First Course in Differential Equations with Applications*** : Macmillan India Ltd., (2006)
3) D.G.Zill and M.R.Cullen : ***Advanced Engineering Mathematics*** (Second Edition) : Jones and Bartlett Publishers, (2000)

B.Sc. (Third Year)(Mathematics)(Sixth Semester)

Paper – MAT 605: Programming in C – II

Periods : 45
Marks : 40

1) Decision Making and Branching:
Introduction, Decision making with if statement, Simple if statement, The ifelse statement, Nesting of ifelse statement, The elseif ladder, The switch statement, The ?: Operator, The goto statement [1]

2) Decision Making and Looping:
Introduction, The while statement, The do statement, The for statement, Jumps in loops [1]

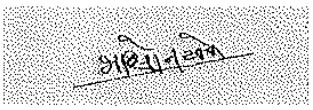
3) Arrays:
Introduction, One dimensional arrays, Declaration, Initialization, Two dimensional arrays, Initializing two-dimensional arrays, Multidimensional arrays. [1]

Recommended Book :
1] E. Balagurusamy : ***Programming in ANSI C*** (Second Edition) : Tata McGraw Hill

Scope:
Ch – 5 : 5.1 to 5.9
Ch – 6 : 6.1 to 6.5
Ch – 7 : 7.1 to 7.7

References:
1) Y.P. Kanetkar : ***Let us C*** : BPB Publication
2) Gottfried : ***Programming in C*** : Schaum's Series
3) Moolish Kooper : *Spirit of "C"*
4) D. Ravichandran : ***Programming in C*** : New-Age International Publisher
5) J.B.Dixit :***Mastering C Programs***
6) Pradip D Y and Manas Ghosh : ***Fundamentals of Computing and Programming in C***
7) V.Rajaraman : ***Computer Programming in C*** : PHI Pvt Ltd, New Delhi(2005)

Note: (i) There should be annual practical based on Paper : MAT 505 and MAT 605 of 20 Marks in Mar/Apr Practical Examination
(ii) There should be separate passing for Theory and Practical.



Dr. B. R. Sontakke
(Chairman, Board of Studies in Mathematics)

B.Sc. (Third Year)(Mathematics)(Sixth Semester)

Practical Paper – MAT-PR 605(Based on MAT 605)

Periods : 15
Marks : 10

List o f Experiments/Programs:

1. Program to find minimum between two number using if.
2. Program to Calculate factorial of a number.
3. Program to check given number is prime or not.
4. Program to check given number is Armstrong or not. ($153 = 1^3+5^3+3^3$)
5. Program to find n terms of Fibonacci Series (1 1 2 3 5 8 13 21 .....)
6. Program to find n terms of the Series.

$$\sum_{n=1}^{\infty} \frac{1}{2^n} = \frac{1}{2} + \frac{1}{4} + \frac{1}{8} + \cdots.$$

7. Program to Sort any 10 Array Elements.
8. Program to Calculate Addition/Subtraction of two Matrices.
9. Program to calculate multiplication of two matrices.
10. Program to calculate Determinant of Matrix.
11. Program to Find Transpose of a Matrix.
12. Program to check given year is leap or not.
13. Program to find sum of series 1 to n.
14. Program to Calculate Grade of Student by inputting Percenta ge of the student.
15. Program to C heck given number is palindrome or not (ex. 12321)

Note: University Practical Examination will be conducted ann ually.

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PRACTICAL QUESTION FORMAT

(MAT-PR-505 &605) (20 Marks) Max.Time :Three Hours

Q.1. Record Book **05 Marks.**

Q.2. Oral (Viva) **05 Marks.**

Q. 3. Write/Edit/Print a program in C **10 Marks.**
(Based on MAT-505& 605)

OR

Q. 4. Write /Edit/Print a program in C **10 Marks.**
(Based on MAT-505& 605)

Dr. Bhausaheb Sontakke
Chairman,
BOS in Mathematics

16

डॉ. बाबासाहेब आंबेडकर मराठवाडा विद्यापीठ, औरंगाबाद

परिपत्रक क्रमांक/एस.यु./विज्ञान/अभ्यासक्रम/७४/२०१४

या परिपत्रकाद्वारे सर्व संबंधीतांना सुचित करण्यात येते की, विज्ञान विद्याशाखेने शिफारस केल्यानुसार बी. एस्सी. / एम. एस्सी. प्रथम व द्वितीय वर्षाच्या सुधारित अभ्यासक्रमास आणि बी. एस्सी. प्रथम वर्षाच्या अभ्यासक्रमात किरकोळ बदल करण्यास विद्यापरिषदेच्या वतीने मा. कुलगुरु यांनी, त्यांना प्राप्त असलेल्या विशेष अधिकार महाराष्ट्र विद्यापीठ अधिनियम-१९९४ कलम १४(७) अन्वये मान्यता दिलेली आहे. त्या अनुषंगाने सुधारीत तयार केलेल्या अभ्यासक्रमाची प्रत या परिपत्रकासोबत आपल्या पुढील कार्यवाहीसाठी पाठविण्यात येत आहे.

[1]	B.Sc. Physics	Semester-III & IV,
[2]	B.Sc. Chemistry	Semester-III & IV,
[3]	B.Sc. Botany	Semester-III & IV,
[4]	B.Sc. Zoology with minor changes	Semester-I & II,
[5]	B.Sc. Zoology	Semester-III & IV,
[6]	B.Sc. Fisheries	Semester-III & IV,
[7]	B.Sc. Electronics (Opt.)	Semester-III & IV,
[8]	B.A./B.Sc. Mathematics	Semester-III & IV,
[9]	B.Sc. Computer Science	Semester-I & II,
[10]	B.Sc. Information Technology	Semester-I & II,
[11]	B.C.A.	Semester-I & II,
[12]	B.Sc. Computer Science(Opt.)	Semester-I & II,
[13]	B.Sc. Information Technology(Opt.)	Semester-I & II,
[14]	B.Sc. Computer Application(Opt.)	Semester-I & II,
[15]	B.Sc. Computer Maintenance(Opt.)	Semester-I & II,
[16]	B.Sc. Biotechnology (Progressively)	Semester-I to VI,
[17]	B.Sc. Biotechnology (Opt.) (Progressively)	Semester-I to IV,
[18]	B.Sc. Sericulture Technology	Semester-I & II,
[19]	B.Sc. Networking Multimedia	Semester-III & IV,
[20]	B.Sc. Bioinformatics	Semester-I & II,
[21]	B.Sc. Hardware & Networking	Semester-I & II,
[22]	B.Sc. Animation	Semester-I & II,
[23]	B.Sc. Dairy Science & Technology	Semester-III & IV,
[24]	B.Sc. Biochemistry	Semester-III & IV,
[25]	B.Sc. Analytical Chemistry	Semester-III & IV,
[26]	B.Sc. Textile & Int. Decoration with minor changes	Semester-I & II,
[27]	B.Sc. Textile & Int. Decoration	Semester-III & IV,
[28]	B.Sc. Home Science with minor changes	Semester-I & II,
[29]	B.Sc. Home Science	Semester-III & IV,
[30]	B.Sc. Agro.Chem. & Fertilizers	Semester-III & IV,

..2..

[31]	**B.Sc. Geology**	**Semester-III & IV,**
[32]	**B.A. Statistics with minor changes**	**Semester-I & II,**
[33]	**B.A. Statistics**	**Semester-III & IV,**
[34]	**B.Sc. Statistics with minor changes**	**Semester-I & II,**
[35]	**B.Sc. Statistics**	**Semester-III & IV,**
[36]	**B.Sc. Industrial Chemistry**	**Semester-III & IV,**
[37]	**B.Sc. Horticultural**	**Semester-I & II,**
[38]	**B.Sc. Dry land Agriculture**	**Semester-I & II,**
[39]	**B.Sc. Microbiology**	**Semester-III & IV,**
[40]	**M.Sc. Computer Science**	**Semester-I to IV,**
[41]	**M.Sc. Information Technology**	**Semester-I to IV.**

हा सुधारीत व नवीन तयार केलेल्या अभ्यासक्रमाचा आराखडा शैक्षणिक वर्ष २०१४-१५ करिता मर्यादित असेल व विद्यापरिषदेच्या अंतिम मान्यतेनंतर हे परिपत्रक नियमित ठेवण्याबाबत या कार्यालयाद्वारे नवीन परिपत्रक पारीत करण्यात येईल. तसेच सुधारीत व नवीन तयार केलेल्या अभ्यासक्रमाची प्रत विद्यापीठाच्या संकेतस्थळावर उपलब्ध आहे.

करिता, या परिपत्रकाची सर्व संबंधितांनी नोंद घ्यावी.

विद्यापीठ प्रांगण,
औरंगाबाद-४३१ ००४.
संदर्भ क्र.एस.यु./सा.शा./सबवि /२०१३-१४/
६५९९-७०२
दिनांक :- २७-०५-२०१४.

संचालक,
महाविद्यालये व विद्यापीठ
विकास मंडळ.

****

या परिपत्रकाची एक प्रत :-

१) मा. परिक्षा नियंत्रक, परिक्षा विभाग,
२) मा. प्राचार्य, सर्व संलग्नीत महाविद्यालये,
३) संचालक, युनिक यांना विनंती करण्यात येते की, सदरील अभ्यासक्रम विद्यापीठाच्या संकेतस्थंळावर उपलब्ध करुण देण्यात यावेत.
४) संचालक, ई-सुविधा केंद्र, विद्यापीठ परिसर,
५) जनसंपर्क अधिकारी, मुख्य प्रशासकीय इमारत,
६) कक्ष अधिकारी, पात्रता विभाग, मुख्य प्रशासकीय इमारत,
७) कक्ष अधिकारी, बी.ए. / बी.एस्सी./ बी.सी.एस./एम.एस्सी. विभाग, परीक्षा भवन,
८) अभिलेख विभाग, मुख्य प्रशासकीय इमारती मागे,

डॉ. बाबासाहेब आंबेडकर मराठवाडा विद्यापीठ, औरंगाबाद.

-=**=-

DR. BABASAHEB AMBEDKAR MARATHWADA UNIVERSITY, AURANGABAD.

REVISED SYLLABUS

OF

B.A./ B.Sc. Mathematics
SECOND YEAR
[Optional]

Third & Fourth Semester

[Effective for - June, 2014-15]

Dr. Babasaheb Ambedkar University, Aurangabad

Revised Syllabus

For

B.Sc. (Second Year) MATHEMATICS

WITH EFFECT FROM JUNE – 2014

Semester Third :

1. Paper No. MAT – 301 : Number Theory
2. Paper No. MAT – 302 : Integral Transforms
3. Paper No. MAT – 303 : Mechanics - I

Semester Fourth :

1. Paper No. MAT – 401 : Numerical Methods
2. Paper No. MAT – 402 : Partial Differential Equations
3. Paper No. MAT – 403 : Mechanics - II

B.A. (Second Year) MATHEMATICS

WITH EFFECT FROM JUNE – 2014

Semester Third :

1. Paper No. MAT – 301 : Number Theory
2. Paper No. MAT – 302 : Integral Transforms

Semester Fourth :

1. Paper No. MAT – 401 : Numerical Methods
2. Paper No. MAT – 402 : Partial Differential Equations

(With Effect from June - 2014)

B. A. & B.Sc. (Second Year)(Third Semester)(Mathematics)

Paper No. MAT – 301: (Number Theory) **(Max. Marks : 50)**

1. Divisibility Theory in the Integers:
The Division Algorithm, The greatest common divisor, The Euclidean algorithm, The Diophantine equation $ax + by = c$.

2. Primes and their Distribution:
The Fundamental Theorem of Arithmetic

3. The Theory of Congruences:
Basic Properties of congruences, Linear congruences

4. Fermat's Theorem:
Fermat's Factorization Theorem, The little Theorem, Wilson's Theorem.

5. Number-Theoretic Functions:
The functions τ and σ, The Mobius inversion formula

6. Euler's Generalization of Fermat's Theorem:
Euler's Phi-function, Euler's Theorem, Some properties of Phi function

Recommended Text Book:
David M. Burton: *Elementary Number Theory*: (Second Edition) – 1987
Scope: Ch. (2) : Complete
Ch. (3) : Article 3.1
Ch. (4) : Articles 4.2, 4.4
Ch. (5) : Articles 5.2, 5.3, 5.4
Ch. (6) : Articles 6.1, 6.2, 6.3
Ch. (7) : Articles 7.2, 7.3

References:
1) Ivan Niven, Herbert Zuckerman: *An introduction to the theory of Numbers*: Wiley Eastern Ltd. New Delhi.
2) S. G. Telang: *Number theory*: Tata McGraw Hills, New Delhi.
3) C. Y. Hsiung: *Elementary theory of Numbers*: Allied publishers Ltd, New Delhi.
4) S. B. Malik: *Basic Number Theory*:
5) Hari Kishan: *Theory of Numbers*: Krishna Prakshan Meerut.
6) Ajay Chaudhari: *Introduction to theory of Numbers*: New Central book Agency(P) Ltd. Calcutta.
7) Ivan Niven, Herbert Zuckerman H. L. Montgomery: *An introduction to the theory of Numbers*: John Wiley and Sons New Delhi.
8) Pundir, Pundir: *Theory of Numbers* Pragati Prakashan Meerut.
9) G. E. Andrews: *Number Theory*: Hindustan Publishing Corporation, New Delhi.

B. A, & B.Sc. (Second Year)(Third Semester)(Mathematics)

Paper No. MAT – 302: (Integral Transforms) **(Max. Marks : 50)**

1. Beta and Gamma Functions:
Euler's Integrals - Beta and Gamma functions, Elementary properties of Gamma Function, Transformation of Gamma Function, Another form of Beta Function, Relation between beta and Gamma functions, Other Transformations. [1]

2. Laplace Transform:
Piece-wise or sectional continuity, function of exponential order, Function of class A, The transform concept, Laplace Transform, Notation, Some Standard results. [2]

3. Inverse Laplace Transform:
Definition, Null function, Uniqueness of inverse Laplace transform, partial fractions, Heaviside's expansion formula, the complex inversion formula

4. Applications to Differential Equations:
Differential Equation, Notations (Problems related to Ordinary Differential Equations only) [2]

5. Fourier Transform:
Infinite Fourier sine transform of $F(x)$, Finite Fourier cosine transform of $F(x)$, Infinite Fourier transform of $F(x)$, Relationship between Fourier transform and Laplace transform, Finite Fourier sine transform, Finite Fourier cosine transform, Fourier Integral Theorem [2]

Recommended Text Books:

1. J. N. Sharma, A. R. Vasishtha : *Real Analysis* : Krishna Prakashan media Pvt. Ltd. Merrut.
Scope : Ch. (14) : Art. 9, 10, 11, 12, 13, 14, 15, 16. 17
2. J. K. Goyal, K. P. Gupta : *Laplace And Fourier Transforms* : Pragati Prakashan, Meerut – Twentieth Edition 2007
Scope: Ch. (1) : Part – I : 1.0, 1.1, 1.2, 1.3, 1.4, 1.5, 1.5, 1.6,
Part – II : 1.0, 1.1, 1.2, 1.3, 1.4, 1.5, 1.5
Part – III : 1.0, 1.1.
Ch. (2) : Part – I : 2.0, 2.1, 2.2, 2.3,
Part- II : 2.0, 2.1

References:

1. B.J.Beerends, etl : ***Fourier and Laplace Transforms*** : Cambridge University Press – 2003.
2. Lokenath Bebnath, Dambaru Bhatta : ***Integral Transforms and their Applications*** : Chapman and Hall/CRC-2007.
3. E.J.Watson : ***Laplace Transforms and Applications*** : Van Nostrand Reinhold Company.
4. J. Williams : ***Laplace Transforms*** : George Allen and Unwin Ltd, London -1973.
5. Joe L. Schiff : ***The Laplace Transform:Theory and Applications*** : Springer-Verlag NewYork – 1999.
6. M.D.Raisinghania : ***Integral Transforms*** : S.chand and Company, New Delhi.
7. M.D.Raisinghania : ***Laplace and Fourier Transforms*** : S.chand and Company, New Delhi.
8. Goyal, Gupta: ***Integral Transforms***: Pragati Prakashan Meerut.

B.Sc. (Second Year) (Third Semester)(Mathematics)

Paper No. MAT – 303 : (MECHANICS – I) **(Max. Marks : 50)**

1. Forces acting on a Particle:

Particle, Rigid body, Force, The force as a vector, Equilibrium, An axiom for equilibrium of two forces, Statics, Resultant of forces, Law of parallelogram of forces, Principle of the transmissibility of force, Deductions, Resultant of forces $m \cdot \overrightarrow{OA}$ and $n \cdot \overrightarrow{OB}$, Components and Resolved parts, the algebraic sum of resolved parts of two forces, To find the magnitude and direction of the resultant of any number of coplanar forces acting at a point, Resultant of parallel forces.

2. Equilibrium of Forces acting on a Particle:

Triangle law of forces, Converse of the triangle law of forces, Polygon of forces, Lami's theorem, Conditions of equilibrium of forces acting on a particle.

3. Forces acting on a Rigid Body:

Introduction, Moment of a force, Sum of vector moments of two like parallel forces, Couples, Conditions of equilibrium of forces acting on a rigid body, Trignometrical Theorems.

4. Centre of Gravity:

Centroid of weighted points, Centre of gravity, Centre of gravity of some uniform bodies.

Recommended Text Book:

V. Tulsani, T. V. Warhekar and N. N. Saste : *Mechanics and Differential Geometry:*
S. Chand and Co. (Pvt) LTd, New Delhi (Second Edition) – 1987

Scope: Part (I): Statics

Ch. (1) : Complete
Ch. (2) : Complete
Ch. (3) : Complete
Ch. (4) : Articles 4.1 to 4.7

References :

1. B. R. Thakur, G. P. Shrivastava : *Mechanics* : Ram Prasad and Sons, Agra – 3.
2. M. L Khanna : *Dynamics* : Kedarnath Ramnath Prakashan, Meerut.
3. S. L. Loney : *An Elementary Tretise on Statics* : A. I. T. B. S. Publishers and Distributors, New Delhi.

B. A. & B. Sc. (Second Year)(Fourth Semester)(Mathematics)

Paper No. MAT – 401: (Numerical Methods) (Max. Marks : 50)

1. Solution of Algebraic and Transcendental Equations:

Introduction, Bisection method, Method of false position, Newton-Raphson method, Genralized Newton's method.

2. Interpolation:

Introduction, Finite differences, Forward differences, Backward differences, Central differences, Symbolic relations and separation of symbols, Differences of a polynomial, Newton's formulae for interpolation, Interpolation with unevenly spaced points, Lagrange's interpolation formula, Hermite's interpolation formula, Divided differences and their properties, Newton's general interpolation formula.

3. Curve Fitting and Approximations:

Introduction, Least-Squares curve fitting procedures, fitting a straight line, nonlinear curve fitting, Approximations of functions, Chebyshev polynomials, Economization of power series.

4. Solution of Linear System of Equations:

Solution of Linear Systems-direct methods, Gaussian elimination method, Method of factorization, Solution of Linear Systems-iterative methods, The Eigenvalue problem, Householder's method, Eigenvalues of a symmetric tridiagonal matrix, The QR method

5. Numerical Solution of Ordinary Differential Equations:

Introduction, Solution by Taylor's series method, Picard's method of successive approximations, Euler's method, Runge Kutta methods

Recommended Text Book:
S. S. Sastry : ***Introductory Methods of Numerical Methods*** : Third Edition, Prentice Hall India, New Delhi.
Scope:
Chapter 2: Articles 2.1, 2.2, 2.4, 2.5, 2.5.1
Chapter 3: Articles 3.1, 3.3, 3.3.1 to 3.3.4, 3.5, 3.6, 3.9, 3.9.1, 3.9.3, 3.11, 3.11.1
Chapter 4: Articles 4.1, 4.2, 4.2.1, 4.2.2, 4.6, 4.6.1, 4.6.2
Chapter 6: Articles 6.3, 6.3.2, 6.3.4, 6.4, 6.5, 6.5.1 to 6.5.3
Chapter 7: Articles 7.1, 7.2, 7.3, 7.4, 7.5

Reference Books:
1). H.C.Saxena: Finite Differences and Numerical Analysis, S.Chand and Co.Pvt. Ltd, New Delhi
2). M.K.Jain, S.R.K. Iyengar, R.K.Jain: Numerical Methods for Scientific and Engineering Computation, New Age International Publishers, New Delhi.

B. A. & B. Sc. (Second Year)(Fourth Semester)(Mathematics)

Paper No. MAT – 402: (Partial Differential Equations) (Max. Marks : 50)

1. Prerequisites:

Derivation of a Partial Differential Equation by the elimination of arbitrary constants, Derivation of a Partial Differential Equation by the elimination of arbitrary functions,

2. Partial Differential Equations of Order One (Linear Equations) :

Definition of Partial Differential Equations, Lagrange's Linear Partial Differential Equation, Geometrical interpretation of the Lagrange's Linear Partial Differential Equation $Pp + Qq = R$.

3. Non-linear Partial Differential Equations of Order One:

Complete and Particular Integrals, General Integral, Singular Integral, Special method, Standard form I, Standard form II, Standard form III, Standard form IV, Charpit's method, Non-linear Partial Differential Equations of order one with three or more independent variables, Jacobi's method.

4. Linear Partial Differential Equations:

Definitions, Linear Homogeneous Partial Differential Equations with constant coefficients, Non-Homogeneous Linear Partial Differential Equations, Equations reducible to Linear form with constant coefficients.

5: Partial Differential Equations of Second Order:

Equations that can be integrated by inspection, Monge's method to solve the equation $Rr + Ss + Tt = V$, Method of Transformations (Canonical Forms)

Recommended Text Book:

P.P. Gupta, G.S.Malik, S.K.Mittal : *Partial Differential Equations* (Second Revised Edition – 2003) Pragati Prakashan, Meerut, ISBN-81-7556-518-7

Note: **Questions on Prerequisite may not be asked**

Scope:

Chapter 4: Articles 4.1, 4.4-4.5
Chapter 5: Complete Chapter (5.1-5.10)
Chapter 6: Articles 6.1- 6.4
Chapter 7: Artices 7.1, 7.2, 7.3, 7.5, 7.6

Reference Books:

1. H.K.Dass : ***Advanced Engineering Mathematics*** **:** S. Chand and Co. Ltd, New Delhi.
2. N. Ch. S. N. Iyengar : ***Differential Equations*** **:** Anmol Publications Pvt. Ltd. New Delhi.
3. M. L. Khanna : ***Partial Differential Equations*** **:** Kedarnath and Ramnath Prakahan, Meerut.

B.Sc. (Second Year)(Fourth Semester)(Mathematics)

Paper No. MAT – 403 : (Mechanics – II) **(Max. Marks : 50)**

1. Kinematics and Dynamics of a Particle in Two Dimensions:
Introduction, Definitions, Velocity and acceleration in terms of vector derivatives, Tangent and unit vector along the tangent, Rate of change of unit vector moving in a plane, Curvature principal normal, Tangential and normal components of velocity and acceleration, Angular speed and angular velocity, Radial and transverse components of velocity and acceleration, Areal speed and areal velocity.

2. Kinetics of a Particle:
Introduction, Newton's law of motion, Matter, Linear momentum, Angular momentum, An Impulsive force and its impulse, Conservation of linear momentum, Impact of two bodies, Work, Energy, Scalar point function, Vector point function, Field of force, Conservative field of force.

3. Motion of a Projectile and Motion in a Resisting Medium:
Rectilinear Motion, Motion under gravity, Projectile, Motion of projectile, Range on an inclined plane, Parabola of Safety, Projectile to pass through a given point, Motion in a resisting medium, Motion of a body moving under gravity and in a medium whose resistance varies as velocity.

4. Central Orbits:
Definitions, Areal velocity in Central Orbit, Differential equation of central orbit, Apses, Law of Force, Pedal equation of some curves

Recommended Text Book:
V. Tulsani, T. V. Warhekar and N. N. Saste : *Mechanics and Differential Geometry:*
S. Chand and Co. (Pvt) Ltd, New Delhi (Second Edition) – 1987
Scope: Part (I): Dynamics of a Particle
Ch. (1) : Complete
Ch. (2) : Complete
Ch. (3) : Complete
Ch. (4) : Articles 4.01 to 4.10

References :
1. B. R. Thakur, G. P. Shrivastava : *Mechanics* : Ram Prasad and Sons, Agra – 3.
2. M. L Khanna : *Statics* : Kedarnath Ramnath Prakashan, Meerut.
3. S. L. Loney : *An Elementary Tretise on Dynamics of a particle and of Rigid Bodies* : A. I. T. B. S. Publishers and Distributors, New Delhi.

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