Department of Mathematics
Faculty of Sciences, Jamia Millia Islamia

B. Sc. (Hons.) Mathematics
Course Structure and Syllabus (w. e. f. 2024-25)

Semester – I			
Category	Code	Title of Paper	Credits
Major	BMHC-11	Calculus	4
Major	BMHC-12	Analytical Geometry	4
		Total Credits	**8**

BMHC-11	**Calculus**

Unit-I   Limit and Continuity by $\epsilon - \delta$ approach, Differentiability, Successive differentiation, Leibnitz Theorem, Rolle's Theorem, Mean Value Theorems, Taylor and Maclaurin series.

Unit-II   Indeterminate forms, Curvature, Cartesian, polar and parametric formulae for radius of curvature, Partial derivatives, Euler's theorem on homogenous functions.

Unit-III   Asymptotes, Test of concavity and convexity, Points of inflexion, Multiple points, Curve tracing in Cartesian coordinates, Tracing in polar coordinates of standard curves.

Unit-IV   Derivations and illustrations of reduction formulae of the various types. Volumes by slicing; disks and washers methods, Volumes by cylindrical shells, Parametric equations, Arc length, Arc length of parametric curves. Surfaces of solids of revolution.

Books Recommended

1.   J. Hass, C. Heil, P. Bogacki and M.D. Weir: Thomas' Calculus, 15th Ed., Pearson Education, Delhi, 2024
2.   K. J. Smith, M.J. Strauss and M. D. Toda: Calculus, 6th Ed., Kendall/Hunt Publishing Co, U.S.,2013.
3.   H. Anton, I. Bivens and S. Davis: Calculus, 10th Ed., Jhon Wiley and Sous (Asia) P. Ltd., Singapore, 2015.
4.   Gorakh Prasad: Differential and Integral Calculus, Rashi Kansal (Pothishala), Reprint 2016
5.   K. Ahmad and P. Sharma: Text Book of Calculus, New Age International Publishers, 2022.

BMHC-12	**Analytical Geometry**

Unit-I   General equation of second degree, Pair of lines, Parabola, Tangent, Normal, Pole and Polar and their properties, Ellipse, Hyperbola, Tangent, Normal, Pole and Polar, Conjugate diameters.

Unit-II   Asymptotes, Conjugate hyperbola and Rectangular hyperbola, Polar equation of a conics, Polar equation of tangent, normal, polar and asymptotes, Tracing of parabola, Ellipse and hyperbola.

Unit-III   Review of straight lines and planes, Equation of sphere, Tangent plane, Plane of contact and polar plane, Intersection of two spheres, radical plane, Coaxial spheres, Equation of a cone, Intersection of cone with a plane and a line, Enveloping cone, Right circular cone.

Unit-IV   Equation of cylinder, Enveloping and right circular cylinders, Equations of central conicoids, Tangent plane, Normal, Plane of contact and polar plane, Enveloping cone and enveloping cylinder, Equations of paraboloids and its simple properties.

Books Recommended

1.   Ram Ballabh: *Textbook of Coordinate Geometry*, Prakashan Kendra.
2.   S. L. Loney: *The elements of Coordinate Geometry*, Michigan Historical Reprint Series.
3.   P. K. Jain and Khalil Ahmad: *Textbook of Analytical Geometry*, New Age International (P) Ltd. Publishers, 1986.
4.   R. J. T. Bell: *Elementary Treatise on Coordinate Geometry of Three Dimensions*, Macmillan India Ltd., 1994.
5.   E. H. Askwith: *A Course of Pure Geometry*, Merchant Books, 2007.

Department of Mathematics
Faculty of Sciences, Jamia Millia Islamia

B. Sc. (Hons.) Applied Mathematics
Course Structure and Syllabus (w.e.f. 2024-25)

Semester – I			
Category	**Code**	**Title of Paper**	**Credits**
Major	BMAC-11	Calculus	4
Major	BMAC-12	Analytical Geometry	4
		Total Credits	**8**

Semester – I	
BMAC-11	**Calculus**

Unit-I — Limit and Continuity by $\epsilon - \delta$ approach, Differentiability, Successive differentiation, Leibnitz Theorem, Rolle's Theorem, Mean Value Theorems, Taylor and Maclaurin series.

Unit-II — Indeterminate forms, Curvature, Cartesian, polar and parametric formulae for radius of curvature, Partial derivatives, Euler's theorem on homogenous functions.

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4. Gorakh Prasad: Differential and Integral Calculus, Rashi Kansal (Pothishala), Reprint 2016
5. K. Ahmad and P. Sharma: Text Book of Calculus, New Age International Publishers, 2022.

BMAC-12	**Analytical Geometry**

Unit-I — General equation of second degree, Pair of lines, Parabola, Tangent, Normal, Pole and Polar and their properties, Ellipse, Hyperbola, Tangent, Normal, Pole and Polar, Conjugate diameters.

Unit-II — Asymptotes, Conjugate hyperbola and Rectangular hyperbola, Polar equation of a conics, Polar equation of tangent, normal, polar and asymptotes, Tracing of parabola, Ellipse and hyperbola.

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