

Syllabus and Course Scheme
Academic year 2018-19



Bachelor of Science- MathEMATICS
Exam.- 2019

UNIVERSITY OF KOTA

MBS Marg, Swami Vivekanand Nagar,

Kota - 324 005, Rajasthan, India

Website: uok.ac.in

B.A. / B.Sc. Part – I Examination-2019
MATHEMATICS

Paper	Nomenclature	Teaching Hr./Week	Exam. Duration	Max. Marks	
				Sci.	Arts
I	Abstract Algebra	3	3 Hrs.	50	44
	Practical	2		25	22
II	Advanced Calculus	4	3 Hrs.	75	66
III	Vector Calculus and Co-ordinate Geometry	4	3 Hrs.	75	68

Practical Marks-25 Science / 22 Arts

B.A. (Pt-I) (Total Marks- 22)

Record	-	05
Practical -1	-	06
Practical -II	-	06
Viva-Voce	-	05

B.Sc. (Pt-I) (Total Marks- 25)

Record	-	05
Practical -1	-	07
Practical -II	-	07
Viva-Voce	-	06

Note : Common paper will be set for both faculties i.e., Arts and Science

Detailed syllabus

Paper I – Number theory and Abstract Algebra

Time duration : 3 Hrs

Max Marks : Science : 50 / Arts : 44

Note : Each question paper will contain three sections as under –

- Section-A : One compulsory question with 10 parts, having 2 parts from each unit, short answer in 20 words for each part. Total marks :05 (Science / Arts)
- Section-B : 10 questions, 2 questions from each unit, 5 questions to be attempted, taking one from each unit, answer approximately in 250 words.
Total marks : 25 (Science / Arts)
- Section-C : 04 questions (question may have sub division) covering all units but not more than one question from each unit, descriptive type, answer in about 500 words, 2 questions to be attempted.

Total marks : (Science -20 / Arts- 14)

Unit – I

Divisibility theory : Division algorithm, Greatest Common divisor(GCD) and its algorithm, Linear diophantine equations of two variables (using Euclid algorithm and Bhaskaracharya’s Kuttaka method) Fundamental theorem of arithmetic, congruences, Chinese Remainder Theorem, Euler’s ϕ -function, primitive roots.

Binary operation. Addition and multiplication modulo operations. Definition of a group with examples and simple properties.

Unit – II

Permutation group, cycle, transpositions, even and odd permutations and alternating group. Order of an element of a group and its properties. Subgroups of a group with its properties, Cyclic groups and their properties, Cosets. Index of a subgroup, Lagrange's theorem and its applications.

Unit – III

Normal subgroups with properties. Simple groups, Quotient groups.

Group homomorphism with its kernel and properties. Isomorphism, Cayle's theorem, automorphism, Fundamental theorem of homomorphism.

Unit – IV

Rings, Zero divisors, integral domains and fields. Characteristic of a ring, Subrings, subfield, prime field, ring homomorphism and isomorphism. Ideals and their properties.

Unit – V

Principal ideals and principal ideal ring. Prime ideal. Maximal ideal. Fundamental theorem of ring homomorphism.

Euclidean ring and its properties. Polynomial over a ring. Polynomial ring. Polynomial over an integral domain and over a field.

Books Recommended for reference:-

1. I. N. Herstein, Topics in Algebra, Wiley Eastern Ltd., New Delhi, 1975.
2. Nathan Jacobson, Lectures in abstract Algebra Vol. I, W. H. Freeman, 1980 (also published by Hindustan Publishing Company).
3. Shanti Narayan, A text book of Modern Abstract Algebra, S. Chand and Co. New Delhi.
4. Surjeet Singh and Qazi Zameeruddin, Vikas Publishing House, Pvt. Ltd., Delhi
5. A. R. Vasishtha, Modern Algebra, Krishna Prakashan Mandir, Meerut
6. Pundir and Pundir theory of numbers Pragati \Prakashan
- 7 Lilavati of Bhaskaracharya (A treatise of Mathematics of Vedic Tradition) Moti lal Banarasidass Publishers (Pvt. Ltd) Delhi

1. form graph of polynomials of four or more degree.
2. simplification of logical circuits using Boolean algebra
3. formation of truth table of Boolean functions.
4. Curve tracing of plane curves including polar curves.
5. Application of fundamental theorem on morphism of groups.
7. Find roots of algebraic equation by graphical method.
8. Application of Lagrange's theorem.
9. Problems related to permutations and permutation groups.

10. Problems related to ring.

11 . Problems related to Kuttak (Pulverization)(Bhaskaraachaarya method).

Paper II – Advanced Calculus

Time duration : 3 Hrs

Max Marks : Science : 75 / Arts : 66

Note : Each question paper will contain three sections as under –

Section-A : One compulsory question with 10 parts, having 2 parts from each unit, short answer in 20 words for each part.

Total marks : (Science 10 / Arts 5)

Section-B : 10 questions, 2 questions from each unit, 5 questions to be attempted, taking one from each unit, answer approximately in 250 words.

Total marks : 35 (Science / Arts)

Section-C : 04 questions (question may have sub division) covering all units but not more than one question from each unit, descriptive type, answer in about 500 words, 2 questions to be attempted.

Total marks : (Science -30 / Arts- 26)

Unit – I

Polar coordinates, angle between radius vector and tangent, polar sub tangent and subnormal. Perpendicular from pole on tangent. Pedal equation of a curve. Derivative of length of an arc in cartesian and polar coordinates.

Curvature, Radius of curvature and its formula in various forms. Centre of curvature, chord of curvature.

Unit – II

Partial differential coefficients of a function of two or more variables. Total differential coefficient. Composite function, Euler's theorem on homogeneous functions of two, three and m-variables. First and second differential coefficients of an implicit function. Taylor's theorem for a function of two variables.

Jacobians with properties. Maxima, minima and saddle points of functions of two and three variables. Lagrange's method of undetermined multipliers.

Unit – III

Asymptotes, envelopes and evolutes.

Test for points of inflexion and multiple points. Test for concavity and convexity. Tracing of curves in cartesian and polar coordinates.

Unit – IV

Quadrature, Rectification, Volumes and surfaces of solids of revolution. Differentiation under the sign of integration.

Unit – V

Beta and Gamma functions. Double integrals and their evaluation by change of order and changing into polar coordinates.

Triple integrals, Dirichlet's double and triple integrals with their Liouville's extension.

Paper III – Vector Calculus and Coordinate Geometry

Time duration : 3 Hrs

Max Marks : Science : 75 / Arts : 66

Note : Each question paper will contain three sections as under –

Section-A : One compulsory question with 10 parts, having 2 parts from each unit, short answer in 20 words for each part.

Total marks : (Science 10 / Arts 5)

Section-B : 10 questions, 2 questions from each unit, 5 questions to be attempted, taking one from each unit, answer approximately in 250 words.

Total marks : 35 (Science / Arts)

Section-C : 04 questions (question may have sub division) covering all units but not more than one question from each unit, descriptive type, answer in about 500 words, 2 questions to be attempted.

Total marks : (Science -30 / Arts- 26)

Unit – I

Vector differentiation and integration, Problems based on Gradient, divergence and curl. Vector identities, Line and surface integrals.

Theorems of Gauss, Green, Stokes(without proof) and problems based on these.

Unit – II

Parabola : Standard equation, parametric co-ordinates, length of chord, tangent, normal and its properties, two tangents from a point, chord of contact, polar, pole, chord with a given middle point, diameter and three normals from a point.

Ellipse : standard equation, auxiliary circle, eccentric angle, tangent, normal, two tangents from point, chord of contact, pole, polar, chord whose mid point given, diameter, conjugate diameters and four normals from a point.

Unit – III

Hyperbola : Standard equation, parametric co-ordinates, asymptotes, equation referred to asymptotes as axes, conjugate diameters and rectangular hyperbola.

Polar Equation : Standard equation, directrix, tangent, normal, polar and asymptotes.

Unit – IV

Sphere : standard equations in various forms, plane section, sphere through the circle of intersection of two spheres, power of a point, tangent plane, polar plane, polar line, angle of intersection of two spheres, length of tangent, radical plane, radical axis, co-axial system of spheres and limiting points.

Cone : Homogeneous equation in x, y, z , cone with a given vertex and given base, enveloping cone, condition for the general equation to represent a cone, tangent plane, reciprocal cone, angle between the two lines, in which a plane cuts a cone, three mutually perpendicular generators and right circular cone.

Cylinder : Right circular cylinder and enveloping cylinder.

Unit – V

Central Conicoids : Standard equation, tangent plane, condition of tangency, director sphere, polar plane, polar lines, section with a given center, enveloping cone, enveloping cylinder.

Ellipsoid : Normal, six normals from a point, cone through six normals, conjugate diameters and their properties.

Books Recommended for Reference:-

1. Shanti Narain, A Test Book of vector calculus, S. Chand and Co., New Delhi.
2. Murray R. Spiegel, Vector Analysis, Schaum Publishing Company, New York.
3. J. N. Sharma & A. R. Vasishtha, Vector Calculus, Krishna Prakashan Mandir, Meerut.
4. S. L. Loney, the elements of coordinate Geometry, Macmillan and Company, London.
5. Gorakh Prasad and H. C. Gupta, Text Book of Coordinate Geometry, Pothishala Pvt. Ltd., Allahabad.
6. R. J. T. Bell, Elementary Treatise on Coordinate Geometry of Three dimension Macmillan India Ltd., 1994.
7. Shanti Narayan, Solid Geometry, S. Chand and Company, New Delhi.
8. M. Ray & S. S. Seth, Differential calculus, students, friends & Co. Agra.
9. M. Ray & S. S. Seth, Integral calculus, students, friends & Co. Agra.

B.A. / B.Sc. Part – I Examination - 2019

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			foKku	dyk
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	izk;ksfxd	2	25	22
AA	mPp dyu	4	3 ?k.Vsa	75 66
AAA	lfn'k dyu ,ao	4	3 ?k.Vsa	75 68
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Note : Common paper will be set for both faculties i.e., Arts and Science

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foKku%50 @dyk%44

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bdkbZ & IV

oy;] 'kwU; ds HkktD] iw.kkZadh; izkUr rFkk {ks=} oy; rFkk iw.kkZadh; izkUr dk vfHky{k.k] mioy;] mi{ks=} vHkkT; {ks=} oy;] lekdkfjrk rFkk rqY;dkfjrk] iw.kkZadh; izkUr dk {ks= es vUr% LFkkiu] foHkkx {ks=A

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xq.ktkofy;]k ,oa xq.k/keZ] eq[; xq.ktkoyh] eq[; xq.ktkoyh oy;] vHkkT; xq.ktkoyh] mfPp"B xq.ktkoyh] oy; lekdkfjrk ij ewyHkwr izes;] ;wfDyfM;u oy; ,oa xq.k/keZ] cgqin oy; iw.kkZdh; izkUr ,oa {ks= ij cgqin oy;] fMfotuy ,Yxksjn~e A

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iz;ksfxd vad% foKku

%25@dyk% 22

ch,-&Hkkx izFke (Total Marks- 22)

Record	-	05
Practical -1	-	04
Practical -II	-	04
Viva-Voce	-	05

B.Sc. (Pt-I) (Total Marks- 25)

Record	-	05
Practical -1	-	07
Practical -II	-	07
Viva-Voce	-	06

- 1- pkj ;k pkj ls vf/kd ?kk okys chth; cgqinksa dk ys[kk fp= vkjs[k.kA
- 2- cwyh; cht xf.kr dh lgk;rk ls rdZ ifjiFkksa dk llyhdj.k djukA
- 3- cwyh; Qyuksa ds fy, IR;rk lkj.kh cukukA
- 4- leryh; oØksa dk vuqjs[k.k djukA
- 5- lewg lekdkfjrk dh ewy izes; ds vuqiz;ksxA
- 6- dqN fo'ks"k lafØ;kvksa ds fy, lafØ;k lkj.kh dk fuekZ.k djukA
- 7- xzkQh; fof/k ls chth; lehdj.kksa ds ewy Kkr djukA
- 8- ysxzkat izes; ds vuqiz;ksxA
- 9- Øep; ,oa Øep; lewg ls IEcfU/kr leL;k,aA
- 10- oy; ls IEcfU/kr leL;k,aA

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gq, dqy 10 y?kq iz'u gksaxs A izR;sd y?kq iz'u dk mÙkj yxHkx
20 'kCnksa esa gksA dqy vad% foKku%10@dyk%5
- [k.M c % bl [k.M esa izR;sd bdkbZ ls 02 iz'u yrsr gq, dqy 10 iz'u gksaxs A
izR;sd bdkbZ ls ,d iz'u dk p;u djrs gq, dqy 05 iz'uksa ds mÙkj nsus
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gS½tks lHkh bdkbZ;ksa esa ls fn, tkosaxs] fdUrq ,d bdkbZ ls ,d ls
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v/k%Li'khZ ,oa v/kksyEc] Li'kZ js[kk ij /kzqo ls yEc dh yEckbZA oØ dk ikfnd
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f=T;k ,oa fofHkUu lw=] oØrk dsUnz] oØrk thokA

bdkbZ & II

nks o nks ls vf/kd pjksa ds vkaf'kd vodyu] lEiw.kZ vodyu xq.kkad nks] rhu
rFkk m pjksa ds le?kkr Qyuksa ds fy, vk;yj izes;] la;qDr Qyu] vLi"V Qyuksa ds
fy;s izFke o f}rh; vody xq.kkadA nks pjksa ds Qyu ds fy;s Vsyj izes;] tsdksfc;u
,oa muds xq.k/keZ] nks o rhu pjksa ds fy;s mfPp"B] fufEu"B ,oa iY;k.k fcUnq]
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bdkbZ & III

vuUr Lif'kZ;ka] vUokyksi rFkk dsUnzt] ufr ifjorZu fcUnw] ,oa cgqy
fcUnqvksa] mÙkyrk o voryrk gsrq ijh{k.k.kA dkrhZ; ,oa /kzqoh; oØks dk vuqjs[k.k.kA

bdkbZ & IV

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chVk ,oa xkek Qyu] f} lekdyu Kkr djuk lekdyu ds Øe esa ifjorZu djuk ,oa /kzqoh; funsZ'kkdksa esa ifjofrZr djukA

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gq, dqy 10 y?kq iz'u gksaxs A izR;sd y?kq iz'u dk mÙkj yxHkx
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[k.M c % bl [k.M esa izR;sd bdkbZ ls 02 iz'u ysrs gq, dqy 10 iz'u gksaxs A
izR;sd bdkbZ ls ,d iz'u dk p;u djrs gq, dqy 05 iz'uksa ds mÙkj nsus
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foKku@dyk % 35

[k.M l % bl [k.M esa 04 iz'u o.kZukREkd gksaxs ¼iz'u esa Hkkx Hkh gks ldrs
gS½tks lHkh bdkbZ;ksa esa ls fn, tkosaxs] fdUrq ,d bdkbZ ls ,d ls
vf/kd iz'u ugha gksxkAnks iz'uksa ds mÙkj fn;s tkus gSaAizR;sd iz'u
dk mÙkj yxHkx 500 'kCnksa esa gks A
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bdkbZ & I

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xkWl] LVksd ,oa xzhu ds izes; ¼izek.kjfg½ rFkk mu ij vk/kkfjr leL;k;saA

bdkbZ & II

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vfHkyEc&xq.k/keZ] ,d fcUnq ls nks Li'kZ js[kk,] Li'kZ thok] /kzqo] /kqzoh] e/;
fcUnw ds :i esa thok] O;kl rFkk ,d fcUnw ls rhu vfHkyEcA

nh/kZo`Ùk %& ekud lehdj.k] lqk;d o`Ùk] mRdsUnz dks.k] Li'kZ js[kk]
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bdkbZ & III

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ds xq.k ,oaa vk;rh; vfrijoy; èkzqoh; lehdj.k] ekud lehdj.k] fu;rk] Li'kZ js[kk vfHkyEc] /kqzoh ,oa vuUr Lif'kZ;kaA

bdkbZ & IV

xksyk %& fofHkUu :i ls ekud lehdj.k] leryh; ifjPNsn] nks xksyksa ds ifjPNsn ls xqtjus okys xksys dk lehdj.k] fcUnq dh 'kfDr] Li'kZ ry] /kzqoh; ry] /kqzoh; js[kk,i] nks ewy js[kk] lek{k xksyksa dk fudk; rFkk lhekUr fcUnqA

'kadq] % ftldk 'kh"kZ o funsZ'kd oØ bafxr gks] vUokyksih 'kadq] f}?kk lehdj.k }kjk ,d 'kadq dks izznf'kZr djus dk izfrcU/k] Li'kZ ry] O;qRØe 'kadq] 'kadq dks ,d lery }kjk dkVus ij izklr nks js[kkvksa ds eè; dks.k] rhu ijLij ledksf.kd tud js[kkvksa dk izfrcU/k] rFkk yEc o`Ùkh; 'kadqA csyu% yEc o`Ùkh; csyu rFkk vUokyksih csyuA

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dsUnzh; 'kkadot %& ekud lehdj.k] Li'kZ ry] Li'kZrk dk izfrcU/k] fu;ked xksyk] /kzqoh; ry] /kzqoh; js[kk,i] fn;s dsUnz okyk ifjPNsn] vUokyksih csyu ,oa vUokyksih 'kadq nh?kZo`rt vfHkyEc] ,d fcUnw ls N% vfHkyEc N% vfHkyEcksa ls tkus okyk 'kadq] la;qXeh O;kl ,oa muds xq.k/keZA

B.A./ B.Sc. Part-II Exam.- 2019
MATHEMATICS

B.A./ B.Sc. Part-II Exam. – 2018

Paper	Nomenclature	Teaching Hr./Week	Exam. Duration	Max. Marks	
				Sci.	Arts
I	Real Analysis	4	3 Hrs	75	66
II	Differential Equations	3	3 Hrs.	50	44
	Practical	2		25	22
III	Mechanics	4	3 Hrs.	75	68

Practical Marks-25 Science / 22 Arts

B.A. (Pt-II) (Total Marks- 22)

Record - 05

Practical -1 - 06

Practical -II - 06

Viva-Voce - 05

B.Sc. (Pt-II) (Total Marks- 25)

Record - 05

Practical -1 - 07

Practical -II - 07

Viva-Voce - 06

Note : Common paper will be set for both faculties i.e., Arts and Science

Paper – I Real Analysis

Time duration : 3 Hrs

Max Marks : Science : 75 / Arts : 66

Note : Each question paper will contain three sections as under –

Section-A : One compulsory question with 10 parts, having 2 parts from each unit, short answer in 20 words for each part.

Total marks : (Science 10 / Arts 5)

Section-B : 10 questions, 2 questions from each unit, 5 questions to be attempted, taking one from each unit, answer approximately in 250 words.

Total marks : 35 (Science / Arts)

Section-C : 04 questions (question may have sub division) covering all units but not more than one question from each unit, descriptive type, answer in about 500 words, 2 questions to be attempted.

Total marks : (Science -30 / Arts- 26)

UNIT – I

The set of real numbers as a complete ordered field, incompleteness of \mathbb{Q} , Archimedean and denseness properties of \mathbb{R} , Modulus, Intervals, Definition of a sequence, Theorems on limit of sequence, bounded and monotonic sequences, nested interval theorem, Cauchy's sequence, Cauchy's convergence criterion.

UNIT – II

Convergence of series of non-negative terms, their various tests (Comparison; D'Alembert's ratio, Cauchy's n^{th} root, Raabe's, Gauss, Logarithmic, Demorgan and Bertand's, Cauchy's condensation, proof of tests not required) for convergence, Alternating series, Leibnitz's test, Series of arbitrary terms, absolute and conditional convergence, Abel's and Dirichlet's tests.

UNIT-III

Equivalent sets. Finite and infinite sets denumerable sets, Countable and uncountable sets. Interior point of a set, open set, limit point of a set, Bolzano-Weierstrass theorem. Closed set. Dense in itself and perfect sets. Cantor's ternary set.

UNIT-IV

Definition of limit of a function. Continuity of a function - Cauchy's and Heine's definitions with their equivalence. Types of discontinuities. Properties of continuous functions defined on closed intervals. Uniform continuity. Differentiability, Rolle's theorem, Lagrange's and Cauchy's mean value theorems and their geometrical interpretations. Taylor's theorem with various forms of remainders. Darboux's intermediate value theorem for derivatives.

UNIT -V

Darboux sums and their properties. Riemann integral, Integrability of continuous and monotonic functions. Mean value theorems of integral calculus, The fundamental theorem of integral calculus.

Improper integrals and their convergence comparison tests. Abel's and Dirichlet's tests.

Books recommended for reference :-

1. Shanti Narayan : Elements of real analysis, S.Chand & company Ltd., New Delhi.
2. Shanti Narayan : A Course of Mathematical Analysis, S.Chand & Company Ltd. New Delhi.
3. S.C. Malik, Mathematical Analysis, Wiley Estern Ltd. New Delhi.
4. S.C. Malik, Principles of Real Analysis, New Age International Ltd., New Delhi.
5. Hari Kishan, Real Analysis, Pragati Prakashan Meerut.
6. J.N. Sharma & A.R. Vasistha, Mathematical Analysis, Krishna Prakashan Mandir, Meerut.

Paper - II DIFFERENTIAL EQUATIONS

Time duration : 3 Hrs

Max Marks : Science : 50 / Arts : 44

Note : Each question paper will contain three sections as under –

Section-A : One compulsory question with 10 parts, having 2 parts from each unit, short answer in 20 words for each part. Total marks :05 (Science / Arts)

Section-B : 10 questions, 2 questions from each unit, 5 questions to be attempted, taking one from each unit, answer approximately in 250 words.

Total marks : 25 (Science / Arts)

Section-C : 04 questions (question may have sub division) covering all units but not more than one question from each unit, descriptive type, answer in about 500 words, 2 questions to be attempted.

Total marks : (Science -20 / Arts- 14)

UNIT-I

Order and Degree of a differential equation. Differential equations of first order and first degree, variables separable, homogeneous equations. Linear equations and equations reducible to linear form. Exact differential equations and equations reducible to exact forms.

Differential equations of first order but not of first degree. Solvable for x , y , p Clairaut's form, singular solutions. Geometrical meaning of a differential equation, orthogonal trajectories.

UNIT-II

Linear differential equations with constant coefficients, Homogeneous linear differential equations, Total differential equations.

UNIT-III

Linear differential equations of second order. Transformation by changing the dependent / independent variable. Method of variation of parameters, Exact differential equations and certain particular forms of equations.

UNIT-IV

Partial differential equations of first order, Lagrange's solution. Charpit's general method of solution.

UNIT-V

Partial differential equations of second and higher orders. Classification of linear partial differential equations of second order. Homogeneous and non-homogeneous equations with constant coefficients. Partial differential equations reducible to equations with constant coefficients. Monge's method.

Books recommended for reference :-

1. M. Ray, J.C. Chaturvedi & H.S. Sharma : A Text Book of Differential Equations, Students Friends & Company, Agra.
2. J.L. Bansal & H.S. Dhama : Differential Equations Vol. I & II, Jaipur Publishing House, Jaipur.

List of Practicals for B.A./B.Sc. (Pt.-II) Paper-II

Name of Practicals

1. Solution of differential equations using picard's method and comparison with exact solution.
2. Solution of differential equations using Euler's method and comparison with exact solution.
3. Formation of the ordinary differential equation.
4. Singular solution of differential equations.
5. Solution of differential equations using variation of parameters method.

6. Solution of partial differential equations using charpit's method.
7. Application of differential equations to solve LCR-circuits and harmonic motions.
8. Find convexity and concavity of the plane curves.
9. Find the singular points and their nature of the plane curves.
10. Formation of partial differential equations.

Time duration : 3 Hrs

Max Marks : Science : 75 / Arts : 66

Note : Each question paper will contain three sections as under –

Section-A : One compulsory question with 10 parts, having 2 parts from each unit, short answer in 20 words for each part.

Total marks : (Science 10 / Arts 5)

Section-B : 10 questions, 2 questions from each unit, 5 questions to be attempted, taking one from each unit, answer approximately in 250 words.

Total marks : 35 (Science / Arts)

Section-C : 04 questions (question may have sub division) covering all units but not more than one question from each unit, descriptive type, answer in about 500 words, 2 questions to be attempted.

Total marks : (Science -30 / Arts- 26)

UNIT-I

Analytical Conditions of equilibrium of a rigid body under coplanar forces. Friction.

UNIT-II

Center of Gravity, Common Catenary

UNIT-III

Simple harmonic motion. Motion under repulsion varying as the distance from a point, motion under inverse square law. Motion under earth's attraction. Hooke's Law, Horizontal and vertical elastic strings Rectilinear motion in a resisting medium.

UNIT- IV

Velocity and acceleration along radial and transverse directions and along tangential and normal directions. Projectiles : Motion on horizontal and inclined planes.

UNIT-V

Direct and oblique impact. Constrained Motion- Circular and Cycloidal.

Books recommended for reference :-

1. M.Ray & P.T. Chandi : Statics, Premier Publishing Company, Delhi.
2. M. Ray : A Text Book on Dynamics, Premier Publishing Company, Delhi.
3. S.M. Mathur : A New Text Book of Higher Statics, Atma Ram & sons, New Delhi.

B.A. / B.Sc Pt. – II Examination- 2019

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Note : Common paper will be set for both faculties i.e., Arts and Science

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B.A. (Pt-II) (Total Marks- 22)

Record	-	05
Practical -1	-	06
Practical -II	-	06
Viva-Voce	-	05

B.Sc. (Pt-II) (Total Marks- 25)

Record	-	05
Practical -1	-	07
Practical -II	-	07
Viva-Voce	-	06

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- 3- lk/kkj.k vody lehdj.k dk fuekZ.k djukA
- 4- vody lehdj.k dk fofp= gy Kkr djukA
- 5- izkpy fopj.k fof/k ls vody lehdj.k dk gy Kkr djukA
- 6- pkfiZV fof/k ls vkaf'kd vody lehdj.k dk gy Kkr djukA
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B.A./B.Sc. Part III Examination - 2019

Paper	Nomenclature	Teaching Hr./Week	Exam. Duration	Max. Marks	
				Sci.	Arts
I	Linear Algebra & complex analysis	4	3 Hrs.	75	66
II	Mathematical Statistics and Linear	4	3 Hrs.	75	66
	programming				
III	Numerical Analysis & C-Programming	3	3 Hrs.	50	46
	Practical	2		25	22

Practical Marks-25 Science / 22 Arts

B.A. (Pt-III) (Total Marks- 22)

Record	-	05
Practical -1	-	06
Practical -II	-	06
Viva-Voce	-	05

B.Sc. (Pt-III) (Total Marks- 25)

Record	-	05
Practical -1	-	07
Practical -II	-	07
Viva-Voce	-	06

Note : Common paper will be set for both faculties i.e., Arts and Science

B.A./B.Sc. Part III Examination – 2019

Paper - I – LINEAR ALGEBRA AND COMPLEX ANALYSIS

Time duration : 3 Hrs

Max Marks : Science : 75 / Arts : 66

Note : Each question paper will contain three sections as under –

Section-A : One compulsory question with 10 parts, having 2 parts from each unit, short answer in 20 words for each part.

Total marks : (Science 10 / Arts 5)

Section-B : 10 questions, 2 questions from each unit, 5 questions to be attempted, taking one from each unit, answer approximately in 250 words.

Total marks : 35 (Science / Arts)

Section-C : 04 questions (question may have sub division) covering all units but not more than one question from each unit, descriptive type, answer in about 500 words, 2 questions to be attempted.

Total marks : (Science -30 / Arts- 26)

Unit I (Linear Algebra)

Definition and examples of a vector space, Subspace of a vector space, Linear combination and Linear span, Linear dependence and independence of vectors, direct sums of subspaces.

Unit II (Linear Algebra)

Basis and dimension of finitely generated spaces. Quotient space, Linear transformation, Rank and nullity of linear transformation.

Unit III (Linear Algebra)

Characteristic values and characteristic vectors of matrices and .

Unit IV (Complex Analysis-I)

Complex numbers as ordered pairs. Geometric representation of complex numbers. Stereographic projection, Limit, Continuity and differentiability of a complex valued function. Analytic functions. Cauchy-Riemann equations. Harmonic functions. Determination of conjugate function.

Unit V (Complex Analysis-II)

Mapping or Transformation, Isogonal and conformal mappings necessary and sufficient conditions for a conformal mapping. Mobius Transformation, Fixed points, Cross ratio, Inverse points, Mapping

by elementary functions. Mapping $w = \frac{1}{2} \left(z + \frac{1}{z} \right)$, the inverse transformation $z = \sqrt{w}$

References:

1. Shanti Narayan : A course of Mathematical Analysis, S.Chand & Co., New Delhi
2. Shanti Narayan : Theory of functions of a complex variable, S.Chand & Co., New Delhi
3. Mullick, Arora: Mathematical Analysis, New Age Publications Delhi
4. Churchill & Brown - Complex Analysis, Tata Mcgraw Hill

5. I. N. Herstein, Topics in Linear Algebra, Wiley Eastern.
6. S. Lang, Linear Algebra
7. Sharma & Vashistha, Linear Algebra, Krishna Prakashan Mandir, Meerut.

Paper - II Mathematical Statistics and Linear programming

Time duration : 3 Hrs

Max Marks : Science : 75 / Arts : 66

Note : Each question paper will contain three sections as under –

Section-A : One compulsory question with 10 parts, having 2 parts from each unit, short answer in 20 words for each part.

Total marks : (Science 10 / Arts 5)

Section-B : 10 questions, 2 questions from each unit, 5 questions to be attempted, taking one from each unit, answer approximately in 250 words.

Total marks : 35 (Science / Arts)

Section-C : 04 questions (question may have sub division) covering all units but not more than one question from each unit, descriptive type, answer in about 500 words, 2 questions to be attempted.

Total marks : (Science -30 / Arts- 26)

NOTE : Non programmable Scientific Calculator is allowed in this paper

Unit I

Central moments, First four central moments in terms of raw moments and vice-versa. Karl-Pearson's Beta and Gamma coefficients. Measure of skewness and kurtosis. Random experiment. Sample space, Event, Types of events, Probability and Conditional probability of an event. Independent events, Theorems of compound and total probabilities, Baye's Theorem and its simple applications.

Unit II

Random variable, discrete and continuous random variables, Probability distribution of a discrete random variable, Probability density function of a continuous random variable. Distribution functions, Mathematical expectation of a random variable and of a function of random variable, Moments and Moment generating function, Cumulant generating function and cumulants, Characteristic functions.

Unit III

Discrete and continuous distributions with properties : Bernouli, Binomial, Poisson and Normal.

Unit IV

Linear programming, Variables , Objective function, Constraints and Mathematical form of a LPP. Graphical method of solution of two variable linear programming problems. Line and line segment in the Euclidean space R^n , Convex set, Hyperplane convex combination, Convex polyhedron, Extreme point of a convex set. Basic solution of a system of linear equations. Slack and surplus variables. Standard form of a LPP. Feasible solution, BFS and optimal BFS of a LPP. Replacement of basis vector. Improved BFS. Unbounded solutions, Conditions of optimality. Simplex algorithm, Artificial variable, Charne's Big M-method.

Unit V

Dual and primal. Problem Standard form of a primal problem. Formation of dual of a standard primal problem. Fundamental theorem of duality. Solution of a LPP by solving its dual by simplex method. Assignment problems.

References:

1. S.C.Gupta & V.K.Kapoor: Elementary mathematical statistics, Sultan Chand & Sons, N.Delhi
2. M.Ray & HS Sharma: Mathematical Statistics, Ramprasad & Sons, Agra
3. RK Gupta: Linear Programming, Krishna Prakashan, Meerut.
4. Kanti Swaroop : Operation Research, S.Chand & Co., New Delhi

Paper - III -NUMERICAL ANALYSIS AND C-PROGRAMMING

Time duration : 3 Hrs

Max Marks : Science : 50 / Arts : 44

Note : Each question paper will contain three sections as under –

Section-A : One compulsory question with 10 parts, having 2 parts from each unit, short answer in 20 words for each part. Total marks :05 (Science / Arts)

Section-B : 10 questions, 2 questions from each unit, 5 questions to be attempted, taking one from each unit, answer approximately in 250 words.

Total marks : 25 (Science / Arts)

Section-C : 04 questions (question may have sub division) covering all units but not more than one question from each unit, descriptive type, answer in about 500 words, 2 questions to be attempted.

Total marks : (Science -20 / Arts- 14)

Unit - I

Principles of C Programming : Algorithms, Flowcharts, Constants, Variables, Data type, Declaration of storage class, assigning values of variables, symbolic constant. Operators and Expressions. Common I/O operators decision making, branching and loops : if, if-else, Nested if-else, WHILE, DO, for loop, while statement, switch-case statement.

Array : One dimensional, Two dimensional. Initialization of two dimensional arrays.

Unit - II

User defined function in C: function declaration, calling a function, Category of function, nesting of functions recursion, Pointers.

Operators : forward difference , backward difference, Shift E, Inverse shift E^{-1} , Differentiation D, Central -Difference , Mean difference , Central sum , Divided difference, Inter relation between various operators, Forward and backward difference table. Factorials notation.

Unit - III

Interpolation with equal and unequal intervals, Central difference interpolation, inverse interpolation.

Unit - IV

Numerical differentiation and Numerical –Integration: Trapezoidal rule, Weddle rule, Simpson’s rules, Gauss quadrature formula.

Unit - V

Solution of equations : Bisection method, regula-falsi method and Newton- Raphson method.
Solution of ordinary differential equations : Picard’s method and Euler’s method.

Book Recommended :

E. BALAGURUSWAMY PROGRAMMING IN ANSI C 2ed TATA Mc Graw - Hill
Pub. N. Delhi.

REFERENCES :

- | | | |
|--------------------|---|--------------------------------|
| 1. SAXENA H.C. - | FINITE DIFFERENCE AND
NUMERICAL ANALYSIS | S.CHAND AND COMPANY |
| 2. E.BALAGURUSWAMY | PROGAMMING IN ANSI C 2 nd | TATA McGraw-HILL
PUB. DELHI |

List of Practicals for B.A./B.Sc. (Pt.-III)

List of Practicals :

1. To find the sum of HARMONIC SERIES.
2. To solve the quadratic Equation.
3. Evaluation of Binomial Coefficients Using do and while loops
4. To print a grouped frequency table using switch case statements.
5. To find minimum cost of operation which consists two components using Break and continue statements.
6. To Calculate the average of numbers.
7. To show a matrix using array.
8. To sort a list and calculate its median using array , If - then - else .
9. To find the Area of curve using trapezoidal rule.
10. To copy one string into another string.
11. Writing a string using % format.
12. To form a grouped frequency table using array and for loop.
13. To calculate the standard deviation of given data using array , If and break statements.
14. to open a file and appending using pointers.

B.A./B.Sc Part – III Examination – 2019

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AAA	la[;kRed fo'ys"k.k ,oa C&izksxzkeax	3	3 ?k.Vsa	50	46
	izk;ksfxd	2	25	22	

Note : Common paper will be set for both faculties i.e., Arts and Science

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[k.M c % bl [k.M esa izR;sd bdkbZ ls 02 iz'u ysrs gq, dqy 10 iz'u gksaxs A
izR;sd bdkbZ ls ,d iz'u dk p;u djrs gq, dqy 05 iz'uksa ds mÜkj nsus
gksaxs A izR;sd iz'u dk mÜkj yxHkx 250 'kCnksa esa gksA
dqy vad%35

¼foKku@dyk½

[k.M l % bl [k.M esa 04 iz'u o.kZukREkd gksaxs ¼iz'u esa Hkkx Hkh gks ldrs
gS½tks lHkh bdkbZ;ksa esa ls fn, tkosaxs] fdUrq ,d bdkbZ ls ,d ls
vf/kd iz'u ugha gksxkAnks iz'uksa ds mÜkj fn;s tkus gSaAizR;sd iz'u
dk mÜkj yxHkx 500 'kCnksa esa gks A
dqy vad %¼30 foKku½¼26 dyk½

bdkbZ&A ¼jSf[kd chtkoyh½

lfn'k lef"V ¼ifjHkk"kk ,oa mnkgj.k½] milfn'k lef"V] lfn'kksa dk ,d?kkr lap;] jSf[kd

Liku] jSf[kd vkfJrrk] jSf[kd Lora=rk] milef"V;ksa dk MkbjsDV ;ksxA

bdkbZ&AA ¼jSf[kd chtkoyh½

vk/kkj ,oa foek] foHkkx lef"V] jSf[kd :ikarj.k] jSf[kd :ikarj.k dh dksfV ,oa 'kwU;rk

bdkbZ&AAA ¼jSf[kd chtkoyh½

esfV^aDI ,oa jSf[kd :ikarj.k vfHkyk{kf.kd ewy ,oa lfn'k

bdkbZ& IV ¼lfEeJ fo'ys"k.k&A½

Øfer ;qXe esa lfEeJ la[;k,sa] lfEeJ la[;kvksa dk T;kferh; fu:i.k] f=foe iz{ksiA

lfEeJ pjksa ds lfEeJ eku ds Qyuksa dh lhek] lkarR;rk] vodyuh;rk] fo'ysf"kd

Qyu] dkW'kh jheu lehdj.k] izlaoknh Qyu] la;qXeh Qyu dk fu/kkZj.kA

bdkbZ& v ¼lfEeJ fo'ys"k.k&AA½

izfrfp=.k ;k :ikUrj.k] rqY;kdks.kh rFkk vuqdk.s.k izfrfp=.k] vuqdk.s.k izfrfp=.k ds fy,
vko';d ,oa i;kZlr izfrca/k] eksfc;l :ikarj.k] izkjafHkd Qyuksa dk izfrykse fcanq

:ikarj.k] :ikUrj.k] $w = \frac{1}{2} \left(z + \frac{1}{z} \right)$ izfrykse :ikarj.k $z = \sqrt{w}$

iz'u i= &AA lkaf[;dh ,oa jsf[kd leL;k,sa

le; & 3 ?kVs

vf/kdre vad% foKku% 75 @dyk % 66

uksV % bl iz'u i= esa 03 [k.M fuEu izdkj gksaxsa %

[k.M v % bl [k.M esa ,d vfuok;Z iz'u ftlesa izR;sd bdkbZ ls 02 y?kq iz'u ysrsgq, dqy 10 y?kq iz'u gksaxsAizR;sd y?kq iz'u dk mÙkj yxHkx 20 'kCnksa esa gksA dqy vad%¼10&foKku½¼5&dyk½

[k.M c % bl [k.M esa izR;sd bdkbZ ls 02 iz'u ysrsgq, dqy 10 iz'u gksaxs A izR;sd bdkbZ ls ,d iz'u dk p;u djrs gq, dqy 05 iz'uksa ds mÙkj nsus gksaxs A izR;sd iz'u dk mÙkj yxHkx 250 'kCnksa esa gksA dqy vad%35 ¼foKku@dyk½

[k.M l % bl [k.M esa 04 iz'u o.kZukREkd gksaxs ¼iz'u esa Hkkx Hkh gks ldrs gS½tks lHkh bdkbZ;ksa esa ls fn, tkosaxs] fdUrq ,d bdkbZ ls ,d ls vf/kd iz'u ugha gksxkAnks iz'uksa ds mÙkj fn;s tkus gSaAizR;sd iz'u dk mÙkj yxHkx 500 'kCnksa esa gks A dqy vad %¼30 foKku½¼26 dyk½ **bdkbZ&A**

vk?kw.kZ ,oa dsUnzh; vk?kw.kZ % izFke pkj dsUnzh; vk?kw.kZ] vk?kw.kZ ,oa dsUnzh; vk?kw.kksZ esa laca/k] dkyZfi;lZu ds chVk ,oa xkek fu;rkad] fo"kerrk dk ekiu ddqnrk % ;kn`fPNd iz;ksx] uewuk lef"V] ?kVuk] ?kVukvksa ds izdkj] izkf;drk ,oa lizfrca/k izkf;drk] Lora= ?kVuk,] ;qXe ,oa lEiw.kZ izkf;drk ds izes;] cs; dk izes; ,oa bls lly vuqiz;ksxA

bdkbZ&AA

;kn`fPNd pj&fofoDr ,oa larr pj] fofoDr pj ds fy, izkf;drk caVu] larr pj ds fy, izkf;drk ?kuRo Qyu] caVu Qyu] izR;k'kk] vk?kw.kZ ,oa vk?kw.kZ tud Qyu] lap;h ,oa lap;h tud Qyu] vfHkyk{kf.kd QyuA

bdkbZ&AAA

fofoDr ,oa larr caVu % f}in] lokalks ,oa izlkekU; A

bdkbZ& IV

jSf[kd izksxzkeu % pj] b"V Qyu] izfrca/k ,oa jSf[kd izksxzkeu leL;k dk
xf.krh; :i] ys[kkfp=
fof/k }kjk gy] ;qfDyM Rⁿ ry esa js[kk ,oa js[kk[k.M] voeq[k leqPp;] vf/klery]
voeq[k lap;] voeq[k cgqHkqt] voeq[k leqPp; ds pje fcUnq] jSf[kd
;qxir&lehdj.kkssa dk vk/kkjH gy] U;wurk ,oa vkf/kD; iwjd pj] jSf[kd izksxzkeu leL;k
dk ekud :i] lqlaxr gy] vk/kkjH lqlaxr gy ,oa b"Vre gy] vk/kkjH lfn'k dk izfrLFkku
mUuf;r vk/kkjH lqlaxr gy] vizfrcaf/kr gy] b"VreRo ds fy, izfrca/k] flEllysDI dyu]
d`f=e pj] pkuZ M fof?k A

bdkbZ& V

izkjafHkd ,oa }Srh leL;k dk ekud :i] izkjafHkd leL;k dk }Srh esa fu:i.k] }Srh
dk ewy izes;] jSf[kd izksxzkeu leL;k dk }Srh }kjk gy] fu;ru leL;k,saA

iz'u i= &AAA la[;kRed fo'ys"K.k ,oa C-izksxzkeax

le; & 3 ?kVs vf/kdre vad% foKku% 50 @dyk % 46
uksV % bl iz'u i= esa 03 [k.M fuEu izdkj gksaxsa %
[k.M v % bl [k.M esa ,d vfuok;Z iz'u ftlesa izR;sd bdkbZ ls 02 y?kq iz'u ysrs
gq, dqy 10 y?kq iz'u gksaxsAizR;sd y?kq iz'u dk mÙkj yxHkx
20 'kCnksa esa gksA dqy vad%¼05&foKku½
¼5&dyk½
[k.M c % bl [k.M esa izR;sd bdkbZ ls 02 iz'u ysrs gq, dqy 10 iz'u gksaxs A
izR;sd bdkbZ ls ,d iz'u dk p;u djrs gq, dqy 05 iz'uksa ds mÙkj nsus
gksaxs A izR;sd iz'u dk mÙkj yxHkx 250 'kCnksa esa gksA

¼foKku@dyk½

[k.M I % bl [k.M esa 04 iz'u o.kZukREkd gksaxs ¼iz'u esa Hkkx Hkh gks ldrs gS½tks IHkh bdkbZ;ksa esa ls fn, tkosaxs] fdUrq ,d bdkbZ ls ,d ls vf/kd iz'u ugha gksxkAnks iz'uksa ds mÙkj fn;s tkus gSaAizR;sd iz'u dk mÙkj yxHkx 500 'kCnksa esa gks A dqy vad %¼foKku 20/ dyk 16½

uksV % bl isij esa lkbaVfQd dSydqysVj ¼ukWu izksxzkescy½ ds iz;ksx dh vuqerh gSA

bdkbZ&A

C&izksxzkfeax ds ewyHkwr fl)kUr % ,YxksfjFkel~] ¶[yks pkVZ] vpj] pj] MkVv Vkbi] LVksjst Dykl dks ifjHkkf"kr djuk] pjksa dks eku iznku djuk] flEoksfyd vpj] ladkjd ,oa O;atd] lkekU; ı/ı ladkjd fu.kZ;kRed] 'kkf[kr ,oa ik'k ¼ywi½ % If, if-else, nested if-else, while, do, for ik'k ¼ywi½] okby izdFku ¼LVsVesUV½] fLop dsl izdFkuA

vkO;wg ¼,sjh½ % ,d foeh;] f}foeh;] f}foeh; vkO;wg dks izkjaHk djuk A

bdkbZ&AA

C esa ;wtj ifjHkkf"kr Qyu] Qyu dh ?kks"k.kk] Qyu dkWy djuk] Qyu ds izdkj] Qyu esa Qyu ifjHkkf"kr djuk] fjdlZu ikWbZUVj A

ladkjd %& vxzkUrj] i'pkUrj] foLFkkfir] izfrykse] vodyu] dsUnzh; vUrj] ek/; vUrj] dsUnzh; ;ksx] foHkkftr vUrj] ,d nwljs ladkjd esa laca/k] vxzkUrj o i'pkUrj lkjf.k;k;] Øexqf.kr ladsr A

bdkbZ&AAA

leku o vleku vUrjky vUrosZ'ku] dsUnzh; vUrj vUrosZ'ku lw=] izfrykse vUrosZ'ku A

bdkbZ& IV

la[;kRed vodyu] la[;kRed lekdyu% V^alktksbMy fu;e] oSMY dk fu;e] flEilu ds fu;e] xkWl Js=dyu lw=A

bdkbZ& v

lehdj.kksa dk gy % f}&Hkktu fof/k] jsXkqYkk&QkYlh fof/k ,oa U;wVu&jkQlu fof/k A

lk/kkj.k vodyu lehdj.k dk la[;kRed gy % fidWkMZ fof/k ,oa vkW;yj fof/kA

izk;ksfxd %

ch-,llh- @ch,- &Hkkx r`rh; izk;ksfxd ijh{kk 25@22 vadks dh gksxhA

¼lh&izksxzkfeax ls lacaf/kr lk/kkj.k leL;k,sa rFkk chth; ,oa vchth;
lehdj.kksa dks la[;kRed fl)kUrksa ls gy djuk½A

foLr`r izk;ksfxd lwph vaxzsth olZu esa miyC/k gSA