Raj Rishi Bhartrihari Matsya University Alwar

MATHEMATICS

Appendix-III

B.A./B.Sc. Part – III – 2019-2020 and ownwards

Teaching : 3 Hours per Week per Theory Paper.
Examination:

		Min.Pass Marks	Max. Marks
Scheme:	**Science – 72**		**200**
	Arts – 72		**200**
		Duration	**Max.Marks**
Paper – I	**Algebra**	**3 hrs.**	**50 (Science)** 53 (Arts)
Paper – II	**Complex Analysis**	**3 hrs.**	**50 (Science)** 53 (Arts)
Paper – III	**Dynamics and Computer Programming in C**	**3 hrs.**	**50 (Science)** 54 (Arts)
Practical : Solution by Programming in C		**2 hrs.**	**50 (Science)** 40 (Arts)

Note:

1. Common paper will be set for both the Faculties of Social Science and Science. However, the marks obtained by the candidate in the case of Faculty of Social Science will be converted according to the ratio of the maximum marks of the papers in the two Faculties.

2. Each candidate is required to appear in the Practical examination to be conducted by internal and external examiners. External examiner will be appointed by the University and internal examiner will be appointed by the Principal in consultation with Local Head/Head, Department of Mathematics in the college.

3. An Internal/external examiner can conduct Practical Examination of not more than 100 (Hundred) Candidates (20 Candidates in one batch).

4. Each candidate has to pass in Theory and Practical examinations separately.

Paper -I : Algebra
Teaching : 3 Hours per Week
Duration of Examination : 3 Hours **Max. Marks: 50 (Science)**
53(Arts)

Note: Syllabus of this paper is divided into five units. This paper contains 11 questions. Candidates are required to attempt only 9 questions. Question no. 1 to 6 are compulsory and any three questions from question no. 7 to 11. First question contain ten parts of very short answer type, two parts from each unit. Each part carries one mark. Questions no. 2 to 6 (five short answer type question) one from each unit. Each carries two marks. Questions no. 7 to 11 are five big questions, one from each unit. Each carries ten marks.

Unit 1: Definition and simple properties of Groups and Subgroups. Permutation group, Cyclic group. Cosets, Lagrange's theorem on the order of subgroups of a finite order group.

Unit 2: Morphism of groups, Cayley's theorem. Normal subgroups and Quotient groups. Fundamental theorems of Isomorphism.

Unit 3: Definition and simple properties of Rings and Subrings. Morphism of rings. Embedding of a ring, Integral domain and field. Characteristics of a Ring and Field.

Unit 4: Ideals and Quotient Ring. Maximal ideal and Prime ideal. Principal Ideal domain. Field of quotients of an integral domain. Prime fields. Definition, Examples and Simple properties of Vector spaces and Subspaces.

Unit 5: Linear combination, Linear dependence and Linear independence of vectors. Basis and Dimension. Generation of subspaces. Sum of subspaces. Direct sum and Complement of subspaces. Quotient space and its dimension.

Paper – II: Complex Analysis
Teaching : 3 Hours per Week
Duration of Examination : 3 Hours **Max. Marks: 50 (Science)**
53 (Arts)

Note: Syllabus of this paper is divided into five units. This paper contains 11 questions. Candidates are required to attempt only 9 questions. Question no. 1 to 6 are compulsory and any three questions from question no. 7 to 11. First question contain ten parts of very short answer type, two parts from each unit. Each part carries one mark. Questions no. 2 to 6 (five short answer type question) one from each unit. Each carries two marks. Questions no. 7 to 11 are five big questions, one from each unit. Each carries ten marks.

Unit 1: Complex plane. Connected and Compact sets. Curves and Regions in complex plane. Jordan curve Theorem (statement only). Extended complex plane. Stereographic projection. Complex valued function – Limits, Continuity and Differentiability. Analytic functions, Cauchy-Riemann equations (Cartesian and polar form). Harmonic functions, Construction of an analytic function.

Unit 2: Complex integration, Complex line integrals, Cauchy integral theorem, Indefinite integral, Fundamental theorem of integral calculus for complex functions. Cauchy integral formula, Analyticity of the derivative of an analytic function, Morera's theorem, Poisson integral formula, Liouville' theorem.

Unit 3: Taylor's theorem. Laurent's theorem. Maximum modulus theorem.
Power series – Absolute convergence, Abel's theorem, Cauchy-Hadamard theorem, Circle and Radius of convergence, Analyticity of the sum function of a power series.

Unit 4: Singularities of an analytic function, Branch point, Meromorphic and Entire functions, Riemann's theorem, Casorati-Weierstrass theorem.
Residue at a singularity, Cauchy's residue theorem. Argument principle. Rouche's theorem. Fundamental theorem of Algebra.

Unit 5: Conformal mapping. Bilinear transformation and its properties. Elementary mappings: $w(z)=\frac{1}{2}\left(z+\frac{1}{z}\right), z^2, e^z, \sin z, \cos z,$ and $\log z$.
Evaluation of a real definite integral by contour integration.
Analytic continuation. Power series method of analytic continuation.

Paper – III: Dynamics and Computer Programming in C
Teaching : 3 Hours per Week
Duration of Examination : 3 Hours **Max. Marks:** **50 (Science)**
54 (Arts)

Note: Syllabus of this paper is divided into five units. This paper contains 11 questions. Candidates are required to attempt only 9 questions. Question no. 1 to 6 are compulsory and any three questions from question no. 7 to 11. First question contain ten parts of very short answer type, two parts from each unit. Each part carries one mark. Questions no. 2 to 6 (five short answer type question) one from each unit. Each carries two marks. Questions no. 7 to 11 are five big questions, one from each unit. Each carries ten marks.

Unit 1: Velocity and acceleration – along radial and transverse directions, along tangential and normal directions. S.H.M., Hooke's law, motion along horizontal and vertical elastic strings.

Unit 2: Motion in resisting medium– Resistance varies as velocity and square of velocity(vertical motion). Work and Energy. Motion on a smooth curve in a vertical plane. Motion on the inside and outside of a smooth vertical circle.

Unit 3: Central orbits – p-r equations, Apses, Time in an orbit, Kepler's law of planetary motion. Moment of inertia – M.I. of rods, Circular rings, Circular disks, Solid and Hollow spheres, Rectangular lamina, Ellipse and Triangle. Theorem of parallel axis. Product of inertia.

Unit 4: Programming languages and problem solving on computers, Algorithm, Flow chart, Programming in C- Constants, Variables, Arithmetic and logical expressions, Input-Output,

Unit 5: Conditional statements, Implementing loops in Programs, Defining and manipulation arrays and functions.

Practical: Solution by Programming in C
Teaching: 2 Hours per Week per Batch
(20 Candidates in each Batch)

Examination:

Scheme	**Duration: 2 Hours**	
	Science	**Arts**
Max.Marks	50	40
Min.Pass Marks	18	13

Distribution of Marks:
Two Practicals

15 Marks each	=	30 Marks (13 Marks each)	26
Practical Record	=	10 Marks	07
Viva-voce	=	10 Marks	07
Total Marks	=	50 Marks	40

Programming in C and execution for the result of

1. Solution of linear algebraic equations by Gauss elimination method
2. Solution of algebraic and transcendental equations by Bisection, False position and Newton – Raphson Methods
3. Solution of ordinary differential equations by Euler's and Runga-Kutta 4th order method
4. Numerical integration by Trapezoidal and Simpson's one third rule
5. Mean and standard deviation (S.D.), Line Graph, Histogram, Bar Graphs, Pie Charts

Note:

1. Each Candidate (Regular/Non-Collegiate) has to prepare his/her practical record.
2. Each Candidate has to pass in Practical and Theory examinations separately.
3. Non Collegiate candidates are required to take practice certificate of 21 days (2 hours per day.)