B.Sc./B.A. Part II Examination 2021

TEACHING AND EXAMINATIION SCHEME

Subject/Paper	Period/Week		Exam. Hours	Max Marks	Min.Pass Marks
	L	P			
MATHEMATICS					
Paper I	3	-	3	75	
Paper II	3	-	3	75	81
Paper III	3	-	3	75	

B.Sc./B.A. Part II Examination – 2021
MATHEMATICS

Paper   I   : **Numerical Analysis and Linear Programming.**
Paper   II   : **Differential Equations.**
Paper   III : **Mechanics I (Statics and Dynamics of particle)**

Total Marks: 75   **Time: 03:00 Hrs.**

Paper I
Numerical Analysis and Linear Programming

Note: Each theory paper is divided in three parts i.e. Section – A, Section – B and Section – C

Section A: Will consist of 10 compulsory questions. There will be two questions from each unit and answer of each question shall be limited up to 30 words. Each question will carry 2 marks.

Section B: Will consist of 10 questions. Each unit will be having two question; students will answer one question from each Unit. Answer of each question shall be limited up to 250 words. Each question will carry 5 marks.

Section C: Will consist of total 05 questions one from each unit. Students will answer any 03 questions and answer of each question shall be limited up to 500 words. Each question will carry 10 marks.

Unit 1: Difference operators and factorial notation, Differences of polynomial, Newton's formulae for forward and backward interpolations. Divided differences, relation between divided differences and Simple difference. Newton's general interpolation formulae, Lagrange interpolation formula.

Unit 2: Central differences, Gauss, Stirling and Bessel interpolation formulae. Numerical Differentiation. Numerical integration, Trapezoidal, Simpson's and Weddle's rules.

Unit 3: Solution of linear difference equations with constant and variable coefficients. Solution of Algebraic and Transcendental equations, Iterative, Regula Falsi and Newton Raphson methods.

Unit 4: Convex sets and their properties. The simplex technique and its application to simple L.P. problems. The Big M-Method.

Unit 5: Two Phase Method, Revised Simplex Method. Concepts of daulity in linear programming. Framing of dual programming. Elementary theorems of daulity. Integer Programming Problem (IPP).

SUGGESTED BOOKS
D.C. Gokhroo & S.R. Saini : Linear Programming (Hindi Ed.), Navkar Prakashan, Ajmer.
Mittal, Sethi : Linear Programming, Pragati Prakashan, Meerut
Goyal, Mittal : Numerical Analysis, Prograti Prakashan, Meerut
J.L.Bansal,S.L. Bhargava & S.M. Agarwal : Numerical Analysis (Hindi Ed.); Jaipur Publishing House, Jaipur
H.C. Saxena : Numerical Analysis; S.Chand & Co., New Delhi
D.C. Gokhroo : Numerical Analysis (Hindi Ed.);Navkar Prakashan, Ajmer
S.L. Bhargava, K.C. Sharma & S.S. Bhati : Linear programming (Hindi Ed.); Jaipur Publishing House, Jaipur.

Total Marks: 75   **Time: 03:00 Hrs.**

Paper II
Differential Equations

Note: Each theory paper is divided in three parts i.e. Section – A, Section – B and Section – C

Section A: Will consist of 10 compulsory questions. There will be two questions from each unit and answer of each question shall be limited up to 30 words. Each question will carry 2 marks.

Section B: Will consist of 10 questions. Each unit will be having two question; students will answer one question from each Unit. Answer of each question shall be limited up to 250 words. Each question will carry 5 marks.

Section C: Will consist of total 05 questions one from each unit. Students will answer any 03 questions and answer of each question shall be limited up to 500 words. Each question will carry 10 marks.

Unit 1: Exact and reducible to exact differential equations of first order and first degree. First order higher degree differential equations solvable for x,y,p. Clairaut's form and singular solutions.

Unit 2: Linear differential equations with constant coefficients, Homogeneous linear differential equations with variable coefficients. Simultaneous differential equations, Total differential equations of the form Pdx + Qdy + Rdz = 0, by method of inspection and method for homogeneous equations.

Unit 3: Linear differential equations of second order of the form $\dfrac{d^2 y}{dx^2} + P\dfrac{dy}{dx} + Qy = R.$

Exact Linear differential equations of nth order. Exact Non-Linear differential equations.

Differential equations of the various forms e.g., (i) $\dfrac{d^2 y}{dx^2} = f(y)$ (ii) Equations not containing y directly (iii) Equations not containing x directly and other forms. Method of variation of parameters to the solution of second order linear differential equations.

Unit 4: Series solutions of Second Order Linear differential equations, Power series method, Bessel and Legendre equations. Partial differential equations of the first order. Lagrange's solution. Some special types of equations which can be solved easily by methods other than the general method. Charpit (general) method of solution.

Unit 5: Partial differential equations of second and higher order. 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 of integrating Rr + Ss + Tt = V.

SUGGESTED BOOKS

Sharma, Gupta : Differential Equations; Krishna Prakashan, Meerut

Ray, Chaturvedi : Differential equations; Kedar Nath, Ram Nath & co., Agra.

J.L.Bansal, H.S.Dhami : Differential equations (Vol. II); Jaipur Publishing House, Jaipur

D.C.Gokhroo, S.R. Saini & R.K.Kumbhat : Differential equations (Hindi Ed.);Navkar Prakashan, Ajmer

Gokhroo, Saini, Oza : Partial differential equations; Jaipur Publishing House, Jaipur.

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Paper III
Mechanics – I
(Statics and Dynamics of a Particle)

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Note: Each theory paper is divided in three parts i.e. Section – A, Section – B and Section – C

Section A: Will consist of 10 compulsory questions. There will be two questions from each unit and answer of each question shall be limited up to 30 words. Each question will carry 2 marks.

Section B: Will consist of 10 questions. Each unit will be having two question; students will answer one question from each Unit. Answer of each question shall be limited up to 250 words. Each question will carry 5 marks.

Section C: Will consist of total 05 questions one from each unit. Students will answer any 03 questions and answer of each question shall be limited up to 500 words. Each question will carry 10 marks.

Unit 1: Resultant and equilibrium of coplanar forces acting on a rigid body. Friction.

Unit 2: Stable and Unstable equilibrium. Forces in three dimensions, Poinsot's central axis, Wrenches.

Unit 3: Virtual work and common catenary.

Unit 4: Velocities and accelerations along radial and transverse directions and along tangential and normal directions. Simple harmonic motion and motion under inverse square law.

Unit 5: Motion on smooth and rough plane curves, circular and cycloidal motions. Central forces and central orbits (excluding planetary motion).

SUGGESTED BOOKS

S.L. Ioney : Statics

R.S. Verma : A Text Book on Statics; S. Chand & Co., New Delhi.

S.L. Loney : Dynamics of a particle & Rigid bodies.

M.Ray : A Text book on Dynamics; S. Chand & Co., New Delhi

D.C.Gokhroo, S.R. Saini & G.R.Yadav : Higher Dynamics II (Hindi Ed.); Navkar Prakashan, Ajmer

S.L. Bhargava & S.M.Agarwal : Dynamics (Hindi Ed.);Jaipur Publishing House, Jaipur

S.L. Bhargava, S.M.Agarwal & V.G. Gupta : Statics (Hindi Ed.); Jaipur Publishing House, Jaipur

Gokhroo : Statics (Hindi Ed.); Navkar Prakashan, Ajmer.