OUTLINES OF TESTS,

SYLLABI AND COURSES OF READING

FOR

B. A./ B.Sc -2nd Year

Programme Code:MTHB3PUP

Session 2024-25, 2025-26,2026-27.

Head
Mathematics Deptt.
Punjabi University, Patiala

SEMESTER-III

Code	Title of Paper/Subject	Hrs/Week	Credit	Max Cont. Assmt.	Marks Univ Exam	Total
MTHB2101T	Advanced Calculus	4.5	3	15	35	50
MTHB2102T	Statics	4.5	3	15	35	50

SEMESTER-IV

Code	Title of Paper/Subject	Hrs/Week	Credit	Max Cont. Assmt.	Marks Univ Exam	Total
MTHB2201T	Mathematical Methods	4.5	3	15	35	50
MTHB2202T	Dynamics	4.5	3	15	35	50

Chauhan

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MTHB2101T: ADVANCED CALCULUS

Course Outcomes:	
CO1	Student will be able to understand function of several real variables
CO2	Able to learn differentiability of real valued functions of more than one variable
CO3	Able to learn the techniques to find maxima and minima of functions of several real variables.
CO4	Able to learn integration of functions of more than one real variable
CO5	Able to calculate ares and volumes.

For Regular Students / Students of Centre for Distance and Online Education
Maximum Marks: 50 Marks

Maximum Time: 3 Hrs.

For Regular students:6Lectures of 45minutes/week

External Marks: 35
Internal Assessment: 15
Pass Percentage: 35%
For Private Students
Maximum Marks: 50 Marks

INSTRUCTIONS FOR THE PAPER-SETTER

The question paper will consist of three sections A, B and C. Sections A and B will have four questions each from the respective sections of the syllabus and Section C will consist of one compulsory question having eleven short answer type questions covering the entire syllabus uniformly. Each question in Sections A and B will be of 06 marks and Section C will be of 11 marks.

INSTRUCTIONS FOR THE CANDIDATES

Candidates are required to attempt five questions in all selecting two questions from each of the Sections A and B and compulsory question of Section C.

SECTION-A

Limit and Continuity of Functions of several variables. Differentiability of real-valued functions of two variables. Partial differentiation, Jacobians and their properties, Schwarz's & Young's theorems. Euler's theorem on homogenous functions. Taylor's theorem for functions two variables and error estimation. Maxima and Minima, Lagrange's multiplier method.

SECTION-B

Double and Triple Integrals, Change of order of integration in double integrals, Change of variables. Applications to evaluation of areas, Volume, Centre of Gravity and Moments of Inertia.

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Parveen Lata
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REFERENCE BOOKS:

1. Malik and Arora; Mathematical Analysis.
2. Shanti Narayan; Mathematical Analysis.
3. Thomas and Finney; Calculus and Analytical Geometry.

Chawla

Parveen Lata

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MTHB2102T: STATICS

Course Outcomes:	
CO1	Student will be able to understand basic notations of Statics
CO2	Able to analyze different types of force system
CO3	Able to learn how to apply equilibrium analysis to solve problems involving static equilibrium
CO4	Student will be able to apply statics principles to real-world problems.
CO5	Problem-Solving Skills will be developed

For Regular Students / Students of Centre for Distance and Online Education
Maximum Marks: 50 Marks

Maximum Time: 3 Hrs.

For Regular students:6Lectures of 45minutes/week

External Marks: 35
Internal Assessment: 15
Pass Percentage: 35%
For Private Students
Maximum Marks: 50 Marks

INSTRUCTIONS FOR THE PAPER-SETTER

The question paper will consist of three sections A, B and C. Sections A and B will have four questions each from the respective sections of the syllabus and Section C will consist of one compulsory question having eleven short answer type questions covering the entire syllabus uniformly. Each question in Sections A and B will be of 06 marks and Section C will be of 11 marks.

INSTRUCTIONS FOR THE CANDIDATES

Candidates are required to attempt five questions in all selecting two questions from each of the Sections A and B and compulsory question of Section C.

SECTION-A

Statics: Basic notation, Newton Laws of motion, system of two forces, parallelogram law of forces, resultant of two collinear forces, resolution of forces, moment of a force, couple, theorem on moments of a couple, coplanar forces, resultant of three coplanar concurrent forces, theorem of resolved parts, resultant of two forces acting on a rigid body, Varignon's theorem, generalized theorem of moments.

SECTION-B

Equilibrium of two concurrent forces, equilibrium condition for any number of coplanar concurrent forces, Lami's theorem. λ - μ theorem, theorems of moments, resultant of a force and a couple. Equilibrium conditions for coplanar non-concurrent forces.
Friction: Definition and nature of friction, laws of friction, Centre of gravity.

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Parveen Lata
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REFERENCE BOOKS:

1) S.L. Loney: *The Elements of Statics and Dynamics*, 5th edition, Cambridge University Press, 1947.
2) John L. Synge and Byron A. Griffith :*Principles of Mechanics* 3rd Edition McGraw-Hill international student editions

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MTHB2201T: MATHEMATICAL METHODS

Course Outcomes:	
CO1	Will be able to learn about Fourier series and Fourier Transform
CO2	Problem solving skills will be enhanced
CO3	Students will be able to solve initial value problems using Laplace Transform
CO4	Students will be able to calculate Laplace and Fourier Transforms of various functions
CO5	Students will be able to calculate inverse Fourier transform of various functions.

For Regular Students / Students of Centre for Distance and Online Education
Maximum Marks: 50 Marks

Maximum Time: 3 Hrs.

For Regular students:6Lectures of 45minutes/week

External Marks: 35
Internal Assessment: 15
Pass Percentage: 35%
For Private Students
Maximum Marks: 50 Marks

INSTRUCTIONS FOR THE PAPER-SETTER

The question paper will consist of three sections A, B and C. Sections A and B will have four questions each from the respective sections of the syllabus and Section C will consist of one compulsory question having eleven short answer type questions covering the entire syllabus uniformly. Each question in Sections A and B will be of 06 marks and Section C will be of 11 marks.

INSTRUCTIONS FOR THE CANDIDATES

Candidates are required to attempt five questions in all selecting two questions from each of the Sections A and B and compulsory question of Section C.

SECTION-A

Fourier series : Fourier series, Dirichlet's conditions, Fourier series for even and odd functions, Half range Fourier series.

Fourier transforms : Fourier integral formula (without proof), Fourier transform, Inverse Theorem for Fourier transform, Fourier sine and cosine transforms and their inversion formulae. Linearity property of Fourier transforms, Change of scale property, Shifting theorem, Modulation theorem, Convolution theorem of Fourier transforms, Parseval's identity, Finite Fourier sine transform, Inversion formula for sine transform, Finite Fourier cosine Transform, Inversion formula for cosine transform.

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SECTION-B:

Laplace transforms:

Definition of Laplace transform, linearity property, Existence of Laplace transform, Functions of exponential order and of class A. First and second shifting theorems of Laplace transform, Change of scale property, Laplace transform of derivatives, Initial value problems, Laplace transform of integrals, Multiplication by t, Division by t, Laplace transform of periodic functions. Definition of Inverse Laplace transform, Linearity property, First and second shifting theorems of inverse Laplace transform, Change of scale property, Division by p, Convolution theorem, Heaviside's expansion formula.

REFERENCE BOOKS:

1. Shanthi Narayan and P.K Mittal: Scope as in A course of Mathematical Analysis by, Published by S. Chand & Company,
2. A.R. Vasishtha & Dr. R.K.Gupta: Scope as in Integral transforms by Published by Krishna Prakashan Media Pvt. Ltd. Meerut.

Chairman

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MTHB2202T: DYNAMICS

Course Outcomes:	
CO1	Student will develop solid understanding of Kinematics.
CO2	Student will be able to apply equations of motion.
CO3	Students will be able to analyse motion of Projectile
CO4	Student will understand the concept of constrained motion.
CO5	Will be able to analyze the motion of particles connected by an elastic string and will develop problem solving techniques.

For Regular Students / Students of Centre for Distance and Online Education
Maximum Marks: 50 Marks

Maximum Time: 3 Hrs.

For Regular students:6Lectures of 45minutes/week

External Marks: 35
Internal Assessment: 15
Pass Percentage: 35%
For Private Students
Maximum Marks: 50 Marks

INSTRUCTIONS FOR THE PAPER-SETTER

The question paper will consist of three sections A, B and C. Sections A and B will have four questions each from the respective sections of the syllabus and Section C will consist of one compulsory question having eleven short answer type questions covering the entire syllabus uniformly. Each question in Sections A and B will be of 06 marks and Section C will be of 11 marks.

INSTRUCTIONS FOR THE CANDIDATES

Candidates are required to attempt five questions in all selecting two questions from each of the Sections A and B and compulsory question of Section C.

Section - A

Motion of a particle with constant acceleration, acceleration of falling bodies, motion under gravity, motion of a body projected vertically upward, motion of a two particles connected by a string, motion along a smooth inclined plane, constrained motion along a smooth inclined plane. Variable acceleration, Simple harmonic motion, elastic string, simple pendulum.

Section - B

Projectile, Work, Power, conservative fields and potential energy, work done against gravity, potential energy of a gravitational field.

Relative motion, relative displacement, velocity and acceleration, motion relative to a rotating frame of reference. Linear momentum, angular momentum, conservation of angular momentum, impulsive forces, principle of impulse and momentum.

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1) S.L. Loney: The elements of statics and dynamics, 5th edition, Cambridge University Press, 1947.
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