

GURU JAMBHESHWAR UNIVERSITY OF SCIENCE & TECHNOLOGY, HISAR

DIRECTORATE OF DISTANCE EDUCATION

Programme: M.Sc. (Mathematics)

Semester: IV

Paper Code: MAL-641

Total Marks = 15

Nomenclature of Paper: Functional Analysis

ASSIGNMENT-I

Important Instructions

- (i) Attempt all three questions from the assignment given below. Each question carries 5 marks and the total marks are 15.
 - (ii) All questions are to be attempted in legible handwriting on plane white A-4 size paper and to be submitted to the Directorate of Distance Education for evaluation either in person or through Speed Post.
1. Define Quotient Space. Let M be a closed linear subspace of a normed linear space N . If the norm of a coset $x + M$ in the quotient space N/M is defined by $\|x + M\| = \inf \{\|x + m\|; m \in M\}$. Then N/M is a normed linear space. Further if N is a Banach space. Then so is N/M .
 2. State and prove Hahn Banach theorem for real space.
 3. Let X and Y be normed linear spaces and let D be a subspace of X . If $T : D \rightarrow Y$ is a closed linear transformation, then the inverse T^{-1} (if exists) is also a closed linear transformation.

ASSIGNMENT-II

Total Marks = 15

Important Instructions

- (i) Attempt all three questions from the assignment given below. Each question carries 5 marks and the total marks are 15.
 - (ii) All questions are to be attempted in legible handwriting on plane white A-4 size paper and to be submitted to the Directorate of Distance Education for evaluation either in person or through Speed Post.
1. Let X and Y be normed spaces and $T : X \rightarrow Y$ is a linear operator. Then prove that if T is bounded and $\dim T(X) < \infty$, then the operator T is compact.
 2. State Parallelogram law. Also prove that a Banach space is a Hilbert space iff Parallelogram law holds.
 3. State and prove Riesz – Representation theorem for Hilbert spaces.

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Programme: M.Sc. (Mathematics)

Semester: IV

Paper Code: MAL-642

Total Marks = 15

Nomenclature of Paper: Differential Geometry

ASSIGNMENT-I

Important Instructions

- (i) Attempt all three questions from the assignment given below. Each question carries 5 marks and the total marks are 15.
 - (ii) All questions are to be attempted in legible handwriting on plane white A-4 size paper and to be submitted to the Directorate of Distance Education for evaluation either in person or through Speed Post.
1. State and prove Serret- Frenet formulae.
 2. In the case of a curve of constant curvature, find the curvature and torsion of the locus of its centre of curvature.
 3. What do you understand by envelope and edge of regression? Find the edge of regression of the envelope of the family of planes: $3a^2x - 3ay + z = a^3$

ASSIGNMENT-II

Total Marks = 15

Important Instructions

- (i) Attempt all three questions from the assignment given below. Each question carries 5 marks and the total marks are 15.
 - (ii) All questions are to be attempted in legible handwriting on plane white A-4 size paper and to be submitted to the Directorate of Distance Education for evaluation either in person or through Speed Post.
1. Calculate the fundamental magnitudes for the surface generated by the binomials of a twisted curve.
 2. Derive the formula for the torsion of a geodesic in terms of principal curvatures.
 3. If L, M, N vanish at all points of the surface, then show that the surface is a plane.

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DIRECTORATE OF DISTANCE EDUCATION

Programme: M.Sc. (Mathematics)

Semester: IV

Paper Code: MAL- 643

Total Marks = 15

Nomenclature of Paper: MECHANICS OF SOLIDS-II

ASSIGNMENT-I

Important Instructions

- (i) Attempt all three questions from the assignment given below. Each question carries 5 marks and the total marks are 15.
 - (ii) All questions are to be attempted in legible handwriting on plane white A-4 size paper and to be submitted to the Directorate of Distance Education for evaluation either in person or through Speed Post.
1. What do you mean by plane strain and plane stress? Derive the field equations for a plane stress problem.
 2. Derive expressions for displacements in terms of two analytic functions for a plane strain case.
 3. Derive constitutive equation for a Maxwell model. Discuss its creep and relaxation phase.

ASSIGNMENT-II

Total Marks = 15

Important Instructions

- (i) Attempt all three questions from the assignment given below. Each question carries 5 marks and the total marks are 15.
 - (ii) All questions are to be attempted in legible handwriting on plane white A-4 size paper and to be submitted to the Directorate of Distance Education for evaluation either in person or through Speed Post.
1. Derive the expression for torsional rigidity and twisting moment on case of the torsion of a cylindrical bar.
 2. State and prove theorem of minimum complementary energy.
 3. Prove that the disturbance in an infinite, homogeneous, isotropic elastic medium can be propagated in the form of dilatational and rotational waves.

Integral Equations (MAL-644)

Assignment: I

M.Sc. Mathematics (Sem. IV)

Max. Marks: 15

Q.1 Define integral equations. Also describe the various types of linear integral equations .

Q.2 Solve the integral equation

$$y(x) = x + \lambda \int_0^1 (xt^2 + x^2t)y(t) dt \text{ by the method of separable kernel.}$$

Q.3 Explain the method of iterated kernels for the solution of Fredholm integral equation.

Integral Equations (MAL-644)

Assignment: II

M.Sc. Mathematics (Sem. IV)

Max. Marks: 15

Q.1 Show that if the kernel $K(x, t)$ is a difference kernel, then resolvent kernel is also a difference kernel.

Q.2 Find the resolvent kernel of the Volterra IE with kernel $K(x, t) = e^{(x-t)}$.

Q.3 Solve

$$y'' + y = -1, y(0) = y\left(\frac{\pi}{2}\right) = 0 \text{ using Green's function and verify the answer.}$$

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DIRECTORATE OF DISTANCE EDUCATION

Programme: M.Sc. (Mathematics)

Semester: IV

Paper Code: MAL-645

Total Marks = 09

Nomenclature of Paper: Programming in C

Important Instructions

- (i) Attempt all three questions from the assignment given below. Each question carries 5 marks and the total marks are 15.
- (ii) All questions are to be attempted in legible handwriting on plane white A-4 size paper and to be submitted to the Directorate of Distance Education for evaluation either in person or through Speed Post.

ASSIGNMENT 1

Q1 Chart the declaration statement for different data types supported by C.

Q2 Differentiate call by value and call by reference.

Q3 How are strings declared and initialized? Explain with example

ASSIGNMENT 2

Q1 Write a program to calculate $f(x) = |x|$ for given x.

Q2 Define recursion and its execution in a program. Write a program to calculate n! using recursion.

Q3 Define array, its declaration, initialization with the help of pointers .